

STAFF REPORT EVALUATION

REPORT TITLE: INTERIM TECHNICAL REPORT ON DIABLO CANYON UNIT 1
INDEPENDENT VERIFICATION PROGRAM
VERIFICATION OF DESIGN ANALYSIS HOSGRI SPECTRA -
ITR 10 REVISION 0

IDVP DESIGNATION: P105-4-839-010

ORIGINATOR: Robert L. Cloud Associates, Inc.

SUBMITTED BY: W. E. Cooper, Teledyne Engineering Services

INTRODUCTION:

The Interim Technical Report Number 10 (ITR 10) written by Robert L. Cloud Associates (RLCA) for the Diablo Canyon Independent Design Verification Program (IDVP) has been reviewed by the staff and its consultants, Brookhaven National Laboratory (BNL).

ITR 10 presents the results of the RLCA review of the recent Diablo Canyon Project (DCP) corrective action, with respect to the control of Hosgri response spectra. RLCA has verified that the DCP Design Criteria Memorandum (DCM C-17), which is the PG&E controlled document for the Hosgri floor response spectra was issued in a controlled manner and that the DCM contains portions of the current Hosgri design bases. DCM C-17 contains the controlled floor response spectra for the individual structures and some of the methods of combining the seismic responses. All of the methods of usage are not included in the DCM. This information was obtained, by telephone, from E. Denison on January 19, 1983. PG&E is currently generating new floor response spectra as part of their reevaluation program. In addition, RLCA verified that spectra have now been defined for areas which previously had no spectra. The work remaining for the IDVP involves an audit of the DCP review of spectra used for Hosgri qualifications. After the DCP performs this review, the IDVP will verify the corrective action on a sampling basis.

SUMMARY OF REPORT

The objective of the ITR is to present the results of the IDVP review of the extent to which the Hosgri spectra were properly applied in the design applications. The design bases spectra reviewed by RLCA were contained in PG&E controlled document DCM C-17, Rev. 3. RLCA compared the design bases spectra as of November 1981 with those contained in the latest URS/Blume building reports.

The RLCA review of the Hosgri spectra inputs into the Diablo Canyon Nuclear Power Plant (DCNPP) qualification process was done in three steps. These steps were:

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- (1) Determine the current Hosgri design bases.
- (2) Review the Hosgri spectra inputs into a sample of design analyses using the docketed Hosgri spectra with two exceptions. These exceptions were the revised November 19, 1981 annulus spectra and the additional turbine building spectra included in the March 1980 URS/Blume turbine building report.
- (3) Verification of recent corrective action already undertaken by the Diablo Canyon Project (DCP) to specify and control portions of the current Hosgri design bases.

The comparisons between the design spectra and the spectra used were made for the following structural analysis.

- (1) Auxiliary Building (October 1979)
- (2) Turbine Building (March 1980)
- (3) Intake Structure (May 1979)
- (4) Containment Structure (May 1979)

The spectra contained in DCM C-17 were found to be in agreement with the URS/Blume spectra with three exceptions for which Error and Open Item (EOIs) reports were issued. Copies of these EOIs are provided in Appendix A. The three exceptions found to the design basis Hosgri seismic inputs were:

- (1) Auxiliary Building - 18 floor response spectra for the N-S direction were different from the October 1979 URS/Blume report (EOI 920)
- (2) Auxiliary Building - torsional combination methods for calculating maximum accelerations differ from the October 1979 URS/Blume report (EOI 1028)
- (3) Intake Structure - some maximum absolute accelerations in the May 1979 URS/Blume report are different from the Hosgri report values in Table 1-53 (EOI 1028).

RLCA field verified all building, piping, equipment and components that were included in the initial verification sample. In the analysis of the initial sample seven locations were identified where Hosgri response spectra were not available, two in the Auxiliary Building, two in the Turbine Building, two in the Containment Structure and one in the Intake Structure. EOI's were issued on each of the items. See Appendix A for a copy of the EOI's.

RLCA compared the spectra used as input for particular design problems with criteria spectra. This comparison was performed by locating

support points for piping and/or equipment, determining the criteria spectra for that point from DCM C-17 and comparing that spectra with the spectra actually used in the design. Eleven equipment verification samples and ten piping samples were selected. Four of the ten piping design analyses chosen contained inapplicable spectra. These spectra inputs did not envelop and were more than 15% lower than the Hosgri response spectra at some frequencies. The response spectra used for electrical equipment and instrumentation qualified by shake table testing were found acceptable for the seven sample groups, except for one group. This group is discussed in Interim Technical Report Number 4, "Shake Table Testing". Eighteen EOI's were identified for the equipment sample and four EOI's were identified for the piping samples. The Hosgri spectra inputs used in the span evaluation procedures for small bore piping will be discussed in a future ITR. A total of forty-four EOI's were issued as a result of the comparison. The report contains a detail description of each EOI.

As a result of the verification review RLCA developed the following 3 concerns.

- (1) The Hosgri report omits certain important portions of the current Hosgri design bases (spectra). In addition, spectra were not controlled.
- (2) Spectra are not available for certain plant areas (e.g. pipeway and containment interior above elevation 140 feet).
- (3) Preliminary and incorrect spectra were used in the design of piping, equipment and components.

To address the above concerns RLCA proposed the following 4 actions and proposed to verify their implementation.

- (1) Assemble the correct URS/Blume Hosgri spectra.
- (2) Assign unique numbers to all spectra figures.
- (3) Control these design spectra and any revisions thereto.
- (4) Review spectra used for all Hosgri qualifications against the design spectra.

EVALUATION

ITR 10 outlines the steps taken by RLCA in their review. The staff concurs that these procedures would be expected to identify deficiencies significant in the PG&E work if they existed. Indeed significant deficiencies were found with respect to applicability of the floor response spectra used for evaluation of buildings, piping, equipment and components. These deficiencies, as found by the samples, were limited to the Auxiliary Building and Intake Structure and centered around using

different floor response spectra than the docketed spectra and the method of combining torsional accelerations. Table 1 of the report shows a comparison between the design analysis and verification analysis for frequency and accelerations and a reference. This table is very useful in assessing the magnitude of the differences found. There was no such comparison for the ten piping samples. The staff concurs with RLCA in the methods and procedures used for identifying errors which may exist in the use of appropriate response spectra for equipment and piping design.

The staff concurs with RLCA in the concerns expressed in the report. The control and proper use of floor response spectra is critical in the seismic evaluation of a facility. The staff concurs in the recommendations for controlling the design spectra and ensuring proper implementation. The staff recommends the updating of the DCM C-17 to include a section that contains a compilation of the methods for using the response spectra and the rules for combining the seismic responses.

APPENDIX A

PROGRAM RESOLUTION REPORT

File No. 920

File Revision No. 5

1. Resolution of an: Open Item: Class _____ Error _____
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task _____
3. Date Reported to PG&E 820722
4. Scheduled for TES Semimonthly Report No. August
5. Resolution based on the following documentation:

Some of the Auxiliary Building floor response spectra in the N-S direction contained in the Hosgri Report differ from those in the October 1979 Blume Report.

Based on the PG&E presentation (July 14-16, 1982) of their internal technical program the auxiliary building is being completely reanalyzed.

6. Program Resolution is:

This EOI is combined with EOI 1097 as an Error A or B. EOI 920 is therefore closed.

7. Potential Program Resolution
Report signed by Edward Denison (RLCA) on 820721
Type Name/Organization Date
8. Signature: *Edward Denison* 820722 (Approved/Program Manager)

1. Resolution of an: Open Item: Class _____ Error _____
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task _____
3. Date Reported to PG&E 820910
4. Scheduled for TES Semimonthly Report No. September
5. Resolution based on the following documentation:

EOI 967 Rev. 4: Some of the Intake Structure maximum absolute accelerations contained in Table 1-53 of the Hosgri Report differ from those in the May 1979 Blume Report.

6. Program Resolution is:

Based on the PG&E presentations on August 6, 1982 and September 1, 1982 the Intake Structure is in reanalysis in the PG&E Internal Technical Program.

File 967 is combined into file 1022, an Error Class A or B also concerning the Intake Structure. Therefore, file 967 is closed.

7. Potential Program Resolution Report signed by Edward Denison (RLCA) on 820907
Type Name/Organization Date
8. Signature: *Edward Denison* 820910 (Approved/Program Manager)

FINAL RESOLUTION SHEET

File No. 976

1. Classification

Revision No. 1

Error

Class (A, B, C or D)

Deviation

Closed Item

2. Documentation Reviewed

Robert L. Cloud Associates, Inc. - Design Verification Program - Seismic Service Related Contracts Prior to June 1978 - Revision 1 - Phase 1 - Section 8.0.

3. Reported to PGandE

Transmittal Date 3/22/82

4. Description

The Exterior Containment spectra were superseded by the URS/Blume Report issued on June 5, 1977. However no transmittal to Westinghouse of this spectra could be located.

5. Final Resolution

The current program requires that RLCA verify the transmittal of spectra from PGandE to Westinghouse. This item is therefore closed.

Edward Denison 3/22/82

Project Engineer/Date
To Indicate RLCA Final Resolution

ERROR REPORT

File No. 978

Class: C
A,B,C or 0

File Revision No. 2

PG&E Task No. 70050

- 1. Dates: Reported to Program Review Committee Not Applicable
 Program Review Committee Action Not Applicable
 Reported to PG&E and Originator 820607
- 2. Scheduled for TES Semimonthly Report No. 15
- 3. Structure(s), system(s), or component(s) involved: 15

Regenerative Heat Exchanger

4. Description of Error:

For the vertical direction, two-thirds of the filtered horizontal spectrum was used in the analysis. The Hosgri report states that two-thirds of the unfiltered horizontal response spectra is to be used as the response spectra for the vertical direction. The analysis has been revised to reflect the correct vertical acceleration.

5. Significance of Error:

All stresses are below allowable.

6. Recommendation:

Error Class C

7. Potential Error Report signed by Edward Denison/RLCA on 820510
Type Name/Organization Date

8. Signatures: Not Applicable
For Program Review Committee D. E. Corwin
Approved/Program Manager

ERROR AND OPEN ITEM SHEET

1. Classification

 Error

or

 Open Item

Error Classification

 Class (A, B, C, or D)

2. Description 3.3.2.4.3 Buried Pipelines

The buried pipelines connecting the Intake Structure to the Turbine Building were qualified by PGandE with input from URS/Blume. PGandE's qualification work was independently checked by Harding-Lawson Associates, using input from URS/Blume (see Log 7). The input used in the above two studies will be verified in the overall reverification program.

3. Significance

Noted in "Preliminary Report, Seismic Reverification Report, Seismic Reverification Program - November 12, 1981"

4. Recommendation

This will be specifically covered by RLCA in the current program.

5. Reported

 PGandETransmittal Date 2/8/82 NRCRef. & Date See above

6. Final Resolution

Edward Donison 2/5/82
Signed/Date

R L Cloud 2/6/82
Project Engineer/Date
Prior to Release

Project Administrator/Date
Prior to Final Resolution

ERROR REPORT

File No. 983

Class: A
A, B, C or D

File Revision No. 2

PG&E Task No. _____

- 1. Dates: Reported to Program Review Committee N/A
 Program Review Committee Action N/A
 Reported to PG&E and Originator 820910
- 2. Scheduled for TES Semimonthly Report No. September
- 3. Structure(s), system(s), or component(s) involved:

Electrical Raceways

4. Description of Error:

Reported as Error Class A in Revision 1 of this file.
Nine of the twenty raceway support seismic calculations were found to have been done with inapplicable spectra.

5. Significance of Error:

6. Recommendation:

Revision 2 of this file is issued to include EOI Files 910 and 930 into this one file which had been classified as an Error Class A in Revision 1.

- 7. Potential Error Report signed by Mr. R. L. Cloud (RLCA) on 820206
- 8. Signatures: N/A _____ 820910
 For Program Review Committee _____ Approved/Program Manager

PROGRAM RESOLUTION REPORT

File No. 986

File Revision No. 5

1. Resolution of an: Open Item: Class _____ Error _____
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task _____
3. Date Reported to PG&E 820722
4. Scheduled for TES Semimonthly Report No. August
5. Resolution based on the following documentation:

Since the final vertical control room spectra are higher than the preliminary spectra, a detailed review of equipment qualification will be necessary in the overall reverification program to ensure that the equipment was conservatively qualified.

Based on the PGandE presentation (July 14-16, 1982) of their internal technical program auxiliary building is being completely reanalyzed.

6. Program Resolution is:

This EOI is combined with EOI 1097 as an Error Class A or B.
EOI 986 is therefore closed.

7. Potential Program Resolution Report signed by Edward Denison (RLCA) on 820721
Type Name/Organization Date
8. Signature: *N. P. [unclear]* 820722 (Approved/Program Manager)

PROGRAM RESOLUTION REPORT

File No. 1002

File Revision No. 4

1. Resolution of an: Open Item: Class _____ Error _____
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task 70074
3. Date Reported to PG&E 820623
4. Scheduled for TES Semimonthly Report No. 16
5. Resolution based on the following documentation:

EOI 1002 Rev. 0: Calculations for Supply Fans S67, 68, and 69 were found to have used incorrect and unconservative seismic inputs. In addition, the forced draft shutter damper qualification showed incorrect seismic definition because gravity had not been added to the vertical acceleration.

P105-4-1002-004: Rev. 1 of Supply Fan calculation and examination of Damper Factor of Safety.

P105-4-446-005: Fan and Damper calculations.

PG&E drawing 59322 Rev. 17

PG&E drawing 501400 Rev. 11, Unit II drawing including Unit I modification (1979)

P105-4-591.5-093: RLCA Field Notes 1979 modification.

RLCA has reviewed the revised qualification analysis to confirm that the proper seismic input were used and that no modifications to Fans were made as a result of EOI 1002.

6. Program Resolution is:

TES has reviewed RLCA actions and concur. Closed Item.

7. Potential Program Resolution Report signed by Edward Denison (RLCA) on 820521
Type Name/Organization Date
8. Signature: *Edward Denison* 820523 (Approved/Program Manager)

1. Resolution of an: Open Item: Class _____ Error
2. Recommended Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E
3. Date Reported to Program Manager 6/9/82
4. Report submitted on behalf of RLCA (Organization)
5. Resolution based on the following documentation:

EOI 1004 Revision 0: Documentation of one transmittal of seismic information from PGandE to Westinghouse has been found to date. However, this transmittal contains only the Newmark earthquake acceleration time histories for the Containment Interior at certain elevations. Noted in "Preliminary Report, Seismic Re-verification Report, Seismic Reverification Program - November 12, 1981".

P105-4-593-143 Telecon: R. Wray of TES informs RLCA that the interface between PGandE and Westinghouse has been confirmed by TES action.

TELEDYNE ENGINEERING SERVICES
CONTROLLED
DOCUMENT

TES PROJ. NO. 5511
DATE 6-10-82

6. Program Resolution is:

Closed Item

7. Signature: Edward Denison RLCA (Recommended by)
6/9/82

1. Classification

Revision No. 1 Error Class (A, B, C or D) Deviation Closed Item

2. Documentation Reviewed

Design Verification Program--Seismic Service Related Contracts
Prior to June 1978--Revision 1, Phase 1.

Reported to PGandE

Transmittal Date 3/9/82

4. Description: From the 11/12/81 Preliminary Report- No document-
ation has been found to date regarding formal transmittals of
spectra from PGandE to Wyle Labs.

5. Final Resolution

RLCA has examined 7 groups of Electrical Equipment
qualified by Wyle testing. Two EOI's have been issued
as a result of these independent calculations: 1013 and
1049.

This interface has been covered under the current program--
therefore EOI 1005 is closed.

Edward Denison 3/9/82

Project Engineer/Date

To Indicate RLCA Final Resolution

1. Classification

Revision No. 1 Error Class (A, B, C or D) Deviation Closed Item

2. Documentation Reviewed

Design Verification Program--Seismic Service Related Contracts
Prior to June 1978--Revision 1, Phase I.

3. Reported to PGandE

Transmittal Date 3/9/82

4. Description --From the 11/12/81 Preliminary Report--

Transmittals between PGandE and their consultants of electrical
equipment information do not satisfactorily document the interface.

5. Final Resolution

The Phase I sample includes 7 groups of electrical equipment
qualified by consultant testing. This interface is covered and
therefore EOI 1007 is closed.

Edward Denison 3/9/82

Project Engineer/Date

To Indicate RLCA Final Resolution

ERROR REPORT

File No. 1008

Class: C
A, B, C or D

File Revision No. 2

PG&E Task No. _____

- 1. Dates: Reported to Program Review Committee Not Applicable
 Program Review Committee Action Not Applicable
 Reported to PG&E and Originator 5/2/78

2. Scheduled for IES Semimonthly Report No. 15

3. Structure(s), system(s), or component(s) involved:

Main Annunciator Cabinet Drawing DC663101-75-1

4. Description of Error:

The Hosgri spectra referenced in the PG&E analysis, Drawing DC663101-75-1, are preliminary spectra (4/4/77). This item represents an incorrect engineering input because the 4/4/77 spectra differ from the Hosgri spectra.

5. Significance of Error:

IDVP independent analysis indicates that allowables are not exceeded as a result of the differences in spectra and therefore EOI 1008 is an error Class C. File 949 (Error Class A or B) on Main Annunciator Cabinet addresses erroneous assumption of rigidity for N-S direction in the PG&E analysis.

6. Recommendation:

PG&E to incorporate correct Hosgri spectra in their reevaluation of cabinet in response to the concerns of File 949.

7. Potential Error Report signed by Edward Denison/RLCA on 820318
 Type Name/Organization Date

8. Signatures: Not Applicable
 For Program Review Committee RLCA Approved/Program Manager

1. Resolution of an: Open Item: Class Error
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task
3. Date Reported to PG&E 820910
4. Scheduled for TES Semimonthly Report No. September
5. Resolution based on the following documentation:

EOI 1009 Rev. 4: Spectra have not been provided or scaling criteria defined for support locations above elevation 140' for the Containment Interior.

6. Program Resolution is:

Based on the PGandE presentation on August 6 and September 1, 1982, the Containment Structure is being reanalyzed or reviewed as part of the PGandE Internal Technical Program. Therefore, this EOI File 1009 is combined into EOI 1014, which also pertains to the Containment Structure, and this file is closed.

7. Potential Program Resolution Report signed by Edward Denison (RLCA) on 820907
8. Signature: *W.C. Coy* 820910 (Approved/Program Manager) Date

PROGRAM RESOLUTION REPORT

File No. 1010

File Revision No. 5

1. Resolution of an: Open Item: Class _____ Error _____
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task _____
3. Date Reported to PG&E 8/07/82
4. Scheduled for TES Semimonthly Report No. August
5. Resolution based on the following documentation:

Spectra have not been provided or scaling criteria defined for support locations above elevation 140' for the Turbine Building.

The Turbine Building is being reevaluated (as-built vs. analysis) in the PG&E internal technical program as presented on July 14-16, 1982.

6. Program Resolution is:

This EOI is combined with EOI 1026 as an Error Class A or B. EOI 1010 is therefore closed.

7. Potential Program Resolution Report signed by Edward Denison/RLCA on 8/20/82
Type Name/Organization Date
8. Signature: [Signature] 8/20/82 (Approved/Program Manager)

FINAL RESOLUTION SHEET

File No. 1011

Classification

Revision No. 1

Error

Class (A, B, C or D)

Deviation

Closed Item

2. Documentation Reviewed

PGandE Diesel Generator Oil Priming Tank analysis File 129.10,
Revision 0, 12/27/77.

P105-4-550-001 RLCA comparison of spectra.

Reported to PGandE

Transmittal Date 3/17/82

4. Description

The Hosgri spectra attached to the PGandE analysis for the Oil Priming Tank are preliminary spectra.

5. Final Resolution

The preliminary spectra are identical to the Hosgri spectra. The accelerations used in the calculation are correct, therefore this item is deviation.

Edward Terison 3/17/82

Project Engineer/Date
To Indicate RLCA Final Resolution

OPEN ITEM REPORT

File No. 1013

File Revision No. 4

1. Date reported to PG&E and RLCA 820723
2. Scheduled for TES (Originator) Quarterly Report No. August
3. Responsive to PG&E Technical Program: Task _____ (if applicable)
4. Prepared as a result of:
 - a. QA Audit and Review Report of _____
 - b. Field Inspection Deficiency
 - c. Independent Calculation Deficiency
 - d. Seismic Input Deficiency
 - e. Design Methodology Deficiency
 - f. Other PG&E Resolution Sheet R.R. Fray 820715
5. Structure(s), system(s) or component(s) involved:

Group VI Electrical Equipment (Qualified by Testing)

6. Description of Concern:

The target test spectra and the SSE test response spectra taken from the test table (Wyle Report 58255) used to qualify the Group VI Electrical Equipment did not envelop the required Hosgri spectra (Figures 4-219 and 4-228).

As stated in the 1013 Fiel Rev. 1: The SSE test response taken from the test table (Wyle Report 58255) completely envelopes the required Hosgri spectra above 15 Hertz. Since the SSE test response spectra completely envelopes the required Hosgri spectra at all equipment resonant frequencies (experimentally determined), TES judges this test adequate to qualify the equipment.

7. Significance of Concern:

8. Recommendation:

RLCA and TES to review the PG&E response (Resolution Sheet R.R. Fray 820715) indicating no modifications and disposition this file.

9. Signature: *R E Gray* 820723 (Originator/Organization)

ERROR REPORT

File No. 1014

Class: A/B
A, B, C or D

File Revision No. 8

PG&E Task No.

- 1. Dates: Reported to Program Review Committee NA
 Program Review Committee Action NA
 Reported to PG&E and Originator 821115
- 2. Scheduled for TES Semimonthly Report No. December
- 3. Structure(s), system(s), or component(s) involved:

Containment Structure

4. Description of Error:

EOI 1014 Revision 6: Spectra have not been provided or scaling criteria defined for the pipe rack attached to the Containment Exterior.

5. Significance of Error:

Spectra used in the design analysis of the pipe rack attached to the Containment Exterior may not be applicable.

6. Recommendation:

Based on the PGandE presentations on August 6 and September 1, 1982, the Containment Structure is being reanalyzed or reviewed in the PGandE Internal Technical Program. Therefore, EOIs 977 and 1009, which also concern the Containment Structure, are combined into this file 1014, which is issued as an Error A or B. Revision 8 is issued to combine 3006 and 3007 into this file as Errors A or B.

- 7. Potential Error Report signed by NA on
- 8. Signatures: NA Type Name/Organization Date
 For Program Review Committee Approved/Program Manager

1. Classification

Error
or
 Open Item

Error Classification
 Class (A, B, C, or D)

2. Description

Diesel Generator Oil Priming Tank

The PGandE qualification analysis (File 129.10, Revision 0, 12/27/77) specified 4% damping. Regulatory Guide 1.61 specifies 3% damping for equipment.

3. Significance

The calculated PGandE results are less than half of the allowable. RLCA examination showed only a slight change in the PGandE results with revised damping value.

4. Recommendation

A recommendation will be provided upon completion of the independent calculations for the generic equipment sample.

5. Reported

PGandE Transmittal Date 2/11/82
 NRC Ref. & Date _____

6. Final Resolution

Section 5.2.1 of the Hosgri Report permits 4% damping for "...components (excluding reactor pressure vessel internals)..." Therefore the damping value used by PGandE is correct.

[Signature] 2/4/82
Signed/Date

[Signature] 2/11/82
Project Engineer/Date
Prior to Release *OK BCL*

[Signature] 2/13/82
Project Administrator/Date

FINAL RESOLUTION SHEET

File No. 1020

Revision No. 1

1. Classification

Error

Class (A, B, C or D)

Deviation

Closed Item

2. Documentation Reviewed

PGandE Auxiliary Saltwater Pump analysis File 116.31, Revision 0,
12/27/77.

P105-4-550-006 RLCA comparison of spectra.

3. Reported to PGandE

Transmittal Date 3/17/82

4. Description

The Hosgri spectra attached to the PGandE analysis for the Auxiliary Saltwater Pump are preliminary spectra.

5. Final Resolution

The preliminary spectra are identical to the Hosgri spectra. The accelerations used in the calculations are correct, therefore this item is a deviation.

Edward Jensen 3/17/82

Project Engineer/Date
To Indicate RLCA Final Resolution

ERROR REPORT
Class: A/B
A,B,C or D

File No. 1022
File Revision No. 5
PG&E Task No. 70093

- 1. Dates: Reported to Program Review Committee N/A
Program Review Committee Action N/A
Reported to PG&E and Originator 820910
- 2. Scheduled for TES Semimonthly Report No. September
- 3. Structure(s), system(s), or component(s) involved: _____

Intake Structure.

4. Description of Error:

EOI 1022 Rev. 4: The upper Auxiliary Salt Water Pump support is located ten feet above elevation -2.1 ft. Spectra applicable at -2.1 feet were used as input for the upper pump support.

5. Significance of Error:

Spectra used in the design analysis may not be applicable to Auxiliary Salt Water Pump upper support.

6. Recommendation:

Based on the PGandE presentations on August 6 and September 1, 1982, the Intake Structure is in reanalysis in the PGandE Internal Technical Program. Files 967 and 988, which also pertain to the Intake Structure, have been combined into this file, 1022, which is issued as an Error Class A or B.

- 7. Potential Error Report signed by Edward Denison (RLCA) on 820907
Type Name/Organization Date
- 8. Signatures: N/A [Signature] 820910
For Program Review Committee Approved/Program Manager

PROGRAM RESOLUTION REPORT

File No. 1025

File Revision No. 5

1. Resolution of an: Open Item: Class _____ Error
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task _____
3. Date Reported to PG&E 820722
4. Scheduled for TES Semimonthly Report No. August
5. Resolution based on the following documentation:

The Hosgri Report does not include vertical spectra for the Turbine Building elevation 104' bents 16-20. Spectra for the Cardox Tank Support may not be applicable for the entire region - bents 16-20.

The Turbine Building is being reevaluated (as-built vs. analysis) in the PG&E internal technical program as presented on July 14-16, 1982.

6. Program Resolution is:

EOI 1025 is combined with EOI 1026 as an Error Class A or B.
EOI 1025 is therefore closed.

7. Potential Program Resolution
Report signed by Edward Denison/RLCA on 820721
Type Name/Organization Date
8. Signature: William S. Payne 820721 (Approved/Program Manager)

ERROR REPORT

File No. 1026

Class: A or B
A, B, C or D

File Revision No. 5

PG&E Task No. _____

- 1. Dates: Reported to Program Review Committee _____ N/A
- Program Review Committee Action _____ N/A
- Reported to PG&E and Originator _____ 820722
- 2. Scheduled for TES Semimonthly Report No. August
- 3. Structure(s), system(s), or component(s) involved:

Turbine Building

4. Description of Error:

The Hosgri Report does not include spectra for several areas of the Turbine Building that support Class I electrical conduit. The March 1980 Blume Turbine Building Report contains spectra for these areas

5. Significance of Error:

The Turbine Building is being reevaluated (as-built vs. analysis) in the PG&E internal technical program as presented on July 14-16, 1982.

6. Recommendation:

EOI 1026 is combined with EOIs 982, 984, 989, 1010, 1025 and 1026. Error Class A or B.

7. Potential Error Report signed by Edward Denison/RLCA on 820721
Type Name/Organization Date

8. Signatures: N/A [Signature]
For Program Review Committee Approved/Program Manager

PROGRAM RESOLUTION REPORT

File No. 1028

File Revision No. 5

1. Resolution of an: Open Item: Class _____ Error
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task 70112
3. Date Reported to PG&E 820713
4. Scheduled for TES Semimonthly Report No. August
5. Resolution based on the following documentation:

EOI 1028, Revision 0: The URS/Blume Auxiliary Building Report-October 1979 page 14 appears to specify a methodology for calculating A_H that differs from the Hosgri Report. In the 1979 Blume Report, an additional co-directional response is to be combined with A_H on the SRSS basis. (A_H = maximum horizontal acceleration).

P105-4-200-010 C-17 Revision 1 Controlled Hosgri Spectra.

6. Program Resolution is:

DCM C-17 Revision 1 clearly defines methods for combining responses, however, the application of these methods is not specified.

PG&E to define the applicable method for combining responses for each building and all piping, equipment and components. PG&E should cite the studies referred to that demonstrate the acceptability of 2-0 absolute sum versus 3-0 SRSS method for combining directional responses.

Open Item with future action by PG&E.

7. Potential Program Resolution

Report signed by Edward Denison/RLCA on 820702

Signature: W. E. [Signature] 820713 (Approved/Program Manager)

PROGRAM RESOLUTION REPORT

File No. 1049

File Revision No. 2

1. Resolution of an: Open Item: Class _____ Error _____
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task _____
3. Date Reported to PG&E 820723
4. Scheduled for TES Semimonthly Report No. AUGUST
5. Resolution based on the following documentation:

P 105-4-441-007 URS/Blume Auxiliary Building Report 1979
P 105-4-591.5-035 RLCA Field Notes.

EOI 1049 Revision 5: The Unit I main annunciator typewriter was seismically tested using auxiliary building spectra for 104 ft. elevation, but is actually in the control room. The control room spectra, generated by a FEM, is generally higher than the Aux. Bldg. 140 ft. spectra. The URS/Blume report states that the control room spectra were generated using input for the walls and columns. Since the Unit I typewriter is located above the K line column, the 140 ft. spectra is applicable to the typewriter. The Unit II typewriter is not so qualified and it must be shown not to be necessary for Unit I safety-related functions.

P 105-4-1049-014 PG&E Response: The Unit II Typewriter is not required for Unit I safe shutdown.

6. Program Resolution is:

EOI 1049 is therefore CLOSED, however as noted in the ITR on Additional Verification and Additional Sampling Revision 0 a concern remains regarding test procedure inputs (including field location).

7. Potential Program Resolution Report signed by E. Denison / RLCA on 820723
8. Signature: [Signature] 820723 (Approved/Program Manager)

FINAL RESOLUTION SHEET

File No. 1053

1. Classification

Revision No. 1

Error

Class (A, B, C or D)

Deviation

Closed Item

2. Documentation Reviewed

PGandE Diesel Generator Starting Air Receiver Tank analysis--
File 129.10 G--2/24/78

3. Reported to PGandE

Transmittal Date 3/22/82

4. Description

The qualification analysis uses curves other than those contained in the Hosgri Report. In addition 3% damping was specified instead of 4% as given in the Hosgri Report.

5. Final Resolution

The curves attached to the qualification analysis are identical to those in the Hosgri Report. Since 3% damping represents a conservative value, this item is a deviation.

Edward Terico 3/22/82

Project Engineer/Date
To Indicate RLCA Final Resolution

FINAL RESOLUTION SHEET

File No. 1055

1. Classification

Revision No. 1

Error

Class (A, B, C or D)

Deviation

Closed Item

2. Documentation Reviewed

RLCA Progress Report Number 9, Attachment G - Recommendation for Additional Verification - Seismic Design and Document Control.

3. Reported to PGandE

Transmittal Date 3/19/82

4. Description

The current annulus spectra curves are not marked with unique identification numbers.

5. Final Resolution

RLCA has recommended that PGandE assign unique numbers to the Hosgri spectra curves. As these curves were not controlled this item is found to be a deviation.

Edward Devisor 3/19/82

Project Engineer/Date
To Indicate RLCA Final Resolution

ERROR REPORTClass: C
A, B, C, or DFile No. 1062
File Revision No. 3
PG&E Task No. 70156

5. Significance of Error:

EOI 932 reports an overstress. EOI 1062 reports stress differences greater than 15% and under allowable. The significance of the twelve items is as follows:

1. Support 58S/23R: EOI 932 addresses this item.
2. The design spectra is greater than or within 15% of the verification spectra - Closed.
3. Mass Lumping: EOI 1060 addresses this item.
4. Support 98/6R: This difference exceeds the 79-14 tolerances - Error Class C.
5. 3/4" Vents: These vents fall outside of the decoupling criteria - Closed.
6. Pipe Weight: This difference is less than 15% - Closed.
7. Empty Pipe Weight: PG&E has supplied an operating procedure to show that this portion of line is empty - Closed.
8. Valve 9001A Modeling: The design analysis valve height is different by more than 15% - Error Class C.
9. Valve 9001A Weight: This difference exceeds 15% - Error Class C.
10. Valve 9002A: This difference exceeds 15% - Error Class C.
11. Pipe Length: This difference exceeds the 79-14 tolerances - Error Class C.
12. Flange: This difference exceeds 15% - Error Class C.

6. Recommendation:

Based on Items 4, 8, 9, 10, 11 & 12, this file is classified as an Error Class C.

7. Potential Error Report signed by Edward Denison/RLCA on 820729

8. Signatures: N/A Type Name/Organization DATE
For Program Review Committee Approved/Program Manager W. E. Logan 820805

ERROR REPORT

Page 1 of 2

File No. 1062

Class: C
A, B, C or D

File Revision No. 3

PG&E Task No. 70156

1. Dates: Reported to Program Review Committee N/A
Program Review Committee Action N/A
Reported to PG&E and Originator 820804
2. Scheduled for TES Semimonthly Report No. August
3. Structure(s), system(s), or component(s) involved:

RLCA Piping Analysis 100

4. Description of Error:

Stresses in the design and verification analyses differ by more than 15%. RLCA changed twelve items in the verification analysis and the pipe stresses agree within 15% (8%).

1. Support 58S/23R changed from a deadweight to vertical restraint.
2. RLCA spectra input changed to agree with spectra used in design analysis.
3. Mass lumping technique changed to agree with design analysis.
4. Y Support portion of 98/6R moved 1'-6" south to support 98/111R.
Z Support portion of 98/6R moved 1'-6" north.
5. Deleted 3/4" vent lines on line 264-8".
6. Changed a section of pipe weight from 3.083 lbs/in. to 3.415lbs/in.
7. Changed a section of pipe weight from 3.083 lbs/in. to 1.116 lbs/in.
(Full to Empty)
8. Changed height of valve 9001A from 19.75" to 15" and the valve stem O.D. from 4" to 3".
9. Changed concentrated weight of valve 9001A from 430 lbs. to 600 lbs. and uniform body weight from 1.97 lbs/in. to .001 lbs/in.
10. Changed uniform weight of valve 9002A from 17.00 lbs/in. to 20.513 lbs/in.
11. Increase pipe length, support 97/23A to elbow tangent point from 3'-1 3/16" to 4'-5 1/2".
12. Changed uniform flange (FE 931) weight from 17.17 lbs/in. to 22.12 lbs/in.

ERROR REPORT
Class: C
A, B, C or D

File No. 106J
File Revision No. 2
PG&E Task No. 70157

1. Dates: Reported to Program Review Committee _____ N/A
Program Review Committee Action _____ N/A
Reported to PG&E and Originator _____ 820722
2. Scheduled for TES Semimonthly Report No. August
3. Structure(s), system(s), or component(s) involved:

RLCA Piping Analysis 107

4. Description of Error

Stresses in the design and verification analyses differ by more than 15%. All stresses are below the allowable. The differences between the analyses are noted:

1. Valve 1-9003A modeled as 900 lbs. in the design analysis and as 2310 lbs. in the verification analysis.
2. Spectra
3. RLCA included the weight of water content north of valve 1-9003A. PG&E has provided additional operational procedures that specify this line empty during operation. P-105-4-432-077
4. The design analysis does not show insulation on line 279-8.
5. The design analysis does not show a NS rigid support on line 279-8 below elevation 100 feet.
6. Supports 58S/124R and 58S/30R are perpendicular to line 264. The design analysis shows these supports skew to line 264.
7. Support 58S/32R has 1/4 inch gaps-not active in verification analysis.
8. Support locations differ by 4 to 48 inches (58S/30R)
9. Pipe leg lengths differ by 7 1/2 to 24 inches (279 Z Direction)
10. Mass Lumping.

5. Significance of Error:

All stresses are below the allowable. The significance of the ten items is as follows:

1. Valve Weight: Error Class C
2. Spectra: The peak of the spectra in the design analysis is 25% lower than the verification spectra for EW-Error Class C
3. Water Weight: Closed Item
4. Insulation: EOI 1050 addresses this item.
5. NS Rigid Support: EOI 964 addresses this item
6. Skewed Supports: Error Class C
7. Support 58S/32R Gaps: EOI 963 addresses this item
8. Support locations: Error Class C
9. Pipe leg lengths: Error Class C
10. Mass Lumping: EOI 1060 addresses this item.

6. Recommendation:

Based on Items 1, 2, 6, 8 and 9, this file is classified as an Error Class C

7. Potential Error Report signed by E. Denison/RLCA on 820710
Type Name/Organization Date
8. Signatures: N/A For Program Review Committee
W. E. Brown Approved/Program Manager

QUALITY ASSURANCE - FINDINGS

1. Company

Pacific Gas and Electric Company

2. Description

A general weakness existed in internal and external interface and document controls. This questions whether appropriate design information was being exchanged and utilized by design groups and consultants. One concern is if the latest Hosgri seismic data was inputted for design analysis.

3. Recommendation - Corrective Action

4. Reported to PGandE

Transmittal Date 3/15/82

RL Olson 3/15/82
Signed/Date

Edward Demison 3/15/82
Project Engineer/Date

5. Final Resolution

Project Engineer/Date
To Indicate RLCA Final Resolution

QUALITY ASSURANCE - FINDINGS

1. Company: URS/Blume

2. Description : The Hosgri Report was not developed or issued by URS /Blume as a controlled design document

3. Recommendation - Corrective Action

4. Reported to PGandE

Transmittal Date 3/15/82

R. J. Cloud 3/15/82
Signed/Date

Edward Jenin 3/15/82
Project Engineer/Date

5. Final Resolution

Project Engineer/Date

ERROR REPORT

File No. 1071

Class: C
A, B, C or D

File Revision No. 3

PG&E Task No. 70166

- 1. Dates: Reported to Program Review Committee N/A
 Program Review Committee Action N/A
 Reported to PG&E and Originator 820811
- 2. Scheduled for TES Semimonthly Report No. August
- 3. Structure(s), system(s), or component(s) involved:

RLCA Piping Analysis 109

4. Description of Error:

Stresses in the design and verification analyses differ by more than 15% (91.9%). RLCA changed five items in the independent analysis P105-4-521-020 Rev 0 and the pipe stresses agree within 15% (12.5%).

- 1. RLCA spectra input changed to agree with spectra used in the design analysis.
- 2. Mass lumping technique changed.
- 3. Supports were added to valves LCV-113 and 115.
- 4. RLCA removed the 3x2 swages at valves LCV-113 and 115.
- 5. RLCA removed the X direction restraint at support 58S/69R.

5. Significance of Error:

RLCA piping analysis 109 showed stresses to exceed the allowable. EOI 1069 reports the overstress. EOI 1071 reports stress differences greater than 15% but not exceeding the allowable. The significance of the five items is as follows:

- 1. Spectra: The design spectra are within 15% of the verification spectra (frequency and accelerations). Closed Item.
- 2. Mass Lumping: EOI 1060 addresses this item.
- 3. Added Supports: EOI 1069 addresses this item.
- 4. Swages: Error Class C.
- 5. 58S/69R: EOI 953 addresses this item.

6. Recommendation:

The 3x2 swages were incorrectly modeled in the design analysis - Error Class C.

7. Potential Error Report signed by Edward Denison/RLCA on 820710

8. Signatures: N/A Type Name/Organization Date
For Program Review Committee W. B. Egan 820811
Approved/Program Manager

1. Resolution of an: Open Item: Class _____ Error
2. Recommended Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E
3. Date Reported to Program Manager 6-8-82
4. Report submitted on behalf of RLCA (Organization)
5. Resolution based on the following documentation:

EOI 1072 Revision 0: The PGandE and RLCA calculated stresses differ by more than 15%. All stresses are below allowable. The following reasons have been established for the differences. The design didn't evaluate the coupled system and base plate anchor bolt flexibility. In addition the spectra used in the qualification summary are not the Hosgri spectra.

TELEDYNE ENGINEERING SERVICES
CONTROLLED
DOCUMENT
TES PROJ. NO. 5811
DATE JUN 9 1982

6. Program Resolution is:

The spectra used in the qualification summary are identical to the Hosgri spectra, except for the identification numbers. Since the spectra were not contained in a controlled document, this item is a deviation.

The RLCA analysis considered the coupled system and base plate anchor bolt flexibility.

The design analysis did not consider this item. This explains the stress differences.

Closed Item.

7. Signature: Edward Derison RLCA (Recommended by)
6/8/82

ERROR REPORT

File No. 1074

Class: C
A, B, C or D

File Revision No. 2

PG&E Task No. 70169

1. Dates: Reported to Program Review Committee	<u>N/A</u>
Program Review Committee Action	<u>N/A</u>
Reported to PG&E and Originator	<u>820805</u>

2. Scheduled for TES Semimonthly Report No. August

3. Structure(s), system(s), or component(s) involved:

RLCA Piping Analysis 101.

4. Description of Error:

Stresses in the design and verification analyses differ by more than 15% (20.3%). RLCA changed four items in the independent analysis P105-4-521-022 Revision 1 and the pipe stresses agreed within 15% (14.8%).

1. RLCA spectra input changed to agree with spectra used in design analysis.
2. Mass lumping technique changed to agree with design analysis.
3. Valve 8821A oriented horizontally (EOI 947).
4. Flange weight as 17.00 lbs/in (design analysis) rather than 19.07 lbs/in (independent analysis).

5. Significance of Error:

All stresses are below 70% of the allowable. The significance of the four items is as follows:

1. Spectra: The design spectra does not envelope Hosgri Figure 4-136.
2. Mass Lumping: EOI 1060 addresses this item.
3. Valve: EOI 947 addresses this item.
4. Flange: Weight agrees within 15% - Closed Item.

6. Recommendation:

The Design Spectra does not envelope the required Hosgri Spectra Error Class C.

7. Potential Error Report signed by Edward Denison (RLCA) on 820618

9. Signatures:	<u>N/A</u>	Type Name/Organization	Date
	<u>For Program Review Committee</u>	<u>ED Denison 820618</u>	<u>820618</u>
		Approved/Program Manager	

ERROR REPORTFile No. 1080CLASS: C
A, B, C, or DFile Revision No. 2PG&E Task No. 70179

10. Mass Lumping
11. Line 930-3" is decoupled from the base 14" line in the verification analysis and included in the design analysis.
5. Significance of Error:
1. Spectra: The design spectra is above or within 15% of the verification spectra--Closed Item.
 2. Valves: The design analysis does not consider the valve eccentricity. Since the three valves are non-remote operated valves, the eccentricity effects are minor--Closed Item.
 3. RHR Pump: The model of the RHR Pump in the design analysis utilized boundary conditions which were not completely justified. To insure adequate design, boundary condition sensitivity should have been considered--Error Class C.
 4. E_H : This difference is less than 15%--Closed Item.
 5. 14" Tee: The weight difference is less than 15%--Closed Item.
 6. Flange Weight: This weight difference exceeds 15%--Error Class C.
 7. Valve 1-8700A: Both analyses model a rigid valve stem. In addition, the weights agree within 15%--Closed Item.
 8. Model dimensions: The location of support 72/2R differs by more than the 79-14 tolerances--Error Class C.
 9. Snubber Orientation: These differences exceed the 79-14 tolerances--Error Class C.
 10. Mass Lumping: EOI 1060 addresses this item.
 11. Line 930-3": The RLCA criteria provides for decoupling lines with an OD ratio of 4--Closed Item.
6. Recommendation:
- Based on Items 3, 6, 8, & 9, this file is classified as an Error Class C.
7. Potential Error Report signed by Edward Denison/RLCA on ---
Type Name/Originator Date
3. Signatures: N/A R. Wray for W. E. Cooper
For Program Review Committee Approved/Program Manager

ERROR REPORT

Page 1 of 2
File No. 1090

Class: C
A, B, C or D.

File Revision No. 2

PG&E Task No. 70170

1. Dates: Reported to Program Review Committee _____ N/A
Program Review Committee Action _____ N/A
Reported to PG&E and Originator _____
2. Scheduled for TES Semimonthly Report No. September
3. Structure(s), system(s), or component(s) involved:

RLCA Piping Analysis 103

4. Description of Error:

1. Spectra
2. Valves 1-8724A, 1-8726A and 1-8728A were modeled in the design analysis with an OD of 8.947" and 447 lbs at the valve body center. The verification analysis has these valves modeled with an OD of 8.625" and 412 lbs at the valve center of gravity together with a distributed weight of 50 lbs along the valve body.
3. The RHR Pump was modeled in the design analysis by lumping the mass at the center of gravity and restraining the rocking and vertical degrees of freedom at the base. This pump was modeled in the verification analysis by using a multi mass stick model and restraining the vertical and lateral degrees of freedom at the base. The RHR Pump rests on a sliding base, two additional verification analyses were run, one assuming a free base and one assuming a fixed base.
4. The design and verification analyses input the value of E_H as 25.4×10^6 psi and 26.6×10^6 psi, respectively, for lines 1663 and 112 and as 26.6×10^6 psi and 27.9×10^6 psi respectively for line 512.
5. The 14" tee was modeled in the design analysis by using equivalent pipe sections (350lbs) and in the verification analysis by using fabrication data (394lbs).
6. The flange unions adjacent to the RHR Pump suction nozzle are modeled in the design analysis as 889 lbs and in the verification analysis as 534 lbs.
7. Valve 1-8700A was modeled in the design analysis with a thickness of 6.50" and a total weight of 2660 lbs. The verification analysis modeled this valve with a thickness of .876 in., a distributed weight of 6.10 lbs/in along the stem and a total weight of 2513 lbs.
8. Several differences in overall model dimensions were noted including a 22.5 inch difference in the location of support 72/2R.
9. Snubbers 4/22 SL and 4/23 SL on the RHR pump are modeled in the design analysis as 11° and 100° from the positive x-axis, respectively. The verification analysis modeled these snubbers as 40° and 130° from the positive x-axis, respectively.

ERROR REPORT

File No. 1081

Class: C
A, B, C or D

File Revision No. 2

PG&E Task No. 70180

- 1. Dates: Reported to Program Review Committee N/A
 Program Review Committee Action N/A
 Reported to PG&E and Originator 820831
- 2. Scheduled for TES Semimonthly Report No. September
- 3. Structure(s), system(s), or component(s) involved:

RLCA Piping Analysis 104.

4. Description of Error:

The stress in the verification (P105-4-521-044 Rev. 1) and design (4-2 and 4-3) analyses differ by more than 15%. Five differences between the analyses have been noted.

- 1. Response Spectra.
- 2. Piping Component Weights
 - a. The design analysis models the weight of valve FCV 431 at a fully restrained point.
 - b. The design analysis gives the weight of FE44, 45, and 46 as 607.5 lbs. versus 996 lbs. in the verification analysis.
- 3. Support locations differ by a maximum of 77 inches between supports 55S/2R and 55S/3R.
- 4. Component locations and piping lengths differ by up to 28.5 inches between FE 46 and the east side elbow.
- 5. Mass Lumping.

5. Significance of Error:

The significance of these items is as follows:

- 1. Response Spectra: The design spectra does not envelop or fall within 15% of the verification spectra at all frequencies - Error Class C.
- 2. Piping Component weights: This weight differs by more than 15% - Error Class C.
- 3. Support Locations: This difference exceeds the 79-14 tolerances Error Class C.
- 4. Component Locations and Piping Lengths: This difference exceeds the 79-14 tolerances - Error Class C.
- 5. Mass Lumping - EOI 1060 addresses this item.

All stresses are below allowable.

6. Recommendation:

Based on items 1 thru 4, this file is classified as an Error Class C.

- 7. Potential Error Report signed by Edward Denison (RLCA) on 820824
 Type Name/Organization Date
- 8. Signatures: N/A
 For Program Review Committee [Signature] Approved/Program Manager

ERROR REPORT

File No. 1084

CLASS: C
A, B, C, or D

File Revision No. 3

PG&E Task No. 70187

12. Valve 88058: EOI 938 addresses this item.

6. Recommendation

Based on items 1, 2a, 2d, 2e, 6, 8, & 9, this file is classified as an Error Class C.

7. Potential Error Report signed by Edward Denison/RLCA on 820823
Type Name/Organization Date

8. Signatures: N/A W.E. Gage 8/20/91
For Program Review Committee Approved/Program Manager

ERROR REPORTFile No. 1084CLASS: c
A, B, C, or DFile Revision No. 3PG&E Task No. 70187

2. Model Weights
 - a. Valve 8924: This difference exceeds 15%-Error Class C.
 - b. Flange Union Omitted: EOI 937 addresses this item.
 - c. Insulation Line 1971: This weight difference is less than 15% of the pipe weight-Closed.
 - d. Flanges: This difference exceeds 15%-Error Class C.
 - e. Insulation Line 734: This weight difference is less than 15% of the pipe weight. Insulation not on piping in field. Insulation indicated on design isometric and included in design analysis-Error Class C.
 - f. Valves 8805A and 8805B: This difference is less than 15%-Closed.
3. 10" Nozzles: Both techniques are acceptable engineering practice-Closed.
4. 3 Foot Segment: The differences in the actual pipe location fall within the 79-14 tolerances-Closed.
5. Support 73/72R Restraint: EOI 939 addresses this item.
6. Separator/Stabilizer: EOI 1098 addresses this item for effects on the in-line component. From the standpoint of piping-Error Class C.
7. Young's Modulus: This difference is less than 15%-Closed.
8. Overlap: The first two design analyses are overlapped near anchor 74/6A. This anchor provides adequate restraint for decoupling-Closed. The second overlap, at line 1456, was based on 2 components of restraint in 2 directions and an axial support north of the line 734 tee. South of the line 734 tee, there is only 1 component of restraint in 2 directions. Two components of restraint in each direction (minimum) are required to decouple the lines. Also, PG&E included a fictitious X-direction restraint at support 73/27R-Error Class C.
9. Spectra: This is related to item 8. RLCA model RLCA 102 includes piping at higher elevations than PG&E's in order to terminate the model with a sufficient overlap support scheme-Error Class C.
10. Branch Line: The verification analysis included the line attached to line 118-3" for overlap effects only-Closed.
11. Valve Flexibility: The design analysis reflected industry practice for the licensing basis-Closed.

ERROR REPORTFile No. 1084CLASS: C
A, B, C, or DFile Revision No. 3FG&E Task No. 70187

3. The verification analysis includes the 10' nozzles to the charging pumps. The design analysis ends at the equipment interface flange.
 4. The design analysis 8-25 modeled the 3 foot section near charging pump 1-2 as 1 planar 45° and 1 rolled 60° elbow. This section was modeled in the verification analysis as 3 planar 45° elbows.
 5. Support 73/72R is modeled in the design analysis 8-25 as an X restraint and in the verification analysis as an XZ restraint.
 6. The separator/stabilizer support is modeled in the design analysis 8-25 as an XY translational restraint. The verification analysis shows this support as an XY translational and XZ rotational restraint.
 7. The values of Young's modulus differ slightly.
 8. The verification analysis is represented by three design analyses.
 9. Spectra.
 10. Design analysis 8-31 included branch line 118-8".
 11. Design analysis 8-24 did not consider valve 8805A & B flexibility.
 12. Valve 8805B is modeled in the design analysis 8-24 as vertical and in the verification analysis as horizontal
5. Significance of Error:

All stresses are below the allowable. The significance of the twelve items is as follows:

1. Model Dimensions
 - a. EW leg: This exceeds the 79-14 tolerances-Error Class C.
 - b. Support 73/71R: This difference exceeds the 79-14 tolerances-Error Class C.
 - c. Anchor 74/6A: This difference exceeds the 79-14 tolerances-Error Class C.
 - d. Support 73/72R: This difference exceeds the 79-14 tolerances-Error Class C.
 - e. Support 74/36R: This difference exceeds the 79-14 tolerances-Error Class C.

ERROR REPORTFile No. 1034Class: C
A, B, C or DFile Revision No. 3PG&E Task No. 70187

1. Dates: Reported to Program Review Committee _____ N/A
 Program Review Committee Action _____ N/A
 Reported to PG&E and Originator _____ 820910
2. Scheduled for TES Semimonthly Report No. September
3. Structure(s), system(s), or component(s) involved: _____

RLCA Piping Analysis 102

4. Description of Error:

Stresses in the design and verification analyses differ by more than 15%. All stresses are below the allowable. Twelve differences between the analyses are noted:

1. Model Dimensions

- a. The EW leg of line 44-4" including support 73-31R is shown in the design analysis 8-25 as 6'10 1/2" and in the verification analysis as 6'1 7/16".
- b. Support 73-71R is shown in the design analysis 8-31 at elevation 76'10" and in the verification analysis at elevation 78'0".
- c. Anchor 74/6A is modeled in the design analyses 8-24 and 8-31 as 1' below the tee and in the verification analysis as 1'1" east of the tee.
- d. Support 73-72R is shown in the design analysis 8-31 at the elbow horizontal weld point and in the verification analysis as 2 1/2" above the elbow vertical weld point.
- e. Support 74-36R is shown in design analysis 8-24 at elevation 96'3" and in the verification analysis at elevation 95'.

2. Model Weights

- a. Valve 8924 is modeled in the design analysis as 238 lbs. and in the verification analysis as 331 lbs.
- b. Design analysis 8-25 omitted one flange union.
- c. The design analysis 8-25 does not include insulation on line 1971.
- d. The flanges to the removable strainers adjacent to the charging pumps were modeled in the design analysis 8-25 as 85 lbs. and in the verification analysis as 54 lbs.
- e. The design analysis 8-31 includes the weight of insulation on line 734. RLCA field verification does not indicate insulation.
- f. Valves 8805A and 8805B were modeled as 531 lbs. in the design analysis 8-24 and as 462 lbs. in the verification analysis.

ERROR REPORTFile No. 1085Class: C
A, B, C or DFile Revision No. 3PG&E Task No. 701885. Significance of Error (cont.):

8. Risers: The difference in pipe length does not exceed the 79-14 tolerances - Closed.
9. Young's Modulus: The difference is less than 15% - Closed.
10. Line 19 Segment: This difference exceeds the 79-14 tolerances - Error Class C.
11. Snubber 11/59 SL: EOI 961 addresses this item.
12. Pressurizer Modeling: PGandE Open Item #22 addresses this item.
13. Support Locations: The difference exceeds the 79-14 tolerances - Error Class C.

6. Recommendation:

Based on items 3, 4, 5, 7, 10, and 13, this file is classified as an Error Class C.

7. Potential Error Report signed by Edward Denison (RLCA) on 320823
8. Signatures: N/A Type Name/Organization Date
For Program Review Committee W. E. Denison Approved/Program Manager

ERROR REPORT

Page 1 of 2
File No. 1085

Class: C
A, B, C or D

File Revision No. 3
PG&E Task No. 70188

1. Dates: Reported to Program Review Committee N/A
Program Review Committee Action N/A
Reported to PG&E and Originator 820831
2. Scheduled for TES Semimonthly Report No. September
3. Structure(s), system(s), or component(s) involved:

RLCA Piping Analysis 105 (Design Analysis 3-5 Rev. 4)

4. Description of Error:

Stresses in the design and verification analyses differ by more than 15%. The following differences between the analyses have been noted:

1. Mass lumping.
2. Spectra.
3. The branch line 17-6" was included in the verification analysis and not in the design analysis.
4. The thickness of line 23 is shown in the design analysis as $\frac{1}{2}$ " and in the verification analysis as $\frac{3}{8}$ ".
5. The thickness of lines 727, 728, and 729 is shown in the design analysis as .432" and in the verification analysis as .718".
6. The small eccentricity of Valves 1-8010 A, B, and C was not modeled in the design analysis.
7. The pipe side flanges, 340lbs., for Valves 1-8010 A, B, and C were omitted from the design analysis.
8. The risers on lines 19, 20, and 21 directly below the relief valves are 4" longer in the verification analysis.
9. The valves of Young's modulus differ slightly.
10. The segment of line 19 including support 11/57 SL is shown in the design analysis as 43" and in the verification analysis as 66 $\frac{3}{8}$ ".
11. Snubber 11/59 SL is shown as vertical in the design analysis and skewed in the verification analysis.
12. Pressurizer Modeling.
13. Support locations differ by 2" to 26" (48/8R).

5. Significance of Error:

All stresses are below the allowables. The significance of the items are reported below:

1. Mass lumping: EOI 1060 addresses this item.
2. Spectra: The design analysis spectra is either above or within 15% of the design spectra - Closed.
3. Branch line: With an O.D. ratio of 2, at a minimum the tributary mass effect of the 6" line must be considered - Error Class C.
4. Line 23: This difference exceeds 15% - Error Class C.
5. Lines 727, 728, and 729 Thickness: The difference exceeds 15% - Error Class C.
6. Eccentricity: This eccentricity is small compared with the valve dimensions - Closed.
7. Flanges: This additional weight is more than 15% of the valve weight - Error Class C.

(continued on page 2)

OPEN ITEM REPORT

File No. 1086

File Revision No. 0

1. Date reported to PG&E and TES 5/14/82
2. Scheduled for RLCA (Originator) Semimonthly Report No. 13
3. Responsive to PG&E Technical Program: Task _____ (if applicable)
4. Prepared as a result of:
 - a. QA Audit and Review Report of _____
 - b. Field Inspection Deficiency
 - c. Independent Calculation Deficiency
 - d. Seismic Input Deficiency
 - e. Design Methodology Deficiency
 - f. Other Deficiency
5. Structure(s), system(s) or component(s) involved:

RLCA Piping Analysis 108.

6. Description of Concern:

The independently calculated pipe stresses differ from those in the design analysis by more than 15%.

7. Significance of Concern:

All stresses are below allowable.

8. Recommendation:

RLCA to determine the reasons for the differences.

9. Signature: Edward Jenison 5/14/82 (Originator/Organization)
RLCA

PROGRAM RESOLUTION REPORT

File No. 1093

File Revision No. 5

1. Resolution of an: Open Item: Class _____ Error _____
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E. Task _____
3. Date Reported to PG&E 8/20/22
4. Scheduled for TES Semimonthly Report No. August
5. Resolution based on the following documentation:

EOI 1093 Rev. 0 Auxiliary Building - Unit I, Hosgri Response Spectra is not available for the following areas: Fan Room Elevation 163-175 ft., L and 18 lines; and Ventilation Room elevation 140-165 ft., V and 6⁺ lines.

Based on the PG&E presentation (July 14-16, 1982) of their internal technical program the auxiliary building and fuel handling building are being completely reanalyzed.

6. Program Resolution is:

This EOI is combined with EOI 1097 as an Error Class A or B. EOI 1093 is therefore closed.

7. Potential Program Resolution Report signed by Edward Denison (RLCA) on 8/20/21
8. Signature: NE [Signature] (Approved/Program Manager)

ERROR REPORTFile No. 1097Class: A or B
A, B, C or DFile Revision No. 5

PG&E Task No. _____

1. Dates: Reported to Program Review Committee N/A
 Program Review Committee Action N/A
 Reported to PG&E and Originator 830627
2. Scheduled for TES Semimonthly Report No. July
3. Structure(s), system(s), or component(s) involved:

Auxiliary Building

4. Description of Error:

Hosgri Response Spectra is not available for the Fan/Machine Room above elevation 163'6". This area is located at the intersection of column lines H and 18 and contains Fan E-27.

5. Significance of Error:

Based on the PGandE presentation (July 14-16, 1982), of their internal technical program the Auxiliary Building is being completely reanalyzed.

6. Recommendation:

This EOI is combined with 920, 986, 1029, 1070, and 1093 as an Error Class A or B.

Revision 5 of this File issued to include EOI 1132 which as been combined with this File.

7. Potential Error Report signed by N/A on _____
 Type Name/Organization Date
8. Signatures: N/A
 For Program Review Committee RF [Signature] Approved/Program Manager

OPEN ITEM REPORT

File No. 1102

RLCA

File Revision No. 4

1. Date reported to PG&E and ~~YES~~ YES 821108
2. Scheduled for TES (Originator) Semimonthly Report No. November
3. Responsive to PG&E Technical Program: Task _____ (if applicable)
4. Prepared as a result of:
 - a. QA Audit and Review Report of _____
 - b. Field Inspection Deficiency
 - c. Independent Calculation Deficiency
 - d. Seismic Input Deficiency
 - e. Design Methodology Deficiency
 - f. Other ~~Deficiency~~ Program Review Committee Discussions of 11/1/82.
5. Structure(s), system(s) or component(s) involved:

HVAC Damper 7A

6. Description of Concern:

Revision 3 of this file was a Potential Error C which addresses the following issues:

1. Discrepancy in damper flange thickness.
2. Incorrect vertical spectra noted in manufacturer's damper analysis.
3. Analyses do not consider damper in as-built configuration.

The Phase I Program Review Committee discussed this file on 11/1/82 and considered the PG&E response of 10/17/82 by R. R. Fray. The discussion resulted in the following clarification and agreements.

1. Discrepancy in damper flange thickness between a drawing value of 3/4" and as-built value of 7/8" is mainly related to a weight problem. It was determined that the weight issue was not significant.
2. Although the damper manufacturer analysis referenced an unconservative vertical g-level, the manufacturer actually used conservative inputs to qualify the damper.
3. The damper orientation is not the real issue, rather it is the difference in the actuator C of G location between the analysis and as-built condition.

7. Recommendation:

RLCA to revise their potential error report to clarify the actual issue on which their error recommendation will be based.

8. Signature: *R. R. Fray* 821104 (Originator/Organization)

PROGRAM RESOLUTION REPORT

File No. 1103

File Revision No. 5

1. Resolution of an: Open Item: Class _____ Error _____
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task _____
3. Date Reported to PG&E: 821203
4. Scheduled for TES Semimonthly Report No. December
5. Resolution based on the following documentation:

Pipe supports 18/1SL, 18/4R, 10/2SL, 10/1SL and 5/10R are attached to rupture restraints, steel plate, and building structural steel. Concern is that local pipe supports are addressed in the qualification of the supporting steel.

PGandE considers all supplementary steel between the piping and the building structure for the 20 Hz. criteria. Rupture restraints are considered rigid in the rupture restraint line of action.

6. Program Resolution is:

PGandE is to specify the process used to evaluate pipe support flexibility for supports attached to rupture restraints/loads transverse to the rupture restraint line of action.

7. Potential Program Resolution
Report signed by Edward Denison (RLCA) on 821118
Type Name/Organization Date
8. Signature: NE G... 821203 (Approved/Program Manager)

PROGRAM RESOLUTION REPORT

File No. 3004

File Revision No. 1

- 1. Resolution of an: Open Item: Class _____ Error
- 2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task _____
- 3. Date Reported to PG&E 820623
- 4. Scheduled for TES Semimonthly Report No. 16
- 5. Resolution based on the following documentation:

The second Phase I Interim Technical Report, on the Quality Assurance Program and Implementation Review, issued by TES and dated June 23, 1982.

6. Program Resolution is:

File 3004 relates to the RFR QA Audit and Review Report findings with respect to PG&E.

These Findings are responded to by including in the program additional verification of the PG&E work as described in the first Phase I Interim Technical Report, on Additional Verification and Additional Sampling, issued by RLCA on June 10, 1982.

- 7. Potential Program Resolution Report signed by N/A on N/A
- | | |
|------------------------|------|
| Type Name/Organization | Date |
|------------------------|------|
- 8. Signature: *RLC* 820622 (Approved/Program Manager)

PROGRAM RESOLUTION REPORT

File No. 3005

File Revision No. 1

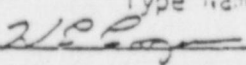
1. Resolution of an: Open Item: Class _____ Error _____
2. Independent Design Verification Program Resolution is as:
 - a. Closed Item
 - b. Deviation
 - c. Open Item with future action by PG&E: Task _____
3. Date Reported to PG&E 820623
4. Scheduled for TES Semimonthly Report No. 16
5. Resolution based on the following documentation:

The second Phase I Interim Technical Report, on the Quality Assurance Program and Implementation Review, issued by TES and dated June 23, 1982.

6. Program Resolution is:

File 3005 relates to the RFR QA Audit and Review Report findings with respect to URS/Blume.

These Findings are responded to by including in the program additional verification of the structures and components as described in the first Phase I Interim Technical Report, on Additional Verification and Additional Sampling, issued by RLCA on June 10, 1982.

7. Potential Program Resolution Report signed by N/A on N/A
8. Signature:  820622 (Approved/Program Manager)