Docket No.: 50-275

OCT 27 1983

MEMORANDUM FOR: Chairman Palladino
Commissioner Gilinsky
Commissioner Roberts
Commissioner Asselstine
Commissioner Bernthal

FROM: Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation

SUBJECT: DIABLO CANYON - ALLEGATIONS CONCERNING SMALL BORE PIPING AND SUPPORTS (Board Notification No. 83-171)

In accordance with the procedures for Board Notification the enclosed information is being provided directly to the Commission. The Boards and Parties are being informed by copy of this memorandum.

On October 27, 1983 the NRC staff received the enclosed allegations concerning the analysis and design of small bore piping and supports. The NRC staff will evaluate these allegations. We will inform you of the results of these efforts when available.

Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc: See next page

DL:LB#3	DL:LB#3	DL:LB#3	DL	DL:AD/L	DL:DIR
HSchierling.yt	JLee	GWKnighton	SBlack	TMNovak	DGEisenhut
10/27/83	10/ /83	10/27/83	10/ /83	10/ /83	10/ /83

cc: J. F. Wolf, ASLB
G. O. Bright, ASLB
J. Kline, ASLB
T. S. Moore, ASLAB
W. R. Johnson, ASLAB
J. H. Buck, ASLAB
SECY
OGC
EDO
Parties to the Proceeding

DISTRIBUTION LIST FOR BOARD NOTIFICATION

Diablo Canyon Units 1&2
Docket Nos. 50-275/323 OL

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Enclosure

It has become evident that Bechtel Corporation management (backed by PG&E) lacks the discipline and engineering integrity to insure code compliance and quality assurance involved in the design, analysis and construction of piping and pipe supports necessary for the safe operation of Diablo Canyon Nuclear Power Plant.

Improper design and analysis is now final for Unit I that will endanger the operational systems of Diablo and possibly the surrounding environment...all due to Bechtel's attempt to mitigate required design and analysis set forth by the nuclear industry. Bechtel's own design and analysis documentation is, in itself, proof that both the integrity of the piping as well as the pipe supports are not meeting industry standards that would otherwise insure proper safety operation at Diablo. In an attempt to meet schedule goals (low power loading, Nov. 1983), Bechtel has purposely approved analyses that has FAILED by altering current documentation that indeed shows FAILING piping systems and FAILING pipe supports...all by a statistical "coup" known to Bechtel as The Sample.

The purpose of this report is to indicate how Bechtel/PG&E has altered FAILING systems such that they now appear to PASS all code requirements. This report will illustrate how Bechtel has mitigated the required analysis at Diablo in order to maximize their "engineering profits". It is important for the public to be made aware that it will ultimately be their environmental and financial risk alone when Diablo is allowed to go on-line as a result of PG&E, the NRC and the ASLB having allowed Bechtel to tragically substitute Economics for Engineering in the building of this nuclear power plant.

Attached you will find copies of Analysis 12-300 and 3-313 and various sheets from other analyses that illustrate major quality assurance problems at Diablo. Many modelling techniques that have been imposed by management (under the direction of Myron Leppky) upon their technical staff have resulted in numerous fictitious analyses in the Unit I Sample. Management has been informed by competent engineers from the technical staff that such modelling techniques yield erroneous results and, subsequently, lead to violations of code requirements and analysis procedures. Management, however, has reacted to these concerns by "pulling" the analyses away from the concerned staff and re-assigning them to engineers that are not totally cognizant of standard nuclear analysis procedures and/or guidelines. The sole purpose in this effort is to alter as many pipe stress failures and pipe support failures as necessary such that the Unit I Sample can statistically be shown to meet all code requirements--and hence, the remaining 400+ yet unanalyzed piping systems in Unit I need not be analyzed.

The current modelling techniques of support flexibilities is a prime example of the retards which management is undertaking in order to statistically pass the small bore piping and pipe support sample. Engineers have been instructed to selectively model individual failing "rigid" supports as flexible in selective load cases such that the previous failing loads disappear or are absorbed into the surrounding rigid supports-- eventhough there is no actual difference in the relative stiffness of these supports. In this way, Sample supports can be shown to be "passing", eventhough in reality, they are still failing. Needless to mention that as a result ① the surrounding supports are now designed to fictitious loads and ② the pipe stress analysis is no longer valid for the qualification of the pipe itself due to these imposed flexibility imbalances.

Having realized that modelling selective rigid supports as flexible is a viable method for the reduction of construction problems and subsequent fixes, management is proceeding with "passing" failing piping systems and pipe supports that are necessary in order to pass the overall Sample Program. Can Bechtel, PG&E, and the NRC explain how selective flexibilities, in selective load cases, can be used at Diablo, whereas code compliance has not allowed it to be used at other nuclear plants?

In order to approve these Pass-Altered Failures, Bechtel management has acquired engineering signatures from employees that are less compelled to follow good engineering practice and guidelines set forth by Diablo Canyon procedures. Upon inspection, the basic documentation of Analysis 12-300 reveals the random guess-work that employees are capable of making during the analysis of Class 1 Nuclear piping.

Inspection of Analysis 3-313 Rev(0) illustrates how a cognizant engineer has proven that the inclusion of an anchor is necessary to validate this analysis. The next revision, Rev(1), now shows how management has over-ridden this warning in an effort to circumvent the necessary field construction to fix this failing system. The attached documentation shows the three distinct phases of Analysis 3-313. The first shows the failing system before the proper anchor was modelled into the analysis (see attached computer print-out). The second, Rev(0), shows the anchor included per proper code-stress requirements. The third, Rev(1), shows how management has removed the necessary anchor and, instead, placed lumped masses to fictitiously represent the original piping model. The lumped-mass technique currently shows a passing piping system—eventhough it is supposed to be the equivalent of the original "no anchor" model that was proved to fail initially. (Managements proud explanation of the lumped-mass technique is also attached).

Another technique that has been employed to pass failing Sample supports is the addition of new supports adjacent to the failing Sample supports such that the failing loads will be distributed among the new supports. In this manner, the Sample supports can be reported as having passed the load allowables. Management justifies these new support additions under different reasons (thermal expansion problems, seismic problems, etc.) to hide the real reason for the fix: A Failing Sample Support. Although no documentation is attached in this report, it is readily observable upon inspection of the "before and after" drawings of the piping and pipe support locations. The initial "as-built" isometrics show scattered supports and Sample supports...and the final drawings show the addition of new supports placed next to the Sample supports.

This report is being sent to you due to the lack of response from the Diablo Canyon management. Violations of modelling techniques, if not appropriately rectified to meet standard nuclear regulations, could jeopardize the functional requirements of many operational systems at Diablo. I have already properly expressed numerous other generic design problems to Bechtel and PG&E. No longer under the employment of Bechtel/PG&E, I am compelled to submit these concerns externally to insure proper review and resolution to these existing problems.

To aid in your review of this information, the following table categorizes the specific quality assurance problem with the particular analysis:

ANALYSIS #	DESCRIPTION
S-301 S-307 S-322A S-322B S-322C	Use of supports for seismic analysis but not for thermal analysis (modelling of penetrations)
S-304 S-307 S-306 * S-320 *	Support flexibilities
12-300	Documentation guess-work
S-313 (init) Rev(0) Rev(1)	Lumped-mass modelling vs. inclusion of anchor
REPORT	Weld design & procedures

* Documentation not attached

It is my personal opinion that the small bore Sample should be allowed (as originally planned) to indicate the actual credibility of the entire small bore piping and pipe supports of Unit I. I am currently withholding my name such that the above quality assurance concerns are, in themselves, focused upon instead of any "employment" issues that Bechtel/PG&E may use to cloud the "engineering" issues. These Pass-Altered Failures are just part of the TOTAL failing systems still existing at Diablo, the only difference being that these are known to fail "yet, just on paper". The full realization of the total number of failing systems that still exist at Diablo may never be seen: lost with the acceptance of the Pass-Altered Failures... and, in the process, the pass-altered Sample itself.

cc: [redacted]

G.A. Maneatis, Pacific Gas & Electric Co.

Mothers Of Peace, San Luis Obispo

The San Francisco Chronicle

San Luis Obispo Telegram-Tribune

FOR INFORMATION ONLY

ANALYSIS ISSUE

✓ New Analysis ✓ Change in Analysis SEP 0 1983

Design Review Isometric No. HS-139, HS-393, HS-741, H7-215, H7-254, H4-286 D. C. Unit 1

✓ Seismic/Dynamic ✓ Seismic/DL ✓ Snn

✓ Tributary Mass ✓ Flex ✓ Dead Load

To: EG/TM/DJP/DOCUMENT LIBRARY G.O.

Analysis No. 8-304 Rev. 4

If change in analysis, list changes made: ✓
If new analysis, list superseded analysis numbers (Seismic and Flex):

Issue for Rev. 4 to reflect new boundaries.

[redacted]

pe supports or support modifications required:

All modifications from 8-304 Rev 3 are still applicable to 8-304 Rev 4

Name: Dan Pegan Approval Date: 8-25-83

REVIEWS CHECK LIST

FOR INFORMATION ONLY

SEP 8 1983

REVIEWS NO. 8-304 REV. 4 DATE: 8-19-83

REVIEWER M. LENOV CHECKER DEF

INDEX NO.	COMMENT	RESOLUTION	DISPOSITION A	DISPOSITION C
	All comments from 8-304 Rev. 3 are applicable to 8-304 Rev 4			
	For supports 60-2 (a p. 278 and 60-3 a.p. 750) stiffness has been calculated by using STRUDL program stiffness for these supports was considered only for thermal case due to the fact that thermal loads on these supports were too high and infinit stiffness which was used before does not reflect the real situation.	Stiffnesses were used per group leader Mr. Grey's instruct		

Column C is to be used by checker. Column A is to be used by Analyst.

PACIFIC GAS AND ELECTRIC COMPANY
DESIGN CALCULATION COVER SHEET

File No. [illegible]

Calculation No. 8-307 REV 1

Project: Diablo Canyon Unit # 1

Date ____________

Engineering Discipline: M & N E

Structure, System, or Component: Piping System # 8 (CVCS)

Type of or Purpose of Design Calculations: Design Reverification Program

No. of Sheets: 21

SAR Change Required (Nuclear Projects only): ☐ Yes ☒ No

	Signature	Discipline/Dept.	Date
Preparer	L. Tripiciano	M & N E	8-15-83
Checker	Richard Klimczak	M & N E	8-16-83
Approval:			
Discipline Engineer (if required)	Dan Pogan	M & N E	7-15-83
Group Leader/Supervisor			

Record of Revisions

Rev. No.	Date	Reason for Revision	Rev. by	Checked by	Approval Engr.	Approval GL/Supr.
0	7-15-83	Design Reverification Program	Larry Tripiciano	RKK	DTP	—
~~[illegible]~~		~~FINAL ANALYSIS REV... SYSTEM... [illegible] REV 3.~~				
		~~SEE MEMO TO FILE FOR QUALIFICATION OF THK ANALYSIS~~				
1	7-29-83	INTRODUCTION OF SUPPORT STIFFNESS FOR SUPPORT LOAD REDUCTION.	Larry Tripiciano	RKK		

ANALYSIS ISSUE

X	New Analysis	No	Change In Analysis		
Design Review Isometric No.		H8-750 (6-29-83), H8-384 (6-27-83) H8-340 (5-25-82), H8-392 (6-28-83) H8-390 (5-25-82), H8-[illegible] (6-28-83)		D. C. Unit	1
X	Seismic/Hosgri	X	Seismic/DE	N/A	SAM
X	Tributary Mass	X	Flex	X	Dead Load

To: SG/TM/DJP/DOCUMENT LIBRARY G.O.

Analysis No. S-307 Rev. 1

If change in analysis, list changes made:
If new analysis, list superseded analysis numbers (Seismic and Flex):

a) This calc reflects a Class-1 design/analysis, although all piping was later downgraded to Class-E in accordance with DCO-E-1314 (See Appendix-C).

b) Due to modeling limitations, pipe supports attached at the following node points: 460, 465, 5, 50, 65, 75, 595, 596, 865, 875, and 900, cannot be qualified using loads derived from this (computer) analysis.

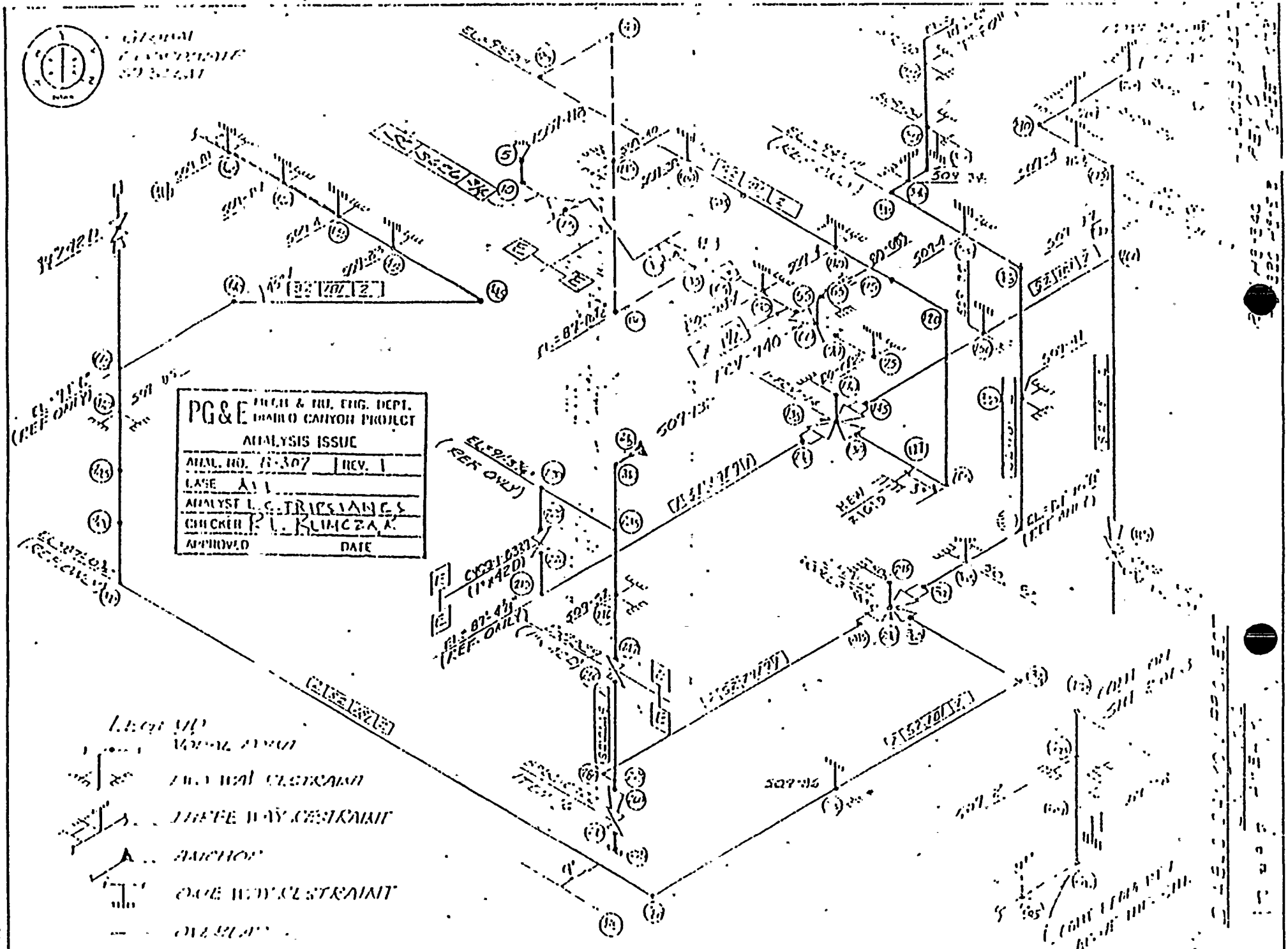
Note: Rev-1 is being issued for the purpose of reducing loads for supports 512-4, 512-2, and 512-3 attached at node points 475, 510, 535, 585 and 516. (Stiffness values were introduced in the model.)

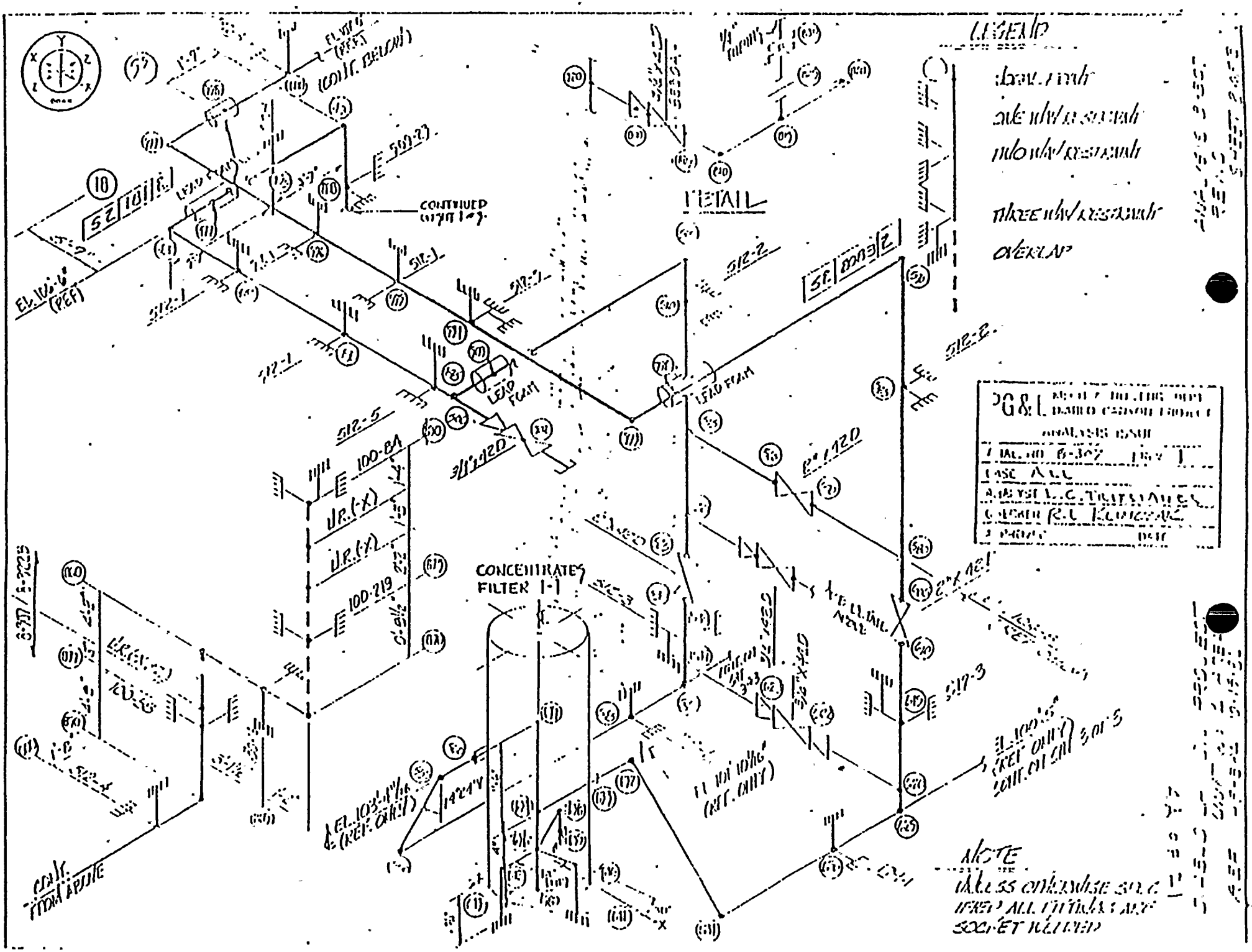
New supports or support modifications required:

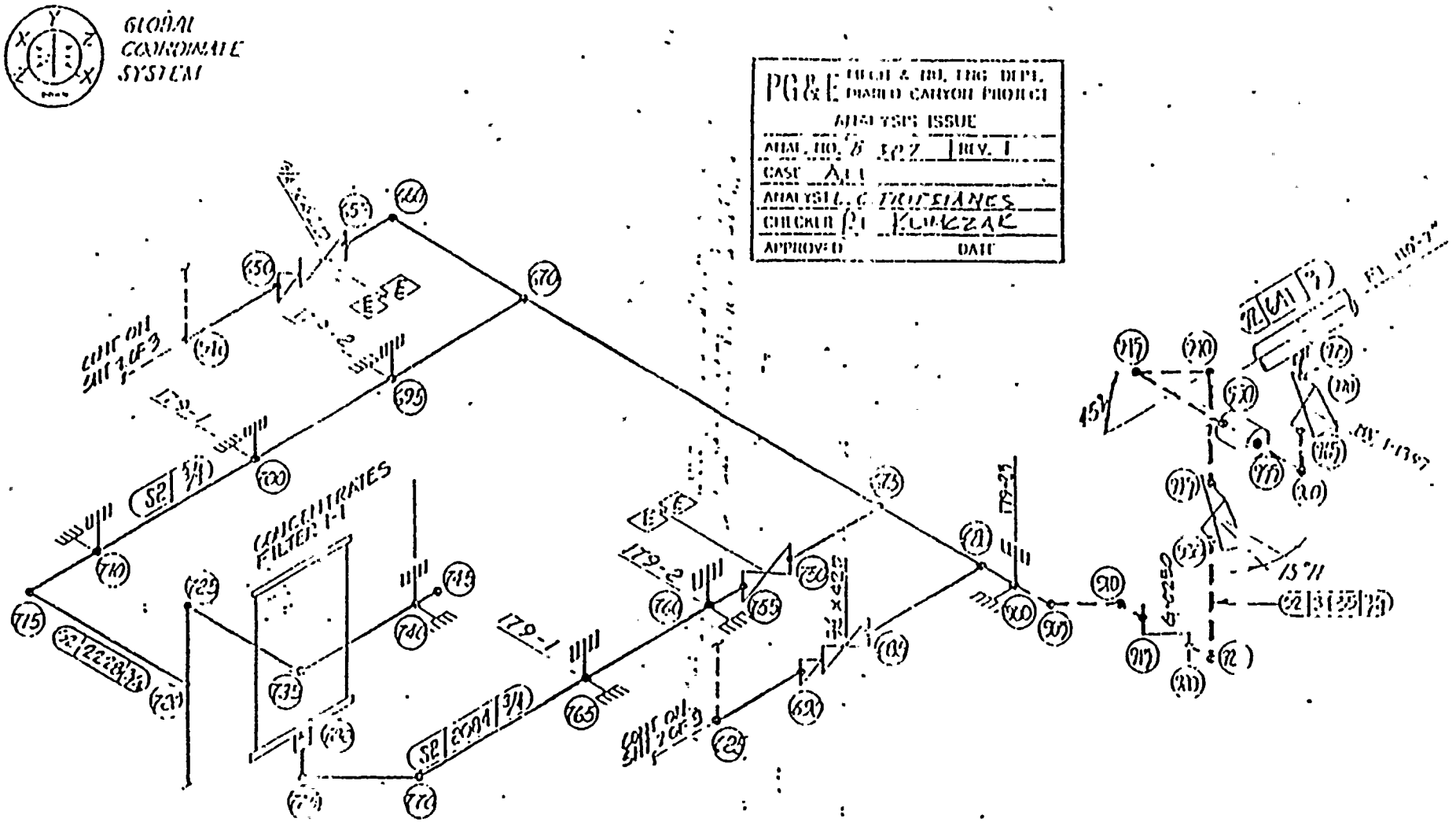
DATA POINT	PIPE SUPPORT	REMARKS
5	1509-148	Modify existing bilat to an anchor.
127	New	Install new x-direction restraint (rigid).
140	New (*)	Install new z-direction restraint (rigid).
245	509-132	Modify existing bilat to an anchor.
295	New (*)	Install new z-direction restraint (rigid).
[illegible]	512-3	Modify existing 3-way to a bilat.

(*) Provide 1/16" gap in both directions.

Issued By: _____ Approval Date: _____


PG&E
DIABLO CANYON PROJECT
ANALYSIS ISSUE
ANAL. NO. 83307
REV. 1
CHECKED
APPROVED
DATE


CONCENTRATES FILTER 1-1
CONTINUED WITH 1-7
LEAD FOAM
LEAD FOAM
DETAIL
CONTINUED WITH 1-7
CONCENTRATES FILTER 1-1
NOTE
UNLESS OTHERWISE SHOWN
INSERT ALL FITTINGS AND
SOCKET WELDED



DIABLO CANYON PROJECT
UNIT ONE AREA K

REF ISO. # 119-392
" 8-750

PIPING STRESS SUMMARY CHECK AND COVER SHEET

ANSI-B31.1

PROJECT: DIABLO CANYON UNIT # 1

JOB NO. 15330 PLANT DESIGN GROUP

SYSTEM CHEMICAL AND VOLUME CONTROL

CALC NO 8-3[illegible] ISO NO [illegible] REV NO

DESIGN CONDITION	LEVEL	LOCATION OF MAXIMUM END	LOCATION OF MAXIMUM ELEMENT	MAXIMUM COMPUTED STRESS (PSI)	ALLOWABLE STRESS (PSI)	COMPUTED / ALLOWABL
SUSTAINED LOADS EQN. 11		245	240 245	7081	SH 16375	.432
OCCASIONAL LOADS EQN. 12	B	245	240 245	11126	1.2 SH [illegible]	.566
OCCASIONAL LOADS EQN. 12	C	29[illegible]	29[illegible] 295	18263	1.8 SH 29475	.621
OCCASIONAL LOADS EQN. 12	D	135	135 140	41381	2.4 SH 393[illegible]	1.053*
THERMAL EXPANSION EQN. 13		445	440 445	18703	SA 27460	.681

REFERENCE CALCULATIONS:

WEIGHT ✓ SEISMIC-INERTIA PORTION ✓ OTHERS N.A.

THERMAL EXP ✓ SEISMIC-ANCHOR MOVEMENT N.A.

DYNAMIC —

	NAME	SIGNATURE	DATE
PREPARED BY	LARRY TRIPSIANES	[signature]	5-15-8[illegible]
REVIEWED BY	RICHARD L. KLIMCZAK	[signature]	5-16-83
APPROVED BY			

** THIS STRESS FAILURE IS NULLIFIED, SINCE IT OCCURS . THE YOKE OF THE VALVE - WHICH VALVE IS QUALIFIED

*ASS.TP MEDICTAPE.USV

REVIEW CHECK LIST

SHEET NO. 1 OF 21

REVIEW NO. 2-307 REV. 1 DATE: 8-15-83

REVIEWER: L.C. TRIPSIANES CHECKER: RLK

COMMENT NO.	COMMENT	RESOLUTION	DATE A*	DATE C*
1	THE FOLLOWING SUPPORTS NEED TO BE QUALIFIED FOR LOCAL PIPE STRESS. 512-3 ⟶ N.PT. 535 512-3 ⟶ N.PT. 615 509-92 ⟶ N.PT. 305 509-81 ⟶ N.PT. 465 509-88 ⟶ N.PT. 207 509-34 ⟶ N.PT. 200 509-34 ⟶ N.PT. 350 509-4 ⟶ N.PT. 110	S.F.E.G GROUP	LCT	RLK
2	DUE TO THE PRESENCE OF GAP, SOME OF THE RESTRAINTS (SUCH AS THOSE AT N.PTS. 140, 295, WILL NOT EXPERIENCE THERMAL LOADING - FOR MODELING PURPOSES THESE (RIGID) SUPPORTS WERE MODELED AS SNUBBERS.	NONE REQ'D	LCT	RLK
3	RESTRAINTS (RIGID) AT N.PTS 510, 535, 585, 615 WERE MODELED WITH APPROPRIATE STIFFNESS PROPERTIES. (SEE APPENDIX-C FOR CALCULATIONS).	NONE REQ'D	LCT	RLK

*Column C is to be used by checker. Column A is to be used by Analyst.

ANALYSIS CHECK LIST SHEET NO. 21 OF 21

ANALYSIS NO. A-707 REV. 1 DATE: 8-15-83

ANALYST L.C TRIPCIANES CHECKER RICHARD KLIMCZAK

COMMENT NO.	COMMENT	RESOLUTION	DATE A*	DATE C*
4	IN THE CASE OF AN INSULATED PIPE, GOING THROUGH A LEAD FOAM PENETRATION (SEE N.PTS 503, 477, 502 & 598 OF STRESS ISO), WHERE THERMAL EXPANSION MOVEMENTS ARE CONTROLED AND OF SMALL MAGNITUDE; NO RESTRAINTS WILL BE CONSIDERED IN THE FLEXIBILITY PORTION OF THE ANALYSIS. FOR THE DYNAMIC PORTION OF THE ANALYSIS A RESTRAINT WAS MODELED AT THE MIDPOINT OF THE LEAD FOAM PENETRATION. RKM 9-11-83	REQUIRES APPROVAL OF SUPERVISOR.	LCT	RKM

Colum C is to be used by checker. Colum A is to be used by Analyst.

INTEROFFICE MEMORANDUM

Diablo Canyon Project

PACIFIC GAS AND ELECTRIC COMPANY
BECHTEL POWER CORPORATION

To R. Grey

From Leo Mangoba

Cc: Onsite Project Engineering Group

At Jobsite Extension 3057

Date August 4, 1985

File No. 925

Subject Calculated stiffness of supports

Per your request, we calculated stiffness of supports:

1512-2	1512-3	
	Line #S2-181-2	Line #S2-2083-2
Ky = 1536 lb. IN	Kx = 3625 lb. IN	Kx = 6706 lb. IN
Kz = 898 lb. IN	Ky = 1536 lb. IN	Kx = 7136 lb. IN
	Kz = 898 lb. IN	Kz = 3362 lb. IN

Thank you,

Leo Mangoba

L. Mangoba/ jb

Reply Requested: No

Attachments: None

cc: P. Schmer
A. Shusterman

SPE - 0238

ANALYSIS ISSUE

YES New Analysis _____ Change In Analysis

Design Review Isometric No. (TE-11) HS-370, HS-300, HS-354 D. C. Unit: 1

YES Seismic/Hosgri YES Seismic/DE NO SAM

YES Tributary Mass YES Flex YES Dead Load

To: EG/TM/DJP/DOCUMENT LIBRARY G.O.

Analysis No. S-322B Rev. D

If change in analysis, list changes made:
If new analysis, list superseded analysis numbers (Seismic and Flex):

ANALYSIS S-322B WAS QUALIFIED ONLY TO EQUATIONS 11 AND 13 OR 14. SEISMIC LOADING WAS ONLY CONSIDERED FOR SPECIFIC SAMPLE SUPPORT QUALIFICATION.

Are supports or support modifications required:

NONE REQUIRED

FOR INFORMATION ONLY

RESTRAINT 106-72 DATA POINT 195 EXCEEDS RECOMMENDED SUPPORT LOADS.

Issued By: Dan Pegan Approval Date: 8-15-83

JOB # B-1125 REV. C DATE: 8-15-83

ANALYST MAHNCKE CHECKER M. LENOV

CHECK	RESOLUTION	INITIAL
THE PIPE PASSING THROUGH THE WALL PENETRATION IN ANALYSIS B-1125 IS INSULATED WITH ... CALCIUM SILICATE AND SEALED WITH RTV FOAM. EACH SUCH PENETRATION WAS MODELED AS A BILATERAL RESTRAINT AT THE MID-POINT OF THE PENETRATION FOR SEISMIC. ... THIS RESTRAINT WAS MODELED AT THIS POINT FOR FLEXIBILITY ANALYSIS.	MODELED PER GROUP LEADERS INSTRUCTIONS	AM

SEP 7 1983

FOR WITHIN 10D...

Column B is to be used by checker. Column A is to be used by Analyst.

ANALYSIS CHECK LIST SHEET NO. 20 OF 21

ANALYSIS NO. E-322C REV. 0 DATE: 8-322C

ANALYST ALLEN MAHNCKE CHECKER [illegible]

COMMENT NO.	COMMENT	RESOLUTION	INITIAL A*	INITIAL C*
1.	ANALYSIS ONLY QUALIFIED TO EQUATIONS 11 AND 13 OR 14.	NONE REQUIRED	AJM	ML
2.	ALL LOCAL STRESS CALCULATIONS PERFORMED AT S.F.G.O.	NONE REQUIRED	AJM	ML
3.	THE PIPING PASSING THROUGH THE WALL PENETRATION IN ANALYSIS E-322C IS INSULATED WITH CALCIUM SILICATE AND SEALED WITH HARD LEAD FOAM. EACH SUCH PENETRATION WAS MODELED AS A BILATERAL RESTRAINT AT THE MIDPOINT OF THE PENETRATION FOR SEISMIC ANALYSIS, NO RESTRAINT WAS MODELED AT THESE POINTS FOR FLEXIBILITY ANALYSIS.	NONE REQUIRED	AJM	ML

*Colum C is to be used by checker. Colum A is to be used by Analyst.

ANALYSIS CHECK LIST SHEET NO. 13 OF 24

ANALYSIS NO. E-301 REV. 3 DATE: 8-15-95

ANALYST ALLEN J. MAHNCKE CHECKER Wally F. Conway

COMMENT NO.	COMMENT	RESOLUTION	DATED A*	DATED C
1.	INSULATION WEIGHTS USED IN ANALYSIS ARE HIGHER THAN ACTUAL.	NONE REQUIRED	AJM	
2.	SEISMIC AND TANK STIFFNESS ACCOUNTED FOR BY EQUIPMENT SAM MOVEMENTS.	NONE REQUIRED	AJM	
3.	LOCAL STRESS CALCULATIONS ARE PERFORMED AT SAN FRANCISCO GENERAL OFFICE.	NONE REQUIRED	AJM	
4.	THE PIPING PASSING through the WALL PENETRATIONS IN ANALYSIS E-301. (DATA Ft. 905) IS INSULATED WITH CALCIUM SILICATE AND SEALED WITH HARD Lead FOAM. EACH PENETRATION WAS MODELED AS A LATERAL RESTRAINT AT the MIDPOINT OF the PENETRATION FOR SEISMIC ANALYSIS. NO RESTRAINT WAS MODELED AT these POINTS for FLEXIBILITY. ANALYSIS. RKL 8-17-95	NONE REQUIRED (MODELING PER PIPE STRESS GROUP LEADER)	AJM	

*Column C is to be used by checker. Column A is to be used by Analyst.

ANALYSIS ISSUE

YES New Analysis _____ Change In Analysis

Design Review Isometric No. (DS-Y4) HS-370, HS-721, HS-722 D. C. Unit 1

YES Seismic/Hosgri YES Seismic/DE _____ SAM

YES Tributary Mass YES Flex YES Dead Load

To: EG/TM/DJP/DOCUMENT LIBRARY G.O.

Analysis No. 8-322A Rev. 0

If change in analysis, list changes made:
If new analysis, list superseded analysis numbers (Seismic and Flex):

ANALYSIS 8-322A HAS ONLY QUALIFIED FOR EQUATIONS 11 AND 13 OR 14. SEISMIC LOADING WAS ONLY CONSIDERED FOR SPECIFIC SAMPLE SUPPORT QUALIFICATIONS.

FOR INFORMATION ONLY

New supports or support modifications required:

SEP 7 1983

- NONE REQUIRED
- SUPPORTS ABOVE RECOMMEND LOAD.

a) 950-148 (NODE 855) c) 950-149 (NODE 810)

b) 950-25 (NODE 830)

Issued By: Dan Pegan Approval Date: 3-29-83

ANALYSIS CHECK LIST

SHEET 12 OF 21

I.C. B-322A REV. 0 DATE: 8-12-83

ANALYST JAN J. MAINWARE CHECKER M. LENOV

COMMENT	RESOLUTION	CHECKED A*	CHECKED C*
1. PIPING PASSING THROUGH PENETRATION 563 IN ANALYSIS ARE INSULATED WITH. 2. INSULATE AND SEALED WITH CAULKING AT PENETRATION. WAS MODELED AS A BILATERAL RESTRAINT (INSTRUCTIONS FOR SEISMIC ANALYSIS - NO RESTRAINT WAS MODELED AT THE "MID" POINT OF PENETRATION FOR FLEXIBILITY REASONS.	NONE REQUIRED	AJM	MML

FOR INFORMATION ONLY

SEP 7 1983

B

Column C is to be used by checker. Column A is to be used by Analyst.

FINAL

PACIFIC GAS AND ELECTRIC COMPANY
ENGINEERING DEPARTMENT
DESIGN CALCULATION COVER SHEETS

File No. [illegible]
Calculation No. 12-300

Project: DIABLO CANYON POWER PLANT Date: [illegible]

Engineering Discipline: MECHANICAL

Structure, System, or Component: PIPING SYS # 12

Type of or Purpose of Design Calculations: VERIFY PIPING STRESS AND PIPE SUPPORT LOADS FOR THE REVERIFICATION PROGRAM

No. of Sheets: [illegible]

SAR change required ( ) Yes (X) No
(Nuclear Projects only)

	Signature	Discipline/Dept.	Date
Preparer	[illegible]	ME NE	[illegible]
Checker	J. CHEN	ME NE	11-5-82
Approval:			
Discipline Engineer (if required)			
Group Leader/Supervisor	[illegible]	[illegible]	11-6-82

Record of Revisions

Rev. No.	Date	Reason for Revision	Rev. By	Checked By	Approval Engr	Approval G. Supv
[illegible]	[illegible]	ORIGINAL ISSUE	[illegible]	[illegible]		MD
	[illegible]	SPECTRA, SAM/TAMS + RENUMBERED.	[illegible]	[illegible]		DJP
2	6-30-83	Final per spectra [illegible]	MML	WA		DJT
		M Tracker [illegible] DCM-M46 Rev.3				
		SAM/TAM [illegible] Libraries: 3-103 Rev.3				
		S-117 Rev.3, S-118 Rev.2 [illegible]				
3	8-16-83	Update SAM/TAM data with	MML	WA	DJP	DJP
		[illegible] S-117 Rev. [illegible]	[illegible]	[illegible]	[illegible]	

[illegible] ... [illegible] 2F M [illegible] ... [illegible] OF [illegible]

[illegible] 12-300 Rev [illegible] | [illegible] 8-03 Rev 3

[illegible] DX=.116, DY=.00[illegible], DZ=.065 (DE) | ANC 40 DX=.056, DY=.002, DZ=.056 (D[illegible]
DX=.216, DY=.005, DZ=.133 (DD) | DX=.132, DY=.004, DZ=.109 (DD[illegible]
DX=.206, DY=.023, DZ=.122 (HS) | DX=.140, DY=.00[illegible], DZ=.056 ([illegible]

4/B [illegible] Rev 2

[illegible] 85 DX=.170, DY=.035, DZ=.144 (DE) | ANC 260 DX=.172, DY=.034, DZ=.143 (DE[illegible]
DX=.340, DY=.07, DZ=.283 (DD) | DX=.344, DY=.068, DZ=.286 (DD[illegible]
DX=.246, DY=.482, DZ=.06 (HS) | DX=.242, DY=.382 DZ=.200 (HS[illegible]

4/B 8-117 Rev 3

125 DX=.219, DY=.114, DZ=.145 (DE) | ANC 2 DX=.167, DY=.107, DZ=.11 (DE)
DX=.433, DY=.225, DZ=.280 (DD) | DX=.300, DY=.214, DZ=.[illegible] (DD)
[illegible] DY=.[illegible], DZ=.[illegible] (HS) | [illegible] DY=.[illegible], DZ=.17[illegible]

<u>[illegible]metry</u> Minor errors in geometry have been found in analysis 12-300 Rev [illegible] these errors will not effect the analysis significantly.

Hot loads instead of cold loads and wrong stiffnesses of springs being used in the analysis. This will not effect analysis significantly.

<u>AM/TAM</u>: Old SAM/TAM and new SAM/TAM values have been compared (see the attached sheets) and it is concluded that minor differen[ces] will not effect the analysis. In majority of cases old values are big[ger] than new).

<u>Thermal modes</u>. The old thermal modes and new thermal modes have been compared (see the attached sheet). It is found out that two thermal modes: one normal with T=250°F up to 10 dia AT L/B 29[illegible]

[illegible] Crisbee. W.A.F. [illegible]

and [illegible] 8"25 [illegible] and one [illegible] with T = 40°F have not been considered in the analysis but this will not effect the analysis significantly.

<u>Rigidity of the system</u>. Z.P.A. and modes have been reviewed and found out that system is rigid dynamically. Thrust load due to SPV was not considered in the analysis.

The fluid is water instead of steam or gas and pressure is low therefore it will not effect the analysis significantly.

<u>Response spectra</u>. Old spectra is valid (letter from M. Tresler 5/25/83)

<u>Conclusion</u>. The above mentioned changes will not effect the analysis significantly therefore problem 12-300 Rev. 1 is not to be rerun.

R

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PACIFIC GAS AND ELECTRIC COMPANY
DESIGN CALCULATION COVER SHEET

File No. [illegible]

Calculation No. [illegible]

Project DIABLO CANYON UNIT 1 Date 7-13-83

Engineering Dimipline MECH. and NUCLEAR ENGR.

Structure, System, or Component PIPING SYSTEM #3 - FEEDWATER LINE NO. 2477

Type of or Purpose of Design Calculations DESIGN VERIFICATION PROGRAM - ANALYSIS REQUESTED BY PIPE SUPPORT GROUP. FOR CODE BREAK ANALYSIS.

No. of Sheets [illegible]

SAR Change Required (Nuclear Projects only) ☐ Yes ☒ No

	Signature	Discipline/Dept.	Date
Preparer	[signature]	M&NE	7-13-83
Checker	[signature]	M&NE	7-14-83
Approval:			
Discipline Engineer (if required)			
Group Leader/Supervisor	P. TIM	M&NE	7-15-83

Record of Revisions

Rev. No.	Date	Reason for Revision	Rev. by	Checked by	Approved: Engr.	Approved: GL Supr.
0	7-13-83	VERIFICATION PROGRAM FOR CODE BREAK ANALYSIS	[illegible]	[illegible]	[illegible]	[illegible]
	9/2/83	Final Issue	[illegible]	[illegible]	[illegible]	[illegible]

8403250419

ANALYSIS ISSUE

____ New Analysis ✓ Change In Analysis

Design Review Isometric No. (79-14) AE-212 D. C. Unit 1

✓ Seismic/Response ✓ Seismic/DE — SAM

✓ Tributary Mass ✓ Flex ✓ Dead Load

To: EG/TM/DJP/DOCUMENT LIBRARY G.C.

Analysis No. 3-312 Rev. 1

If change in analysis, list changes made:
If new analysis, list superseded analysis numbers (Seismic and Flex):

3-312. Rev 0.

New supports or support modifications required:

1. The existing (YZ) clip angle 2IC5-32 @ DP 72 is still valid
2. The existing (Z) restraint 2IC5-15 @ DP 50 is still valid

Issued By: R R Grim Approval Date: 5-12-93

FINAL

ANALYSIS ISSUE

✓ New Analysis ____ Change In Analysis

Design Review Isometric No. (79-17) H3-21C D. C. Unit: —

✓ Seismic/Hosgri * ✓ Seismic/DE NOT REQUIRED SAM

✓ Tributary Mass ✓ Flex ✓ Dead Load

To: EG/TM/DJP/DOCUMENT LIBRARY G.O.

Analysis No. 3-313 Rev. 0

If change in analysis, list changes made:
If new analysis, list superseded analysis numbers (Seismic and Flex):
NEW CODE BREAK ANALYSIS. SUPERCEDES HAND CALCULATION BY THE PIPE SUPPORT GROUP.

*NOTE: FOR SEISMIC ANALYSIS AND TRIBUTARY WEIGHT THIS ANALYSIS IS ONLY VALID BETWEEN NODES 5 and 75.

New supports or support modifications required:

1) MODIFY EXISTING BILAT 2165-32 AT NODE 75 TO A CODE BREAK ANCHOR.

2) REMOVE SUPPORT 2165-15 AT NODE 60 TO ELIMINATE THERMAL OVERSTRESS.

SUPERSEDED
BY REV 1 OF CALC 3-313
DATE 5/15/83 BY P Tam
CHKD N/A APPD DAC

Issued By: P. Tam Approval Date: 7-15-83

0043323551

The hangers shown on the pipe stress isometric have been qualified for loads by A-E calc number 3-303-H which are substantially greater than these loads.

The purpose of this analysis is to qualify the stress induced in the piping because of thermal, dead load, seismic, and SRV/TRV effects. The boundary between the seismic class I and the non-seismic class E piping is the downstream side of the check valve (data point 25). Structurally, the model was terminated at hanger number 2165-31, data point 85. The hangers beyond this point are dead load supports and cannot be considered in a seismic analysis. At data point 85, a mass of three seismic spans of piping were added to simulate the effects of the remaining piping in the system. For the purpose of performing a stress analysis of this code break, this model is more than adequate.

Reviewing the calculated stress reveals the following:

a) For the static analysis (Eq 11) the stress in the pipe is well below code allowable in both the class I and class E sections.

b) For the thermal expansion analyses (Eq 13/14) the stress in the piping is well below code allowable in both class I and class E sections.

c) For the Design Earthquake (D E) seismic analysis (Eq 12/1.2 Sh) the stress in the pipe in the Class I section is well below the code allowable (1.2 Sh). In the class E section, the stress in the pipe does not exceed code allowable until data point 55, which is downstream of the second isolation valve. Note that for all points in the class E section, the calculated stress does not exceed the Hosgri allowable stress (2.4 Sh) implying that plastic deformation does not occur.

d) For the Double Design Earthquake [illegible] in the class I section of the pipe are well below the code allowable. In the class E section of the pipe, the code allowable stress [illegible], is exceeded at data point 35. However, this stress does not exceed the Hosgri allowable stress. The Hosgri allowable stress (2.4Sh) is not exceeded until data point 55, which is downstream of the second isolation valve.

e) For the Hosgri (HS) earthquake, the calculated stress in the class I section is well below code allowable (2.4 Sh). In the class E section, the code allowable is not exceeded until data point 45 which is on the downstream side of the second isolation valve.

EVALUATION:

The lateral seismic movements calculated at data point 85 are $\Delta X(DE)=2.817"$, $\Delta X(DDE)=5.633"$, and $\Delta X(HS)=8.162"$. The drawing shows the existence of a wall penetration 2'-10 1/2" from data point 85. This wall penetration will restrict the seismic deflection of the pipe to 5-5/8" laterally at any point in the penetration. Because of this penetration, the maximum deflection at data point 85 is expected to be approximately 2-1/8" which is comparable to the "DE" case where stress would be proportional to deflection. Clearly, it can be concluded that the seismic stresses in the piping will be significantly less than those calculated.

Based on this analysis, it is concluded that the criteria for a code break has been met.

GENERAL COMPUTATION SHEET

BACKGROUND INFORMATION

BACKGROUND INFORMATION

ANALYSIS S-513 WAS INITIATED AT THE REQUEST OF THE PIPE SUPPORT GROUP TO SUBSTANTIATE THAT STRESSES IN THE REGION BETWEEN SUPPORT 2165-52 and LINE K16-574 (NODE 5 TO 75) WERE ACCEPTABLE. THE ANALYSIS BOUNDARY WAS EXTENDED TO LINE K16-557 TO INSURE THAT SELF-WEIGHT EXCITATION CONTRIBUTIONS FROM THE NON-SEISMICALLY SUPPORTED PORTION OF LINE 2477 WERE INCLUDED. THE RESULTS OF THIS ANALYSIS SHOWED THAT PIPING IN THE REGION OF CONCERN (NODE 5 TO 75) WAS SEISMICALLY OVERSTRESSED (130,483 PSI @ NODE 65). THE REGION WAS ALSO THERMALLY OVERSTRESSED AT NODE 5 (RATIO = 1.005 - EQN 14). THE FUNDAMENTAL PROBLEM WAS TO REDUCE SEISMIC STRESSES WHICH WAS ACCOMPLISHED BY SUPERSEDED CODE BREAK ANCHOR AT THE LOCATION OF 2165-32 (EXISTING) - NODE 5. FOR THE PURPOSES OF THIS EVALUATION, THIS ANALYSIS COULD HAVE BEEN TERMINATED AT NODE 75. HOWEVER, THERMAL ANCHOR MOVEMENTS AT NODE 150 ARE SUBSTANTIAL AND THE NON-SEISMICALLY SUPPORTED PIPING BEYOND NODE 75 WAS RETAINED IN THE ANALYSIS TO SUBSTANTIATE THAT THE ADDITION OF THE CODE BREAK ANCHOR WOULD NOT CAUSE THERMAL OVERSTRESS IN THE CLASS E PIPING. SEISMIC STRESSES AND LOADS IN THE REGION OF NODE 75 to 150 ARE THEREFORE NOT NOT APPLICABLE TO THIS ANALYSIS.

BY REV
DATE 9-12-83 BY P TAN
CHKD CODE BREAK EVALUATION

ANALYSIS ASSUMPTIONS

a) FOR THERMAL ANCHOR MOVEMENTS AT NODE 75 THE DISPLACEMENTS WERE [illegible]

(FEA ANALYSES ARE NOT AVAILABLE ON SITE; PER THE PIPE STRESS GROUP LEADER [illegible]. THIS ANALYSIS

PACIFIC GAS AND ELECTRIC COMPANY

GENERAL COMPUTATION SHEET

SUBJECT: [illegible] CODE BREAK ANALYSIS [illegible]

MADE BY [illegible] DATE [illegible] CHECKED BY [illegible] APPROVED BY [illegible]

ANALYSIS ASSUMPTIONS cont.

cont. from s[illegible]

IS STILL CONSIDERED FINAL SINCE [illegible] IN THIS AT[illegible] 135 WILL NOT AFFECT THE CODE BR[illegible] PIPING.

b) CORRELATION of THERMAL ANCHOR MOVEMENTS

FOR NODE POINT 5 - ANALYSIS 2-120 USED 3 THERMAL MODES AS FOLLOWS:

THRMO1 = 110°F

THRMO2 = 57°F

THRMO3 = 120°F

ANALYSIS 3-313 UTILIZES 2 THERMAL MODES AS FOLLOWS:

THRMN1 = 57°F NODES [illegible], 110°F NODES 20 & 135

THRMN2 = 131° NODES 5 & 135

THRMN1 CORRELATES WITH THRMO2. FOR THRMN2 USE THE MAXIMUM ENVELOPE of DISPLACEMENTS & ROTATIONS BE THRMO1 & THRMO3.

c) MODELING [illegible]

REFER TO THE NEXT SHEET

SUPERSEDED

BY REV 1 OF CALC 3-313

DATE 9-12-83 BY P. TAM

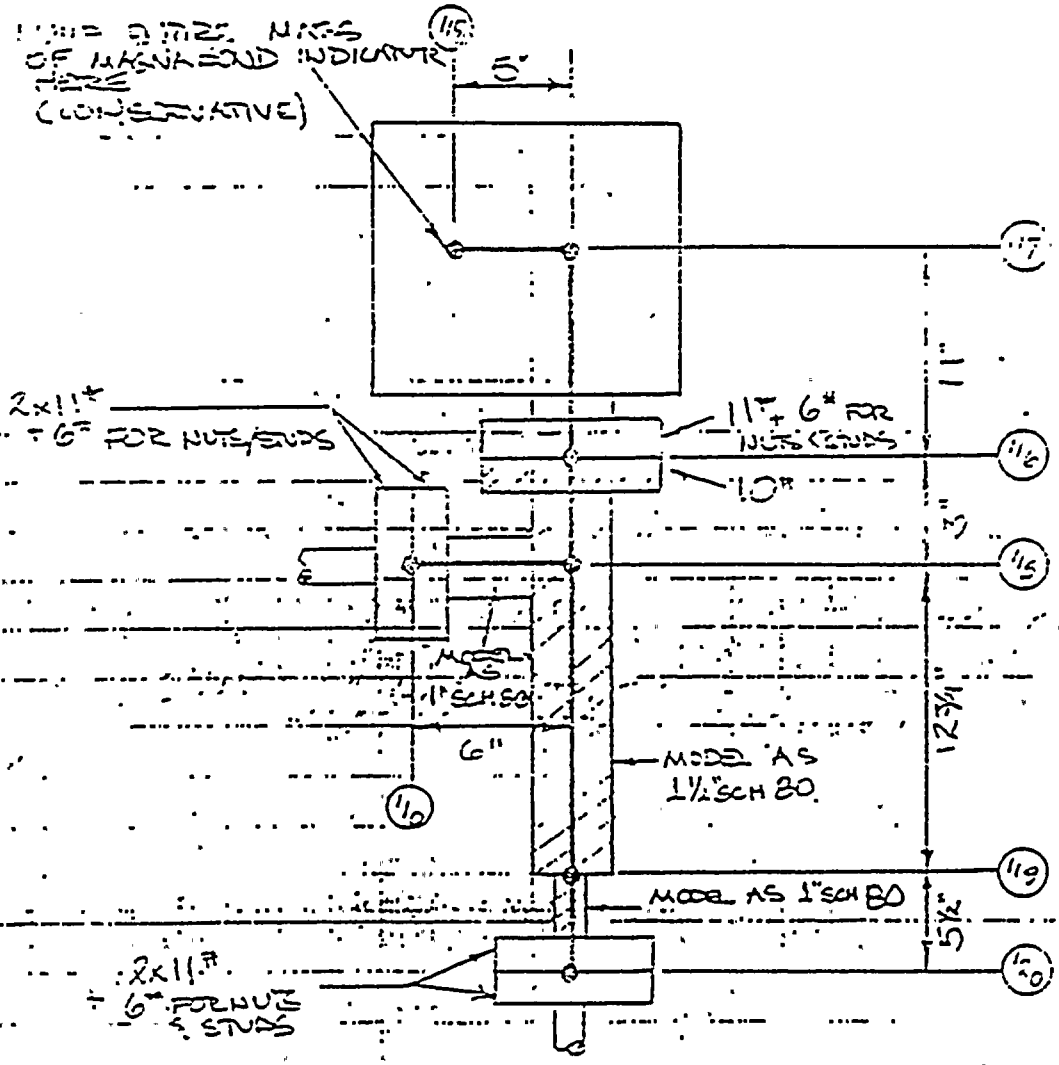
CHKD [illegible] APP'D [illegible]

GENERAL COMPUTATION SHEET

ANALYSIS ASSUMPTIONS CONT.

MODELING FOR FLG

FOR ANALYSIS MODEL THE FS-3 ASSEMBLY AS SHOWN BELOW:



WEIGHT OF FLOWRATOR (CROSS HATCHED REGION) = 23#

LUMP 10# FOR FLG. AT NODE 116 & USE UNIFORM WEIGHTS AS FOLLOWS:

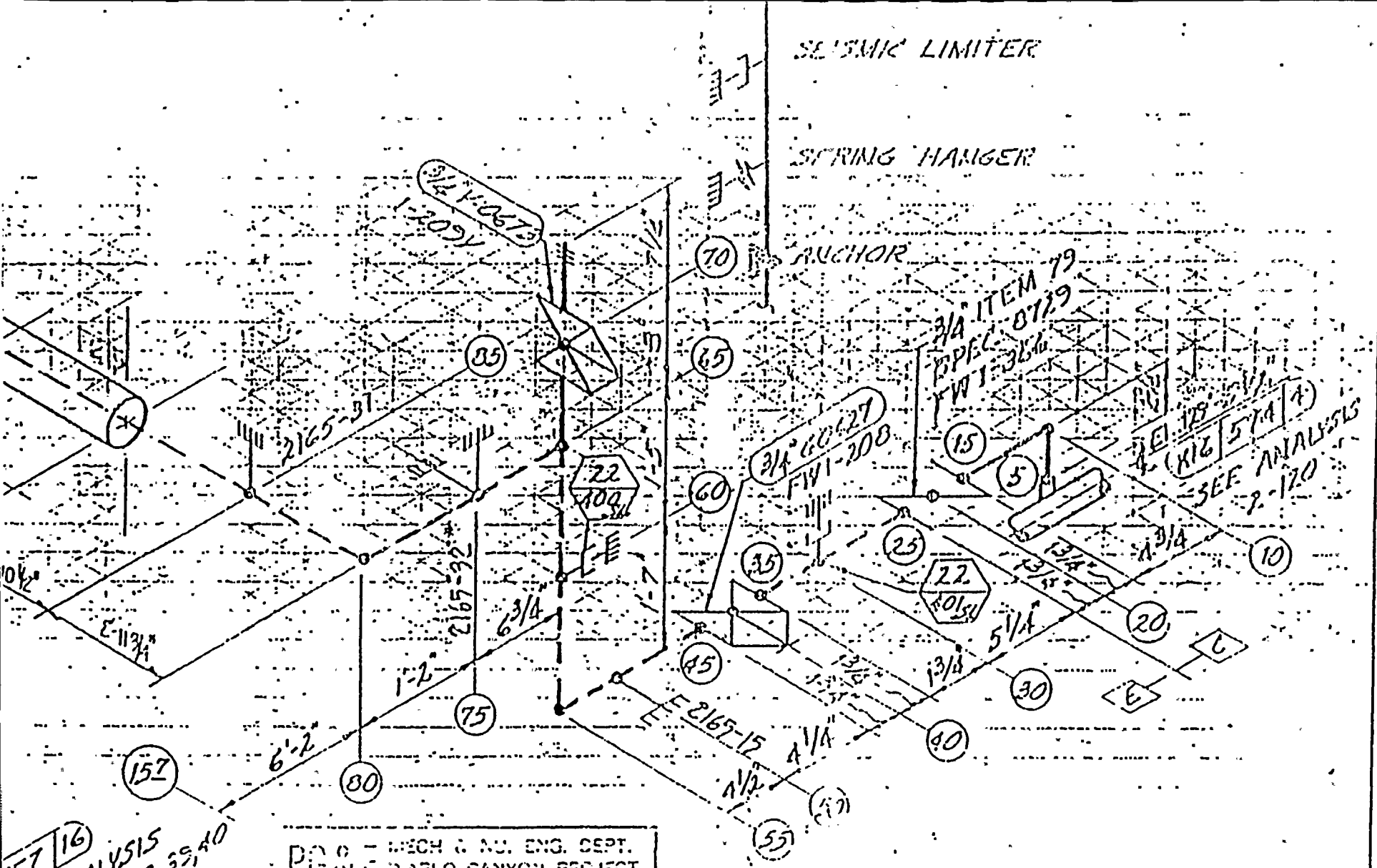
FROM NODE 110 TO 115	4.38#/FT	=	2.19#
FROM NODE 115 TO 116	6.70#/FT	=	1.68#
FROM NODE 115 TO 119	6.70#/FT	=	7.12#
FROM NODE 119 TO 120	4.38#/FT	=	[illegible]

SUPERSEDED

BY REV 1 OF CALC [illegible]

DATE 10-12-83 BY R. TAM

CHKD [signature] APP'D [signature]



PG & E – MECH & NU. ENG. DEPT.
PG&E DIABLO CANYON PROJECT

UNIT ONE

REF. ISO. HB-212, WLKDN. DATE 7-7-83

LEGEND

NODAL POINT

ONE WAY RESTRAINT

TWO WAY RESTRAINT

SEISMIC LIMITER

SPRING HANGER

ANCHOR

GLOBAL COORDINATE SYSTEM

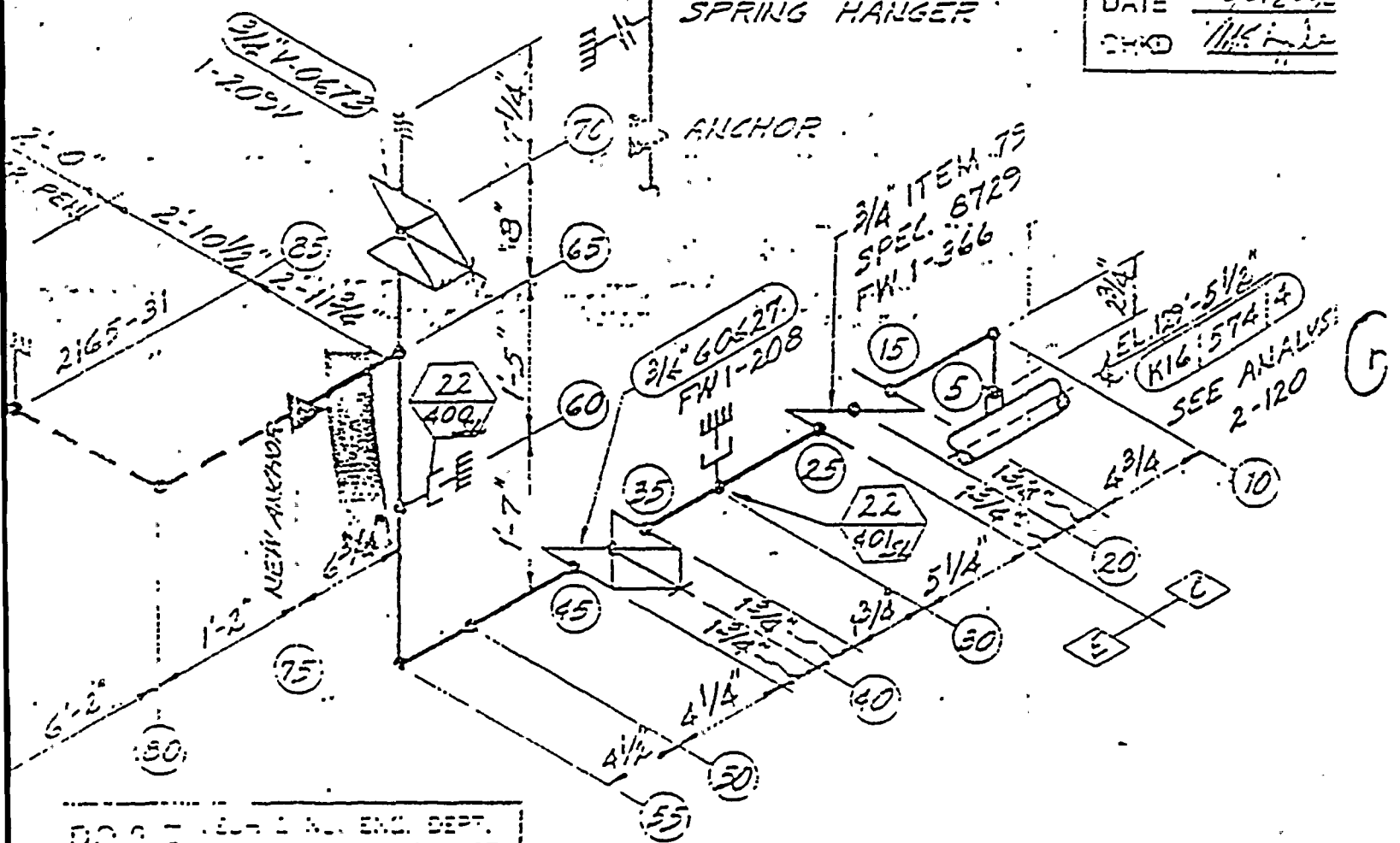
NOTE: FOR SEISMIC AND EFFECTIVE WEIGHT RUNS ANALYSIS THIS IS ONLY VALID BETWEEN NODES 5 AND 75.

SUPER

BY REV 1

DATE 9-12-83

CHKD



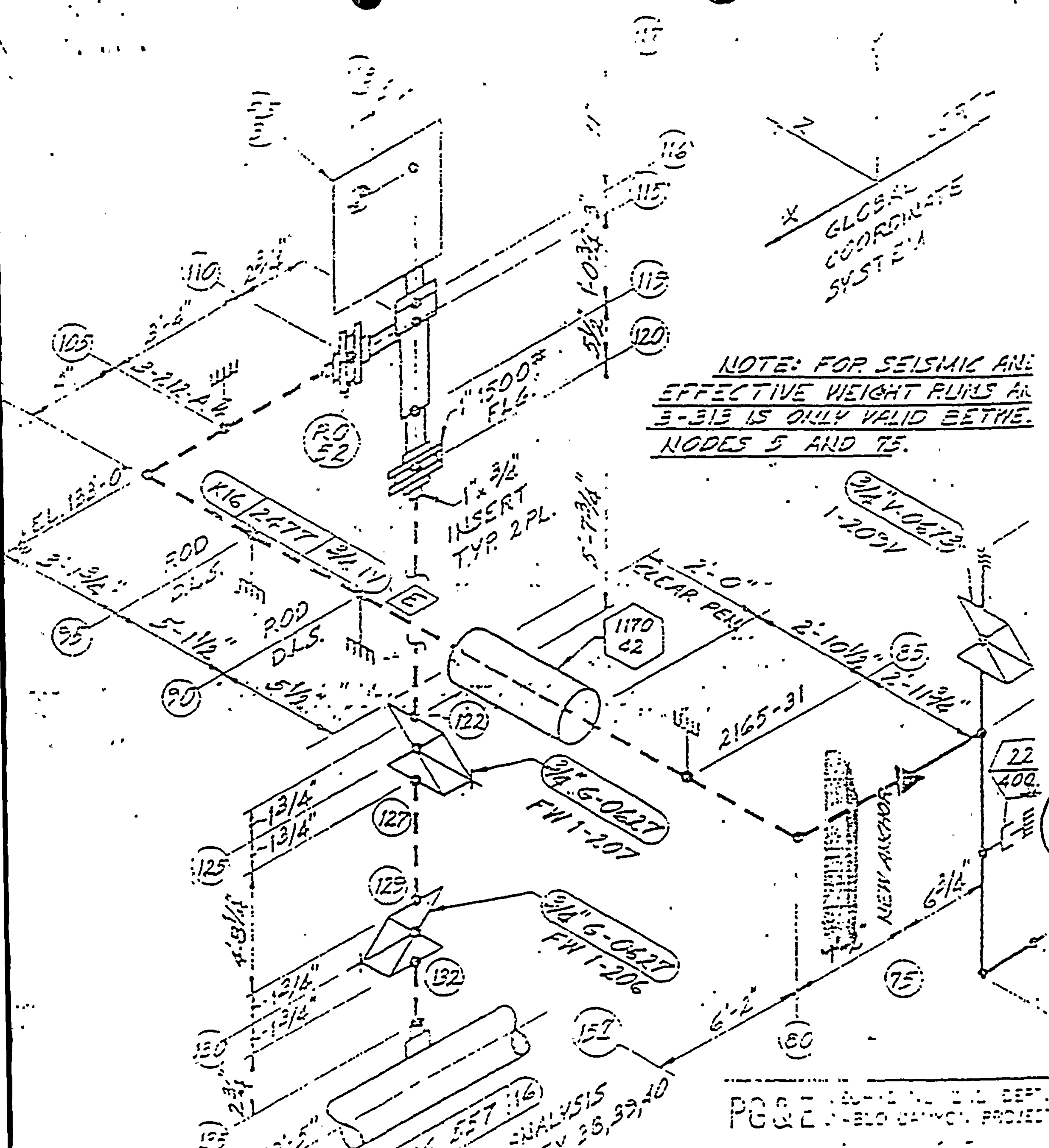
PG&E GEN. ENG. DEPT.
PG&E DIABLO CANYON PROJECT

DRAWN BY D. Whitmer DATE 7-7-83

DIABLO CANYON PROJECT

UNIT ONE

REF ISO. H3-212, WLKDN. DATE 7-7-83



NOTE: FOR SEISMIC AND EFFECTIVE WEIGHT RUNS AL
3-313 IS ONLY VALID BETWE.
NODES 5 AND 75.

PG&E
DIABLO CANYON PROJECT

APPROVED R. TAM

UNLESS OTHERWISE
SPECIFIED ALL FITTINGS
BE SOCKET WELDED

DIABLO CANYON PROJECT UNIT 2 [illegible]

[illegible] PLANT DESIGN GROUP

AUX FEED PP [illegible] DISC [illegible]

CALC NO [illegible] ISO NO HS-2-2 (WALKDOWN DATE [illegible])

DESIGN CONDITION	LEVEL	LOCATION OF MAXIMUM: PT	ELEMENT	MAXIMUM COMPUTED STRESS (PSI)	ALLOWABLE STRESS (PSI)	CALC/ALLOWABLE
SUSTAINED LOADS EQN. 11		[illegible]	[illegible]	[illegible]947	[illegible]	[illegible]
OCCASIONAL LOADS EQN. 12	B	5	[illegible]	12799	[illegible]	0.711
OCCASIONAL LOADS EQN. 12	C	5	[illegible]	22651	[illegible]	0.629
OCCASIONAL LOADS EQN. 12	D	5	[illegible]	30063	36000	0.835
THERMAL EXPANSION EQN. 13		10	10	25237	37[illegible]	.682

REFERENCE CALCULATIONS:

INPUT 3-313 SEISMIC-INERTIA PORTION 3-313 EFWT 3-313

[illegible] 3-313 SEISMIC-ANCHOR MOVEMENT —

DYNAMIC —

	NAME	SIGNATURE	DATE
[illegible]	PETER TAM	Peter Tam	[illegible]
[illegible]	MYRON LEPPKE	Myron E. Leppke	9-[illegible]
	[illegible]	R [illegible]	[illegible]

0 4 3 3 - 2 6 / 1

DIABLO CANYON NUCLEAR POWER PLANT UNIT NO. 1

113-212 (VALVED ENDS) REV. NO. 5

						ALLOWABLE STRESS	COMPUTED ALLOWABLE
						15100	.357
		5	5 / 10	2136		18800	0.230
		5	5 / 10	6081		27000	0.224
		5	5 / 10	8872		36000	0.246
						37	.71

THE PRINTED VALUES ... STRESS RATIOS ... THE NON-SEISMICALLY ... PORTION OF THE PIPING ... THEREFORE NOT VALUES ... MAXIMUM STRESS RATIO ... CODE BREAK ... (NODE 5 & 75) ... CORRECTED VALUES.

5-315 REV 0		5-315 REV 0	5-313 REV 0
5-315 REV 0		3-313 REV 0	

— NA —

THESE CELLS ... BETWEEN ... IS THE ... OF THE ... IS ... ANALYSIS.

SUPERSEDED
BY REV.
OF C.I.D.
DATE 9-16-83
CHK'D

... COORDINATOR	[signature]	7-15-83
... MANAGER	[signature]	7-15-83
...	[signature]	7-15-83

(2)

The hangers shown in the pipe stress isometric have been qualified for loads by B&R calc number 3-303-H which are substantially greater than these loads.

The purpose of this analysis is to qualify the stress induced in the piping because of thermal, dead load, seismic, and SAM/TAM effects. The boundary between the seismic class I and the non-seismic class E piping is the downstream side of the check valve (data point 25). Structurally, the model was terminated at hanger number 2165-31, data point 85. The hangers beyond this point are dead load supports and cannot be considered in a seismic analysis. At data point 85, a mass of three seismic spans of piping were added to simulate the effects of the remaining piping in the system. For the purpose of performing a stress analysis of this code break, this model is more than adequate.

Reviewing the calculated stress reveals the following:

a) For the static analysis (Eq 11) the stress in the pipe is well below code allowable in both the class I and class E sections.

b) For the thermal expansion analyses (Eq 13/14) the stress in the piping is well below code allowable in both class I and class E sections.

c) For the Design Earthquake (D E) seismic analysis (Eq 12/1.2 Sh) the stress in the pipe in the Class I section is well below the code allowable (1.2 Sh). In the class E section, the stress in the pipe does not exceed code allowable until data point 55, which is downstream of the second isolation valve. Note that for all points in the class E section, the calculated stress does not exceed the Mosgri allowable stress (2.4 Sh) implying that plastic deformation does not occur.

6

NOTES CHECK LIST

NOTES NO. 3-313 REV. 0 DATE: 7-12-85

AUTHOR: KELLY J. CONDRON CHECKER: A. MAHNCKE E/M

CHECK NO.	COMMENT	RESOLUTION	CHECK A*	CHECK C*
21.	FOR PURPOSES OF THIS ANALYSIS, ONLY PIPING BETWEEN NODES 67 AND 75 IS EVALUATED FOR STRESS. THE REMAINDER OF PIPING (NODES 75 TO 135) IS INCLUDED FOR OVERLAPPING EFFECTS.	1. NONE REQUIRED REV. 1	KJC	AM G
22.	APPLICABLE TO BRANCH LINE CONNECTION @ NODE 5 ONLY.	2. NONE REQUIRED	KJC	AM

*Column C is to be used by checker. Column A is to be used by Analyst.

d) For the Double Design Earthquake (DDE), the calculated stress in the class I section of the pipe are well below the code allowable. In the class I section of the pipe, the code allowable stress [illegible] exceeded at data point 35. However, this stress does not exceed the Hosgri allowable stress. The Hosgri allowable stress (2.4Sh) is not exceeded until data point 55, which is downstream of the second isolation valve.

e) For the Hosgri (HS) earthquake, the calculated stress in the class I section is well below code allowable (2.4 Sh). In the class I section, the code allowable is not exceeded until data point 45 which is on the downstream side of the second isolation valve.

EVALUATION:

The lateral seismic movements calculated at data point 85 are $\Delta X(DE)=2.817"$, $\Delta X(DDE)=5.633"$, and $\Delta X(HS)=8.162"$. The drawing shows the existence of a wall penetration 2'-10 1/2' from data point 85. This wall penetration will restrict the seismic deflection of the pipe to 5-5/8" laterally at any point in the penetration. Because of this penetration, the maximum deflection at data point 85 is expected to be approximately 2-1/8" which is comparable to the "DE" case where stress would be proportional to deflection. Clearly, it can be concluded that the seismic stresses in the piping will be significantly less than those calculated.

Based on this analysis, it is concluded that the criteria for a code break has been met.

6

WELD NCR

ONSITE PROJECT ENGINEERING GROUP
REQUEST FOR WELD INSPECTION

TO: HARRY HALFHILL

REQUEST NUMBER: [illegible]

FROM: KELLY J. CONDRON

PAGE 1 OF 1

EXT: 3502

PLEASE CONFIRM THAT FOR A SOCKET WELDED FITTING TOE OF WELD BLENDS SMOOTHLY WITH NO UNDERCUT WITH PIPE WALL.

WELD NO. SEE SKETCH BELOW

LINE NO. 2477

AREA GE

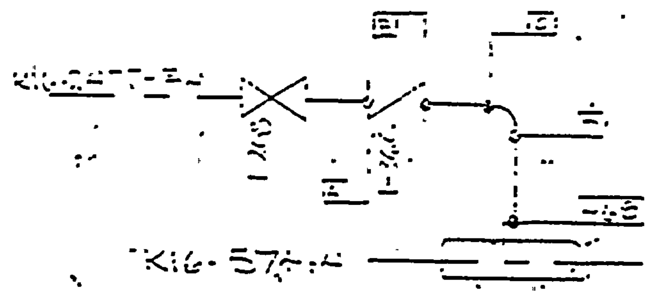
ISOMETRIC NO. H3-212

ELEVATION 130'

P.I. or COL. 4½" E of R

Rad. or LINE 7.10% of 15

DESCRIPTION:



VERIFY THAT WELDS A, B, C, D, 468 HAVE NO UNDERCUT AND BLEND SMOOTHLY WITH THE BASE MATERIAL.

INSPECTOR'S COMMENTS:

WELD A - SLIGHT UNDERCUT / DOESN'T BLEND SMOOTHLY

WELD B - UNDERCUT & GRINDING MARK / DOESN'T BLEND SMOOTHLY

WELD C - NO UNDERCUT / DOESN'T BLEND SMOOTHLY

WELD D - UNDERCUT / DOESN'T BLEND SMOOTHLY

WELD 468 - UNDERCUT / DOESN'T BLEND SMOOTHLY

INSPECTOR'S SIGNATURE [signature]

DIABLO CANYON PROJECT

TELEPHONE CALLS

FROM: E. NILES OF: OPEG. PHONE: (415) [illegible] DATE: [illegible]

TO: L. NICHOLSON OF: BECHTEL SFO JOB NO. [illegible] ITEM: [illegible] TIME: 3:00 PM

ITEMS OF DISCUSSION	ACTION REQ'D. (INCLUDE NAMES & DATES)
SUBJECT: RESPONSE SPECTRA	
SPECTRA FILE #3-315	
1. THE STRESS ANALYST HAD MODIFIED A SLOT INTO AN ANCHOR.	
2. THE SLOT IS STRUCTURALLY ATTACHED TO A WALL IN THE CONTAINMENT PENETRATION AREA AND THE NEW ANCHOR WILL ALSO BE ATTACHED TO THE SAME STRUCTURE.	
3. PLEASE NOTE THAT NONE OF THE RESTRAINTS ARE ATTACHED TO CONTAINMENT EXTERIOR WALL.	
4. THEREFORE, THERE WILL NOT BE ANY CHANGES IN THE SPECTRA EVENTUALLY. SPECTRA IS FINAL.	

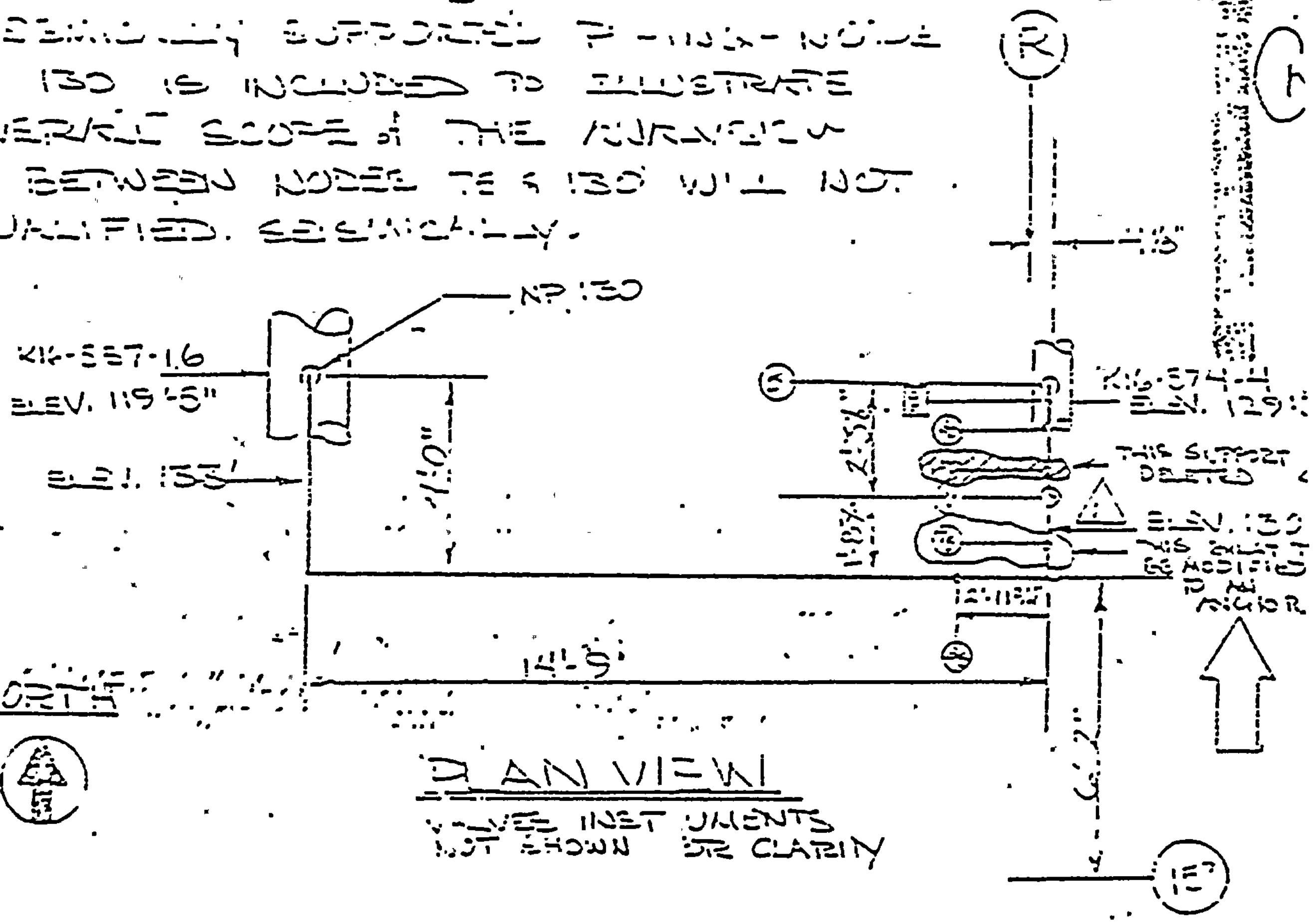
WRITTEN RESPONSE REQUESTED

BY: [illegible]

BY DATE

SPECTRAL PACKAGE DATA

ANALYSIS 13-313 IS BEING RUN TO PROVIDE ADDITIONAL DATA TO THE PSS WHICH SUBSTANTIATE SEISMIC STRESSES IN THE REGION OF NODES 5 TO 75 ARE ACCEPTABLE. NON-SEISMICALLY SUPPORTED PIPING NODE 85 TO 130 IS INCLUDED TO ILLUSTRATE THE OVERALL SCOPE OF THE ANALYSIS. PIPING BETWEEN NODES 75 & 130 WILL NOT BE QUALIFIED SEISMICALLY.



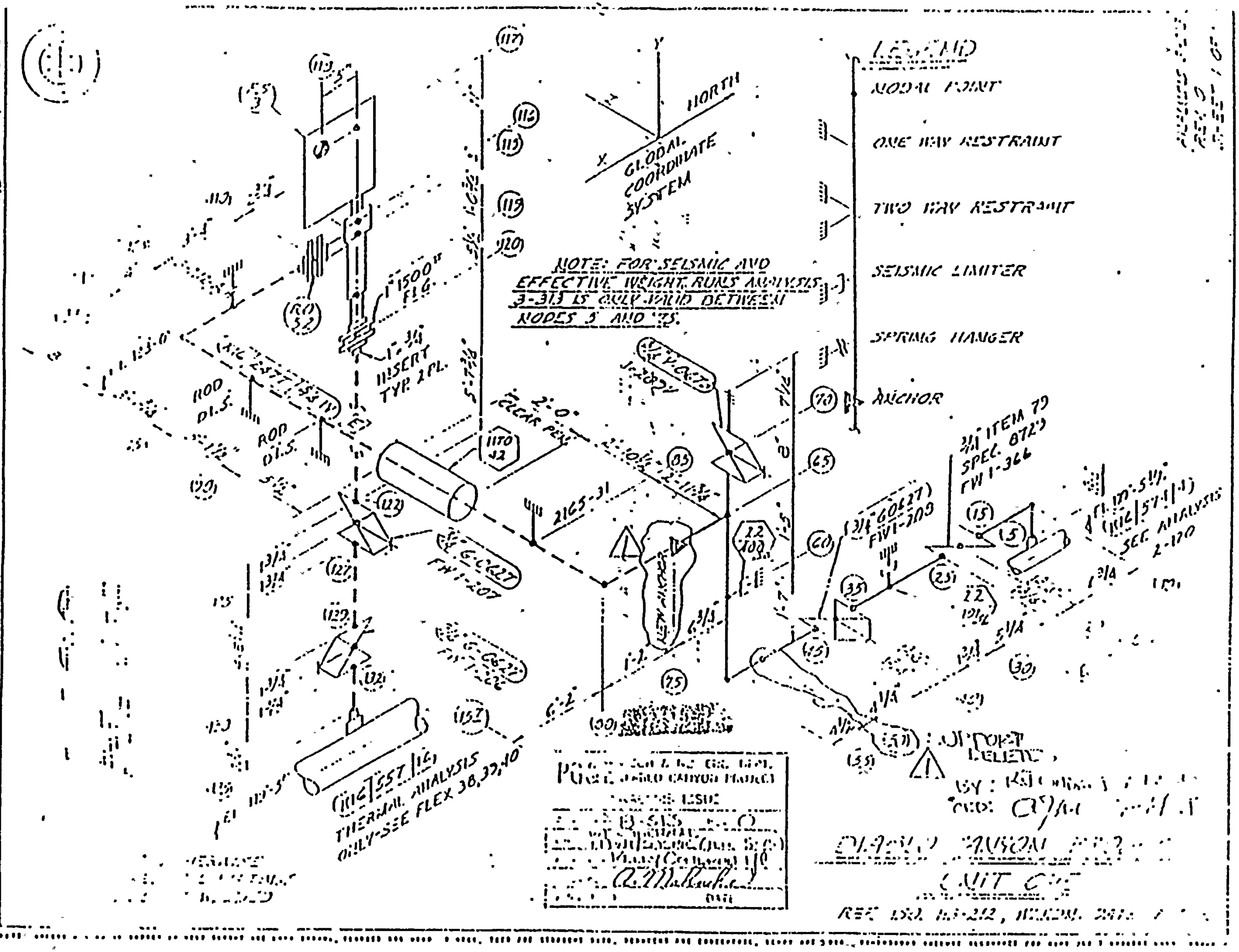
PLAN VIEW

VALVES INSTRUMENTS NOT SHOWN FOR CLARITY

LINE NO.	PIPE SIZE	SUPPORT I.D.	DATA POINT	DIRECTION OF RESTRAINT (VERT., LAT., AUX., ETC.)	ATTACH. STRUCTURE & EL.
2477	3/4 Ø S/O	-1BORE LINE 574	5	ANCHOR	NOT APPLICABLE
		22-401 SH	30	Y	CNTMT. PENETRATION RM CEILING @ EL. 137' AREA (E)
		2165-15	35	DELETED	CONTAINMENT AREA WALL @ EL. 131'
		22-400 SH	60	X	CONT PEN AREA WALL @ EL. 131'7"
		NEW ANCHOR 2165-32	75	ANCHOR	CONTMT PENET. RM WALL @ EL. 133' & 125'
		2165-31	85	Y	CONTMT PEN. AREA CEILING @ EL 137'
		1BORE LINE 557	130	ANCHOR	NOT APPLICABLE No Seismic Analysis

COPY

0 U 4 3 3 2 /


LEGEND
NODAL POINT
ONE WAY RESTRAINT
TWO WAY RESTRAINT
SEISMIC LIMITER
SPRING HANGER
ANCHOR
GLOBAL COORDINATE SYSTEM
NORTH
NOTE: FOR SEISMIC AND EFFECTIVE WEIGHT RUNS ANALYSIS 3-313 IS ONLY VALID BETWEEN NODES 5 AND 75.
1 1500# FLG.
1-3/4 INSERT TYP. 2 PL.
ROD DIS.
2'-0" CLEAR PEN.
2165-31
3/4 ITEM 79 SPEC. 8729 FW1-366
SEE ANALYSIS 2-170
THERMAL ANALYSIS ONLY-SEE FLEX 38,39,40
FW1-207
SUPPORT DELETED
UNIT 2

VERSION PRE-FIX1
PASSWORD KJC

TIT=AUX FEED FF 3/3 DISC FILL,
PROBNO=3-313REV0,
PROJNO=15:20,
USER=R.GRAY,
DC=ON,DIGN=6,UNITS=2,
MODE=30,FR=.025,
LDCASE=WTPI(A+W),
LDCASE=EF T01(A),

THRM1=START UP/SHUTDOWN
FTR NODES 5 TO 20
DIFF NODES 20 TO 135

THRM2=...ENVELOPES ... 445,...AND ...
... NODES 5 TO 135

LDCASE=THRM01(1),
LDCASE=TH-MV2(2),
LDCASE=SEISDX(A),
LDCASE=SEISDZ(A),
LDCASE=SEISHX(A),
LDCASE=SEISHZ(A),

SAM LOAD CASES ARE NOT REQUIRED SINCE DISPLACEMENTS ARE LESS THAN 1/16"

5 -.165 ROT-Z=-.00158 .1
5 .174 ROT-Z=.00161, .2

EXP=-0.231 .1
EXP=2.99
CODE=B31S73,DPRESS=1586,
SC=15000,SH=15000,
OD=1.05,THI=.154,LBS/FT=3.1,
I=27.956,

6		.031	SIF=2.1,
10		0-1-3/4	SIF=2.1,
15	0-4.7		SIF=2.1,
25	0-1.8		THI=.308,LBS/FT=0,ADDWT=4.2,
25	0-1.8		SIF=2.1,
			EXP=0.305
30	0-5.2		THI=.154,LBS/FT=3.1,
			DPRESS=1415,
			DTI=SNB 22-401SL,
30		1	
35	0-1.8		SIF=2.1,
40	0-1.7		THI=.308,LBS/FT=0,ADDWT=2.6,
45	0-1.7		SIF=2.1,
50	0-4.3		THI=.154,LBS/FT=3.1,

[illegible]

[illegible] 1-2 CIF=P.1,

2-11-37[illegible] [illegible]TI=C169-.1,ADDWT=32.5

THE MASS OF 3 SPAN LENGTHS WAS LUMPED AT NODE [illegible] SEISMICALLY ACCT FOR THE MASS CONTRIBUTION AFFECTS OF THE CLASS [illegible] PIPING. NOTE THAT APPROACH DOES NOT ADDRESS THERMAL AFFECTS FOR SAME.

HOSGRI HORIZ.	HOSGRI VERT.	DE HORIZ.	DE VERT.
HA56+2.148(HA44)	HA32	DA13+1.301(HA20)	22a
HA51+1.301(HA57)	HA33	DA13+1.3[illegible](HA16)	
HA22+2.148(HA50)			
HA4[illegible]+1.193(HA54)			

1. CRITERIA FOR UTILIZATION OF DESIGN EARTHQUAKE RESPONSE SPECTRA FOR STRUCTURES, SYSTEMS AND COMPONENTS DIABLO CANYON POWER PLANT, UNIT 1 AND 2 DCM NO. C-25,REV. 2[illegible]

2. CRITERIA FOR UTILIZATION OF HOSGRI 7.5 M EARTHQUAKE RESPONSE SPECTRA FOR STRUCTURES, SYSTEMS AND COMPONENTS DIABLO CANYON POWER PLANT, UNIT 1 AND 2 DCM NO. C-17,REV. 7

TITLE=[illegible] CAL. NO. 3-31

[illegible]

.0145,	.4018,	.0171,	.5757,	.[illegible]207,	.57
.0236,	.5825,	.0253,	.7650,	.[illegible]510,	.76
.0332,	.7598,	.0360,	.5[illegible],	.[illegible]440,	.5[illegible]
.0441,	.5313,	.0470,	.[illegible],	.[illegible]	.7[illegible]
.0557,	.8[illegible],	.0600,	.7116,	.[illegible]	.[illegible]
.0643,	1.3292,	.0675,	1.[illegible],	.[illegible]	1.[illegible]
.0707,	2.3145,	.0[illegible],	4.[illegible],	.[illegible]	4.[illegible]
.1100,	3.6442,	.1125,	2.5556,	.[illegible]222,	2.47
.1375,	2.4433,	.1385,	1.8412,	.1467,	1.[illegible]
.1571,	1.6561,	.1672,	1.[illegible],	.[illegible]	1.3[illegible]
.1630,	1.4998,	.1[illegible],	1.7741,	.[illegible]	1.77
.2340,	1.7696,	.27[illegible],	.[illegible],	.[illegible]	1.[illegible]
.2[illegible],	1.[illegible]179,	.30[illegible],	1.[illegible],	.[illegible]	1.[illegible]
.3333,	1.3539,	.3667,	1.3[illegible],	.[illegible]27,	1.[illegible]
.4231,	1.3252,	.45[illegible],	1.1[illegible],	.[illegible]	.[illegible]
.5[illegible],	.7018,	.6[illegible],	.[illegible],	.[illegible]7[illegible],	.74
.7[illegible],	.7192,	.7[illegible],	.[illegible]7,	.[illegible]	.[illegible]
.[illegible]182,	.[illegible]656,	1.00[illegible],	.[illegible],	1.[illegible]	.[illegible]
1.2222,	.4[illegible]57,	1.3750,	.2545,	1.[illegible]	.[illegible]
1.8333,	.2699,	2.2000,	.1[illegible],	2.[illegible]	.[illegible]
3.[illegible]667,	.0661,	[illegible].5000,	.0[illegible],		

[illegible]

.[illegible]01[illegible],	.1330,	.0500,	.1[illegible],	.[illegible]	.[illegible]
.0800,	.[illegible]670,	.0900,	.[illegible]670,	.[illegible]	.[illegible]
.1203,	.[illegible]70,	.13[illegible],	.[illegible]57[illegible],	.[illegible]	.[illegible]