RCP

RCP, Inc

801 Louisiana, Ste.200
Houston, Texas 77002
Redacted

October 20, 2011

Pacific Gas and Electric Company
350 N. Wiget
Walnut Creek, CA 94598
Attention: Redacted

Test Contractor:	ARB – T-34 10/20/11
Asset Owner:	Pacific Gas and Electric Company – 41497355
Construction Contractor:	ARB – 0629-53-3500 T-34
Test Section:	PG&E T-34 , L-132 , MP31.95 - 34.68
Test Date:	October 20, 2011
Certificate Number:	RCP 61362 - T-34, L-132, MP 31.95 - 34.68

To whom it may concern,

This letter is to certify that the hydrostatic test performed on pipe owned by Pacific Gas and Electric Company and tested by ARB met the requirements of the Code of Federal Regulations, Title 49, Part 192, Subpart J (Class 3).

The test segment was subjected to a spike pressure test of 717 psig for 30 minutes, without observed leakage or yielding of the pipe segment. The 30 minute spike test and subsequent pressure reduction with volume bleed was included and is part of the 8.17 hour test duration period.

This hydrostatic test was completed successfully. Pressure was maintained on the test facilities in excess of 8.17 continuous hours without evidence of a leak failure. Water was the test medium. At the highest elevation point in the test section, the calculated test pressure was 612 psig and the MAOP per 49 CFR Part 192, Subpart J can be as high as 408 psig. The MAOP established by this test is sufficient to qualify for Pacific Gas and Electric Company's desired MAOP of 400 psig.

Pressure decreased 48 psi during the test. 25,568.00 ounces of fluid was intentionally released from the test section Net corrected volumetric change from beginning of the test to the end of the test is calculated to be 4,540.87 ounces, gain, which is equivalent to a 0.94 °F change in pipe temperature and within the error attributed to the temperature measurement instrumentation utilized.

Test pressure did not remain steady even though no leaks were observed. The volumetric gain is attributed to the error characteristic of the temperature measurement instrumentation utilized.

Sincerely,

Redacted

cc. file

Redacted

Hydrostatic Test Certification

RCP

Company	Pacific Gas and Electric Company	Job Number	41497355
Construction Co.	ARB	Job Number	0629-53-3500 T-34
Hydro. Test Co.	ARB	Project No.	T-34 10/20/11
Test Section	PG&E T-34 , L-132 , MP31.95 - 34.68		
File Name	RCP 61362 - T-34, L-132, MP 31.95 - 34.68		

Hydrostatic Test Pressure

APPLICABLE CODE FOR CERTIFICATION: Test Date: 20-Oct-11

Code of Federal Regulations, Title 49, Part 192, Subpart J (Class 3)

This is to certify that the pipeline or pipeline section(s) described below was hydrostatically pressure tested in accordance with the following procedure:

Pipeline: PG&E T-34 , L-132 , MP31.95 - 34.68

From: 0+00 To: 145+54

Pipe Data

Segment	Length	Diameter	Wall Thickness	Specification	100% SMYS
1	5 ft	36.000 in.	0.500 in.	API5L-X65, DSAW, Arc Weld, Steel	1,905 psi
2	44 ft	30.000 in.	0.375 in.	API5L-X65, DSAW, Arc Weld, Steel	1,625 psi
3	4,876 ft	36.000 in.	0.313 in.	API5L-X52, DSAW, Arc Weld, Steel	965 psi
4	9,754 ft	30.000 in.	0.375 in.	API5L-X52, DSAW, Arc Weld, Steel	1,300 psi
5	15 ft	30.000 in.	0.313 in.	API5L-X52, DSAW, Arc Weld, Steel	1,083 psi
6	3 ft	12.750 in.	0.375 in.	API5L-Grade B, SM, Arc Weld, Steel	2,059 psi
7	71 ft	2.375 in.	0.154 in.	API5L-Grade B, SM, Arc Weld, Steel	4,539 psi
8	30 ft	1.315 in.	0.191 in.	API5L-Grade B, SM, Arc Weld, Steel	10,157 psi
9	115 ft	1.315 in.	0.113 in.	API5L-Grade B, SM, Arc Weld, Steel	6,015 psi
10	8 ft	36.000 in.	0.750 in.	API5L-X60, DSAW, Arc Weld, Steel	2,500 psi
11	9 ft	30.000 in.	0.750 in.	API5L-X70, DSAW, Arc Weld, Steel	3,500 psi

Initial Test Conditions

Pressure at Test Point:	717 psig	Date/Time:	10/20/11 1:05 PM	Pipe Temperature Unrestrained:	64.0 °F
Ambient Temperature:	68.0 °F			Restrained:	61.0 °F
		Elevation @ Test Point:	568.0 ft	Location:	0+00
Pressure @ High Point (Cal/Measure):	660 psig	Elevation @ High Point:	699.0 ft	Location:	61+69
Pressure @ Low Point (Cal/Measure):	717 psig	Elevation @ Low Point:	567.0 ft	Location:	0+55

Final Test Conditions

Pressure at Test Point:	669 psig	Date/Time:	10/20/11 9:15 PM	Pipe Temperature Unrestrained:	63.0 °F
Ambient Temperature:	58.0 °F			Restrained:	61.0 °F
		Elevation @ Test Point:	568.0 ft	Location:	0+00
Pressure @ High Point (Cal/Measure):	612 psig	Elevation @ High Point:	699.0 ft	Location:	61+69
Pressure @ Low Point (Cal/Measure):	669 psig	Elevation @ Low Point:	567.0 ft	Location:	0+55
	Total Fluid Injected:			Volume gain	
	Total Fluid Withdrawn:	25568.00 fluid ounces			
Net Change in Volume of the Test Section = (+ Gain, - Loss):		4,540.87 oz	gain	0.0061%	0.938 °F equivalent

Test Duration: 8.17 hours

Minimum Test Pressure:	Test Point	669 psig	Max Elevation	612 psig	Min Elevation	669 psig
Maximum Test Pressure:		717 psig		660 psig		717 psig
% SMYS:		15.0%		50.8%		55.2%

Test Segment Observed % SMYS:		Minimum	7.1%	Maximum	77.4%
				Minimum Test Pressure (Calculated/Measured):	612 psig
		Maximum Allowable Operating Pressure:	DOT Part 192	Test Factor= 1.50	408 psig

The MAOP established by this test is sufficient to qualify for Pacific Gas and Electric Company's desired MAOP of 400 psig.

Were leaks observed?	No	Explain:
Acceptable Hydrostatic Test?	Yes	The test segment was subjected to a spike pressure test of 717 psig for 30 minutes, without observed leakage or yielding of the pipe segment. The 30 minute spike test and subsequent pressure reduction with volume bleed was included and is part of the 8.17 hour test duration period. No leaks were observed during the test period. The test section included 14,448 feet of buried and 283 feet of exposed pipe. Pressure lost 48 psi during the test. The buried pipe segment fluid temperature remained steady and the exposed pipe segment lost 1°F. 25,568.00 ounces of fluid was intentionally released from the test section. Net corrected volumetric change from beginning of the test to the end of the test is calculated to be 4,540.87 ounces, gain, which is equivalent to a 0.94 °F change in pipe temperature and within the error attributed to the temperature measurement instrumentation utilized. Test pressure did not remain steady even though no leaks were observed. The volumetric gain is attributed to the error characteristic of the temperature measurement instrumentation utilized.
Remarks		

Redacted

20-Oct-11

COPY

OCT 20 2011

PG & E

Dead Weight Log Sheet

Owner Company	Pacific Gas and Electric Company	Job Number	41497355
Construction Co.	ARB	Job Number	0629-53-3500 T-34
Testing Co.	ARB	Project No.	T-34 10/20/11
Test Section	PG&E T-34 , L-132 , MP31.95 - 34.68		
File Name	RCP 61362 - T-34, L-132, MP 31.95 - 34.68		

Date 20-Oct-11

Test Log

Log No.	Test Period		Test Pressure	Temperature °F			Remarks		
	Date	Time		Ambient	Pipe				
					Unrestrained	Restrained	Comment	Bleed	Inject
1	10/20/11	12:00 PM	493 psig	66 °F	62 °F	61 °F	Start Spike		
2	10/20/11	12:03 PM	503 psig	66 °F	62 °F	61 °F	Inject		5,444 oz.
3	10/20/11	12:06 PM	513 psig	66 °F	62 °F	61 °F	Inject		6,028 oz.
4	10/20/11	12:09 PM	523 psig	66 °F	62 °F	61 °F	Inject		6,145 oz.
5	10/20/11	12:12 PM	533 psig	66 °F	62 °F	61 °F	Inject		5,744 oz.
6	10/20/11	12:15 PM	543 psig	66 °F	62 °F	61 °F	Inject		6,162 oz.
7	10/20/11	12:18 PM	553 psig	66 °F	62 °F	61 °F	Inject		5,844 oz.
8	10/20/11	12:21 PM	563 psig	66 °F	62 °F	61 °F	Inject		5,778 oz.
9	10/20/11	12:24 PM	573 psig	66 °F	62 °F	61 °F	Inject		5,694 oz.
10	10/20/11	12:27 PM	583 psig	66 °F	62 °F	61 °F	Inject		5,728 oz.
11	10/20/11	12:30 PM	593 psig	66 °F	62 °F	61 °F	Inject		5,444 oz.
12	10/20/11	12:33 PM	603 psig	66 °F	62 °F	61 °F	Inject		5,627 oz.
13	10/20/11	12:36 PM	613 psig	66 °F	62 °F	61 °F	Inject		5,577 oz.
14	10/20/11	12:38 PM	623 psig	66 °F	62 °F	61 °F	Inject		5,193 oz.
15	10/20/11	12:40 PM	633 psig	66 °F	62 °F	61 °F	Inject		5,460 oz.
16	10/20/11	12:42 PM	643 psig	66 °F	62 °F	61 °F	Inject		5,377 oz.
17	10/20/11	12:44 PM	653 psig	66 °F	62 °F	61 °F	Inject		5,243 oz.
18	10/20/11	12:47 PM	663 psig	66 °F	62 °F	61 °F	Inject		5,327 oz.
19	10/20/11	12:50 PM	673 psig	66 °F	62 °F	61 °F	Inject		4,926 oz.
20	10/20/11	12:53 PM	683 psig	66 °F	62 °F	61 °F	Inject		5,527 oz.
21	10/20/11	12:56 PM	693 psig	66 °F	62 °F	61 °F	Inject		5,360 oz.
22	10/20/11	12:58 PM	703 psig	67 °F	64 °F	61 °F	Inject		5,060 oz.
23	10/20/11	1:01 PM	713 psig	68 °F	64 °F	61 °F	Inject		3,707 oz.
24	10/20/11	1:03 PM	717 psig	68 °F	64 °F	61 °F	Inject		1,461 oz.
25	10/20/11	1:05 PM	717 psig	68 °F	64 °F	61 °F	On Test		
26	10/20/11	1:15 PM	717 psig	68 °F	64 °F	61 °F			
27	10/20/11	1:25 PM	717 psig	68 °F	64 °F	61 °F			
28	10/20/11	1:35 PM	717 psig	68 °F	64 °F	61 °F	End Spike		
29	10/20/11	1:50 PM	695 psig	69 °F	64 °F	61 °F		11,968 oz.	
30	10/20/11	2:05 PM	670 psig	69 °F	64 °F	61 °F		13,600 oz.	
31	10/20/11	2:20 PM	670 psig	69 °F	65 °F	61 °F			
32	10/20/11	2:35 PM	670 psig	69 °F	66 °F	61 °F			
33	10/20/11	2:50 PM	670 psig	69 °F	66 °F	61 °F			
34	10/20/11	3:05 PM	671 psig	69 °F	66 °F	61 °F			
35	10/20/11	3:20 PM	671 psig	68 °F	66 °F	61 °F			
36	10/20/11	3:35 PM	671 psig	69 °F	66 °F	61 °F			
37	10/20/11	3:50 PM	671 psig	69 °F	66 °F	61 °F			
38	10/20/11	4:05 PM	671 psig	69 °F	66 °F	61 °F			
39	10/20/11	4:20 PM	671 psig	68 °F	66 °F	61 °F			
40	10/20/11	4:35 PM	671 psig	67 °F	66 °F	61 °F			
41	10/20/11	4:50 PM	671 psig	67 °F	66 °F	61 °F			
42	10/20/11	5:05 PM	671 psig	67 °F	66 °F	61 °F			
43	10/20/11	5:20 PM	671 psig	65 °F	66 °F	61 °F			
44	10/20/11	5:35 PM	671 psig	64 °F	66 °F	61 °F			
45	10/20/11	5:50 PM	671 psig	64 °F	66 °F	61 °F			
46	10/20/11	6:05 PM	671 psig	62 °F	66 °F	61 °F			
47	10/20/11	6:20 PM	671 psig	63 °F	65 °F	61 °F			

Redacted

Dead Weight Log Sheet

Owner Company	Pacific Gas and Electric Company	Job Number	41497355
Construction Co.	ARB	Job Number	0529-53-3500 T-34
Testing Co.	ARB	Project No.	T-34 10/20/11
Test Section	PG&E T-34 , L-132 , MP31.95 - 34.68		
File Name	RCP 61362 - T-34, L-132, MP 31.95 - 34.68		

Date: 20-Oct-11

Test Log

Log No.	Test Period		Test Pressure	Temperature °F			Remarks		
	Date	Time		Ambient	Pipe				
					Unrestrained	Restrained	Comment	Bleed	Inject
48	10/20/11	6:35 PM	671 psig	61 °F	64 °F	61 °F			
49	10/20/11	6:50 PM	671 psig	58 °F	64 °F	61 °F			
50	10/20/11	7:05 PM	670 psig	58 °F	64 °F	61 °F			
51	10/20/11	7:20 PM	670 psig	58 °F	64 °F	61 °F			
52	10/20/11	7:35 PM	670 psig	58 °F	64 °F	61 °F			
53	10/20/11	7:50 PM	670 psig	58 °F	64 °F	61 °F			
54	10/20/11	8:05 PM	670 psig	57 °F	63 °F	61 °F			
55	10/20/11	8:20 PM	670 psig	58 °F	63 °F	61 °F			
56	10/20/11	8:35 PM	670 psig	58 °F	63 °F	61 °F			
57	10/20/11	8:50 PM	669 psig	58 °F	63 °F	61 °F			
58	10/20/11	9:05 PM	669 psig	58 °F	63 °F	61 °F			
59	10/20/11	9:15 PM	669 psig	58 °F	63 °F	61 °F	End of Test		
							Spike Test		121,856.0 oz.
							Hydrostatic Test	25,568.0 oz.	

Were leaks observed during the test period?	Exposed and buried pipe, no leaks observed.	High Test Pressure:	717 psig
		Low Test Pressure:	669 psig

COPY
OCT 20 2011
PG & E

Redacted

Pipe Segment Volume Calculations

Company	Pacific Gas and Electric Company	Job Number	41497355
Construction Co.	ARB	Job Number	0629-53-3500 T-34
Hydro. Test Co.	ARB	Project No.	T-34 10/20/11
Test Section	PG&E T-34 , L-132 , MP31.95 - 34.68	WATER	
File Name	RCP 61362 - T-34, L-132, MP 31.95 - 34.68		

General Pipe Data

Description	Segment 1	2	3	4	5	6	7	8
Restrained or Unrestrained?	Unrestrained	Unrestrained	Restrained	Restrained	Restrained	Restrained	Unrestrained	Unrestrained
Outside Diameter	36.000 in.	30.000 in.	36.000 in.	30.000 in.	30.000 in.	12.750 in.	2.375 in.	1.315 in.
Wall Thickness	0.500 in.	0.375 in.	0.313 in.	0.375 in.	0.313 in.	0.375 in.	0.154 in.	0.191 in.
Inside Diameter	35.000 in.	29.250 in.	35.375 in.	29.250 in.	29.375 in.	12.000 in.	2.067 in.	0.933 in.
Spec./Grade	API5L-X65	API5L-X65	API5L-X52	API5L-X52	API5L-X52	API5L-Grade B	API5L-Grade B	API5L-Grade B
Length Unrestrained	5 ft	44 ft					71 ft	30 ft
Length Restrained			4,676 ft	9,754 ft	15 ft	3 ft		
Temperature – On Test	64 °F	64 °F	61.0 °F	61.0 °F	61.0 °F	61.0 °F	64.0 °F	64.0 °F
Temperature – End of Test	63 °F	63 °F	61.0 °F	61.0 °F	61.0 °F	61.0 °F	63.0 °F	63.0 °F
Pressure – On Test	717 psig	717 psig	717 psig	717 psig	717 psig	717 psig	717 psig	717 psig
Pressure – End of Test	669 psig	669 psig	669 psig	669 psig	669 psig	669 psig	669 psig	669 psig

Unrestrained Pipe

Vo	2,540.12 gal / 325,136 oz.		Vtp1	2,549.99 gal / 326,399 oz.		Vtp2	2,549.50 gal / 326,337 oz.	
Vo Unrestrained	250 gal	1,536 gal					12 gal	1 gal
Fwp 1	1.002195	1.002195					1.002195	1.002195
Fpp 1	1.002091	1.002330					1.000401	1.000145
Fpt 1	1.000073	1.000073					1.000073	1.000073
Fwt 1	1.000375	1.000375					1.000375	1.000375
Fpwt 1 = Fpt/Fwt	0.999698	0.999698					0.999698	0.999698
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	250.90 gal	1,542.40 gal					12.40 gal	1.07 gal
Fwp 2	1.002048	1.002048					1.002048	1.002048
Fpp 2	1.001951	1.002174					1.000374	1.000136
Fpt 2	1.000055	1.000055					1.000055	1.000055
Fwt 2	1.000267	1.000267					1.000267	1.000267
Fpwt = Fpt/Fwt	0.999788	0.999788					0.999788	0.999788
Vtp = Vo(Fwp)(Fpp)(Fpwt)	250.85 gal	1,542.07 gal					12.40 gal	1.07 gal

Restrained Pipe

Vo	579,756.05 gal / 74,210,311 oz.		Vtp1	582,172.20 gal / 74,518,042 oz.		Vtp2	582,008.41 gal / 74,497,077 oz.	
Vo Unrestrained			238,741 gal	340,482 gal	528 gal	18 gal		
Fwp 1			1.002195	1.002195	1.002195	1.002195		
Fpp 1			1.002466	1.001700	1.002048	1.000700		
Fpt 1			1.000012	1.000012	1.000012	1.000012		
Fwt 1			1.000080	1.000080	1.000080	1.000080		
Fpwt 1 = Fpt/Fwt			0.999932	0.999932	0.999932	0.999932		
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)			239,838 gal	341,786 gal	530 gal	18 gal		
Fwp 2			1.002048	1.002048	1.002048	1.002048		
Fpp 2			1.002301	1.001586	1.001911	1.000653		
Fpt 2			1.000012	1.000012	1.000012	1.000012		
Fwt 2			1.000080	1.000080	1.000080	1.000080		
Fpwt = Fpt/Fwt			0.999932	0.999932	0.999932	0.999932		
Vtp = Vo(Fwp)(Fpp)(Fpwt)			239,764 gal	341,697 gal	530 gal	18 gal		

Combined Pipe

Vo	582,308.18 gal / 74,535,447 oz.	Vtp1	584,722.19 gal / 74,844,440 oz.	Vtp2	584,557.91 gal / 74,823,413 oz.

Redacted

RCP

Pipe Segment Volume Calculations

Company	Pacific Gas and Electric Company
Construction Co.	ARB
Hydro. Test Co.	ARB
Test Section	PG&E T-34 , L-132 , MP31.95 - 34.68
File Name	RCP 61362 - T-34, L-132, MP 31.95 - 34.68

General Pipe Data								
Description								
	9	10	11					
Restrained or Unrestrained?	Unrestrained	Unrestrained	Unrestrained					
Outside Diameter	1.315 in.	36.000 in.	30.000 in.					
Wall Thickness	0.113 in.	0.750 in.	0.750 in.					
Inside Diameter	1.089 in.	34.500 in.	28.500 in.					
Spec/Grade	API5L-Grade B	API5L-X60	API5L-X70					
Length Unrestrained	115 ft	9 ft	9 ft					
Length Restrained								
Temperature – On Test	64.0 °F	64.0 °F	64.0 °F					
Temperature – End of Test	63.0 °F	63.0 °F	63.0 °F					
Pressure – On Test	717 psig	717 psig	717 psig					
Pressure – End of Test	669 psig	669 psig	669 psig					
Unrestrained Pipe								
Vo								
Vo Unrestrained	6 gal	437 gal	298 gal					
Fwp 1	1.002195	1.002195	1.002195					
Fpp 1	1.000288	1.001374	1.001135					
Fpt 1	1.000073	1.000073	1.000073					
Fwt 1	1.000375	1.000375	1.000375					
Fpwt 1 = Fpt/Fwt	0.999698	0.999698	0.999698					
Vp 1 = Vo(Fwp)(Fpp)(Fpwt)	5.58 gal	438.49 gal	299.16 gal					
Fwp 2	1.002048	1.002048	1.002048					
Fpp 2	1.000269	1.001282	1.001059					
Fpt 2	1.000055	1.000055	1.000055					
Fwt 2	1.000267	1.000267	1.000267					
Fpwt = Fpt/Fwt	0.999788	0.999788	0.999788					
Vp = Vo(Fwp)(Fpp)(Fpwt)	5.58 gal	438.42 gal	299.12 gal					
Restrained Pipe								
Vo								
Vo Unrestrained								
Fwp 1								
Fpp 1								
Fpt 1								
Fwt 1								
Fpwt 1 = Fpt/Fwt								
Vp 1 = Vo(Fwp)(Fpp)(Fpwt)								
Fwp 2								
Fpp 2								
Fpt 2								
Fwt 2								
Fpwt = Fpt/Fwt								
Vp = Vo(Fwp)(Fpp)(Fpwt)								
Combined Pipe								
Vo								

Redacted

Pipe Segment Volume Calculations

Company	Pacific Gas and Electric Company
Construction Co.	ARB
Hydro. Test Co.	ARB
Test Section	PG&E T-34 , L-132 , MP31.95 - 34.68
File Name	RCP 61362 - T-34, L-132, MP 31.95 - 34.68

General Pipe Data				
Description				
Restrained or Unrestrained?				
Outside Diameter				
Wall Thickness				
Inside Diameter				
Spec./Grade				
Length Unrestrained				
Length Restrained				
Temperature – On Test				
Temperature – End of Test				
Pressure – On Test				
Pressure – End of Test				
Unrestrained Pipe				
Vo				
Vo Unrestrained				
Fwp 1				
Fpp 1				
Fpt 1				
Fwt 1				
Fpwt 1 = Fpt/Fwt				
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)				
Fwp 2				
Fpp 2				
Fpt 2				
Fwt 2				
Fpwt = Fpt/Fwt				
Vtp = Vo(Fwp)(Fpp)(Fpwt)				
Restrained Pipe				
Vo				
Vo Unrestrained				
Fwp 1				
Fpp 1				
Fpt 1				
Fwt 1				
Fpwt 1 = Fpt/Fwt				
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)				
Fwp 2				
Fpp 2				
Fpt 2				
Fwt 2				
Fpwt = Fpt/Fwt				
Vtp = Vo(Fwp)(Fpp)(Fpwt)				
Combined Pipe				
Vo				

Redacted

Pipe Segment Volume Allowance Calculations

Company	Pacific Gas and Electric Company	Job Number	41497355
Construction Co.	ARB	Job Number	0629-53-3500 T-34
Hydro. Test Co.	ARB	Project No.	T-34 10/20/11
Test Section	PG&E T-34 , L-132 , MP31.95 - 34.68	WATER	
File Name	RCP 61362 - T-34, L-132, MP 31.95 - 34.68		

General Pipe Data

Description	Segment 1	2	3	4	5	6	7	8
Restrained or Unrestrained?	Unrestrained	Unrestrained	Restrained	Restrained	Restrained	Restrained	Unrestrained	Unrestrained
Outside Diameter	36.000 in.	30.000 in.	36.000 in.	30.000 in.	30.000 in.	12.750 in.	2.375 in.	1.315 in.
Wall Thickness	0.500 in.	0.375 in.	0.313 in.	0.375 in.	0.313 in.	0.375 in.	0.154 in.	0.191 in.
Inside Diameter	35.000 in.	29.250 in.	35.375 in.	29.250 in.	29.375 in.	12.000 in.	2.067 in.	0.933 in.
Spec./Grade	API5L-X65	API5L-X65	API5L-X52	API5L-X52	API5L-X52	API5L-Grade B	API5L-Grade B	API5L-Grade B
Length Unstrained	5 ft	44 ft					71 ft	30 ft
Length Restrained			4,676 ft	9,754 ft	15 ft	3 ft		
Temperature – On Test	63 °F	63 °F	60 °F	60 °F	60 °F	60 °F	63 °F	63 °F
Temperature – End of Test	64 °F	64 °F	61 °F	61 °F	61 °F	61 °F	64 °F	64 °F
Pressure – On Test	693 psig	693 psig	693 psig	693 psig	693 psig	693 psig	693 psig	693 psig
Pressure – End of Test	693 psig	693 psig	693 psig	693 psig	693 psig	693 psig	693 psig	693 psig

Unrestrained Pipe

Vo	2,540.12 gal / 325,136 oz.		Vtp1	2,549.86 gal / 326,382 oz.		Vtp2	2,549.63 gal / 326,353 oz.	
Vo Unrestrained	250 gal	1,536 gal					12 gal	1 gal
Fwp 1	1.002122	1.002122					1.002122	1.002122
Fpp 1	1.002021	1.002252					1.000388	1.000141
Fpt 1	1.000055	1.000055					1.000055	1.000055
Fwt 1	1.000267	1.000267					1.000267	1.000267
Fpwt 1 = Fpt/Fwt	0.999788	0.999788					0.999788	0.999788
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	250.88 gal	1,542.30 gal					12.40 gal	1.07 gal
Fwp 2	1.002122	1.002122					1.002122	1.002122
Fpp 2	1.002021	1.002252					1.000388	1.000141
Fpt 2	1.000073	1.000073					1.000073	1.000073
Fwt 2	1.000375	1.000375					1.000375	1.000375
Fpwt = Fpt/Fwt	0.999698	0.999698					0.999698	0.999698
Vtp = Vo(Fwp)(Fpp)(Fpwt)	250.86 gal	1,542.16 gal					12.40 gal	1.07 gal

Restrained Pipe

Vo	579,768.05 gal / 74,210,311 oz.		Vtp1	582,127.91 gal / 74,512,372 oz.		Vtp2	582,090.30 gal / 74,507,558 oz.	
Vo Restrained			238,741 gal	340,482 gal	528 gal	18 gal		
Fwp 1			1.002122	1.002122	1.002122	1.002122		
Fpp 1			1.002380	1.001640	1.001976	1.000673		
Fpt 1			1.000000	1.000000	1.000000	1.000000		
Fwt 1			1.000000	1.000000	1.000000	1.000000		
Fpwt 1 = Fpt/Fwt			1.000000	1.000000	1.000000	1.000000		
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)			239,817 gal	341,763 gal	530 gal	18 gal		
Fwp 2			1.002122	1.002122	1.002122	1.002122		
Fpp 2			1.002383	1.001643	1.001980	1.000676		
Fpt 2			1.000012	1.000012	1.000012	1.000012		
Fwt 2			1.000080	1.000080	1.000080	1.000080		
Fpwt = Fpt/Fwt			0.999932	0.999932	0.999932	0.999932		
Vtp = Vo(Fwp)(Fpp)(Fpwt)			239,801 gal	341,741 gal	530 gal	18 gal		

Combined Pipe

Vo	582,308.18 gal / 74,535,447 oz.		Vtp1	584,677.77 gal / 74,838,754 oz.		Vtp2	584,639.93 gal / 74,833,911 oz.	
1 °F Change	37.63 gal		4,842.76 oz.					

Redacted

Pipe Segment Volume Allowance Calculations

Company	Pacific Gas and Electric Company
Construction Co.	ARB
Hydro. Test Co.	ARB
Test Section	PG&E T-34 , L-132 , MP31.95 - 34.68
File Name	RCP 61362 - T-34, L-132, MP 31.95 - 34.68

General Pipe Data								
Description	9	10	11					
Restrained or Unrestrained?	Unrestrained	Unrestrained	Unrestrained					
Outside Diameter	1.315 in.	36.000 in.	30.000 in.					
Wall Thickness	0.113 in.	0.750 in.	0.750 in.					
Inside Diameter	1.089 in.	34.500 in.	28.500 in.					
Spec./Grade	API5L-Grade B	API5L-X60	API5L-X70					
Length Unstrained	115 ft	9 ft	9 ft					
Length Restrained								
Temperature – On Test	63 °F	63 °F	63 °F					
Temperature – End of Test	64 °F	64 °F	64 °F					
Pressure – On Test	693 psig	693 psig	693 psig					
Pressure – End of Test	693 psig	693 psig	693 psig					
Unrestrained Pipe								
Vo								
Vo Unrestrained	6 gal	437 gal	298 gal					
Fwp 1	1.002122	1.002122	1.002122					
Fpp 1	1.000278	1.001328	1.001097					
Fpt 1	1.000055	1.000055	1.000055					
Fwt 1	1.000267	1.000267	1.000267					
Fpwt 1 = Fpt/Fwt	0.999788	0.999788	0.999788					
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	5.58 gal	438.47 gal	299.15 gal					
Fwp 2	1.002122	1.002122	1.002122					
Fpp 2	1.000278	1.001328	1.001097					
Fpt 2	1.000073	1.000073	1.000073					
Fwt 2	1.000375	1.000375	1.000375					
Fpwt = Fpt/Fwt	0.999698	0.999698	0.999699					
Vtp = Vo(Fwp)(Fpp)(Fpwt)	5.58 gal	438.44 gal	299.13 gal					
Restrained Pipe								
Vo								
Vo Restrained								
Fwp 1								
Fpp 1								
Fpt 1								
Fwt 1								
Fpwt 1 = Fpt/Fwt								
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)								
Fwp 2								
Fpp 2								
Fpt 2								
Fwt 2								
Fpwt = Fpt/Fwt								
Vtp = Vo(Fwp)(Fpp)(Fpwt)								
Combined Pipe								
Vo								
1 °F Change								

Redacted

Pipe Segment Volume Allowance Calculations

Company	Pacific Gas and Electric Company
Construction Co.	ARB
Hydro. Test Co.	ARB
Test Section	PG&E T-34 , L-132 , MP31.95 - 34.68
File Name	RCP 61362 - T-34, L-132, MP 31.95 - 34.68

General Pipe Data				
Description				
Restrained or Unrestrained?				
Outside Diameter				
Wall Thickness				
Inside Diameter				
Spec./Grade				
Length Unstrained				
Length Restrained				
Temperature – On Test				
Temperature – End of Test				
Pressure – On Test				
Pressure – End of Test				
Unrestrained Pipe				
Vo				
Vo Unrestrained				
Fwp 1				
Fpp 1				
Fpt 1				
Fwt 1				
Fpwt 1 = Fpt/Fwt				
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)				
Fwp 2				
Fpp 2				
Fpt 2				
Fwt 2				
Fpwt = Fpt/Fwt				
Vtp = Vo(Fwp)(Fpp)(Fpwt)				
Restrained Pipe				
Vo				
Vo Restrained				
Fwp 1				
Fpp 1				
Fpt 1				
Fwt 1				
Fpwt 1 = Fpt/Fwt				
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)				
Fwp 2				
Fpp 2				
Fpt 2				
Fwt 2				
Fpwt = Fpt/Fwt				
Vtp = Vo(Fwp)(Fpp)(Fpwt)				
Combined Pipe				
Vo				
1 °F Change				

Redacted

RCP

Hydrostatic Test Pipe Data Table

Pipe Type	Length	Restrained / Unrestrained	Outside Diameter	Wall Thickness	Specification & Grade	Pipe Yield Pressure	Material	Joint Type	Seam Type
1	5 ft	Unrestrained	36.000 in.	0.5000 in.	API5L-X65	1,806 psig	Steel	Arc Weld	DSAW
2	44 ft	Unrestrained	30.000 in.	0.3750 in.	API5L-X65	1,625 psig	Steel	Arc Weld	DSAW
3	4,676 ft	Restrained	36.000 in.	0.3125 in.	API5L-X52	903 psig	Steel	Arc Weld	DSAW
4	9,754 ft	Restrained	30.000 in.	0.3750 in.	API5L-X52	1,300 psig	Steel	Arc Weld	DSAW
5	15 ft	Restrained	30.000 in.	0.3125 in.	API5L-X52	1,083 psig	Steel	Arc Weld	DSAW
6	3 ft	Restrained	12.750 in.	0.3750 in.	API5L-Grade B	2,059 psig	Steel	Arc Weld	SM
7	71 ft	Unrestrained	2.375 in.	0.1540 in.	API5L-Grade B	4,539 psig	Steel	Arc Weld	SM
8	30 ft	Unrestrained	1.315 in.	0.1910 in.	API5L-Grade B	10,167 psig	Steel	Arc Weld	SM
9	115 ft	Unrestrained	1.315 in.	0.1130 in.	API5L-Grade B	6,015 psig	Steel	Arc Weld	SM
10	9 ft	Unrestrained	36.000 in.	0.7500 in.	API5L-X60	2,500 psig	Steel	Arc Weld	DSAW
11	9 ft	Unrestrained	30.000 in.	0.7500 in.	API5L-X70	3,500 psig	Steel	Arc Weld	DSAW

Hydrostatic Test Project Owner & Participants

Owner Company	Pacific Gas and Electric Company	Job Number
Address	350 N. Wiget Walnut Creek, CA 94598 Attention: Redacted	41497355
Construction Company	ARB	Job Number
Address	1875 Loveridge Road Pittsburg, CA 94565 Attention: Redacted	0629-53-3500 T-34
Hydrostatic Test Co.	ARB	Project No.
Address	1875 Loverridge Road Pittsburg, Ca. 94565 attention : Redacted	T-34 10/20/11
Test Section	PG&E T-34 , L-132 , MP31.95 - 34.68 From: 0+00 To: 146+54	
File Name	RCP 61362 - T-34, L-132, MP 31.95 - 34.68	

Part II – Test Data (TO BE PREPARED BY PERSON SUPERVISING TEST AT TIME OF TEST)

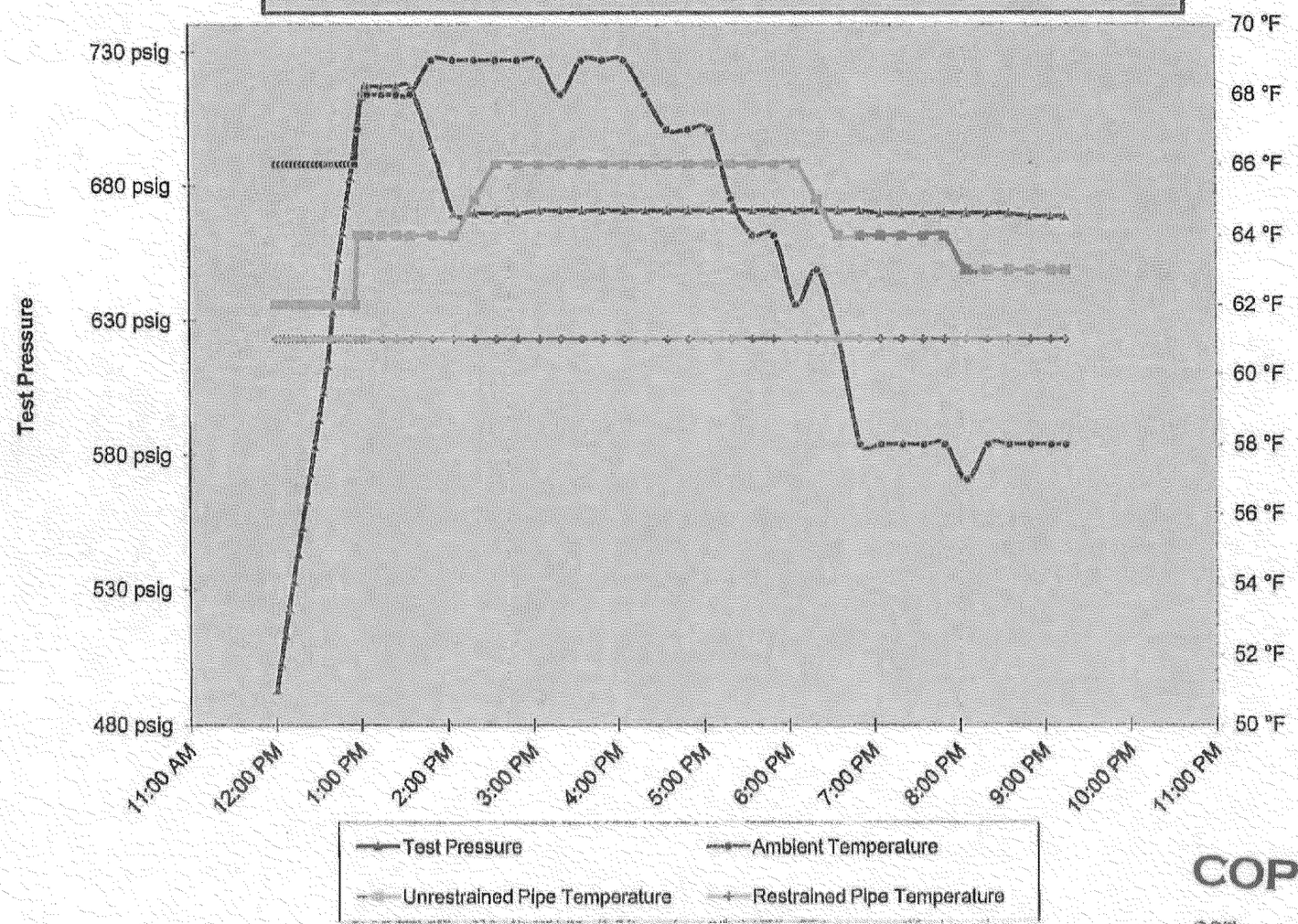
Note: Minimum test pressure and duration are not to be changed without written approval.

Time and Date Test Pressure Reached	10/20/11 1:05 PM	Elevation at Test Point	568 ft	Min. Required Test Press At Test Point (1)	656.77 psig	Max. Allowable Test Press at Test Point (4)	812.57 psig
Time and Date Test Ended	10/20/11 9:15 PM	Max. Elevation in Test Section	699 ft	Min. Indicated Test Pressure (2)	669.00 psig	Max. Indicated Test Pressure (5)	717.00 psig
Actual Duration of Test	8 hours 10 minutes	Min. Elevation in Test Section	567 ft	Min. Test Pressure at Max. Elevation (3)	612.23 psig	Max. Test Pressure at Min. Elevation (6)	717.43 psig

Redacted

RCP

PG&E T-34 , L-132 , MP31.95 - 34.68



Redacted

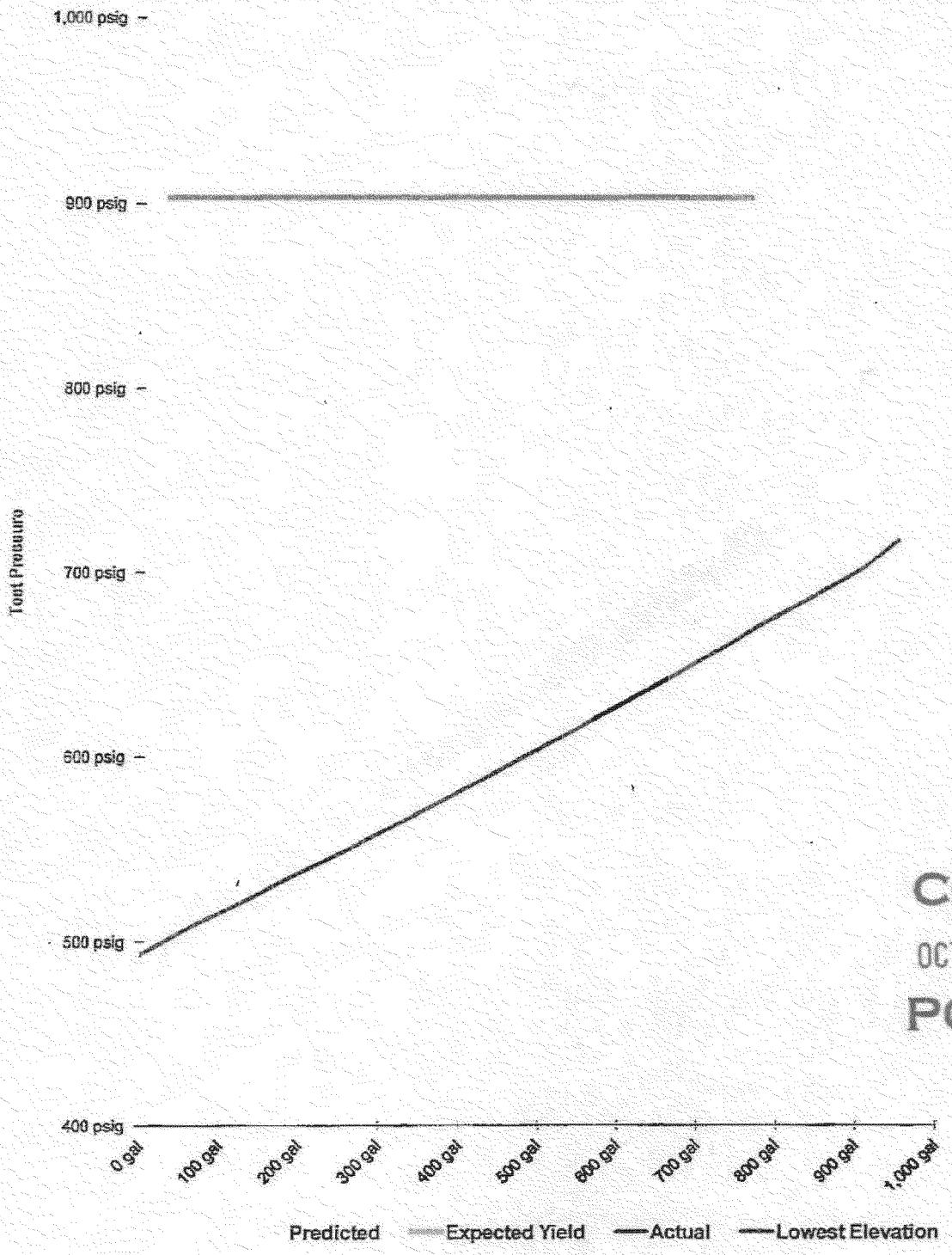
COPY

OCT 20 2011

PG & E

RCP

Spike Pressure Test
Stress Strain Curve -- PG&E T-34 , L-132 , MP31.95 - 34.68



RCP

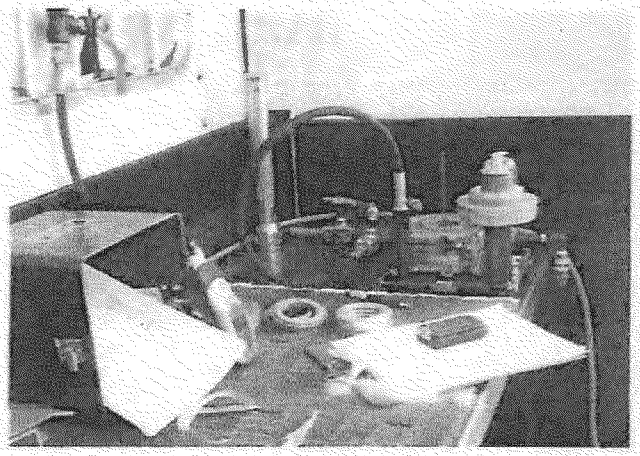
Actual Pressure Volume Plot Data			Predicted Pressure Volume Plot Data	Slope	
Pressure	Strokes	Gallons	Gallons	Actual	Predicted
493 psig	0	0.00 gal		0	0.000
503 psig	3260	42.53 gal	34.23 gal	4.253	3.423
513 psig	6870	89.62 gal	68.47 gal	4.709	3.423
523 psig	10550	137.63 gal	102.70 gal	4.801	3.424
533 psig	13990	182.51 gal	136.94 gal	4.488	3.424
543 psig	17680	230.65 gal	171.18 gal	4.814	3.424
553 psig	21180	276.31 gal	205.43 gal	4.566	3.424
563 psig	24640	321.44 gal	239.67 gal	4.514	3.425
573 psig	28050	365.93 gal	273.92 gal	4.449	3.425
583 psig	31480	410.67 gal	308.17 gal	4.475	3.425
593 psig	34740	453.20 gal	342.42 gal	4.253	3.425
603 psig	38110	497.17 gal	376.67 gal	4.396	3.425
613 psig	41450	540.74 gal	410.93 gal	4.357	3.426
623 psig	44560	581.31 gal	445.19 gal	4.057	3.426
633 psig	47830	623.97 gal	479.45 gal	4.266	3.426
643 psig	51050	665.98 gal	513.71 gal	4.201	3.426
653 psig	54190	706.94 gal	547.97 gal	4.096	3.426
663 psig	57380	748.55 gal	582.24 gal	4.162	3.427
673 psig	60330	787.04 gal	616.51 gal	3.848	3.427
683 psig	63640	830.22 gal	650.78 gal	4.318	3.427
693 psig	66850	872.10 gal	685.05 gal	4.188	3.427
703 psig	69880	911.62 gal	719.33 gal	3.953	3.427
713 psig	72100	940.59 gal	753.60 gal	2.896	3.428
717 psig	72975	952.00 gal	767.31 gal	2.854	3.428
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000
717 psig		952.00 gal	767.31 gal	0.000	0.000

Spike Pressure Test Stress Strain Curve -- PG&E T-34 , L-132 , MP31.95 - 34.68	
39250	0.048 gal/stroke
Pump Piston Diameter	1.250 in
Pump Piston Stroke	3.00 in
Pump Cylinders	3 ea
Volume check gal per stroke	0.013 gal/stroke
Volume Released (gallons)	42.50 gal
Pressure Reduced (psi)	10 psi
Maximum2	1,000 gal
Minimum2	0 gal
Maximum1	1,003 psig
Minimum1	400 psig
Gallons/Stroke Used	0.013 gal/stroke
Predicted Gallons/Stroke	0.011 gal/stroke
Pressure Increment	10 psi
Max Pressure	717 psig
Buried Pipe Temperature	60 °F
Exposed Pipe Temperature	62 °F
ASME B31.8 Appendix N-5	
Average Actual Elastic Slope	4.214
Average Predicted Elastic Slope	3.426
Code Prescribed Minimum Yield Slope (less 10%) B31.8 N-5 (c)(2)	8.006
Established Minimum Yield Pressure B31.8 N-5 (c)(2)	717 psig
Maximum Allowed Volume (After Slope Deviation) B31.8 N-5 (c)(2)	418 gal
Volume (After Slope Deviation) B31.8 N-5 (c)(2)	0 gal

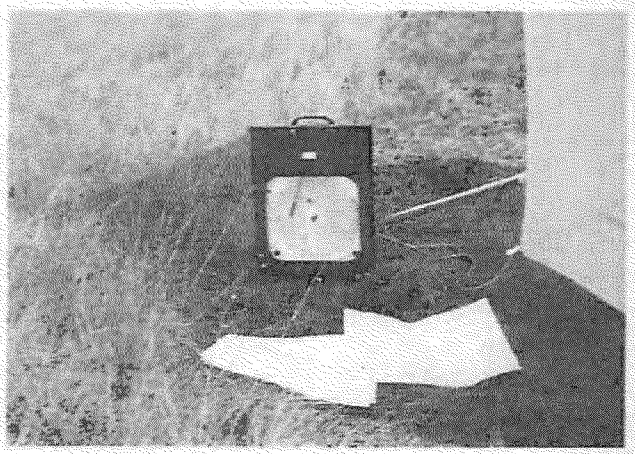
Redacted

10/20/11
Date

COPY
OCT 20 2011
PG & E

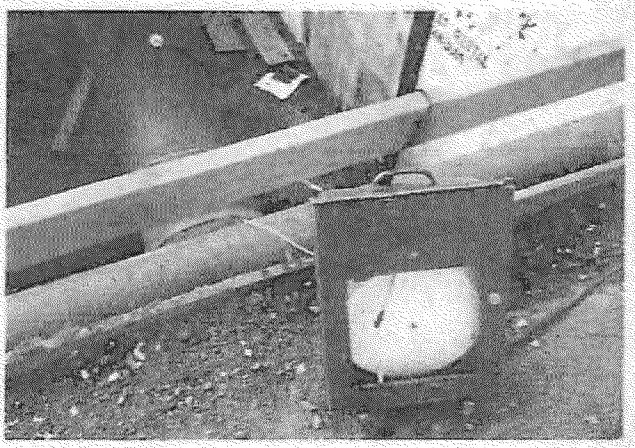


test 34 Loc. B deadweights for test

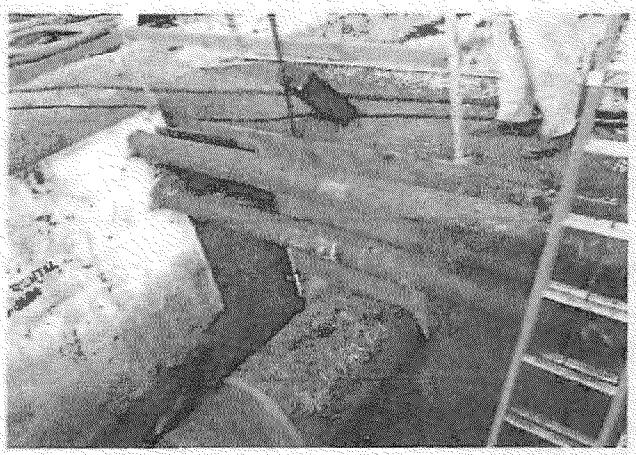


Test 34 Loc. B remote restrained temp. recorder

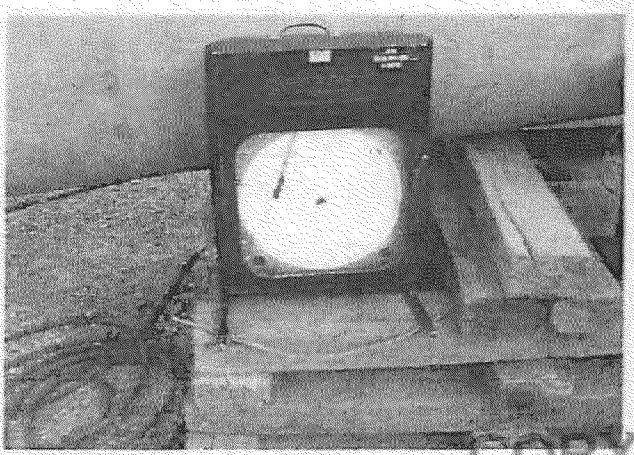
Test 34 Loc. B testhead and riser



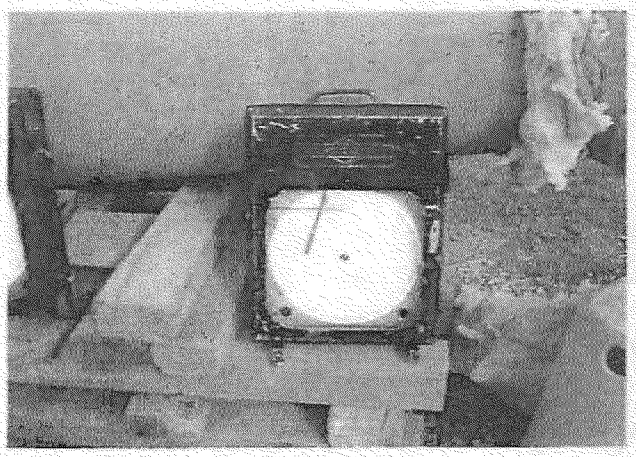
Test 34 Loc. B restrained pipe temp. recorder



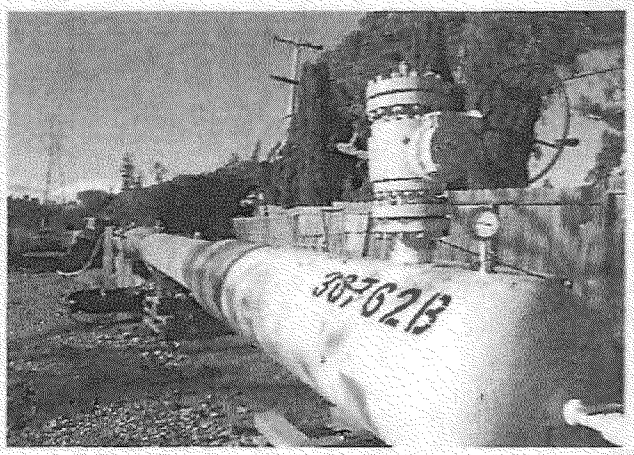
Test 34 Loc. B restrained temp. recorder



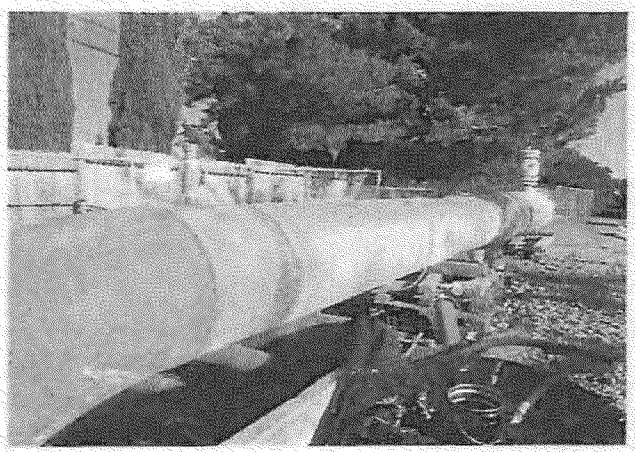
Test 34 loc. B pressure recorder



Test 34 Loc. B unrestrained pipe temp. recorder



Test 34 Loc.A test head



Test 34 Loc. A riser and test head