RCP

RCP, Inc

801 Louisiana, Ste.200
Houston, Texas 77002
(713)655-8080
Redacted

November 12, 2011

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

Test Contractor:	ARB -- T-31
Asset Owner:	Pacific Gas and Electric Company -- 41497349-T-31
Construction Contractor:	ARB -- 0629-53-3500 T-31
Test Section:	PG&E T-31 L-132, MP 18.4621 - 23.1638
Test Date:	November 12, 2011
Certificate Number:	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638

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 684 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 8.4 hour test duration period.

This hydrostatic test was completed successfully. Pressure was maintained on the test facilities in excess of 8.4 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 611 psig and the MAOP per 49 CFR Part 192, Subpart J can be as high as 407 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 54 psi during the test. 26,593.28 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 1,700.42 ounces, gain, which is equivalent to a 0.27 °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

Hydrostatic Test Certification

Company	Pacific Gas and Electric Company	Job Number	41497349-T-31
Construction Co.	ARB	Job Number	0629-53-3500 T-31
Hydro. Test Co.	ARB	Project No.	T-31
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638		
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638		

Hydrostatic Test Pressure

APPLICABLE CODE FOR CERTIFICATION: Test Date: 12-Nov-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-31 L-132, MP 18.4621 - 23.1638		
From:	0+20	To:	261+12

Pipe Data

Segment	Length	Diameter	Wall Thickness	Specification	100% SMYS
1	605 ft	30.000 in.	0.375 in.	API5L-X42, DSAW, Arc Weld, Steel	1,050 psi
2	22 ft	30.000 in.	0.375 in.	API5L-X65, DSAW, Arc Weld, Steel	1,625 psi
3	3,602 ft	30.000 in.	0.313 in.	API5L-X52, DSAW, Arc Weld, Steel	1,083 psi
4	119 ft	24.000 in.	0.375 in.	API5L-X60, DSAW, Arc Weld, Steel	1,875 psi
5	357 ft	24.000 in.	0.313 in.	API5L-X42, DSAW, Arc Weld, Steel	1,094 psi
6	580 ft	24.000 in.	0.313 in.	API5L-Grade B, SM, Arc Weld, Steel	911 psi
7	20,215 ft	24.000 in.	0.281 in.	45ksmys, SM, Arc Weld, Steel	1,054 psi
8	20 ft	24.000 in.	0.281 in.	API5L-X42, DSAW, Arc Weld, Steel	984 psi
9	16 ft	24.000 in.	0.250 in.	API5L-X42, DSAW, Arc Weld, Steel	875 psi
10	3 ft	4.500 in.	0.237 in.	API5L-Grade B, SM, Arc Weld, Steel	3,687 psi
11	3 ft	3.500 in.	0.216 in.	API5L-Grade B, SM, Arc Weld, Steel	4,320 psi
12	9 ft	30.000 in.	0.750 in.	API5L-X60, DSAW, Arc Weld, Steel	3,000 psi
13	10 ft	24.000 in.	0.500 in.	API5L-X52, DSAW, Arc Weld, Steel	2,167 psi
14	8 ft	3.500 in.	0.188 in.	API5L-Grade B, SM, Arc Weld, Steel	3,760 psi
15	6 ft	2.375 in.	0.154 in.	API5L-Grade B, SM, Arc Weld, Steel	4,539 psi
16	5 ft	1.315 in.	0.140 in.	API5L-Grade B, SM, Arc Weld, Steel	7,452 psi
17	10 ft	1.315 in.	0.113 in.	API5L-Grade B, SM, Arc Weld, Steel	6,015 psi

Initial Test Conditions

Pressure at Test Point:	684 psig	Date/Time:	11/12/11 10:31 AM	Pipe Temperature Unrestrained:	52.0 °F
Ambient Temperature:	62.0 °F			Restrained:	60.0 °F
		Elevation @ Test Point:	508.0 ft	Location:	251+12
Pressure @ High Point (Cal/Measure):	665 psig	Elevation @ High Point:	553.0 ft	Location:	232+26
Pressure @ Low Point (Cal/Measure):	831 psig	Elevation @ Low Point:	168.0 ft	Location:	167+55

Final Test Conditions

Pressure at Test Point:	630 psig	Date/Time:	11/12/11 6:55 PM	Pipe Temperature Unrestrained:	56.0 °F
Ambient Temperature:	50.0 °F			Restrained:	60.0 °F
		Elevation @ Test Point:	508.0 ft	Location:	251+12
Pressure @ High Point (Cal/Measure):	611 psig	Elevation @ High Point:	553.0 ft	Location:	232+26
Pressure @ Low Point (Cal/Measure):	777 psig	Elevation @ Low Point:	168.0 ft	Location:	167+55
Total Fluid Injected:				Volume gain	
Total Fluid Withdrawn:	26593.28 fluid ounces				
Net Change in Volume of the Test Section ± (+ Gain, - Loss):	1,700.42 oz	gain		0.0021%	0.272 °F equivalent

Test Duration: 8.40 hours

Minimum Test Pressure:	Test Point	630 psig	Max Elevation	611 psig	Min Elevation	777 psig
Maximum Test Pressure:		684 psig		665 psig		831 psig
% SMYS :		63.1%		63.1%		79.2%
Test Segment Observed % SMYS :			Minimum	9.4%	Maximum	91.9%
					Minimum Test Pressure (Calculated/Measured):	611 psig
				Maximum Allowable Operating Pressure:	DOT Part 192	Test Factor= 1.50	407 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:
		The test segment was subjected to a spike pressure test of 684 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 8.4 hour test duration period.

Hydrostatic Test Certification

Company	Pacific Gas and Electric Company	Job Number	41497349-T-31
Construction Co.	ARB	Job Number	0629-53-3500 T-31
Hydro. Test Co.	ARB	Project No.	T-31
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638		
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638		

Hydrostatic Test Pressure

Acceptable Hydrostatic Test?	**Yes**	No leaks were observed during the test period. The test section included 25,630 feet of buried and 160 feet of exposed pipe. Pressure lost 54 psi during the test. The buried pipe segment fluid temperature remained steady and the exposed pipe segment gained 4°F. 26,593.28 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 1,700.42 ounces, gain, which is equivalent to a 0.27 °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

RCP

Dead Weight Log Sheet

Owner Company	Pacific Gas and Electric Company	Job Number	41497349-T-31
Construction Co.	ARB	Job Number	0629-53-3500 T-31
Testing Co.	ARB	Project No.	T-31
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638		
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638		

Date 12-Nov-11

Test Log

Log No.	Test Period		Test Pressure	Temperature °F			Remarks		
	Date	Time		Ambient	Pipe				
					Unrestrained	Restrained	Comment	Bleed	Inject
1	11/12/11	9:52 AM	465 psig	58 °F	51 °F	60 °F	Start Spike		
2	11/12/11	9:54 AM	475 psig	58 °F	51 °F	60 °F	Inject		5,740 oz.
3	11/12/11	9:56 AM	485 psig	58 °F	51 °F	60 °F	Inject		5,484 oz.
4	11/12/11	9:58 AM	495 psig	58 °F	51 °F	60 °F	Inject		5,439 oz.
5	11/12/11	10:00 AM	505 psig	58 °F	51 °F	60 °F	Inject		5,514 oz.
6	11/12/11	10:02 AM	515 psig	58 °F	51 °F	60 °F	Inject		5,369 oz.
7	11/12/11	10:04 AM	525 psig	58 °F	51 °F	60 °F	Inject		5,253 oz.
8	11/12/11	10:06 AM	535 psig	58 °F	51 °F	60 °F	Inject		5,133 oz.
9	11/12/11	10:07 AM	545 psig	58 °F	51 °F	60 °F	Inject		5,228 oz.
10	11/12/11	10:09 AM	555 psig	58 °F	51 °F	60 °F	Inject		5,068 oz.
11	11/12/11	10:11 AM	565 psig	58 °F	51 °F	60 °F	Inject		5,018 oz.
12	11/12/11	10:13 AM	575 psig	58 °F	51 °F	60 °F	Inject		4,962 oz.
13	11/12/11	10:15 AM	585 psig	58 °F	51 °F	60 °F	Inject		4,862 oz.
14	11/12/11	10:17 AM	595 psig	58 °F	51 °F	60 °F	Inject		4,942 oz.
15	11/12/11	10:19 AM	605 psig	58 °F	51 °F	60 °F	Inject		4,797 oz.
16	11/12/11	10:21 AM	615 psig	58 °F	51 °F	60 °F	Inject		4,817 oz.
17	11/12/11	10:23 AM	625 psig	58 °F	51 °F	60 °F	Inject		4,772 oz.
18	11/12/11	10:25 AM	635 psig	58 °F	51 °F	60 °F	Inject		4,661 oz.
19	11/12/11	10:26 AM	645 psig	58 °F	51 °F	60 °F	Inject		4,661 oz.
20	11/12/11	10:27 AM	655 psig	58 °F	51 °F	60 °F	Inject		4,671 oz.
21	11/12/11	10:28 AM	665 psig	58 °F	51 °F	60 °F	Inject		4,586 oz.
22	11/12/11	10:29 AM	675 psig	58 °F	51 °F	60 °F	Inject		4,596 oz.
23	11/12/11	10:30 AM	684 psig	58 °F	51 °F	60 °F	Inject		4,310 oz.
24	11/12/11	10:31 AM	684 psig	62 °F	52 °F	60 °F	On Test		
25	11/12/11	10:41 AM	684 psig	63 °F	52 °F	60 °F			
26	11/12/11	10:51 AM	683 psig	62 °F	55 °F	60 °F			
27	11/12/11	11:01 AM	683 psig	62 °F	56 °F	59 °F	End Spike		
28	11/12/11	11:07 AM	674 psig	62 °F	56 °F	59 °F	Bleed	4,516 oz.	
29	11/12/11	11:13 AM	664 psig	62 °F	56 °F	59 °F	Bleed	5,018 oz.	
30	11/12/11	11:18 AM	654 psig	62 °F	56 °F	59 °F	Bleed	5,018 oz.	
31	11/12/11	11:24 AM	644 psig	62 °F	56 °F	59 °F	Bleed	5,018 oz.	
32	11/12/11	11:30 AM	634 psig	62 °F	56 °F	59 °F	Bleed	5,018 oz.	
33	11/12/11	11:36 AM	630 psig	62 °F	56 °F	59 °F	Bleed	2,007 oz.	
34	11/12/11	11:40 AM	630 psig	62 °F	57 °F	59 °F			
35	11/12/11	11:55 AM	631 psig	63 °F	58 °F	59 °F			
36	11/12/11	12:10 PM	631 psig	62 °F	58 °F	59 °F			
37	11/12/11	12:25 PM	631 psig	62 °F	58 °F	60 °F			
38	11/12/11	12:40 PM	631 psig	61 °F	58 °F	60 °F			
39	11/12/11	12:55 PM	631 psig	62 °F	58 °F	60 °F			
40	11/12/11	1:10 PM	631 psig	62 °F	58 °F	60 °F			
41	11/12/11	1:25 PM	631 psig	62 °F	58 °F	60 °F			
42	11/12/11	1:40 PM	631 psig	63 °F	58 °F	60 °F			
43	11/12/11	1:55 PM	631 psig	63 °F	58 °F	60 °F			
44	11/12/11	2:10 PM	631 psig	63 °F	58 °F	60 °F			
45	11/12/11	2:25 PM	631 psig	63 °F	58 °F	60 °F			
46	11/12/11	2:40 PM	631 psig	63 °F	58 °F	60 °F			
47	11/12/11	2:55 PM	630 psig	63 °F	58 °F	60 °F			

Dead Weight Log Sheet

Owner Company	Pacific Gas and Electric Company	Job Number	41497349-T-31
Construction Co.	ARB	Job Number	0629-53-3500 T-31
Testing Co.	ARB	Project No.	T-31
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638		
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638		

Date **12-Nov-11**

Test Log

Log No.	Test Period		Test Pressure	Temperature °F			Remarks		
	Date	Time		Ambient	Pipe				
					Unrestrained	Restrained	Comment	Bleed	Inject
48	11/12/11	3:10 PM	630 psig	63 °F	58 °F	60 °F			
49	11/12/11	3:25 PM	630 psig	59 °F	58 °F	60 °F			
50	11/12/11	3:40 PM	630 psig	58 °F	58 °F	60 °F			
51	11/12/11	3:55 PM	630 psig	58 °F	58 °F	60 °F			
52	11/12/11	4:10 PM	630 psig	57 °F	58 °F	60 °F			
53	11/12/11	4:25 PM	630 psig	57 °F	58 °F	60 °F			
54	11/12/11	4:40 PM	630 psig	56 °F	58 °F	60 °F			
55	11/12/11	4:55 PM	630 psig	54 °F	58 °F	60 °F			
56	11/12/11	5:10 PM	630 psig	54 °F	58 °F	60 °F			
57	11/12/11	5:25 PM	630 psig	53 °F	58 °F	60 °F			
58	11/12/11	5:40 PM	630 psig	52 °F	57 °F	60 °F			
59	11/12/11	5:55 PM	630 psig	52 °F	57 °F	60 °F			
60	11/12/11	6:10 PM	630 psig	51 °F	56 °F	60 °F			
61	11/12/11	6:25 PM	630 psig	51 °F	56 °F	60 °F			
62	11/12/11	6:40 PM	630 psig	51 °F	56 °F	60 °F			
63	11/12/11	6:55 PM	630 psig	50 °F	56 °F	60 °F	End of Test		
							Spike Test		109,885.4 oz.
							Hydrostatic Test	26,593.3 oz.	

Were leaks observed during the test period? Exposed and buried pipe, no leaks observed.

High Test Pressure:	684 psig
Low Test Pressure:	630 psig

Pipe Segment Volume Calculations

Company	Pacific Gas and Electric Company	Job Number	41497349-T-31
Construction Co.	ARB	Job Number	0629-53-3500 T-31
Hydro. Test Co.	ARB	Project No.	T-31
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638	WATER	
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638		

General Pipe Data

Description	Segment 1	2	3	4	5	6	7	8
Restrained or Unrestrained?	Restrained	Unrestrained	Restrained	Unrestrained	Restrained	Restrained	Restrained	Restrained
Outside Diameter	30.000 in.	30.000 in.	30.000 in.	24.000 in.	24.000 in.	24.000 in.	24.000 in.	24.000 in.
Wall Thickness	0.375 in.	0.375 in.	0.313 in.	0.375 in.	0.313 in.	0.313 in.	0.281 in.	0.281 in.
Inside Diameter	29.250 in.	29.250 in.	29.375 in.	23.250 in.	23.375 in.	23.375 in.	23.438 in.	23.438 in.
Spec./Grade	API5L-X42	API5L-X65	API5L-X52	API5L-X60	API5L-X42	API5L-Grade B	45ksmys	API5L-X42
Length Unrestrained		22 ft		119 ft				
Length Restrained	605 ft		3,802 ft		357 ft	580 ft	20,215 ft	20 ft
Temperature -- On Test	60 °F	52 °F	60.0 °F	52.0 °F	60.0 °F	60.0 °F	60.0 °F	60.0 °F
Temperature -- End of Test	60 °F	56 °F	60.0 °F	56.0 °F	60.0 °F	60.0 °F	60.0 °F	60.0 °F
Pressure -- On Test	684 psig	684 psig	684 psig	684 psig	684 psig	684 psig	684 psig	684 psig
Pressure -- End of Test	630 psig	630 psig	630 psig	630 psig	630 psig	630 psig	630 psig	630 psig

Unrestrained Pipe

Vo	3,917.05 gal / 501,382 oz.	Vtp1	3,933.98 gal / 503,549 oz.	Vtp2	3,932.05 gal / 503,303 oz.

Vo Unrestrained		778 gal		2,625 gal				
Fwp 1		1.002094		1.002094				
Fpp 1		1.002223		1.001767				
Fpt 1		0.999854		0.999854				
Fwt 1		0.999411		0.999411				
Fpwt 1 = Fpt/Fwt		1.000443		1.000443				
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)		782.13 gal		2,635.84 gal				
Fwp 2		1.001928		1.001928				
Fpp 2		1.002048		1.001628				
Fpt 2		0.999927		0.999927				
Fwt 2		0.999668		0.999668				
Fpwt = Fpt/Fwt		1.000259		1.000259				
Vtp = Vo(Fwp)(Fpp)(Fpwt)		781.72 gal		2,634.56 gal				

Restrained Pipe

Vo	629,755.46 gal / 80,608,699 oz.	Vtp1	632,189.71 gal / 80,920,283 oz.	Vtp2	631,997.16 gal / 80,895,637 oz.

Vo Unrestrained	21,119 gal	133,853 gal	7,958 gal	12,930 gal	453,079 gal	448 gal	
Fwp 1	1.002094	1.002094	1.002094	1.002094	1.002094	1.002094	
Fpp 1	1.001618	1.001950	1.001552	1.001552	1.001731	1.001731	
Fpt 1	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	
Fwt 1	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	
Fpwt 1 = Fpt/Fwt	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	21,197 gal	134,395 gal	7,988 gal	12,977 gal	454,814 gal	450 gal	
Fwp 2	1.001928	1.001928	1.001928	1.001928	1.001928	1.001928	
Fpp 2	1.001491	1.001796	1.001429	1.001429	1.001594	1.001594	
Fpt 2	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	
Fwt 2	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	
Fpwt = Fpt/Fwt	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	
Vtp = Vo(Fwp)(Fpp)(Fpwt)	21,191 gal	134,352 gal	7,985 gal	12,973 gal	454,676 gal	450 gal	

Combined Pipe

Vo	633,672.51 gal / 81,110,081 oz.	Vtp1	636,123.69 gal / 81,423,833 oz.	Vtp2	635,929.22 gal / 81,398,940 oz.

RCP

Pipe Segment Volume Calculations

Company	Pacific Gas and Electric Company
Construction Co.	ARB
Hydro. Test Co.	ARB
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638

General Pipe Data

Description	9	10	11	12	13	14	15	16
Restrained or Unrestrained?	Restrained	Restrained	Restrained	Unrestrained	Unrestrained	Restrained	Restrained	Restrained
Outside Diameter	24.000 in.	4.500 in.	3.500 in.	30.000 in.	24.000 in.	3.500 in.	2.375 in.	1.315 in.
Wall Thickness	0.250 in.	0.237 in.	0.216 in.	0.750 in.	0.500 in.	0.188 in.	0.154 in.	0.140 in.
Inside Diameter	23.500 in.	4.026 in.	3.068 in.	28.500 in.	23.000 in.	3.124 in.	2.067 in.	1.035 in.
Spec./Grade	API5L-X42	API5L-Grade B	API5L-Grade B	API5L-X60	API5L-X52	API5L-Grade B	API5L-Grade B	API5L-Grade B
Length Unrestrained				9 ft	10 ft			
Length Restrained	16 ft	3 ft	3 ft			8 ft	6 ft	5 ft
Temperature -- On Test	60.0 °F	60.0 °F	60.0 °F	52.0 °F	52.0 °F	60.0 °F	60.0 °F	60.0 °F
Temperature -- End of Test	60.0 °F	60.0 °F	60.0 °F	56.0 °F	56.0 °F	60.0 °F	60.0 °F	60.0 °F
Pressure -- On Test	684 psig	684 psig	684 psig	684 psig	684 psig	684 psig	684 psig	684 psig
Pressure -- End of Test	630 psig	630 psig	630 psig	630 psig	630 psig	630 psig	630 psig	630 psig

Unrestrained Pipe

Vo								
Vo Unrestrained				298 gal	216 gal			
Fwp 1				1.002094	1.002094			
Fpp 1				1.001063	1.001311			
Fpt 1				0.999854	0.999854			
Fwt 1				0.999411	0.999411			
Fpwt 1 = Fpt/Fwt				1.000443	1.000443			
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)				299.34 gal	216.66 gal			
Fwp 2				1.001928	1.001928			
Fpp 2				1.000998	1.001208			
Fpt 2				0.999927	0.999927			
Fwt 2				0.999668	0.999668			
Fpwt = Fpt/Fwt				1.000259	1.000259			
Vtp = Vo(Fwp)(Fpp)(Fpwt)				299.21 gal	216.56 gal			

Restrained Pipe

Vo								
Vo Unrestrained	361 gal	2 gal	1 gal			3 gal	1 gal	0 gal
Fwp 1	1.002094	1.002094	1.002094			1.002094	1.002094	1.002094
Fpp 1	1.001950	1.000352	1.000295			1.000345	1.000278	1.000153
Fpt 1	1.000000	1.000000	1.000000			1.000000	1.000000	1.000000
Fwt 1	1.000000	1.000000	1.000000			1.000000	1.000000	1.000000
Fpwt 1 = Fpt/Fwt	1.000000	1.000000	1.000000			1.000000	1.000000	1.000000
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	362 gal	2 gal	1 gal			3 gal	1 gal	0 gal
Fwp 2	1.001928	1.001928	1.001928			1.001928	1.001928	1.001928
Fpp 2	1.001796	1.000325	1.000271			1.000318	1.000256	1.000141
Fpt 2	1.000000	1.000000	1.000000			1.000000	1.000000	1.000000
Fwt 2	1.000000	1.000000	1.000000			1.000000	1.000000	1.000000
Fpwt = Fpt/Fwt	1.000000	1.000000	1.000000			1.000000	1.000000	1.000000
Vtp = Vo(Fwp)(Fpp)(Fpwt)	362 gal	2 gal	1 gal			3 gal	1 gal	0 gal

Combined Pipe

Vo	

Pipe Segment Volume Calculations

Company	Pacific Gas and Electric Company
Construction Co.	ARB
Hydro. Test Co.	ARB
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638

General Pipe Data

Description	17			
Restrained or Unrestrained?	Restrained			
Outside Diameter	1.315 in.			
Wall Thickness	0.113 in.			
Inside Diameter	1.089 in			
Spec./Grade	API5L-Grade B			
Length Unrestrained				
Length Restrained	10 ft			
Temperature – On Test	60.0 °F			
Temperature -- End of Test	60.0 °F			
Pressure – On Test	684 psig			
Pressure – End of Test	630 psig			

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	0 gal			
Fwp 1	1.002094			
Fpp 1	1.000200			
Fpt 1	1.000000			
Fwt 1	1.000000			
Fpwt 1 = Fpt/Fwt	1.000000			
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	0 gal			
Fwp 2	1.001928			
Fpp 2	1.000184			
Fpt 2	1.000000			
Fwt 2	1.000000			
Fpwt = Fpt/Fwt	1.000000			
Vtp = Vo(Fwp)(Fpp)(Fpwt)	0 gal			

Combined Pipe

Vo	

RCP

Pipe Segment Volume Allowance Calculations

Company	Pacific Gas and Electric Company	Job Number	41497349-T-31
Construction Co.	ARB	Job Number	0629-53-3500 T-31
Hydro. Test Co.	ARB	Project No.	T-31
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638	WATER	
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638		

General Pipe Data

Description	Segment 1	2	3	4	5	6	7	8
Restrained or Unrestrained?	Restrained	Unrestrained	Restrained	Unrestrained	Restrained	Restrained	Restrained	Restrained
Outside Diameter	30.000 in.	30.000 in.	30.000 in.	24.000 in.	24.000 in.	24.000 in.	24.000 in.	24.000 in.
Wall Thickness	0.375 in.	0.375 in.	0.313 in.	0.375 in.	0.313 in.	0.313 in.	0.281 in.	0.281 in.
Inside Diameter	29.250 in.	29.250 in.	29.375 in.	23.250 in.	23.375 in.	23.375 in.	23.438 in.	23.438 in.
Spec./Grade	API5L-X42	API5L-X65	API5L-X52	API5L-X60	API5L-X42	API5L-Grade B	45ksmys	API5L-X42
Length Unstrained		22 ft		119 ft				
Length Restrained	605 ft		3,802 ft		357 ft	580 ft	20,215 ft	20 ft
Temperature – On Test	59 °F	53 °F	59 °F	53 °F	59 °F	59 °F	59 °F	59 °F
Temperature – End of Test	60 °F	54 °F	60 °F	54 °F	60 °F	60 °F	60 °F	60 °F
Pressure – On Test	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig
Pressure – End of Test	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig

Unrestrained Pipe

Vo	3,917.05 gal / 501,382 oz.		Vtp1	3,933.21 gal / 503,451 oz.		Vtp2	3,933.05 gal / 503,430 oz.	
Vo Unrestrained		778 gal		2,625 gal				
Fwp 1		1.002011		1.002011				
Fpp 1		1.002135		1.001697				
Fpt 1		0.999873		0.999873				
Fwt 1		0.999472		0.999472				
Fpwt 1 = Fpt/Fwt		1.000401		1.000401				
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)		781.97 gal		2,635.33 gal				
Fwp 2		1.002011		1.002011				
Fpp 2		1.002135		1.001697				
Fpt 2		0.999891		0.999891				
Fwt 2		0.999532		0.999532				
Fpwt = Fpt/Fwt		1.000359		1.000359				
Vtp = Vo(Fwp)(Fpp)(Fpwt)		781.93 gal		2,635.22 gal				

Restrained Pipe

Vo	629,755.46 gal / 80,608,699 oz.		Vtp1	632,142.05 gal / 80,914,182 oz.		Vtp2	632,093.43 gal / 80,907,959 oz.	
Vo Restrained	21,119 gal		133,853 gal		7,958 gal	12,930 gal	453,079 gal	448 gal
Fwp 1	1.002011		1.002011		1.002011	1.002011	1.002011	1.002011
Fpp 1	1.001551		1.001870		1.001487	1.001487	1.001659	1.001659
Fpt 1	0.999988		0.999988		0.999988	0.999988	0.999988	0.999988
Fwt 1	0.999907		0.999907		0.999907	0.999907	0.999907	0.999907
Fpwt 1 = Fpt/Fwt	1.000081		1.000081		1.000081	1.000081	1.000081	1.000081
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	21,196 gal		134,383 gal		7,987 gal	12,976 gal	454,780 gal	450 gal
Fwp 2	1.002011		1.002011		1.002011	1.002011	1.002011	1.002011
Fpp 2	1.001554		1.001873		1.001491	1.001491	1.001662	1.001662
Fpt 2	1.000000		1.000000		1.000000	1.000000	1.000000	1.000000
Fwt 2	1.000000		1.000000		1.000000	1.000000	1.000000	1.000000
Fpwt = Fpt/Fwt	1.000000		1.000000		1.000000	1.000000	1.000000	1.000000
Vtp = Vo(Fwp)(Fpp)(Fpwt)	21,194 gal		134,373 gal		7,986 gal	12,975 gal	454,745 gal	450 gal

Combined Pipe

Vo	633,672.51 gal / 81,110,081 oz.	Vtp1	636,075.26 gal / 81,417,633 oz.	Vtp2	636,026.48 gal / 81,411,389 oz.
1 °F Change	48.78 gal	6,244.31 oz.			

Pipe Segment Volume Allowance Calculations

Company	Pacific Gas and Electric Company
Construction Co.	ARB
Hydro. Test Co.	ARB
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638

General Pipe Data								
Description	9	10	11	12	13	14	15	16
Restrained or Unrestrained?	Restrained	Restrained	Restrained	Unrestrained	Unrestrained	Restrained	Restrained	Restrained
Outside Diameter	24.000 in.	4.500 in.	3.500 in.	30.000 in.	24.000 in.	3.500 in.	2.375 in.	1.315 in.
Wall Thickness	0.250 in.	0.237 in.	0.216 in.	0.750 in.	0.500 in.	0.188 in.	0.154 in.	0.140 in.
Inside Diameter	23.500 in.	4.026 in.	3.068 in.	28.500 in.	23.000 in.	3.124 in.	2.067 in.	1.035 in.
Spec./Grade	API5L-X42	API5L-Grade B	API5L-Grade B	API5L-X60	API5L-X52	API5L-Grade B	API5L-Grade B	API5L-Grade B
Length Unstrained				9 ft	10 ft			
Length Restrained	16 ft	3 ft	3 ft			8 ft	6 ft	5 ft
Temperature – On Test	59 °F	59 °F	59 °F	53 °F	53 °F	59 °F	59 °F	59 °F
Temperature – End of Test	60 °F	60 °F	60 °F	54 °F	54 °F	60 °F	60 °F	60 °F
Pressure – On Test	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig
Pressure – End of Test	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig	657 psig
Unrestrained Pipe								
Vo								
Vo Unrestrained				298 gal	216 gal			
Fwp 1				1.002011	1.002011			
Fpp 1				1.001040	1.001259			
Fpt 1				0.999873	0.999873			
Fwt 1				0.999472	0.999472			
Fpwt 1 = Fpt/Fwt				1.000401	1.000401			
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)				299.29 gal	216.62 gal			
Fwp 2				1.002011	1.002011			
Fpp 2				1.001040	1.001259			
Fpt 2				0.999891	0.999891			
Fwt 2				0.999532	0.999532			
Fpwt = Fpt/Fwt				1.000359	1.000359			
Vtp = Vo(Fwp)(Fpp)(Fpwt)				299.28 gal	216.62 gal			
Restrained Pipe								
Vo								
Vo Restrained	361 gal	2 gal	1 gal			3 gal	1 gal	0 gal
Fwp 1	1.002011	1.002011	1.002011			1.002011	1.002011	1.002011
Fpp 1	1.001870	1.000335	1.000279			1.000328	1.000264	1.000144
Fpt 1	0.999988	0.999988	0.999988			0.999988	0.999988	0.999988
Fwt 1	0.999907	0.999907	0.999907			0.999907	0.999907	0.999907
Fpwt 1 = Fpt/Fwt	1.000081	1.000081	1.000081			1.000081	1.000081	1.000081
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	362 gal	2 gal	1 gal			3 gal	1 gal	0 gal
Fwp 2	1.002011	1.002011	1.002011			1.002011	1.002011	1.002011
Fpp 2	1.001873	1.000339	1.000283			1.000331	1.000267	1.000147
Fpt 2	1.000000	1.000000	1.000000			1.000000	1.000000	1.000000
Fwt 2	1.000000	1.000000	1.000000			1.000000	1.000000	1.000000
Fpwt = Fpt/Fwt	1.000000	1.000000	1.000000			1.000000	1.000000	1.000000
Vtp = Vo(Fwp)(Fpp)(Fpwt)	362 gal	2 gal	1 gal			3 gal	1 gal	0 gal
Combined Pipe								
Vo								
1 °F Change								

Pipe Segment Volume Allowance Calculations

Company	Pacific Gas and Electric Company
Construction Co.	ARB
Hydro. Test Co.	ARB
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638

General Pipe Data				
Description	17			
Restrained or Unrestrained?	Restrained			
Outside Diameter	1.315 in.			
Wall Thickness	0.113 in.			
Inside Diameter	1.089 in.			
Spec./Grade	API5L-Grade B			
Length Unstrained				
Length Restrained	10 ft			
Temperature -- On Test	59 °F			
Temperature -- End of Test	60 °F			
Pressure -- On Test	657 psig			
Pressure -- End of Test	657 psig			

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				
Vto = Vo(Fwp)(Fpp)(Fpwt)				

Restrained Pipe				
Vo				
Vo Restrained	0 gal			
Fwp 1	1.002011			
Fpp 1	1.000188			
Fpt 1	0.999988			
Fwt 1	0.999907			
Fpwt 1 = Fpt/Fwt	1.000081			
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	0 gal			
Fwp 2	1.002011			
Fpp 2	1.000192			
Fpt 2	1.000000			
Fwt 2	1.000000			
Fpwt = Fpt/Fwt	1.000000			
Vtp = Vo(Fwp)(Fpp)(Fpwt)	0 gal			

Combined Pipe	
Vo	
1 °F Change	

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	605 ft	Restrained	30.000 in.	0.3750 in.	API5L-X42	1,050 psig	Steel	Arc Weld	DSAW
2	22 ft	Unrestrained	30.000 in.	0.3750 in.	API5L-X65	1,625 psig	Steel	Arc Weld	DSAW
3	3,802 ft	Restrained	30.000 in.	0.3125 in.	API5L-X52	1,083 psig	Steel	Arc Weld	DSAW
4	119 ft	Unrestrained	24.000 in.	0.3750 in.	API5L-X60	1,875 psig	Steel	Arc Weld	DSAW
5	357 ft	Restrained	24.000 in.	0.3125 in.	API5L-X42	1,094 psig	Steel	Arc Weld	DSAW
6	580 ft	Restrained	24.000 in.	0.3125 in.	API5L-Grade B	911 psig	Steel	Arc Weld	SM
7	20,215 ft	Restrained	24.000 in.	0.2810 in.	45ksmys	1,054 psig	Steel	Arc Weld	SM
8	20 ft	Restrained	24.000 in.	0.2810 in.	API5L-X42	984 psig	Steel	Arc Weld	DSAW
9	16 ft	Restrained	24.000 in.	0.2500 in.	API5L-X42	875 psig	Steel	Arc Weld	DSAW
10	3 ft	Restrained	4.500 in.	0.2370 in.	API5L-Grade B	3,687 psig	Steel	Arc Weld	SM
11	3 ft	Restrained	3.500 in.	0.2160 in.	API5L-Grade B	4,320 psig	Steel	Arc Weld	SM
12	9 ft	Unrestrained	30.000 in.	0.7500 in.	API5L-X60	3,000 psig	Steel	Arc Weld	DSAW
13	10 ft	Unrestrained	24.000 in.	0.5000 in.	API5L-X52	2,167 psig	Steel	Arc Weld	DSAW
14	8 ft	Restrained	3.500 in.	0.1880 in.	API5L-Grade B	3,760 psig	Steel	Arc Weld	SM
15	6 ft	Restrained	2.375 in.	0.1540 in.	API5L-Grade B	4,539 psig	Steel	Arc Weld	SM
16	5 ft	Restrained	1.315 in.	0.1400 in.	API5L-Grade B	7,452 psig	Steel	Arc Weld	SM
17	10 ft	Restrained	1.315 in.	0.1130 in.	API5L-Grade B	6,015 psig	Steel	Arc Weld	SM

Hydrostatic Test Project Owner & Participants

Owner Company	Pacific Gas and Electric Company	Job Number
Address	350 N. Wiget	41497349-T-31
	Walnut Creek, CA 94598	
	Attention: Redacted	
Construction Company	ARB	Job Number
Address	1875 Loveridge Road	0629-53-3500 T-31
	Pittsburg, CA 94565	
	Attention: Redacted	
Hydrostatic Test Co.	ARB	Project No.
Address	1875 Loveridge Road	T-31
	Pittsburg, CA 94565	
	Attention: Redacted	
Test Section	PG&E T-31 L-132, MP 18.4621 - 23.1638	
	From: 0+20	
	To: 261+12	
File Name	RCP 61362 - PG&E T-31 L-132, MP 18.4621 - 23.1638	

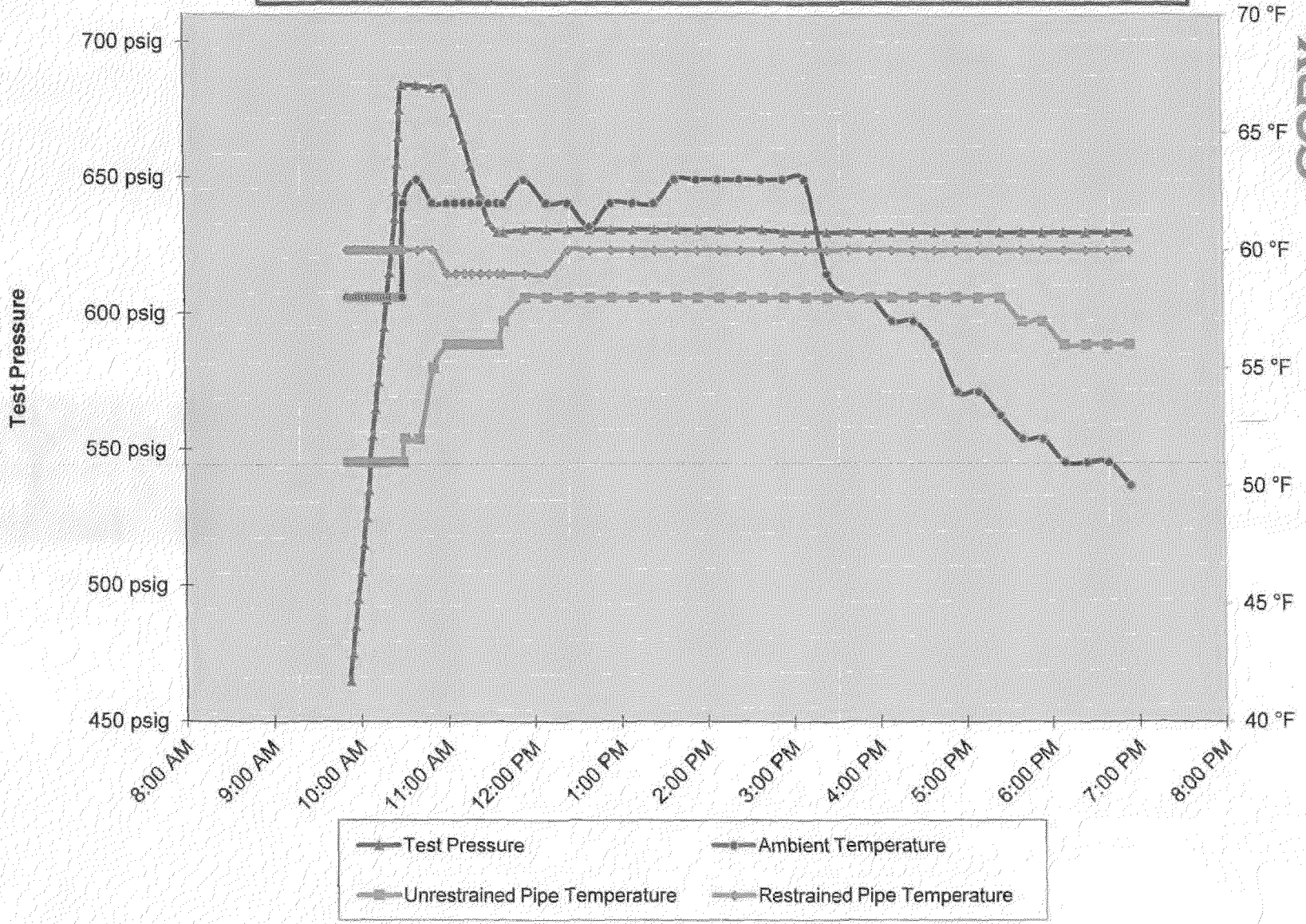
Part II – Test Data (TO BE PREPARED BY PERSON SUPERVISING TEST AT TIME OF TEST)

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

Time and Date Test Pressure Reached	11/12/11 10:31 AM	Elevation at Test Point	508 ft	Min. Required Test Press At Test Point (1)	619.50 psig	Max. Allowable Test Press at Test Point (4)	687.67 psig
Time and Date Test Ended	11/12/11 6:55 PM	Max. Elevation in Test Section	553 ft	Min. Indicated Test Pressure (2)	630.00 psig	Max. Indicated Test Pressure (5)	684.00 psig
Actual Duration of Test	8 hours 24 minutes	Min. Elevation in Test Section	168 ft	Min. Test Pressure at Max. Elevation (3)	610.50 psig	Max. Test Pressure at Min. Elevation (6)	831.33 psig

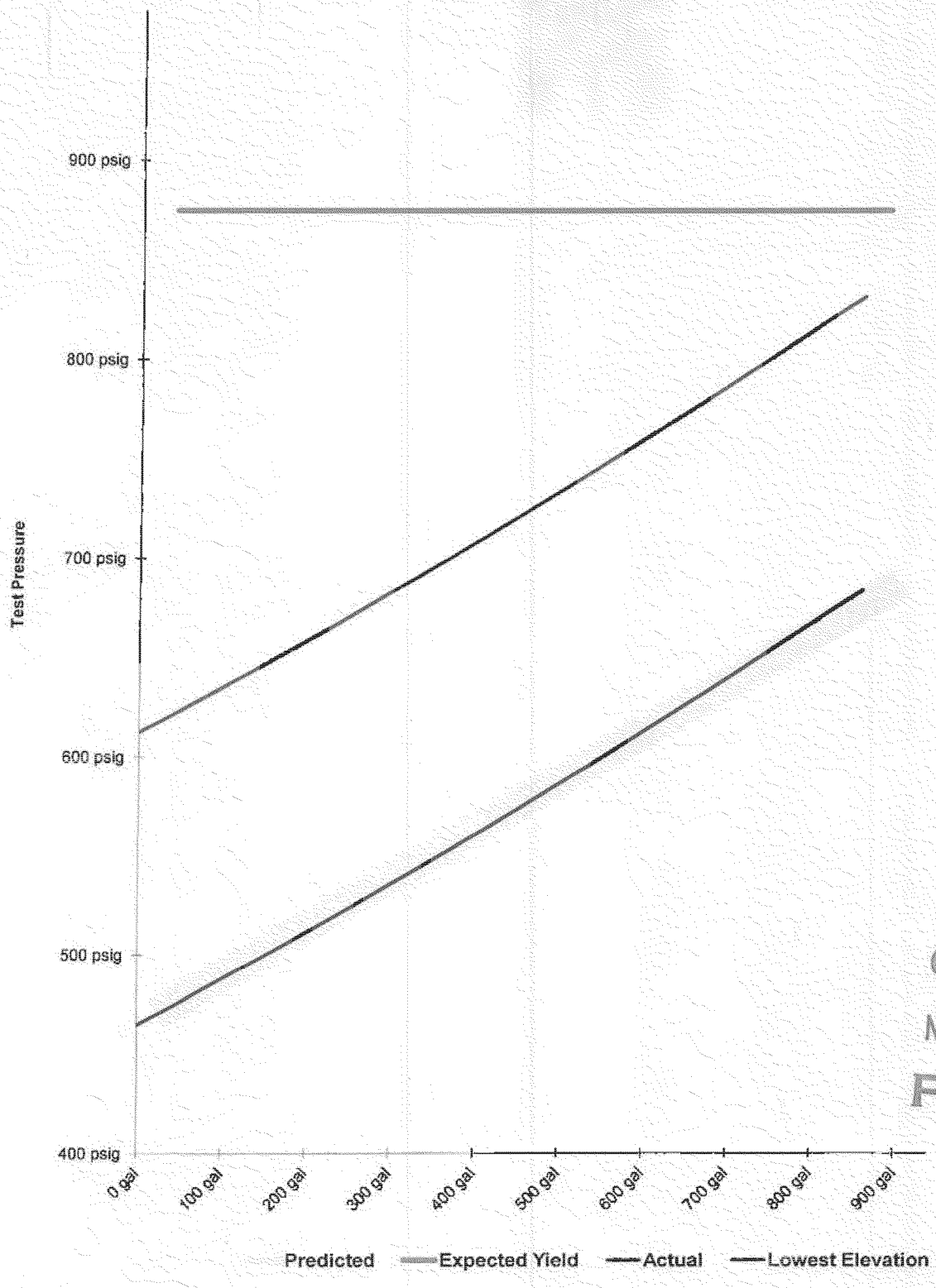
RCP

PG&E T-31 L-132, MP 18.4621 - 23.1638



RCP

Spike Pressure Test
Stress Strain Curve -- PG&E T-31 L-132, MP 18.4621 - 23.1638



RCP

Actual Pressure Volume Plot Data			Predicted Pressure Volume Plot Data	Slope	
Pressure	Strokes	Gallons	Gallons	Actual	Predicted
465 psig	0	0.00 gal		0	0.000
475 psig	1144	44.84 gal	40.55 gal	4.484	4.055
485 psig	2237	87.69 gal	81.11 gal	4.285	4.056
495 psig	3321	130.18 gal	121.67 gal	4.249	4.056
505 psig	4420	173.26 gal	162.23 gal	4.308	4.056
515 psig	5490	215.21 gal	202.79 gal	4.194	4.056
525 psig	6537	256.25 gal	243.35 gal	4.104	4.057
535 psig	7560	296.35 gal	283.92 gal	4.010	4.057
545 psig	8602	337.20 gal	324.49 gal	4.085	4.057
555 psig	9612	376.79 gal	365.06 gal	3.959	4.057
565 psig	10612	415.99 gal	405.64 gal	3.920	4.058
575 psig	11601	454.76 gal	446.22 gal	3.877	4.058
585 psig	12570	492.74 gal	486.80 gal	3.798	4.058
595 psig	13555	531.36 gal	527.38 gal	3.861	4.058
605 psig	14511	568.83 gal	567.96 gal	3.748	4.059
615 psig	15471	606.46 gal	608.55 gal	3.763	4.059
625 psig	16422	643.74 gal	649.14 gal	3.728	4.059
635 psig	17351	680.16 gal	689.73 gal	3.642	4.059
645 psig	18280	716.58 gal	730.33 gal	3.642	4.059
655 psig	19211	753.07 gal	770.93 gal	3.650	4.060
665 psig	20125	788.90 gal	811.53 gal	3.583	4.060
675 psig	21041	824.81 gal	852.13 gal	3.591	4.060
684 psig	21900	858.48 gal	888.67 gal	3.741	4.060
684 psig		858.48 gal	888.67 gal	0.000	0.000
684 psig		858.48 gal	888.67 gal	0.000	0.000
684 psig		858.48 gal	888.67 gal	0.000	0.000
684 psig		858.48 gal	888.67 gal	0.000	0.000
684 psig		858.48 gal	888.67 gal	0.000	0.000
684 psig		858.48 gal	888.67 gal	0.000	0.000
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684 psig		858.48 gal	888.67 gal	0.000	0.000
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684 psig		858.48 gal	888.67 gal	0.000	0.000
684 psig		858.48 gal	888.67 gal	0.000	0.000
684 psig		858.48 gal	888.67 gal	0.000	0.000
684 psig		858.48 gal	888.67 gal	0.000	0.000
684 psig		858.48 gal	888.67 gal	0.000	0.000
684 psig		858.48 gal	888.67 gal	0.000	0.000

Spike Pressure Test

Stress Strain Curve -- PG&E T-31 L-132, MP 18.4621 - 23.1638

39250	0.094 gal/stroke
Pump Piston Diameter	1.625 in
Pump Piston Stroke	3.50 in
Pump Cylinders	3 ea
Volume check gal per stroke	0.039 gal/stroke
Volume Released (gallons)	39.20 gal
Pressure Reduced (psi)	10 psi
Maximum2	940 gal
Minimum2	0 gal
Maximum1	975 psig
Minimum1	400 psig
Gallons/Stroke Used	0.039 gal/stroke
Predicted Gallons/Stroke	0.041 gal/stroke
Pressure Increment	10 psi
Max Pressure	684 psig
Buried Pipe Temperature	60 °F
Exposed Pipe Temperature	52 °F

ASME B31.8 Appendix N-5

Average Actual Elastic Slope	3.919
Average Predicted Elastic Slope	4.058
Code Prescribed Minimum Yield Slope (less 10%) B31.8 N-5 (c)(2)	7.446
Established Minimum Yield Pressure B31.8 N-5 (c)(2)	684 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

11/12/2011
Date

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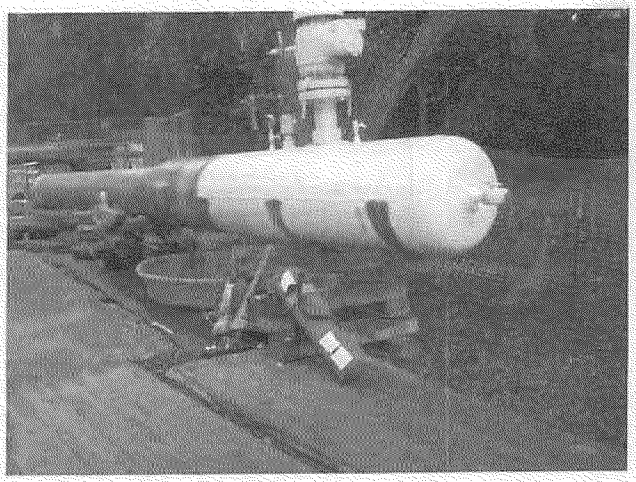
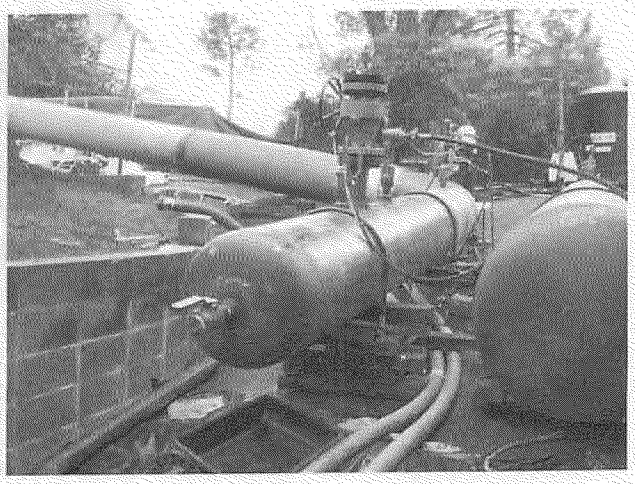
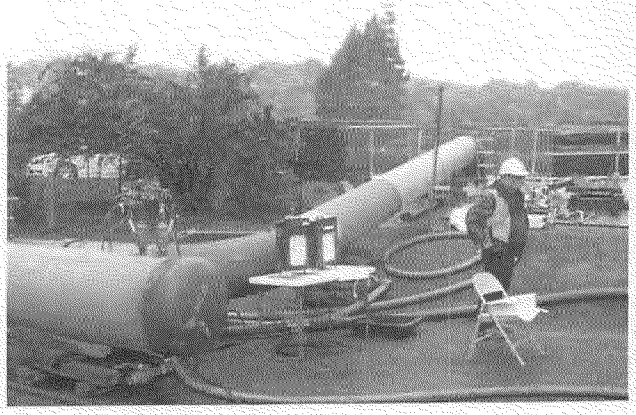
NOV 12 2011
PG&E



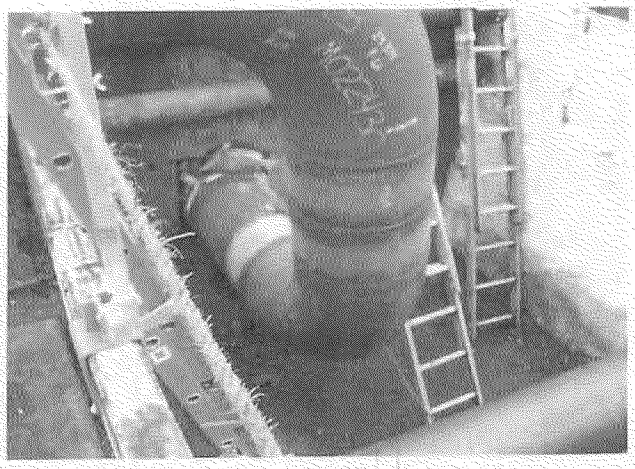
Test End



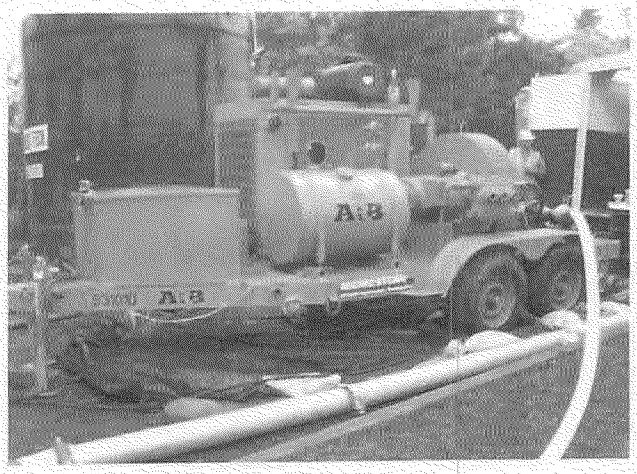
T- Test Header



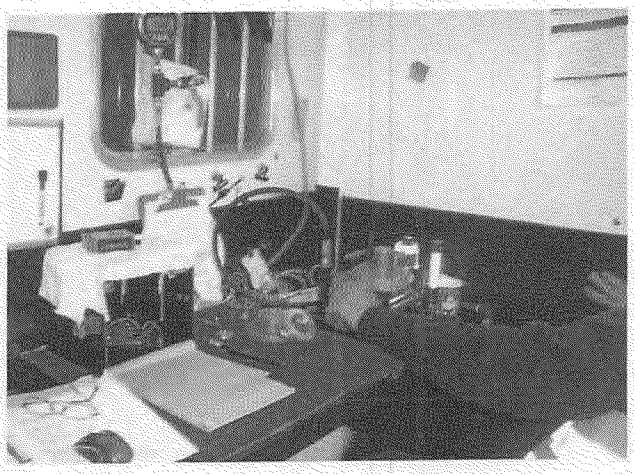
Tie-in pipe Included in Test.



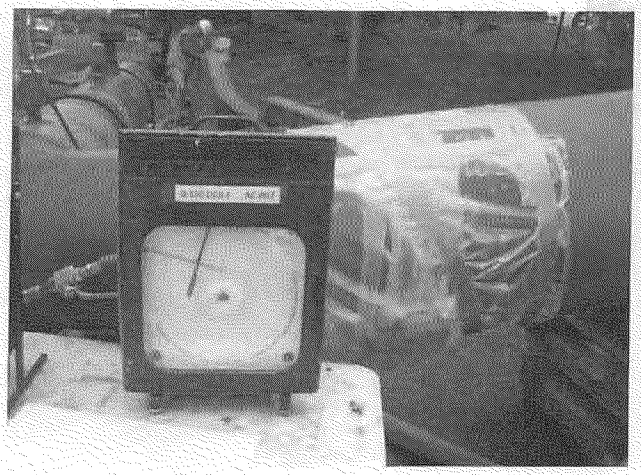
Connection to Main Line



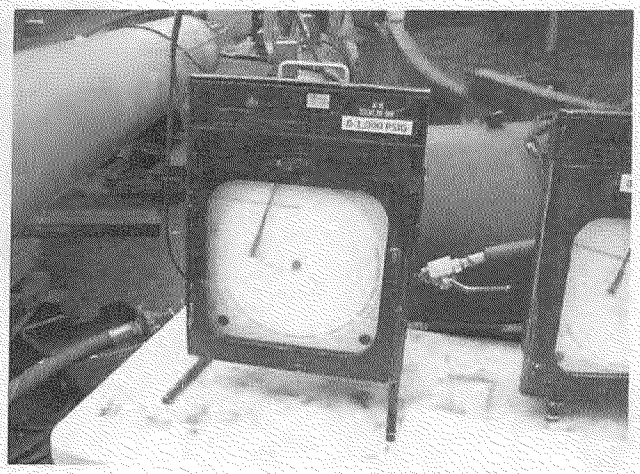
Presure Pump.



Deadweght Test Equipment



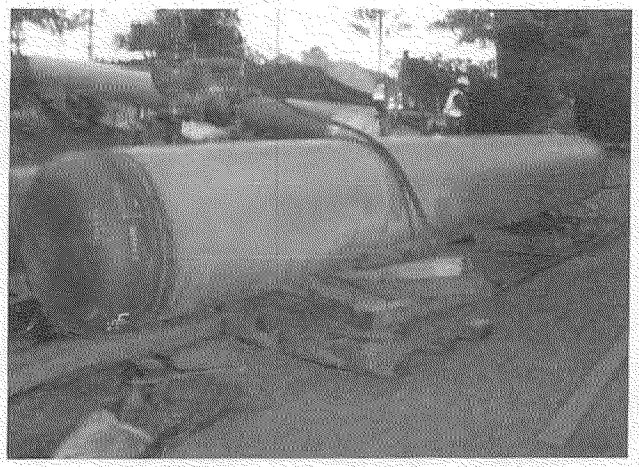
Unrestained Temp Chart Recorder



Pressure Chart Recorder

Restrained Temperature Chart Recorder

Restrained Temperature Chart Recorder (Backup)



22 Ft Pup For T-32