



RCP, Inc

801 Louisiana, Ste.200  
Houston, Texas 77002

Redacted

October 14, 2011

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

Test Contractor:	AKRI -- T-22 10/13/11
Asset Owner:	Pacific Gas and Electric Company -- 41497302
Construction Contractor:	ARB -- 0629-53-3500 T-22
Test Section:	PG&E T-22S&N L-131, Redacted
Test Date:	October 13, 2011
Certificate Number:	RCP 61362 - T-22S&N, L-131, Redacted

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 AKRI 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 984 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 8.25 hour test duration period.

This hydrostatic test was completed successfully. Pressure was maintained on the test facilities in excess of 8.25 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 911 psig and the established MAOP is 607 psig.

Pressure decreased 70 psi during the test. 44,160.00 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 20,136.35 ounces, gain, which is equivalent to a 2.06 °F change in pipe temperature and larger than the anticipated 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 inherent error associated with physically attempting to measure the average temperature of 27,208 feet of buried and 143 feet of exposed pipe from a single point on the line.

Sincerely,

Redacted

cc. file

Redacted Documents\PG&E Pressure tests\T-22\  
Test 22 N & S Rev. 1  
Letter



# Hydrostatic Test Certification

Company	Pacific Gas and Electric Company	Job Number	41497302
Construction Co.	ARB	Job Number	0629-53-3500 T-22
Hydro. Test Co.	AKRI	Project No.	T-22 10/13/11
Test Section	PG&E T-22S&N L-131, Redacted		
File Name	RCP 61362 - T-22S&N,		

## Hydrostatic Test Pressure

APPLICABLE CODE FOR CERTIFICATION:	Test Date:	13-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-22S&N L-131, Redacted		
From:	0+00	To:	264+97

## Pipe Data

Segment	Length	Diameter	Wall Thickness	Specification	100% SMYS
1	15 ft	30.000 in.	0.625 in.	APISL-X65, DSAW, Arc Weld, Steel	2,708 psi
2	54 ft	30.000 in.	0.500 in.	APISL-X65, DSAW, Arc Weld, Steel	2,167 psi
3	3,232 ft	30.000 in.	0.625 in.	APISL-X65, DSAW, Arc Weld, Steel	2,708 psi
4	49 ft	30.000 in.	0.562 in.	APISL-X52, DSAW, Arc Weld, Steel	1,948 psi
5	1,899 ft	30.000 in.	0.500 in.	APISL-X60, DSAW, Arc Weld, Steel	2,000 psi
6	37 ft	30.000 in.	0.424 in.	APISL-X65, DSAW, Arc Weld, Steel	1,837 psi
7	3,727 ft	30.000 in.	0.375 in.	APISL-X60, DSAW, Arc Weld, Steel	1,500 psi
8	14,343 ft	30.000 in.	0.375 in.	APISL-X52, DSAW, Arc Weld, Steel	1,300 psi
9	233 ft	30.000 in.	0.313 in.	APISL-X52, DSAW, Arc Weld, Steel	1,083 psi
10	12 ft	6.625 in.	0.280 in.	APISL-Grade B, SM, Arc Weld, Steel	2,958 psi
11	7 ft	4.500 in.	0.237 in.	APISL-Grade B, SM, Arc Weld, Steel	3,987 psi
12	4 ft	4.500 in.	0.156 in.	APISL-Grade B, SM, Arc Weld, Steel	2,427 psi
13	3 ft	3.500 in.	0.216 in.	APISL-Grade B, SM, Arc Weld, Steel	4,320 psi
14	6 ft	34.000 in.	0.505 in.	APISL-X60, DSAW, Arc Weld, Steel	1,782 psi
15	6 ft	34.000 in.	0.524 in.	APISL-X60, DSAW, Arc Weld, Steel	1,849 psi
16	3,659 ft	34.000 in.	0.438 in.	48ksmys, DSAW, Arc Weld, Steel	1,237 psi
17	14 ft	30.000 in.	0.500 in.	APISL-X65, DSAW, Arc Weld, Steel	2,167 psi
18	7 ft	1.315 in.	0.113 in.	APISL-Grade B, SM, Arc Weld, Steel	6,015 psi
19	22 ft	34.000 in.	0.375 in.	APISL-X65, DSAW, Arc Weld, Steel	1,434 psi
20	22 ft	30.000 in.	0.590 in.	APISL-X65, DSAW, Arc Weld, Steel	2,167 psi

## Initial Test Conditions

Pressure at Test Point:	984 psig	Date/Time:	10/13/11 4:15 PM	Pipe Temperature	
Ambient Temperature:	86.0 °F	Elevation @ Test Point:	24.0 ft	Unrestrained:	84.0 °F
Pressure @ High Point (Cal/Measure):	981 psig	Elevation @ High Point:	30.0 ft	Restrained:	66.0 °F
Pressure @ Low Point (Cal/Measure):	1,005 psig	Elevation @ Low Point:	(25.0) ft	Location:	40+99
				Location:	88+60
				Location:	12+90

## Final Test Conditions

Pressure at Test Point:	914 psig	Date/Time:	10/14/11 12:30 AM	Pipe Temperature	
Ambient Temperature:	64.0 °F	Elevation @ Test Point:	24.0 ft	Unrestrained:	78.0 °F
Pressure @ High Point (Cal/Measure):	911 psig	Elevation @ High Point:	30.0 ft	Restrained:	64.0 °F
Pressure @ Low Point (Cal/Measure):	935 psig	Elevation @ Low Point:	(25.0) ft	Location:	40+99
				Location:	88+60
				Location:	12+90

Total Fluid Injected:		Volume gain	
Total Fluid Withdrawn:	44160.00 fluid ounces		
Net Change in Volume of the Test Section ± (+ Gain, - Loss):	20,136.35 oz	gain	0.0159% 2.057 °F equivalent

Test Duration:		8.25 hours		
Minimum Test Pressure:	914 psig	911 psig	935 psig	
Maximum Test Pressure:	984 psig	981 psig	1,005 psig	
% SMYS:	65.4%	65.4%	81.3%	
Test Segment Observed % SMYS:	Minimum	16.4%	Maximum	91.3%

Minimum Test Pressure (Calculated/Measured):		911 psig	
Maximum Allowable Operating Pressure:	DOT Part 192	Test Factor= 1.50	807 psig

Were leaks observed?	No	Explain:
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The test segment was subjected to a spike pressure test of 984 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 8.25 hour test duration period.

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### Hydrostatic Test Certification

Company	Pacific Gas and Electric Company	Job Number	41497302
Construction Co.	ARB	Job Number	0629-53-3500 T-22
Hydro. Test Co.	AKRI	Project No.	T-22 10/13/11
Test Section	PG&E T-22S&N L-131, Redacted		
File Name	RCP 61362 - T-22S&N, Redacted		

#### Hydrostatic Test Pressure

Acceptable Hydrostatic Test?	<b>Yes</b>	<p>No leaks were observed during the test period. The test section included 27,208 feet of buried and 143 feet of exposed pipe. Pressure lost 70 psi during the test. The buried pipe segment lost 2°F fluid temperature and the exposed pipe segment lost 6°F.</p> <p>44,160.00 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 20,136.35 ounces, gain, which is equivalent to a 2.06 °F change in pipe temperature and larger than the anticipated error attributed to the temperature measurement instrumentation utilized.</p> <p>Test pressure did not remain steady even though no leaks were observed. The volumetric gain is attributed to the inherent error associated with physically attempting to measure the average temperature of 27,208 feet of buried and 143 feet of exposed pipe from a single point on the line.</p>
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Remarks

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14-Oct-11

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# Dead Weight Log Sheet



Owner Company	Pacific Gas and Electric Company	Job Number	41497302
Construction Co.	ARB	Job Number	0629-53-3500 T-22
Testing Co.	AKRI	Project No.	T-22 10/13/11
Test Section	PG&E T-22S&N L-131, Redacted		
File Name	RCP 61362 - T-22S&N, Redacted		

Date: 13-Oct-11

## Test Log

Log No.	Test Period		Test Pressure	Temperature °F			Remarks		
	Date	Time		Ambient	Pipe		Comment	Bleed	Inject
					Unrestrained	Restrained			
1	10/13/11	3:04 PM	671 psig	86 °F	84 °F	66 °F	Start Spike		
2	10/13/11	3:06 PM	681 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
3	10/13/11	3:08 PM	691 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
4	10/13/11	3:10 PM	701 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
5	10/13/11	3:12 PM	711 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
6	10/13/11	3:14 PM	721 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
7	10/13/11	3:16 PM	731 psig	86 °F	84 °F	66 °F	Inject		6,385 oz.
8	10/13/11	3:18 PM	741 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
9	10/13/11	3:19 PM	751 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
10	10/13/11	3:21 PM	761 psig	86 °F	84 °F	66 °F	Inject		6,463 oz.
11	10/13/11	3:23 PM	771 psig	86 °F	84 °F	66 °F	Inject		6,326 oz.
12	10/13/11	3:25 PM	781 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
13	10/13/11	3:27 PM	791 psig	86 °F	84 °F	66 °F	Inject		6,443 oz.
14	10/13/11	3:29 PM	801 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
15	10/13/11	3:31 PM	811 psig	86 °F	84 °F	66 °F	Inject		6,375 oz.
16	10/13/11	3:33 PM	821 psig	86 °F	84 °F	66 °F	Inject		6,424 oz.
17	10/13/11	3:35 PM	831 psig	86 °F	84 °F	66 °F	Inject		6,404 oz.
18	10/13/11	3:37 PM	841 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
19	10/13/11	3:39 PM	851 psig	86 °F	84 °F	66 °F	Inject		6,385 oz.
20	10/13/11	3:41 PM	861 psig	86 °F	84 °F	66 °F	Inject		6,443 oz.
21	10/13/11	3:43 PM	871 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
22	10/13/11	3:45 PM	881 psig	86 °F	84 °F	66 °F	Inject		6,424 oz.
23	10/13/11	3:47 PM	891 psig	86 °F	84 °F	66 °F	Inject		6,482 oz.
24	10/13/11	3:49 PM	901 psig	86 °F	84 °F	66 °F	Inject		6,414 oz.
25	10/13/11	3:52 PM	911 psig	86 °F	84 °F	66 °F	Inject		6,375 oz.
26	10/13/11	3:55 PM	921 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
27	10/13/11	3:58 PM	931 psig	86 °F	84 °F	66 °F	Inject		6,414 oz.
28	10/13/11	4:01 PM	941 psig	86 °F	84 °F	66 °F	Inject		6,404 oz.
29	10/13/11	4:04 PM	951 psig	86 °F	84 °F	66 °F	Inject		6,511 oz.
30	10/13/11	4:07 PM	961 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
31	10/13/11	4:10 PM	971 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
32	10/13/11	4:13 PM	981 psig	86 °F	84 °F	66 °F	Inject		6,433 oz.
33	10/13/11	4:14 PM	984 psig	86 °F	84 °F	66 °F	Inject		1,150 oz.
34	10/13/11	4:15 PM	984 psig	86 °F	84 °F	66 °F	On Test		
35	10/13/11	4:25 PM	984 psig	86 °F	84 °F	66 °F			
36	10/13/11	4:35 PM	984 psig	86 °F	84 °F	66 °F			
37	10/13/11	4:45 PM	984 psig	86 °F	84 °F	66 °F	End Spike		
38	10/13/11	4:55 PM	974 psig	85 °F	84 °F	66 °F		6,400 oz.	
39	10/13/11	5:05 PM	964 psig	84 °F	84 °F	66 °F		6,400 oz.	
40	10/13/11	5:15 PM	954 psig	83 °F	84 °F	66 °F		6,400 oz.	
41	10/13/11	5:25 PM	944 psig	82 °F	84 °F	66 °F		6,400 oz.	
42	10/13/11	5:35 PM	934 psig	81 °F	84 °F	66 °F		6,400 oz.	
43	10/13/11	5:45 PM	924 psig	80 °F	84 °F	66 °F		6,400 oz.	
44	10/13/11	5:55 PM	915 psig	78 °F	84 °F	66 °F		5,760 oz.	
45	10/13/11	6:00 PM	915 psig	77 °F	85 °F	66 °F			
46	10/13/11	6:15 PM	915 psig	77 °F	85 °F	66 °F			
47	10/13/11	6:30 PM	915 psig	75 °F	84 °F	66 °F			

Redacted







## Pipe Segment Volume Calculations

Company	Pacific Gas and Electric Company	Job Number	41497302
Construction Co.	ARB	Job Number	0829-53-3500 T-22
Hydro. Test Co.	AKRI	Project No.	T-22 10/13/11
Test Section	PG&E T-22S&N L-131, <span style="border: 1px solid black; padding: 2px;">Redacted</span>	WATER	
File Name	RCP 61352 - T-22S&N, <span style="border: 1px solid black; padding: 2px;">Redacted</span>		

General Pipe Data								
Description	Segment							
	1	2	3	4	5	6	7	8
Restrained or Unrestrained?	Unrestrained	Unrestrained	Restrained	Restrained	Restrained	Restrained	Restrained	Restrained
Outside Diameter	30.000 in.	30.000 in.	30.000 in.	30.000 in.	30.000 in.	30.000 in.	30.000 in.	30.000 in.
Wall Thickness	0.625 in.	0.500 in.	0.625 in.	0.562 in.	0.500 in.	0.424 in.	0.375 in.	0.375 in.
Inside Diameter	28.750 in.	29.000 in.	28.750 in.	28.876 in.	29.000 in.	29.152 in.	29.250 in.	29.250 in.
Spec./Grade	API5L-X65	API5L-X65	API5L-X65	API5L-X52	API5L-X60	API5L-X65	API5L-X60	API5L-X52
Length Unrestrained	15 ft	54 ft						
Length Restrained			3,232 ft	49 ft	1,899 ft	37 ft	3,727 ft	14,343 ft
Temperature – On Test	84 °F	84 °F	66.0 °F	66.0 °F	66.0 °F	66.0 °F	66.0 °F	66.0 °F
Temperature – End of Test	78 °F	78 °F	64.0 °F	64.0 °F	64.0 °F	64.0 °F	64.0 °F	64.0 °F
Pressure – On Test	984 psig	984 psig	984 psig	984 psig	984 psig	984 psig	984 psig	984 psig
Pressure – End of Test	914 psig	914 psig	914 psig	914 psig	914 psig	914 psig	914 psig	914 psig

Unrestrained Pipe								
Vo	4,648.04 gal 594,693 oz.		Vtp1	4,660.11 gal 596,494 oz.		Vtp2	4,662.02 gal 596,738 oz.	
Vo Unrestrained	506 gal	1,853 gal						
Fwp 1	1.003015	1.003015						
Fpp 1	1.001886	1.002378						
Fpt 1	1.000437	1.000437						
Fwt 1	1.003044	1.003044						
Fpwt 1 = Fpp/Fwt	0.997401	0.997401						
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	507.02 gal	1,858.05 gal						
Fwp 2	1.002800	1.002800						
Fpp 2	1.001752	1.002209						
Fpt 2	1.000328	1.000328						
Fwt 2	1.002122	1.002122						
Fpwt = Fpt/Fwt	0.998209	0.998209						
Vto = Vo(Fwp)(Fpp)(Fpwt)	507.25 gal	1,858.84 gal						

Restrained Pipe								
Vo	980,513.36 gal 125,505,710 oz.		Vtp1	985,125.51 gal 126,096,066 oz.		Vtp2	984,935.92 gal 126,071,798 oz.	
Vo Unrestrained			108,995 gal	1,667 gal	65,160 gal	1,283 gal	130,098 gal	500,669 gal
Fwp 1			1.003015	1.003015	1.003015	1.003015	1.003015	1.003015
Fpp 1			1.001395	1.001555	1.001753	1.002074	1.002350	1.002350
Fpt 1			1.000073	1.000073	1.000073	1.000073	1.000073	1.000073
Fwt 1			1.000582	1.000582	1.000582	1.000582	1.000582	1.000582
Fpwt 1 = Fpp/Fwt			0.999491	0.999491	0.999491	0.999491	0.999491	0.999491
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)			109,420 gal	1,674 gal	65,438 gal	1,289 gal	130,730 gal	503,102 gal
Fwp 2			1.002800	1.002800	1.002800	1.002800	1.002800	1.002800
Fpp 2			1.001290	1.001439	1.001622	1.001921	1.002177	1.002177
Fpt 2			1.000048	1.000048	1.000048	1.000048	1.000048	1.000048
Fwt 2			1.000375	1.000375	1.000375	1.000375	1.000375	1.000375
Fpwt = Fpt/Fwt			0.999674	0.999674	0.999674	0.999674	0.999674	0.999674
Vtp = Vo(Fwp)(Fpp)(Fpwt)			109,405 gal	1,674 gal	65,427 gal	1,289 gal	130,704 gal	503,000 gal

Combined Pipe								
Vo	985,159.40 gal 126,100,403 oz.		Vtp1	989,785.62 gal 126,692,560 oz.		Vtp2	989,597.94 gal 126,668,536 oz.	

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## Pipe Segment Volume Calculations

Company	Pacific Gas and Electric Company		
Construction Co.	ARB		
Hydro. Test Co.	AKRI		
Test Section	PG&E T-22S&N L-131,	Redacted	
File Name	RCP 61362 - T-22S&N,		

### General Pipe Data

Description	9	10	11	12	13	14	15	16
Restrained or Unrestrained?	Restrained	Restrained	Unrestrained	Unrestrained	Restrained	Unrestrained	Unrestrained	Restrained
Outside Diameter	30.000 in.	6.625 in.	4.500 in.	4.500 in.	3.500 in.	34.000 in.	34.000 in.	34.000 in.
Wall Thickness	0.313 in.	0.280 in.	0.237 in.	0.156 in.	0.216 in.	0.505 in.	0.524 in.	0.438 in.
Inside Diameter	29.375 in.	6.065 in.	4.026 in.	4.188 in.	3.068 in.	32.990 in.	32.952 in.	33.124 in.
Spec./Grade	API5L-X52	API5L-Grade B	API5L-Grade B	API5L-Grade B	API5L-Grade B	API5L-X60	API5L-X60	48ksmys
Length Unrestrained			7 ft	4 ft		6 ft	6 ft	
Length Restrained	239 ft	12 ft			3 ft			3,659 ft
Temperature -- On Test	66.0 °F	66.0 °F	84.0 °F	84.0 °F	66.0 °F	84.0 °F	84.0 °F	66.0 °F
Temperature -- End of Test	64.0 °F	64.0 °F	78.0 °F	78.0 °F	64.0 °F	78.0 °F	78.0 °F	64.0 °F
Pressure -- On Test	984 psig	984 psig	984 psig	984 psig	984 psig	984 psig	984 psig	984 psig
Pressure -- End of Test	914 psig	914 psig	914 psig	914 psig	914 psig	914 psig	914 psig	914 psig

### Unrestrained Pipe

Vo	9	10	11	12	13	14	15	16
Vo Unrestrained			5 gal	3 gal		266 gal	266 gal	
Fwp 1			1.003015	1.003015		1.003015	1.003015	
Fpp 1			1.000696	1.001101		1.002678	1.002578	
Fpt 1			1.000437	1.000437		1.000437	1.000437	
Fwt 1			1.003044	1.003044		1.003044	1.003044	
Fpwt 1 = Fpt/Fwt			0.997401	0.997401		0.997401	0.997401	
Vtp 1 = Vo(Fwp)/(Fpp)(Fpwt)			4.63 gal	2.67 gal		267.25 gal	266.61 gal	
Fwp 2			1.002800	1.002800		1.002800	1.002800	
Fpp 2			1.000647	1.001022		1.002488	1.002395	
Fpt 2			1.000328	1.000328		1.000328	1.000328	
Fwt 2			1.002122	1.002122		1.002122	1.002122	
Fpwt = Fpt/Fwt			0.998209	0.998209		0.998209	0.998209	
Vtp = Vo(Fwp)/(Fpp)(Fpwt)			4.64 gal	2.87 gal		267.36 gal	266.72 gal	

### Restrained Pipe

Vo	9	10	11	12	13	14	15	16
Vo Unrestrained	8,203 gal	18 gal			1 gal			163,797 gal
Fwp 1	1.003015	1.003015			1.003015			1.003015
Fpp 1	1.002827	1.000668			1.000446			1.002279
Fpt 1	1.000073	1.000073			1.000073			1.000073
Fwt 1	1.000582	1.000582			1.000582			1.000582
Fpwt 1 = Fpt/Fwt	0.999491	0.999491			0.999491			0.999491
Vtp 1 = Vo(Fwp)/(Fpp)(Fpwt)	8,247 gal	18 gal			1 gal			164,582 gal
Fwp 2	1.002800	1.002800			1.002800			1.002800
Fpp 2	1.002621	1.000615			1.000408			1.002111
Fpt 2	1.000048	1.000048			1.000048			1.000048
Fwt 2	1.000375	1.000375			1.000375			1.000375
Fpwt = Fpt/Fwt	0.999674	0.999674			0.999674			0.999674
Vtp = Vo(Fwp)/(Fpp)(Fpwt)	8,245 gal	18 gal			1 gal			164,549 gal

### Combined Pipe

Vo	9	10	11	12	13	14	15	16
Vo								

Redacted



## Pipe Segment Volume Calculations

Company	Pacific Gas and Electric Company		
Construction Co.	ARB		
Hydro. Test Co.	AKRI		
Test Section	PG&E T-22S&N L-131, MP	Redacted	
File Name	RCP 61362 - T-22S&N, L-131		

### General Pipe Data

Description	General Pipe Data			
	17	18	19	20
Restrained or Unrestrained?	Restrained	Unrestrained	Unrestrained	Unrestrained
Outside Diameter	34.000 in.	1.315 in.	34.000 in.	30.000 in.
Wall Thickness	0.500 in.	0.113 in.	0.375 in.	0.500 in.
Inside Diameter	33.000 in.	1.089 in.	33.250 in.	29.000 in.
Spec./Grade	API5L-X65	API5L-Grade B	API5L-X65	API5L-X65
Length Unrestrained		7 ft	22 ft	22 ft
Length Restrained	14 ft			
Temperature -- On Test	66.0 °F	84.0 °F	84.0 °F	84.0 °F
Temperature -- End of Test	64.0 °F	78.0 °F	78.0 °F	78.0 °F
Pressure -- On Test	984 psig	984 psig	984 psig	984 psig
Pressure -- End of Test	914 psig	914 psig	914 psig	914 psig

### Unrestrained Pipe

Vo	17	18	19	20
Vo Unrestrained		0 gal	992 gal	755 gal
Fwp 1		1.003015	1.003015	1.003015
Fpp 1		1.000395	1.003635	1.002378
Fpt 1		1.000437	1.000437	1.000437
Fwt 1		1.003044	1.003044	1.003044
Fpwt 1 = Fpt/Fwt		0.997401	0.997401	0.997401
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)		0.34 gal	996.37 gal	756.98 gal
Fwp 2		1.002800	1.002800	1.002800
Fpp 2		1.000367	1.003377	1.002209
Fpt 2		1.000328	1.000328	1.000328
Fwt 2		1.002122	1.002122	1.002122
Fpwt = Fpt/Fwt		0.998209	0.998209	0.998209
Vtp = Vo(Fwp)(Fpp)(Fpwt)		0.34 gal	996.70 gal	757.31 gal

### Restrained Pipe

Vo	17	18	19	20
Vo Unrestrained	622 gal			
Fwp 1	1.003015			
Fpp 1	1.001992			
Fpt 1	1.000073			
Fwt 1	1.000582			
Fpwt 1 = Fpt/Fwt	0.999491			
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	625 gal			
Fwp 2	1.002800			
Fpp 2	1.001844			
Fpt 2	1.000048			
Fwt 2	1.000375			
Fpwt = Fpt/Fwt	0.999674			
Vtp = Vo(Fwp)(Fpp)(Fpwt)	625 gal			

### Combined Pipe

Vo	17	18	19	20
Vo				

Redacted





## Pipe Segment Volume Allowance Calculations

Company	Pacific Gas and Electric Company			Job Number	41497302			
Construction Co.	ARB			Job Number	0629-53-3500 T-22			
Hydro. Test Co.	AKRI			Project No.	T-22 10/13/11			
Test Section	PG&E T-22S&N L-131, Redacted			WATER				
File Name	RCP 61362 - T-22S&N,							
General Pipe Data								
Description	Segment							
	1	2	3	4	5	6	7	8
Restrained or Unrestrained?	Unrestrained	Unrestrained	Restrained	Restrained	Restrained	Restrained	Restrained	Restrained
Outside Diameter	30.000 in.	30.000 in.	30.000 in.	30.000 in.	30.000 in.	30.000 in.	30.000 in.	30.000 in.
Wall Thickness	0.625 in.	0.500 in.	0.625 in.	0.562 in.	0.500 in.	0.424 in.	0.375 in.	0.375 in.
Inside Diameter	28.750 in.	29.000 in.	28.750 in.	28.876 in.	29.000 in.	29.152 in.	29.250 in.	29.250 in.
Spec./Grade	API5L-X65	API5L-X65	API5L-X65	API5L-X52	API5L-X60	API5L-X65	API5L-X60	API5L-X52
Length Unstrained	15 ft	54 ft						
Length Restrained			3,232 ft	49 ft	1,899 ft	37 ft	3,727 ft	14,343 ft
Temperature -- On Test	80 °F	80 °F	64 °F	64 °F	64 °F	64 °F	64 °F	64 °F
Temperature -- End of Test	81 °F	81 °F	65 °F	65 °F	65 °F	65 °F	65 °F	65 °F
Pressure -- On Test	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig
Pressure -- End of Test	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig
Unrestrained Pipe								
Vo	4,646.04 gal		Vtp1	4,661.75 gal		Vtp2	4,661.19 gal	
	594,693 oz			596,704 oz.			596,632 oz.	
Vo Unrestrained	506 gal	1,853 gal						
Fwp 1	1.002908	1.002908						
Fpp 1	1.001819	1.002293						
Fpt 1	1.000364	1.000364						
Fwt 1	1.002418	1.002418						
Fpwt 1 = Fp/Fwt	0.997951	0.997951						
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	507.21 gal	1,858.72 gal						
Fwp 2	1.002908	1.002908						
Fpp 2	1.001819	1.002293						
Fpt 2	1.000362	1.000382						
Fwt 2	1.002556	1.002556						
Fpwt = Fpt/Fwt	0.997832	0.997832						
Vtp = Vo(Fwp)(Fpp)(Fpwt)	507.15 gal	1,858.50 gal						
Restrained Pipe								
Vo	980,513.36 gal		Vtp1	985,117.50 gal		Vtp2	985,041.58 gal	
	126,505,710 oz.			126,095,040 oz.			126,085,323 oz.	
Vo Restrained			108,995 gal	1,667 gal	65,160 gal	1,283 gal	130,098 gal	500,669 gal
Fwp 1			1.002908	1.002908	1.002908	1.002908	1.002908	1.002908
Fpp 1			1.001339	1.001493	1.001884	1.001994	1.002260	1.002260
Fpt 1			1.000048	1.000048	1.000048	1.000048	1.000048	1.000048
Fwt 1			1.000375	1.000375	1.000375	1.000375	1.000375	1.000375
Fpwt 1 = Fpt/Fwt			0.999674	0.999674	0.999674	0.999674	0.999674	0.999674
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)			109,422 gal	1,674 gal	65,438 gal	1,289 gal	130,728 gal	503,096 gal
Fwp 2			1.002908	1.002908	1.002908	1.002908	1.002908	1.002908
Fpp 2			1.001342	1.001497	1.001688	1.001997	1.002263	1.002263
Fpt 2			1.000061	1.000061	1.000061	1.000061	1.000061	1.000061
Fwt 2			1.000467	1.000467	1.000467	1.000467	1.000467	1.000467
Fpwt = Fpt/Fwt			0.999593	0.999593	0.999593	0.999593	0.999593	0.999593
Vtp = Vo(Fwp)(Fpp)(Fpwt)			109,414 gal	1,674 gal	65,433 gal	1,289 gal	130,718 gal	503,057 gal
Combined Pipe								
Vo	985,159.40 gal		Vtp1	989,779.25 gal		Vtp2	989,702.77 gal	
	126,100,403 oz.			126,691,744 oz.			126,681,955 oz.	
1 °F Change	76.48 gal		9,789.13 oz.					

Redacted



## Pipe Segment Volume Allowance Calculations

Company	Pacific Gas and Electric Company							
Construction Co.	ARB							
Hydro. Test Co.	AKRI							
Test Section	PG&E T-22S&N L-131, <span style="border: 1px solid black; padding: 2px;">Redacted</span>							
File Name	RCP 61362 - T-22S&N, <span style="border: 1px solid black; padding: 2px;">Redacted</span>							
<b>General Pipe Data</b>								
Description	9	10	11	12	13	14	15	16
Restrained or Unrestrained?	Restrained	Restrained	Unrestrained	Unrestrained	Restrained	Unrestrained	Unrestrained	Restrained
Outside Diameter	30.000 in.	6.625 in.	4.500 in.	4.500 in.	3.500 in.	34.000 in.	34.000 in.	34.000 in.
Wall Thickness	0.313 in.	0.280 in.	0.237 in.	0.156 in.	0.216 in.	0.505 in.	0.524 in.	0.438 in.
Inside Diameter	29.375 in.	6.065 in.	4.026 in.	4.188 in.	3.068 in.	32.990 in.	32.952 in.	33.124 in.
Spec./Grade	API5L-X52	API5L-Grade B	API5L-Grade B	API5L-Grade B	API5L-Grade B	API5L-X60	API5L-X60	48ksmys
Length Unstrained			7 ft	4 ft		6 ft	6 ft	
Length Restrained	233 ft	12 ft			3 ft			3,659 ft
Temperature – On Test	64 °F	64 °F	80 °F	80 °F	64 °F	80 °F	80 °F	64 °F
Temperature – End of Test	65 °F	65 °F	81 °F	81 °F	65 °F	81 °F	81 °F	65 °F
Pressure – On Test	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig
Pressure – End of Test	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig	949 psig
<b>Unrestrained Pipe</b>								
Vo								
Vo Unrestrained			5 gal	3 gal		266 gal	266 gal	
Fwp 1			1.002908	1.002908		1.002908	1.002908	
Fpp 1			1.000572	1.001062		1.002583	1.002487	
Fpt 1			1.000364	1.000364		1.000364	1.000364	
Fwt 1			1.002418	1.002418		1.002418	1.002418	
Fpwt 1 = Fpt/Fwt			0.997951	0.997951		0.997951	0.997951	
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)			4.64 gal	2.87 gal		267.34 gal	266.70 gal	
Fwp 2			1.002908	1.002908		1.002908	1.002908	
Fpp 2			1.000672	1.001062		1.002583	1.002487	
Fpt 2			1.000382	1.000382		1.000382	1.000382	
Fwt 2			1.002556	1.002556		1.002556	1.002556	
Fpwt = Fpt/Fwt			0.997832	0.997832		0.997832	0.997832	
Vtp = Vo(Fwp)(Fpp)(Fpwt)			4.64 gal	2.87 gal		267.31 gal	266.67 gal	
<b>Restrained Pipe</b>								
Vo								
Vo Restrained	8,203 gal	18 gal			1 gal			163,797 gal
Fwp 1	1.002908	1.002908			1.002908			1.002908
Fpp 1	1.002720	1.000638			1.000423			1.002191
Fpt 1	1.000048	1.000048			1.000048			1.000048
Fwt 1	1.000375	1.000375			1.000375			1.000375
Fpwt 1 = Fpt/Fwt	0.999674	0.999674			0.999674			0.999674
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	8,247 gal	18 gal			1 gal			164,580 gal
Fwp 2	1.002908	1.002908			1.002908			1.002908
Fpp 2	1.002724	1.000642			1.000427			1.002195
Fpt 2	1.000061	1.000061			1.000061			1.000061
Fwt 2	1.000467	1.000467			1.000467			1.000467
Fpwt = Fpt/Fwt	0.999593	0.999593			0.999593			0.999593
Vtp = Vo(Fwp)(Fpp)(Fpwt)	8,246 gal	18 gal			1 gal			164,567 gal
<b>Combined Pipe</b>								
Vo								
1 °F Change								

Redacted



## Pipe Segment Volume Allowance Calculations

Company	Pacific Gas and Electric Company		
Construction Co.	ARB		
Hydro. Test Co.	AKRI		
Test Section	PG&E T-22S&N L-131, MF	Redacted	
File Name	RCP 61362 - T-22S&N, L-1		

### General Pipe Data

Description	17	18	19	20
Restrained or Unrestrained?	Restrained	Unrestrained	Unrestrained	Unrestrained
Outside Diameter	34.000 in.	1.315 in.	34.000 in.	30.000 in.
Wall Thickness	0.500 in.	0.113 in.	0.375 in.	0.500 in.
Inside Diameter	33.000 in.	1.089 in.	33.250 in.	29.000 in.
Spec./Grade	API5L-X65	API5L-Grade B	API5L-X65	API5L-X65
Length Unstrained		7 ft	22 ft	22 ft
Length Restrained	14 ft			
Temperature – On Test	64 °F	80 °F	80 °F	80 °F
Temperature – End of Test	65 °F	81 °F	81 °F	81 °F
Pressure – On Test	949 psig	949 psig	949 psig	949 psig
Pressure – End of Test	949 psig	949 psig	949 psig	949 psig

### Unrestrained Pipe

Vo	17	18	19	20
Vo Unrestrained		0 gal	992 gal	755 gal
Fwp 1		1.002908	1.002908	1.002908
Fpp 1		1.000381	1.003506	1.002293
Fpt 1		1.000364	1.000364	1.000364
Fwt 1		1.002418	1.002418	1.002418
Fpwt 1 = Fpt/Fwt		0.997951	0.997951	0.997951
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)		0.34 gal	996.68 gal	757.26 gal
Fwp 2		1.002908	1.002908	1.002908
Fpp 2		1.000381	1.003506	1.002293
Fpt 2		1.000382	1.000382	1.000382
Fwt 2		1.002556	1.002556	1.002556
Fpwt = Fpt/Fwt		0.997832	0.997832	0.997832
Vtp = Vo(Fwp)(Fpp)(Fpwt)		0.34 gal	996.56 gal	757.17 gal

### Restrained Pipe

Vo	17	18	19	20
Vo Restrained	622 gal			
Fwp 1	1.002908			
Fpp 1	1.001914			
Fpt 1	1.000048			
Fwt 1	1.000375			
Fpwt 1 = Fpt/Fwt	0.999674			
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	625 gal			
Fwp 2	1.002908			
Fpp 2	1.001918			
Fpt 2	1.000051			
Fwt 2	1.000467			
Fpwt = Fpt/Fwt	0.999593			
Vtp = Vo(Fwp)(Fpp)(Fpwt)	625 gal			

### Combined Pipe

Vo	17	18	19	20
1 °F Change				

Redacted



## 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	15 ft	Unrestrained	30.000 in.	0.6250 in.	API5L-X65	2,708 psig	Steel	Arc Weld	DSAW
2	54 ft	Unrestrained	30.000 in.	0.5000 in.	API5L-X65	2,167 psig	Steel	Arc Weld	DSAW
3	3,232 ft	Restrained	30.000 in.	0.6250 in.	API5L-X65	2,708 psig	Steel	Arc Weld	DSAW
4	49 ft	Restrained	30.000 in.	0.5620 in.	API5L-X52	1,948 psig	Steel	Arc Weld	DSAW
5	1,899 ft	Restrained	30.000 in.	0.5000 in.	API5L-X60	2,000 psig	Steel	Arc Weld	DSAW
6	37 ft	Restrained	30.000 in.	0.4240 in.	API5L-X65	1,837 psig	Steel	Arc Weld	DSAW
7	3,727 ft	Restrained	30.000 in.	0.3750 in.	API5L-X60	1,500 psig	Steel	Arc Weld	DSAW
8	14,343 ft	Restrained	30.000 in.	0.3750 in.	API5L-X52	1,300 psig	Steel	Arc Weld	DSAW
9	233 ft	Restrained	30.000 in.	0.3125 in.	API5L-X52	1,083 psig	Steel	Arc Weld	DSAW
10	12 ft	Restrained	6.625 in.	0.2800 in.	API5L-Grade B	2,958 psig	Steel	Arc Weld	SM
11	7 ft	Unrestrained	4.500 in.	0.2370 in.	API5L-Grade B	3,887 psig	Steel	Arc Weld	SM
12	4 ft	Unrestrained	4.500 in.	0.1560 in.	API5L-Grade B	2,427 psig	Steel	Arc Weld	SM
13	3 ft	Restrained	3.500 in.	0.2160 in.	API5L-Grade B	4,320 psig	Steel	Arc Weld	SM
14	6 ft	Unrestrained	34.000 in.	0.5050 in.	API5L-X60	1,782 psig	Steel	Arc Weld	DSAW
15	6 ft	Unrestrained	34.000 in.	0.5240 in.	API5L-X60	1,849 psig	Steel	Arc Weld	DSAW
16	3,659 ft	Restrained	34.000 in.	0.4380 in.	48ksmys	1,237 psig	Steel	Arc Weld	DSAW
17	14 ft	Restrained	30.000 in.	0.5000 in.	API5L-X65	2,167 psig	Steel	Arc Weld	DSAW
18	7 ft	Unrestrained	1.315 in.	0.1130 in.	API5L-Grade B	6,015 psig	Steel	Arc Weld	SM
19	22 ft	Unrestrained	34.000 in.	0.3750 in.	API5L-X65	1,434 psig	Steel	Arc Weld	DSAW
20	22 ft	Unrestrained	30.000 in.	0.5000 in.	API5L-X65	2,167 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		41497302
Construction Company	ARB		Job Number
Address	1875 Loveridge Road Pittsburg, CA 94565 Attention: T. Barnes		0629-53-3500 T-22
Hydrostatic Test Co.	AKRI		Project No.
Address	1414 Vahlhalla Drive Bakersfield, CA 93309		T-22 10/13/11
Test Section	PG&E T-22S&N L-131 Redacted From: 0+00 To: 264+97		
File Name	RCP 61362 - T-22S&N, L-131 Redacted		

#### 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.

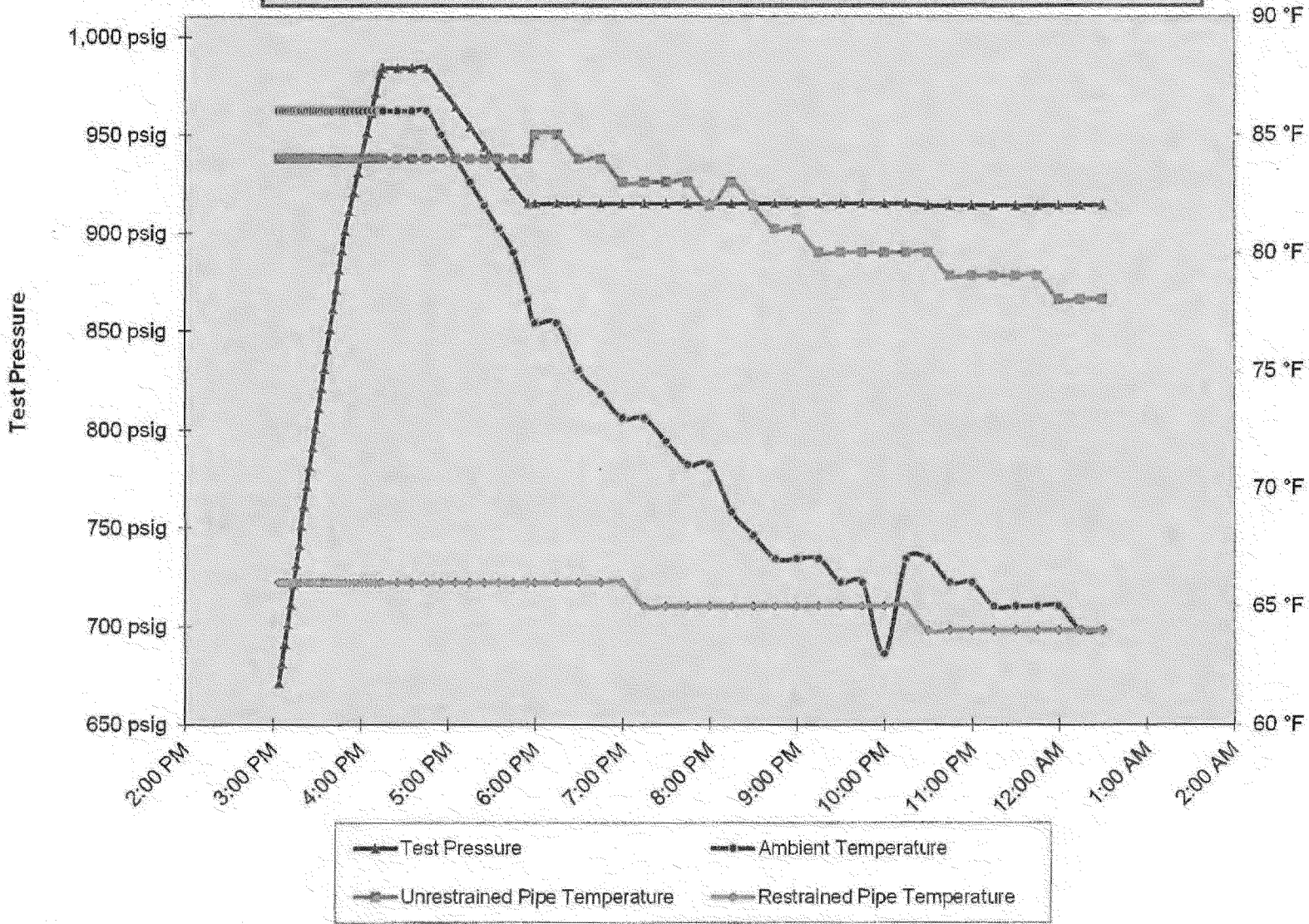
Time and Date Test Pressure Reached	10/13/11 4:15 PM	Elevation at Test Point	24 ft	Min. Required Test Press At Test Point (1)	895.60 psig	Max. Allowable Test Press at Test Point (4)	993.77 psig
Time and Date Test Ended	10/14/11 12:30 AM	Max. Elevation in Test Section	30 ft	Min. Indicated Test Pressure (2)	914.00 psig	Max. Indicated Test Pressure (5)	984.00 psig
Actual Duration of Test	8 hours 15 minutes	Min. Elevation in Test Section	(25) ft	Min. Test Pressure at Max. Elevation (3)	911.40 psig	Max. Test Pressure at Min. Elevation (6)	1,005.23 psig

Redacted

Test 22 N & S Rev. 1  
Pipe



PG&E T-22S&N L-131, Redacted

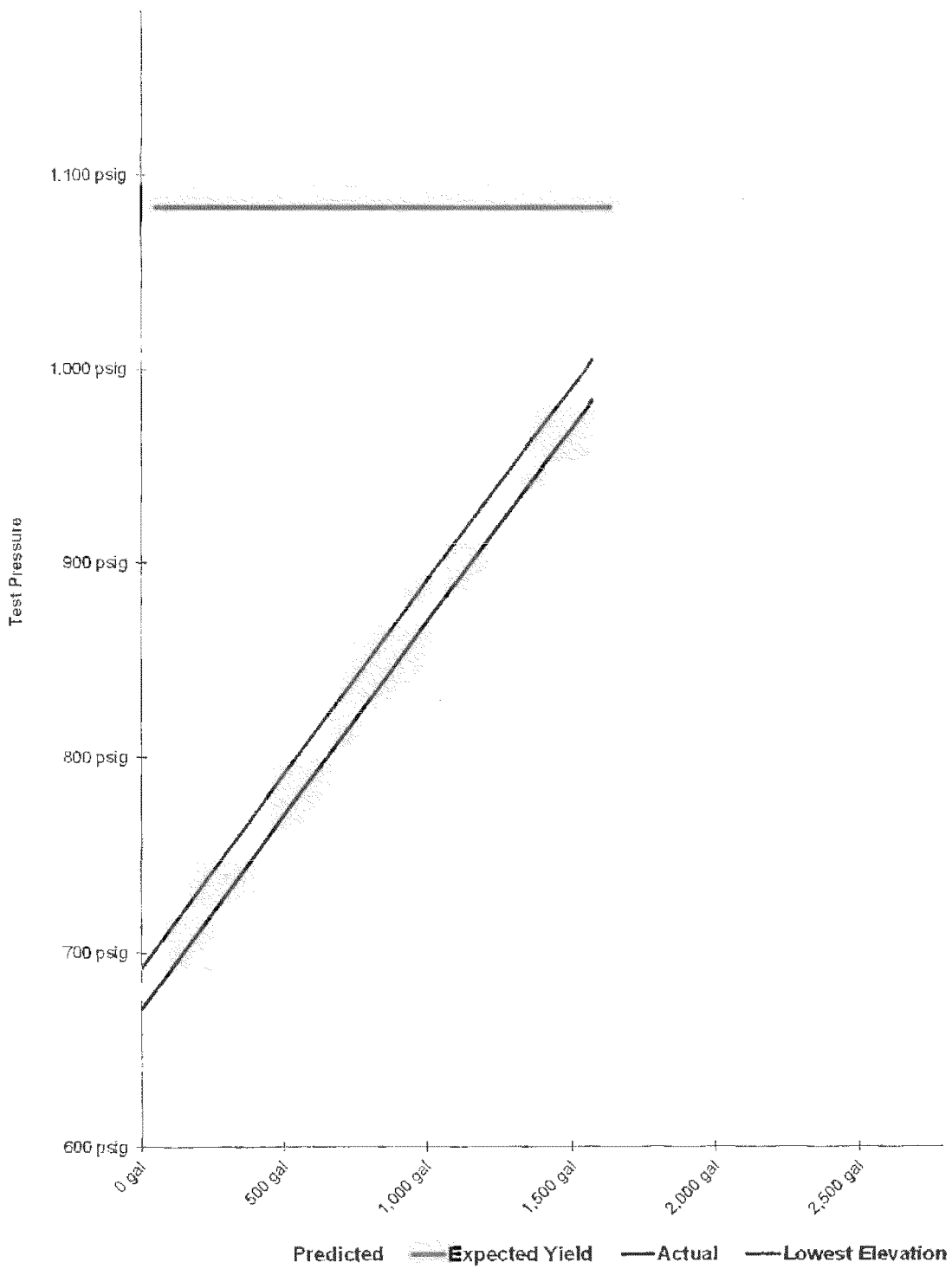


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Test 22 N & S Rev. 1  
PlotT



Spike Pressure Test  
Stress Strain Curve -- PG&E T-22S&N L-131, Redacted

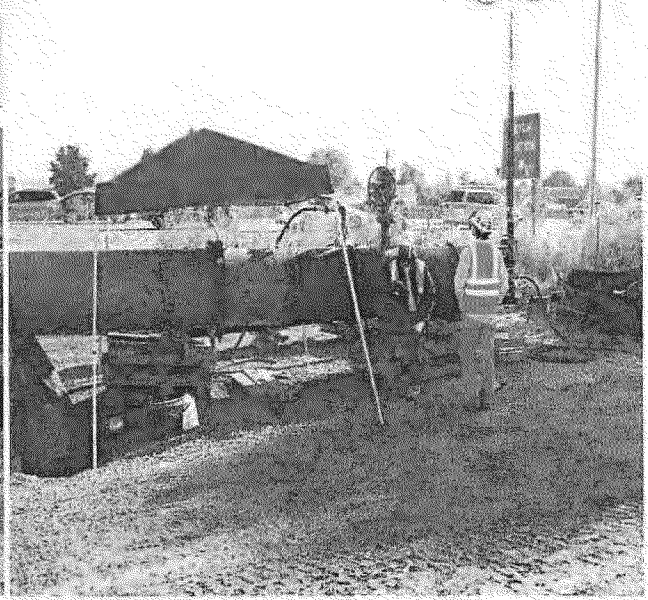


Actual Pressure Volume Plot Data			Predicted Pressure Volume Plot Data	Slope		Spike Pressure Test Stress Strain Curve -- PG&E T-22S&N L-131, Redacted	
Pressure	Strokes	Gallons	Gallons	Actual	Predicted		
671 psig	0	0.00 gal		0	0.000	39250	0.067 gal/stroke
681 psig	660	50.26 gal	52.05 gal	5.026	5.205	Pump Piston Diameter	1.375 in
691 psig	1320	100.52 gal	104.10 gal	5.026	5.205	Pump Piston Stroke	3.50 in
701 psig	1980	150.78 gal	158.15 gal	5.026	5.205	Pump Cylinders	3 ea
711 psig	2640	201.04 gal	208.20 gal	5.026	5.206	Volume check gal per stroke	0.076 gal/stroke
721 psig	3300	251.30 gal	260.26 gal	5.026	5.208	Volume Released (gallons)	50.00 gal
731 psig	3955	301.18 gal	312.32 gal	4.988	5.206	Pressure Reduced (psi)	10 psi
741 psig	4615	351.44 gal	364.39 gal	5.026	5.207	Maximum2	1,720 gal
751 psig	5275	401.70 gal	416.46 gal	5.026	5.207	Minimum2	0 gal
761 psig	5938	452.19 gal	468.53 gal	5.049	5.207	Maximum1	1,184 psig
771 psig	6587	501.61 gal	520.60 gal	4.942	5.207	Minimum1	600 psig
781 psig	7247	551.87 gal	572.68 gal	5.026	5.208	Gallons/Stroke Used	0.076 gal/stroke
791 psig	7908	602.21 gal	624.76 gal	5.034	5.208	Predicted Gallons/Stroke	0.079 gal/stroke
801 psig	8568	652.47 gal	676.85 gal	5.026	5.208	Pressure Increment	10 psi
811 psig	9222	702.27 gal	728.93 gal	4.980	5.209	Max Pressure	984 psig
821 psig	9881	752.46 gal	781.03 gal	5.018	5.209	Buried Pipe Temperature	74 °F
831 psig	10538	802.49 gal	833.12 gal	5.003	5.209	Exposed Pipe Temperature	84 °F
841 psig	11198	852.75 gal	885.22 gal	5.026	5.210	ASME B31.8 Appendix N-5	
851 psig	11853	902.63 gal	937.32 gal	4.985	5.210		
861 psig	12514	952.97 gal	989.42 gal	5.034	5.210	Average Actual Elastic Slope	4.956
871 psig	13174	1,003.23 gal	1,041.53 gal	5.026	5.211	Average Predicted Elastic Slope	5.210
881 psig	13833	1,053.41 gal	1,093.64 gal	5.018	5.211	Code Prescribed Minimum Yield Slope (less 10%) B31.8 N-5 (c)(2)	9.417
891 psig	14498	1,104.05 gal	1,145.75 gal	5.064	5.211	Established Minimum Yield Pressure B31.8 N-5 (c)(2)	984 psig
901 psig	15158	1,154.16 gal	1,197.87 gal	5.011	5.212	Maximum Allowed Volume (After Slope Deviation) B31.8 N-5 (c)(2)	418 gal
911 psig	15810	1,203.96 gal	1,249.99 gal	4.980	5.212	Volume (After Slope Deviation) B31.8 N-5 (c)(2)	0 gal
921 psig	16470	1,254.22 gal	1,302.11 gal	5.026	5.212	Redacted	
931 psig	17128	1,304.33 gal	1,354.23 gal	5.011	5.213		
941 psig	17785	1,354.36 gal	1,406.36 gal	5.003	5.213		
951 psig	18453	1,405.23 gal	1,458.49 gal	5.087	5.213		
961 psig	19113	1,455.49 gal	1,510.63 gal	5.026	5.214		
971 psig	19773	1,505.75 gal	1,562.77 gal	5.026	5.214		
981 psig	20433	1,556.01 gal	1,614.91 gal	5.026	5.214		
984 psig	20551	1,565.00 gal	1,630.55 gal	2.985	5.214		
984 psig		1,565.00 gal	1,630.55 gal	0.000	0.000		
984 psig		1,565.00 gal	1,630.55 gal	0.000	0.000		
984 psig		1,565.00 gal	1,630.55 gal	0.000	0.000		
984 psig		1,565.00 gal	1,630.55 gal	0.000	0.000		
984 psig		1,565.00 gal	1,630.55 gal	0.000	0.000		
984 psig		1,565.00 gal	1,630.55 gal	0.000	0.000		
984 psig		1,565.00 gal	1,630.55 gal	0.000	0.000		

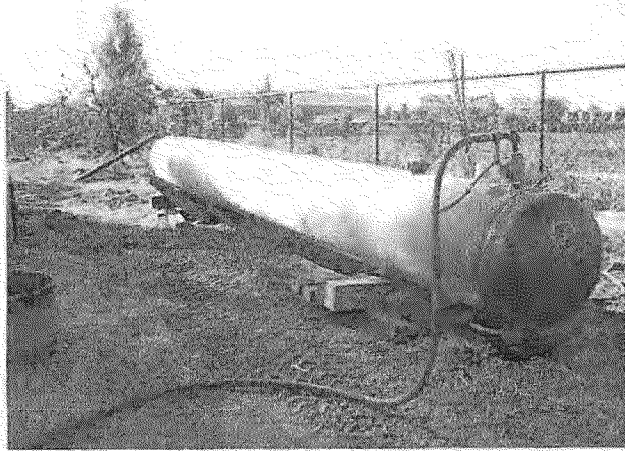
10/14/11  
Date



North Segment Test Header



South Segment Test Header



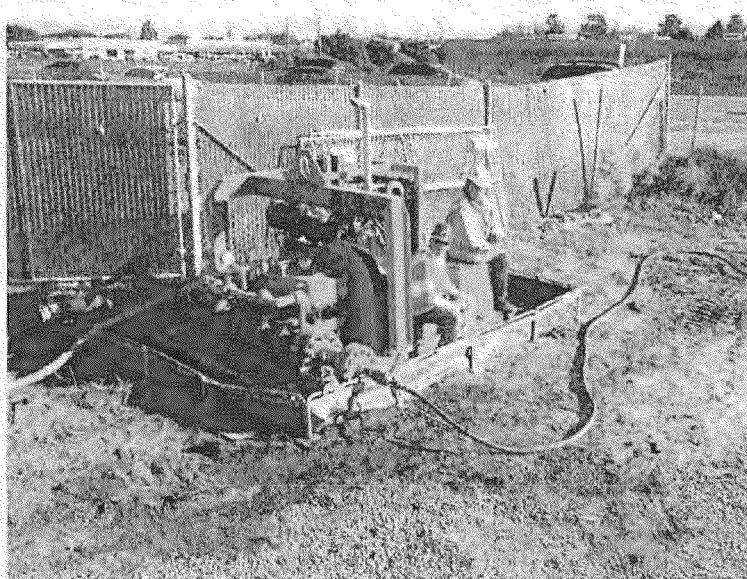
Tie-in pipe included in test.



North and South Test Heads



Deadweight Test equipment



Pressure Pump.