



## Pipe Segment Volume Allowance Calculations

Company	Pacific Gas and Electric Company	Job Number	41497363
Construction Co.	ARB	Job Number	0629-53-3500
Hydro. Test Co.	Contra Costa Inspection Co.	Project No.	T# 47A-1 7/28/2011
Test Section	PG&E T-47A-1 Line 153, MP 17.65- 18.01	WATER	
File Name	RCP 61362 - T-47A-1, L-153 MP 17.65 -18.01		

### General Pipe Data

Description	Segment							
	1	2	3	4				
Restrained or Unrestrained?	Unrestrained	Restrained	Restrained	Unrestrained				
Outside Diameter	30.000 in.	30.000 in.	2.375 in.	30.000 in.				
Wall Thickness	0.375 in.	0.375 in.	0.154 in.	0.500 in.				
Inside Diameter	29.250 in.	29.250 in.	2.067 in.	29.000 in.				
Spec./Grade	API5L-X65	API5L-X52	API5L-Grade B	API5L-X65				
Length Unstrained	58.00 ft			18 ft				
Length Restrained		1,703 ft	2 ft					
Temperature – On Test	66 °F	63 °F	63 °F	66 °F				
Temperature – End of Test	67 °F	64 °F	64 °F	67 °F				
Pressure – On Test	762 psig	762 psig	762 psig	762 psig				
Pressure – End of Test	762 psig	762 psig	762 psig	762 psig				

### Unrestrained Pipe

Sum:	Vo	2,642.23 gal 338,205 oz.	Vtp1	2,653.30 gal 339,623 oz.	Vtp2	2,653.09 gal 339,595 oz.
Vo Unrestrained	2,025 gal		618 gal			
Fwp 1	1.002333		1.002333			
Fpp 1	1.002477		1.001842			
Fpt 1	1.000109		1.000109			
Fwt 1	1.000582		1.000582			
Fpwt 1 = Fpt/Fwt	0.999527		0.999527			
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)	2,033.39 gal		619.92 gal			
Fwp 2	1.002333		1.002333			
Fpp 2	1.002477		1.001842			
Fpt 2	1.000127		1.000127			
Fwt 2	1.000681		1.000681			
Fpwt = Fpt/Fwt	0.999447		0.999447			
Vtp = Vo(Fwp)(Fpp)(Fpwt)	2,033.22 gal		619.87 gal			

### Restrained Pipe

Sum:	Vo	59,446.75 gal 7,609,183 oz.	Vtp1	59,679.75 gal 7,639,008 oz.	Vtp2	59,674.27 gal 7,638,307 oz.
Vo Restrained		59,446 gal	0 gal			
Fwp 1		1.002333	1.002333			
Fpp 1		1.001814	1.000321			
Fpt 1		1.000036	1.000036			
Fwt 1		1.000267	1.000267			
Fpwt 1 = Fpt/Fwt		0.999769	0.999769			
Vtp 1 = Vo(Fwp)(Fpp)(Fpwt)		59,679 gal	0 gal			
Fwp 2		1.002333	1.002333			
Fpp 2		1.001817	1.000325			
Fpt 2		1.000048	1.000048			
Fwt 2		1.000375	1.000375			
Fpwt = Fpt/Fwt		0.999674	0.999674			
Vtp = Vo(Fwp)(Fpp)(Fpwt)		59,674 gal	0 gal			

### Combined Pipe

Sum:	Vo	62,088.97 gal 7,947,389 oz.	Vtp1	62,333.05 gal 7,978,631 oz.	Vtp2	62,327.36 gal 7,977,902 oz.
1 °F Change	5.69 gal					728.37 oz.



## 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	58 ft	Unrestrained	30.000 in.	0.3750 in.	API5L-X65	1,625 psig	Steel	Arc Weld	DSAW
2	1,703 ft	Restrained	30.000 in.	0.3750 in.	API5L-X52	1,300 psig	Steel	Arc Weld	DSAW
3	2 ft	Restrained	2.375 in.	0.1540 in.	API5L-Grade B	4,539 psig	Steel	Arc Weld	SM
4	18 ft	Unrestrained	30.000 in.	0.5000 in.	API5L-X65	2,167 psig	Steel	Arc Weld	DSAW

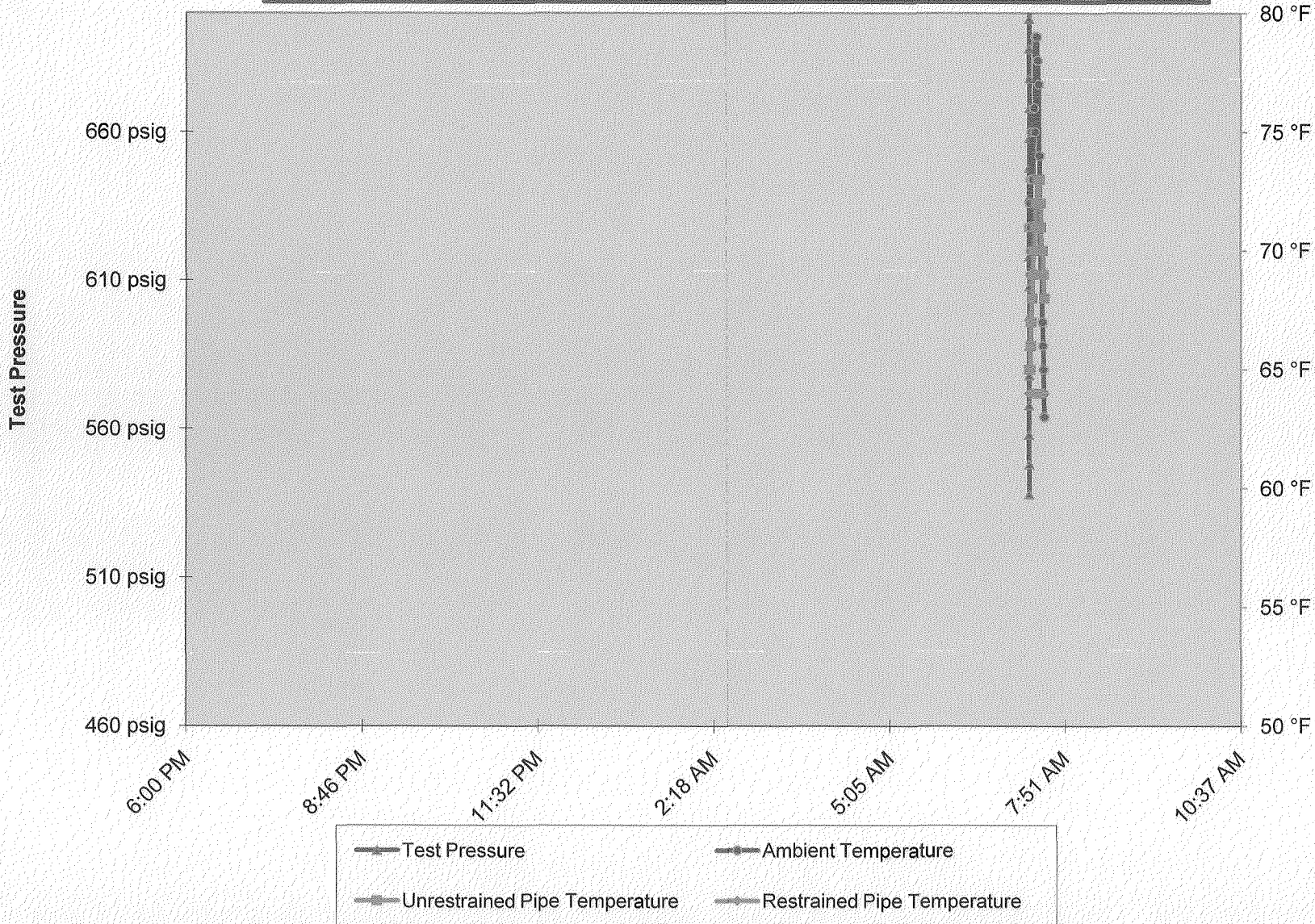
### Hydrostatic Test Project Owner & Participants

Owner Company	Pacific Gas and Electric Company	Job Number
Address	350 N. Wiget Walnut Creek, CA 94598 Attention: Redacted	41497363
Construction Company	ARB	Job Number
Address	1875 Loveridge Road Pittsburg, CA 94565 Attention: Redacted	0629-53-3500
Hydrostatic Test Co.	Contra Costa Inspection Co.	Project No.
Address	2820 LaJolla Drive Antioch, Ca 94531 Attention: Redacted	T# 47A-1 7/28/2011
Test Section	PG&E T-47A-1 Line 153, MP 17.65- 18.01 From: 17+40.5 To: 0+00	
File Name	RCP 61362 - T-47A-1, L-153 MP 17.65 -18.01	

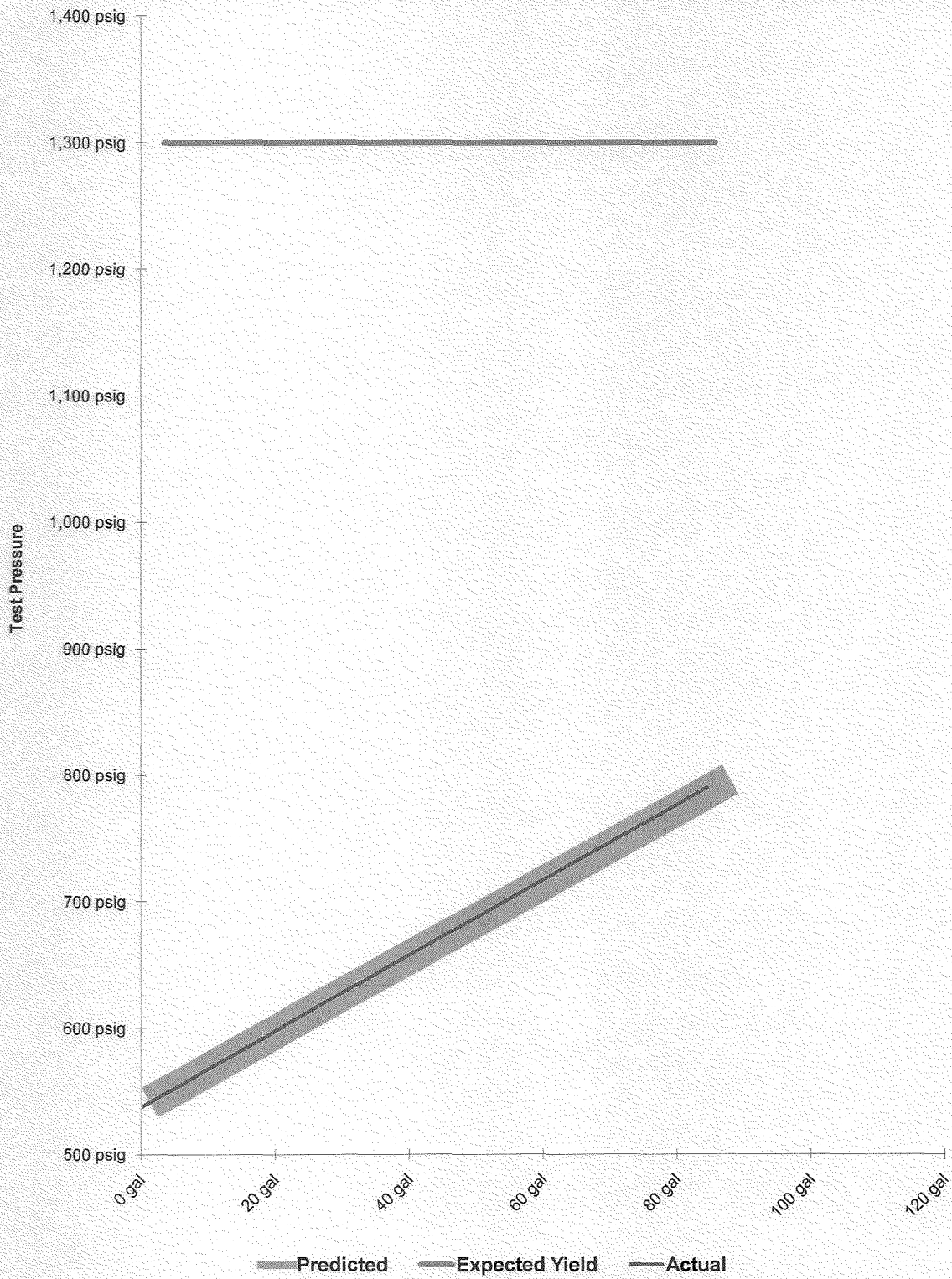
<b>Part II – Test Data (TO BE PREPARED BY PERSON SUPERVISING TEST AT TIME OF TEST)</b>				Note: Minimum test pressure and duration are not to be charged without written approval.			
Time and Date Test Pressure Reached	7/28/11 11:50 AM	Elevation at Test Point	18 ft	Min. Required Test Press At Test Point (1)	719 psig	Max. Allowable Test Press at Test Point (4)	790 psig
Time and Date Test Ended	7/28/11 7:50 PM	Max. Elevation in Test Section	28 ft	Min. Indicated Test Pressure (2)	724 psig	Max. Indicated Test Pressure (5)	790 psig
Actual Duration of Test	8.00 hrs	Min. Elevation in Test Section	18 ft	Min. Test Pressure at Max. Elevation (3)	720 psig	Max. Test Pressure at Min. Elevation (6)	790 psig

PG&E T-47A-1 Line 153,

Redacted



**Spike Pressure Test**  
**Stress Strain Curve -- PG&E T-47A-1 Line 153, MP 17.65- 18.01**



Actual Pressure Volume Plot Data			Predicted Pressure Volume Plot Data	Slope		Spike Pressure Test Stress Strain Curve -- PG&E T-47A-1 Line 153, MP 17.65-18.01	
Pressure	Strokes	Gallons	Gallons	Actual	Predicted		
538 psig	0	0.00 gal		0	0.00 gal	Pump gal per stroke	0.056 gal/stroke
548 psig	60	3.35 gal	3.40 gal	0.335	0.340	Pump Piston Diameter	1.250 in
558 psig	120	6.69 gal	6.79 gal	0.335	0.340	Pump Piston Stroke	3.50 in
568 psig	180	10.04 gal	10.19 gal	0.335	0.340	Pump Cylinders	3 ea
578 psig	240	13.39 gal	13.58 gal	0.335	0.340	Volume check gal per stroke	0.071 gal/stroke
588 psig	300	16.73 gal	16.98 gal	0.335	0.340	Volume Released (gallons)	4.25 gal
598 psig	360	20.08 gal	20.37 gal	0.335	0.340	Pressure Reduced (psi)	10 psi
608 psig	420	23.43 gal	23.77 gal	0.335	0.340	Maximum2	90 gal
618 psig	480	26.77 gal	27.17 gal	0.335	0.340	Minimum2	0 gal
628 psig	540	30.12 gal	30.56 gal	0.335	0.340	Maximum1	1,400 psig
638 psig	600	33.47 gal	33.96 gal	0.335	0.340	Minimum1	500 psig
648 psig	660	36.82 gal	37.36 gal	0.335	0.340	Gallons/Stroke Used	0.056 gal/stroke
658 psig	720	40.16 gal	40.75 gal	0.335	0.340	Predicted Gallons/Stroke	0.057 gal/stroke
668 psig	780	43.51 gal	44.15 gal	0.335	0.340	1160	10 psi
678 psig	840	46.86 gal	47.55 gal	0.335	0.340	Max Pressure	790 psig
688 psig	900	50.20 gal	50.95 gal	0.335	0.340	Buried Pipe Temperature	70 °F
698 psig	960	53.55 gal	54.35 gal	0.335	0.340	Exposed Pipe Temperature	70 °F
708 psig	1020	56.90 gal	57.74 gal	0.335	0.340	<b>ASME B31.8 Appendix N-5</b>	
718 psig	1080	60.24 gal	61.14 gal	0.335	0.340	Average Actual Elastic Slope	0.335
728 psig	1140	63.59 gal	64.54 gal	0.335	0.340	Average Predicted Elastic Slope	0.340
738 psig	1200	66.94 gal	67.94 gal	0.335	0.340	Code Prescribed Minimum Yield Slope (less 10%) B31.8 N-5 (c)(2)	0.636
748 psig	1260	70.28 gal	71.34 gal	0.335	0.340	Established Minimum Yield Pressure B31.8 N-5 (c)(2)	790 psig
758 psig	1320	73.63 gal	74.74 gal	0.335	0.340	Maximum Allowed Volume (After Slope Deviation) B31.8 N-5 (c)(2)	418 gal
768 psig	1380	76.98 gal	78.14 gal	0.335	0.340	Volume (After Slope Deviation) B31.8 N-5 (c)(2)	0 gal
778 psig	1440	80.32 gal	81.54 gal	0.335	0.340	<div style="border: 1px solid black; padding: 10px; display: inline-block;">                     Redacted                 </div> <div style="margin-left: 20px; text-align: right;"> <i>7/28/11</i>                      July 27, 2011                 </div>	
788 psig	1500	83.67 gal	84.94 gal	0.335	0.340		
790 psig	1512	84.34 gal	85.62 gal	0.335	0.340		
790 psig		84.34 gal	85.62 gal	0.000	0.000		
790 psig		84.34 gal	85.62 gal	0.000	0.000		
790 psig		84.34 gal	85.62 gal	0.000	0.000		
790 psig		84.34 gal	85.62 gal	0.000	0.000		
790 psig		84.34 gal	85.62 gal	0.000	0.000		
790 psig		84.34 gal	85.62 gal	0.000	0.000		
790 psig		84.34 gal	85.62 gal	0.000	0.000		
790 psig		84.34 gal	85.62 gal	0.000	0.000		
790 psig		84.34 gal	85.62 gal	0.000	0.000		