APPENDIX B

Summary of DRA Analysis of Late-Filed ALJ Exhibits

A. Estimation of hydrotest costs used to calculate disallowances for pipe replacement projects

1. The PD uses an overly simplistic estimate of hydrotest costs to adjust pipe replacement project costs

Late filed exhibits show that the PD used a constant value of $95.8 per foot for *hydrotesting* to determine the disallowance for pipe *replacement* projects,[1] regardless of whether the disallowed test project is 3 feet or 3,000 feet long.[2] The PD does not describe how the "estimated cost of pressure testing" should be calculated, but DRA determined that the $95.8 value is PG&E's estimated total cost for all hydrotests, less a correction for removed AFUDC, $396.1 million, divided by the total length of hydrotests proposed by PG&E, 783.3 miles.[3] This method provides a very different value from the "average cost per foot of PG&E's hydrotest projects", which is $289.78, and the median cost per foot for the 165 hydrotest projects, $149.23.[4] As discussed below, these differences illustrate the significant inaccuracies generated if *any* single estimate for the hydrotest cost per foot is applied indiscriminately to all replacement projects.

This section describes why the PD is inconsistent with the explicit and implied goals to have PG&E shareholders pay for costs caused by PG&E mismanagement, and ratepayers pay where they receive an incremental benefit for new pipe.[5]

As a preliminary point, it should be clear that the adjustment of replacement costs should be consistent with the costs adopted for hydrotesting elsewhere in the PD. If the Commission adopts PG&E's hydrotest costs as reasonable, despite evidence provided by DRA to the contrary, it must use the same cost estimates when adjusting pipe replacement costs.

2. Hydrotest costs per foot are inversely proportional to project or test section length, and are much higher than $95.8 for "short" pipes

The first point supporting an alternative estimation method is that PG&E's testimony showed that hydrotest costs per foot vary widely, from $47 to $2,646 per foot, [6] and DRA explained that this is a direct result of PG&E's inflated and unsupported fixed hydrotest costs,

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[1] Italics are used throughout this Attachment to focus on important differences, such as "program" vs. "project" data, and "hydrotest" length vs. "replacement" project length.

[2] Late filed exhibit ALJ-1, Table 2, heading for the ninth column from the left.

[3] Late filed exhibit ALJ-1, Table 3. Total value of "Gross project cost…. with AFUDC removed" divided by "Total Project Footage". These summations, which should be shown in Line 168 of the table, were calculated by DRA.

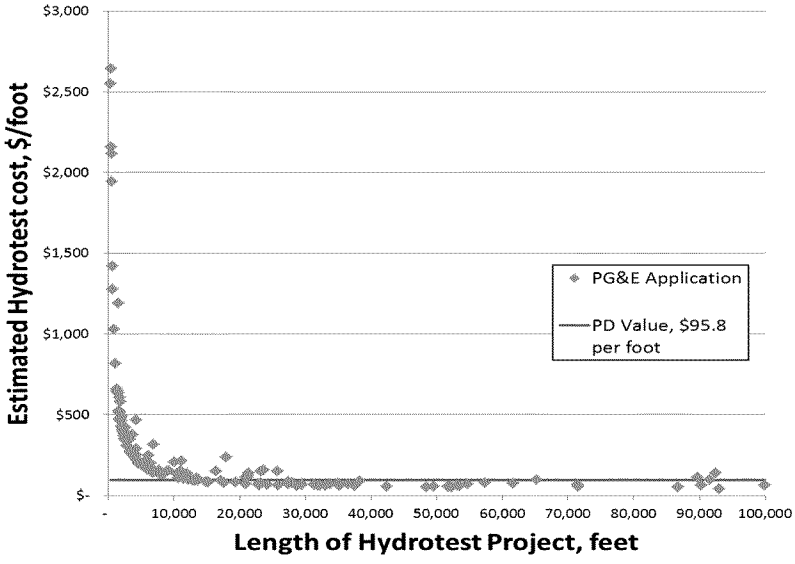
[4] The average developed by PG&E and used in the PD considers PG&E's hydrotest program as a whole, and obtains an average price at the *program* level ($396.1 million/783.3 miles/5,280 feet per mile). There is no median value of the program level because there is only one hydrotest *program* proposed. Statistics can also be calculated at the *project* level, as was done in the cited data above. In this case, the cost per foot for each project is calculated, and average and median statistics can be calculated on the 165 project level costs per foot.

[5] PD, p.62.

[6] Exhibit 9, p.3-42.

which add a minimum of $715,000 to every test regardless of length.[7] PG&E's proposed hydrotest program includes a few projects that are very long and thus have a low cost per foot.[8] This results in the significant differences between the two methods of calculating the average and the median values is shown above. Thus, the use of any single value to represent the estimated cost of a hydrotest, particularly using PG&E's inflated fixed hydrotest costs, is a gross over simplification which fails to incorporate evidence from this proceeding that hydrotest costs per foot are primarily dependent on project and segment length.

In addition, the record shows that hydrotest costs per foot decrease with increased length of a project, as fixed costs are spread over a larger length of pipe. The following chart shows hydrotest costs per foot for PG&E's 165 proposed hydrotests projects, as a function of the length of each project:[9]



This chart shows that short test projects, including all those shorter than 10,000 feet, have a cost per foot higher than $95.8.

3. The average length of pipes in pipeline replacement projects is nearly 17 times shorter than in the hydrotest projects which were used to establish the $95.8 value using in the PD

Given this showing that hydrotest costs depend on test section length, it is necessary to compare the length of PG&E's proposed replacement projects with the length of hydrotest projects illustrated above. For hydrotesting, the median project length is 9,195 feet.[10] A

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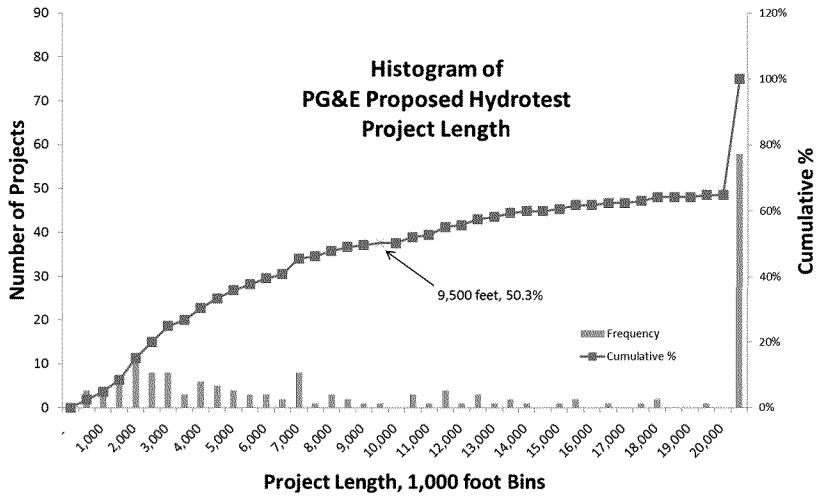
[7] Exhibit 144, TCR testimony, pp. 46-48 and 64-65. PG&E's estimated fixed costs per hydrotest are $715,000 minimum, including $500,000 for Mob/Demob, $200,000 for Move Around, and $15,000 for test heads, Exhibit 2, p.3E-17 for 12" and under pipes.

[8] For example, project L-187TEST is a 39.2 mile project with a PG&E estimated cost of $9,681,000, or approximately $45.6 per foot.

[9] Data from late filed exhibit ALJ-1, Table 3. Value of "Gross project cost.... with AFUDC removed" divided by "Total Project Footage" for each proposed project.

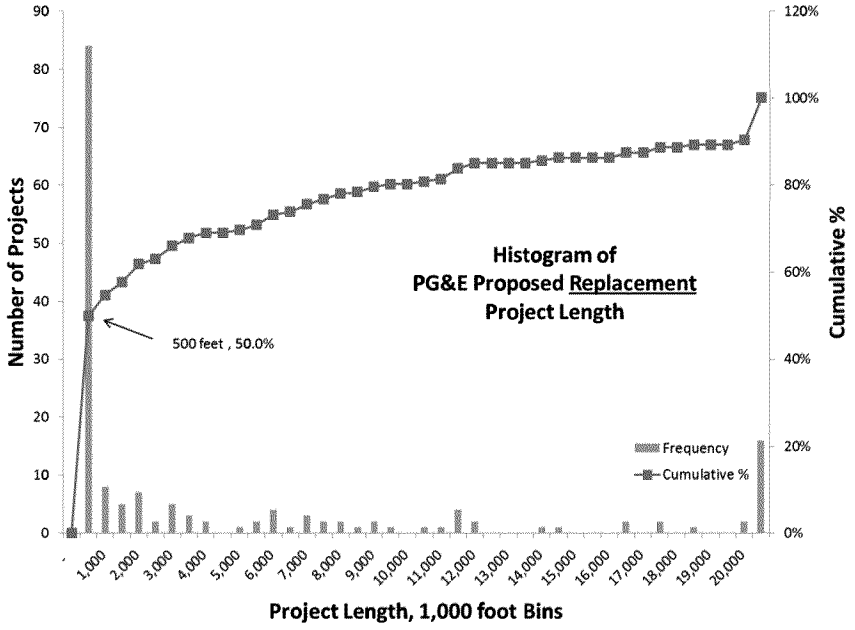
[10] Data from late filed exhibit ALJ-1, Table 3. Median value of "Total Project Footage" for each proposed hydrotest project.

histogram of the 165 hydrotests shows the number of tests (y axis) within each project length bin (x axis):[11]



This chart shows that approximately 2/3 of the *hydrotest* projects are longer than a mile, and 58 projects are longer than 20,000 ft. These long projects, which have a low cost per foot as shown above, drive the average cost per foot used in the PD.

In comparison, the median length of PG&E's proposed *replacement* projects is 509 feet, over 17 times less than the median length of *hydrotest* projects:[12]

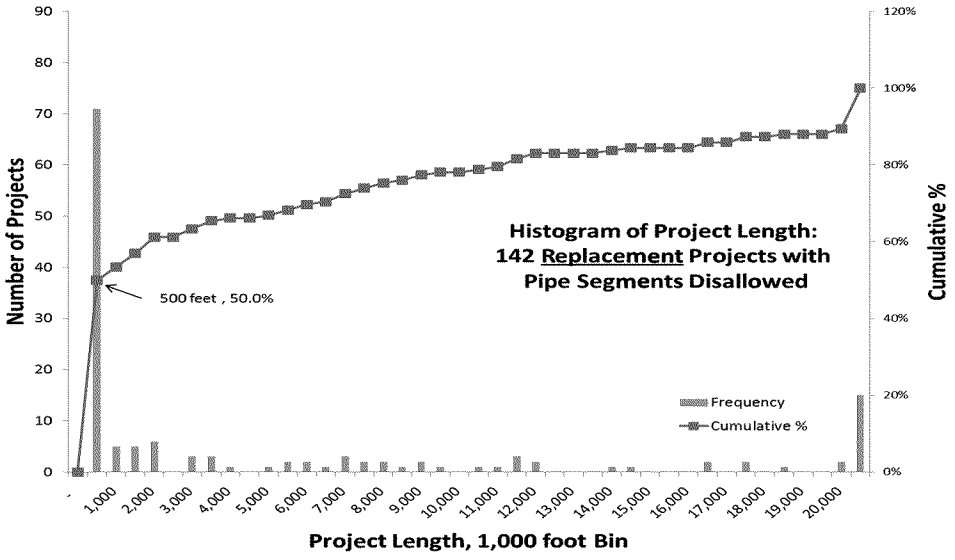


[11] Each project length bin is 500 feet wide, such that the first bin includes are project 0 – 500 feet long. The final bin is an exception, which includes all 25 hydrotest projects that are longer than 20,000 feet long.

[12] 9,195 feet above divided by 509 feet. Data from late filed exhibit ALJ-1, Table 2, median value of "Total Project Footage" for each proposed replacement project.

This chart shows that the majority of proposed *replacement* tests (84 of 168) are less than 1,000 feet long.

Not all replacement projects have segments that are disallowed, regardless of whether PG&E or DRA's cost allocation criteria are used. DRA therefore performed a similar analysis on the 142 replacement projects with disallowances using the criteria of Scenario 3 as described in Section II.A.2(a) of DRA's Comments on the PD.[13] The median value of these projects, 512 feet, and the frequency distribution are similar to the full set of replacement projects:[14]



This data shows that PG&E pipe *replacement* projects are much shorter than *hydrotest* projects, and that the single estimated hydrotest cost of $95.8 per foot is inappropriately low for use for replacement projects, the majority of which have short pipe lengths.

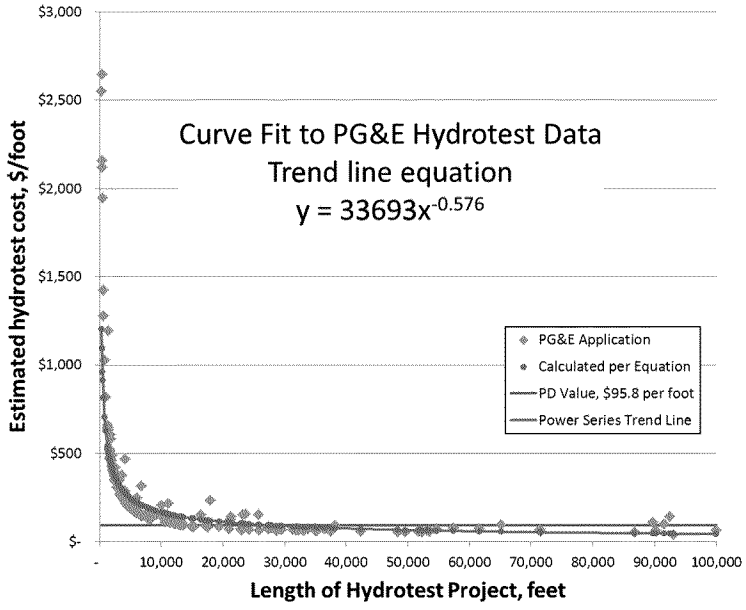
4. The cost per foot can be accurately calculated as a function of test project length with minimal additional effort

To calculate a more accurate estimate of pressure test costs, a curve fit was performed to determine if a simple equation could be used to estimate hydrotest cost based on project length. A standard MS Excel function yielded a power series equation that provides a reasonable fit to PG&E's estimated hydrotest costs:[15]

[13] Costs are disallowed for segments with missing installation date or MAOP validation data; partial MAOP validation, or a test date after 1955.

[14] By coincidence, the 50 percentile occurs in the same 500 to 1,000 foot bin.

[15] This equation was generated using the "trendline" function of MS excel, and selecting the "power" option.



This chart shows PG&E hydrotest cost per foot data in blue, calculated cost per foot in green generated using the equation shown, and the PD's fixed cost of $95.8 in red. The "Trend line equation" shown in the chart, $Y=33693*X^{-.576}$, gives the project cost per foot, "y", as a function of the hydrotest project length, "x". The chart shows that this equation yields a much more accurate estimate of hydrotest costs than the single figure proposed in the PD. This is particularly true for short pipe sections, which constitute the majority of PG&E's proposed replacement projects as described above. It should also be noted that even this more accurate estimation method underestimates the cost per foot of the shortest hydrotest projects.[16]

5. Adjustment to the disallowance for pipe replacement projects based on the estimated cost of hydrotesting

DRA used the more accurate, and slightly more complicated, method discussed above to estimate the costs for *replacement* projects with disallowed segments. Specifically, the curve fit function given above ($y=33693x^{-.576}$) was used to calculate a *hydrotest* cost per foot for each pipeline *replacement* project, using the *total footage* of each *replacement* project as the independent variable "x." These estimated *hydrotest* costs range from $62/ft to $17,894/ft, the latter being for two projects that are each 3 feet long.[17]

These project-specific *hydrotest* costs per foot were then multiplied by the *disallowed footage* for each *replacement* project to get the disallowance per *replacement* project. Using this more accurate method of estimating hydrotest costs and the PD's disallowed footages, the total disallowance increases from $16.5 million to $32.3 million.[18] Note that while the cost per foot is high for short projects, the disallowance is still less than PG&E's proposed replacement costs.

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[16] For example, PG&E estimates the cost of 325 foot long test DFM-7204-01TEST to be $2,550.77/foot, while the equation shown in the chart yields a cost of $1,204.19/foot.

[17] The projects are L-301GREPL and DFM-2412-01REPL. Note that the shortest hydrotest project proposed by PG&E was 325 feet long, which provided 100 times the length on which fixed costs of $715,000 minimum are applied. If PG&E's hydrotest cost model we used for L-301G, which is a 30" pipe, fixed costs of $1,040,000 would be divided by 3 ft for a cost per foot of $346,666/ft.

[18] See DRA Comments on the PD at Section II.A.2(b).

For example, PG&E's proposed cost for replacement project L-301G, the 3 foot long project mentioned previously, was $105,000.[19] The PD proposes a de minimus disallowance of $ $287.40 (3 ft x $95.8/ft),[20] while the more accurate method proposed herein would disallow $53,683 (3 ft x $17,894/ft). The more accurate method proposed by DRA still leaves ratepayers funding $51,317 for the new pipe.

B. Illustrations of Errors in PD cost allocation

Below is an example of pipe segment data for line (Route) L-220, duplicated from DRA testimony:[21]

	A	B	C	D	E	L	M	N	O	P	Q	R	S
1	ROUTE	SGMNT_NO	MP1	MP2	YeaR_INSTALL	TEST_DATE	TEST_PRESS	TEST_DUR	TestPer	MAOPrec430	Sub_j62411	DT_Ref_Num	Prj_Type
2	220	133.9	22.11	22.14	1/1/1981	1/1/1981	1375.0000	9.0000	1.74	Complete	Y	C7	REPL
3	220	134.2	22.14	22.17	1/1/1938		0.0000	0.0000	0.00	Incomplete Record	N	F2	REPL
4	220	134.5	22.17	22.17	1/1/1938		0.0000	0.0000	0.00	Incomplete Record	N	F2	REPL
5	220	135.5	22.17	22.17	1/1/1938		0.0000	0.0000	0.00	Incomplete Record	N	C3	
6	220	136	22.17	22.31	1/1/1937		0.0000	0.0000	0.00	Partial Mileage	N	C3	
7	220	136.3	22.31	22.35	1/1/1937		0.0000	0.0000	0.00	Partial Mileage	N	C3	
8	220	137	22.35	22.41	1/1/1980	1/1/1980	1290.0000	8.0000	2.58	Complete	Y	C6	
9	220	137.5	22.41	22.58	1/1/1980	1/1/1980	1290.0000	8.0000	2.58	Complete	Y	C6	
10	220	137.77	22.58	22.73	1/1/1980	1/1/1980	1290.0000	8.0000	2.58	Complete	Y	C5	
11	220	138	22.73	22.85	1/1/1980	1/1/1980	1290.0000	8.0000	2.58	Complete	Y	C6	
12	220	138.5	22.85	23.10	1/1/1980	1/1/1980	1290.0000	8.0000	2.58	Complete	Y	C5	
13	220	139	23.10	23.15	1/1/1980	1/1/1980	1290.0000	8.0000	2.58	Complete	Y	C6	
14	220	139.5	23.14	23.15	1/1/1962		0.0000	0.0000	0.00	Incomplete Record	N	M4	TEST
15	220	140	23.15	23.37	1/1/1937	1/1/1962	0.0000	0.0000	0.00	Partial Mileage	N	C3	TEST
16	220	141	23.37	23.89	1/1/1937		0.0000	0.0000	0.00		N	C1	TEST

This table shows the data used by PG&E and DRA to allocate costs between PG&E shareholders and ratepayers.[22] Column S shows that the three bottom segments were originally included in PG&E's hydrotest project L-220 TEST, and DRA confirmed that these three segments are still planned for hydrotest at ratepayer expense per the PD.

Data for segment 140, row 15, illustrates one of the types of cost allocation errors raised by DRA: segment **tested** after 1955 without complete test records. Test records were not found for all 1,199 feet of this segment (Partial Mileage in Column P) which was tested after 1955 (Column L). This data indicates that segment 140 was likely hydrotested when segment 139.5 was replaced in 1962 (Row 14), which was after GO112 was adopted. The record in this proceeding supports that this test was originally funded by ratepayers, and that it should not be charged again because PG&E cannot account find complete test records.

Examples of the remaining cost allocation errors are noted below, and can be seen in DRA's workpapers supporting these comments:

1. Segments missing installation date charged to ratepayers: Project DFM-0141-01TEST, segment 180.[23]

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[19] Exhibit 8, PG&E workpapers supporting Chapter 3, p.WP3-232.

[20] Late filed exhibit ALJ-1, Table 2, line 74, column titled "cost of disallowed footage equivalent hydro (ave test $98.5/ft)."

[21] Exhibit 144, Figure 5, p.33. Column S data from Figure 6, p. 38.

[22] This table doesn't show the footage per segment which is actually used to allocate costs for the segment between PG&E shareholders and ratepayers.

[23] DRA Hydrotest Workpaper, Scenario 1. "Calculations" tab, Row 1008 shows that the PD charges this segment to ratepayers, even though line 1008 of the "Input Data" tab shows the installation date is missing.

2. Segment installed after 1955 with missing MAOP Validation status charged to ratepayers: Project L-138, Segment 114. [24]
3. Segment installed after 1955 with "partial" MAOP Validation status charged to ratepayers: Project L-300B, segment 427. This 3.73 mile long, 34" diameter segment was installed in 1957, and tested in 1965, after GO 112 was in place.[25]

The above examples are all for hydrotest projects, but similar examples exist for replacement projects. DRA opening testimony provided a summary of the overall scope of these issues.[26]

[24] DRA Hydrotest Workpaper, Scenario 1. "Calculations" tab, Row 417 shows that the PD charges this segment to ratepayers, even though line 417 of the "Input Data" tab shows the MAOP validation field (Column L) is blank. DRA's understanding of the PD's cost allocation logic is that this 2,580 foot segment was incorrectly allocated to ratepayers based on a "Test_Pressure" of 1,468 [psi] (Column O).

[25] DRA Hydrotest Workpaper, Scenario 1. "Calculations" tab, Row 3155 shows that the PD charges this segment to ratepayers, even though line 3155 of the "Input Data" tab shows "Partial Mileage" for MAOP status (Column L) and a 1965 Test Date.

[26] Ex. 144, p.83.