

Application: 21-06-021
(U 39 M)
Exhibit No.: (PG&E-3-E)
Date: July 29, 2022
Witness(es): Various

PACIFIC GAS AND ELECTRIC COMPANY

2023 GENERAL RATE CASE

EXHIBIT (PG&E-3-E)

GAS OPERATIONS

WORKPAPERS SUPPORTING CHAPTERS 5-14

[INCLUDES ERRATA THROUGH JULY 29, 2022]

VOLUME 1 OF 1



PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3-E) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTERS 5-14 [INCLUDES ERRATA THROUGH JULY 29, 2022]

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PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3-E) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTERS 5-14 [INCLUDES ERRATA THROUGH JULY 29, 2022]

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DOY or G78S7	Chapter	MAT	Original Forecast (as of July 11, 2022)				Reviewed Forecast (includes errata through July 28, 2022)				Variance (Reviewed Forecast - Original Forecast)				Worksheet Table Reference	Notes
			Sum of 2023	2024	2025	2026	2023	2024	2025	2026	2023	2024	2025	2026		
G78S	3.05	GAD	\$ 2,651,012				\$ 2,542,437				\$ (108,575)				Table 5-22	
G78S	3.05	HFA	\$ 9,702,039				\$ 9,150,581				\$ (548,458)				Table 5-27	Require cost model update. Will be provided in subsequent errata submission.
G78S	3.05	HFC	\$ 8,444,960				\$ 8,105,536				\$ (339,028)				Table 5-12	
G78S	3.05	HFE	\$ 268,771				\$ 257,878				\$ (10,893)				Table 5-27	Require cost model update. Will be provided in subsequent errata submission.
G78S	3.05	HFI	\$ 29,500,951				\$ 29,250,975				\$ (250,076)				Table 5-11	
G78S	3.05	HPJ	\$ 8,461,334				\$ 8,111,941				\$ (349,393)				Table 5-13	
G78S	3.05	HPK	\$ 1,988,300				\$ 1,971,179				\$ (16,121)				Table 5-14	
G78S	3.05	HPN	\$ 3,651,404				\$ 3,430,820				\$ (220,584)				Table 5-12	Require cost model update. Will be provided in subsequent errata submission.
G78S	3.05	HPO	\$ 13,404,331				\$ 12,900,173				\$ (504,158)				Table 5-13	
G78S	3.05	HPQ	\$ 2,279,384				\$ 2,279,384				\$ -				Table 5-14	
G78S	3.05	HPR	\$ 13,505,354				\$ 13,040,172				\$ (465,182)				Table 5-12	Require cost model update. Will be provided in subsequent errata submission.
G78S	3.05	HPS	\$ 2,008,880				\$ 2,015,358				\$ (6,478)				Table 5-26	
G78S	3.05	HPU	\$ 24,394,225				\$ 23,965,980				\$ (428,245)				Table 5-15	
G78S	3.05	JTO	\$ 4,511,438				\$ 4,386,305				\$ (125,133)				Table 5-29	
G78S	3.05	JTV	\$ 1,073,278				\$ 1,073,278				\$ -				Table 5-30	
G78S	3.05	JTS	\$ 1,073,278				\$ 1,073,278				\$ -				Table 5-30	
G78S	3.05	JTJ	\$ 1,073,278				\$ 1,073,278				\$ -				Table 5-30	
G78S	3.05	JTR	\$ 1,073,278				\$ 1,073,278				\$ -				Table 5-30	
G78S	3.05	JTB	\$ 6,715,748				\$ 6,433,741				\$ (282,006)				Table 5-32	Require cost model update. Will be provided in subsequent errata submission.
G78S	3.05	JTD	\$ 2,142,417				\$ 2,058,921				\$ (83,496)				Table 5-31	Require cost model update. Will be provided in subsequent errata submission.
G78S	3.05	JTE	\$ 1,919,276				\$ 1,850,821				\$ (68,455)				Table 5-30	
G78S	3.05	JTF	\$ 3,677,227				\$ 3,571,154				\$ (106,073)				Table 5-26	
G78S	3.06	JTB	\$ 2,000,001				\$ 2,000,000				\$ -				Table 6-8	Note, forecast is rounded in worksheet or causing minimal difference.
G78S	3.06	JTL	\$ 2,684,764				\$ 2,627,216				\$ (57,548)				Table 6-10	
G78S	3.06	JTW	\$ 4,505,865				\$ 4,402,757				\$ (103,208)				Table 6-12	
G78S	3.06	JTX	\$ 1,101,765				\$ 1,073,278				\$ (28,487)				Table 6-9	
G78S	3.06	JTY	\$ 1,101,765				\$ 1,073,278				\$ (28,487)				Table 6-9	
G78S	3.06	LVZ	\$ 5,194,253				\$ 5,194,253				\$ -				Table 6-11	
G78S	3.06	AAH	\$ 27,003,937				\$ 27,446,497				\$ (442,560)				Table 7-12	
G78S	3.07	AHJ	\$ 2,759,533				\$ 2,120,136				\$ (639,397)				Table 7-12	
G78S	3.07	AHJ	\$ 2,759,533				\$ 2,120,136				\$ (639,397)				Table 7-12	
G78S	3.07	AHJ	\$ 2,759,533				\$ 2,120,136				\$ (639,397)				Table 7-12	
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G78S	3.07	AHJ	\$ 2,759,533				\$ 2,120,136				\$ (639,397)				Table 7-12	
G78S	3.07	AHJ	\$ 2,759,533				\$ 2,120,136				\$ (639,397)				Table 7-12	
G78S	3.07	AHJ	\$ 2,759,533				\$ 2,120,136				\$ (639,397)				Table 7-12	
G78S	3.07	AHJ	\$ 2,759,533				\$ 2,120,136				\$ (639,397)					

GD or Chapter	Chapter	MAT	Original Forecast (as of July 11, 2022) Special Allocation for Ch. 7 Storage MAT's only				Revised Forecast (includes errata through July 28, 2022) Special Allocation for Ch. 7 Storage MAT's only				Variance (Revised Forecast - Original Forecast) Special Allocation for Ch. 7 Storage MAT's only				Worksheet Table Reference	Notes
			2024	2025	2026	2027	2023	2024	2025	2026	2023	2024	2025	2026		
GT&S	3_10	ACE		\$ 985,308		\$	\$		\$ 985,509		\$ (11,797)				Table 10-55	
GT&S	3_10	JCP		\$ 13,210,155		\$	\$		13,210,155		\$				N/A	No impact - Annual escalation labor rates from the IBEW used; no update required.
GT&S	3_10	JOW		\$ 2,427,293		\$	\$		2,427,293		\$ (10,789)				Table 10-60	
GT&S	3_10	JPO		\$ 3,161,919		\$	\$		3,161,919		\$ (5,896)				Table 10-62	
GT&S	3_10	JPL		\$ 2,445,686		\$	\$		2,445,686		\$ (38,688)				Table 10-64	
GT&S	3_11	ACE		\$ 3,058,964		\$	\$		2,980,493		\$ (78,471)				Table 10-65	
GT&S	3_11	CMA		\$ 17,296,631		\$	\$		17,296,631		\$ (0)				Table 11-14	No impact - Annual escalation labor rates from the IBEW used; no update required.
GT&S	3_11	CMB		\$ 29,456,955		\$	\$		29,124,792		\$ (371,163)				Table 11-16	No impact - Escalation rates based on Gas Transmission expense labor rate only; no update required.
GT&S	3_11	CXA		\$ 5,749,589		\$	\$		5,749,589		\$ (0)				N/A	No impact - Escalation rates based on Gas Transmission expense labor rate only; no update required.
GT&S	3_11	JTA		\$ 939,190		\$	\$		939,190		\$				N/A	No impact - Escalation rates based on Gas Transmission expense labor rate only; no update required.
GT&S	3_11	Total		\$ 98,603,519		\$	\$		98,092,696		\$ (445,834)				N/A	No impact - Correct escalation rates used in the IT Project Estimating Tools; no update required.
GT&S	3_12	JWA		\$ 2,169,838		\$	\$		2,169,838		\$ -				N/A	No impact - Correct escalation rates used in the IT Project Estimating Tools; no update required.
GT&S	3_12	Total		\$ 2,169,838		\$	\$		2,169,838		\$ -				N/A	No impact - Correct escalation rates used in the IT Project Estimating Tools; no update required.
GT&S	3_13	ACE		\$ 3,070,728		\$	\$		2,985,511		\$ (85,217)				Table 13-9	
GT&S	3_13	DNZ		\$ 1,559,743		\$	\$		1,504,354		\$ (55,389)				Table 13-10	
GT&S	3_13	GPP		\$ 5,567,007		\$	\$		5,427,958		\$ (139,079)				Table 13-11	
GT&S	3_13	GZA		\$ 5,550,000		\$	\$		5,546,563		\$ (3,437)				Table 13-10	
GT&S	3_13	OMW		\$ 8,527,090		\$	\$		8,527,090		\$ -				N/A	No impact - Correct escalation rates used in original calculation; no update required.
GT&S	3_13	OSW		\$ 10,252,968		\$	\$		10,252,968		\$ -				N/A	No impact - Correct escalation rates used in original calculation; no update required.
GT&S	3_13	3AA		\$ 3,120,095		\$	\$		3,080,778		\$ (48,287)				N/A	No impact - Correct escalation rates used in original calculation; no update required.
GT&S	3_13	ABW		\$ 18,024,419		\$	\$		17,999,767		\$ (22,653)				Table 13-12	Will be provided in subsequent errata submission.
GT&S	3_13	ABW		\$ 18,024,419		\$	\$		17,999,767		\$ (22,653)				Table 13-12	
GT&S	3_13	Total		\$ 67,486,378		\$	\$		67,122,246		\$ (374,132)				Table 13-12	
GT&S	3_14	JTA		\$ 1,173,000		\$	\$		1,173,000		\$ (44,000)				Table 14-7	
GT&S	3_14	Total		\$ 1,173,000		\$	\$		1,173,000		\$ (44,000)				Table 14-7	

REVISED WORKPAPERS
[INCLUDES ERRATA THROUGH JULY 29, 2022]

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 5, ASSET FAMILY - TRANSMISSION PIPE

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Workpaper Table 5-11
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
ILI Direct Exam and Repair Expense Forecast Calculation, MAT HPI

Line No.

1	Summary of ILI DE&R					
2	Year	Average Miles Per Previous Year ILI	Average Historical DE&R Cost Per Previous Year ILI Mile (2020 \$)	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3	2023	524.75	\$126,319	\$66,285,917	1.078	\$71,463,964

4	Average Annual ILI Miles Forecast for (2022 - 2025) ^(a)			
5	Year	Forecast Miles of Traditional ILI Runs	Forecast Miles of NTILI Runs	Inspected Miles
6	2022	548.15	14.35	562.50
7	2023	424.28	5.12	429.40
8	2024	504.21	6.28	510.49
9	2025	592.91	3.70	596.61
10	Average Miles Per Previous Year ILI			524.75

11 (a) Miles come from PG&E's ILI forecast for 2022 combined with the ILI forecast miles for 2023 through 2025 from this General Rate Case. Digs are assumed to be completed the year following the ILI runs.

12	Calculation of Average Annual DE&R Cost Per Previous Year ILI Mile					
13	DE&R Year	Nominal \$ ^(b)	Escalation Factor	2020 \$	Miles of Traditional ILI Runs ^(c)	Miles of NTILI Runs
14	2016	\$49,456,219	1.093	\$54,041,710	220.77	38.48
15	2017	\$28,937,737	1.064	\$30,778,793	228.99	9.76
16	2018	\$22,761,067	1.027	\$23,372,607	295.01	6.06
17	2019	\$30,514,464	1.005	\$30,653,371	295.95	4.15
18	Totals:			\$138,846,480	1040.72	58.45
19	Average Historical DE&R Cost Per Previous Year ILI Mile			\$126,319		

20 (b) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC
 21 Filing due to timing differences.

22 (c) Miles of Traditional ILI Runs is from the year before, due to the fact that most DE&R digs occur as a result of findings from Traditional ILI in the preceding year.

Workpaper Table 5-12
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
External Corrosion Direct Assessment - MATs HPC and HPN

Line No.

Summary of ECDA Expenses				
Year	Average Annual Assessment Miles	Escalated Survey Costs (HPC)	Escalated Direct Examination Costs (HPN)	Forecast (\$)
2023	67.13	\$8,105,936	\$34,393,820	\$42,499,755

Summary of ECDA Digs (HPN)					
Year	Forecast Average Annual # Digs	Average Cost Per Dig (2020\$)	Dig Costs (2020 \$)	Escalation Rate	Forecast Dig Costs (\$)
2023	168	\$189,891	\$31,901,755	1.078	\$34,393,820

Summary of ECDA Surveys (HPC)					
Year	Average Annual Miles	Average Cost Per Mile Surveyed (2020 \$)	Forecast Survey Costs (2020 \$)	Escalation Rate	Forecast Survey Costs (\$)
2023	67.13	\$111,996	\$7,518,606	1.078	\$8,105,936

Scope						
Contains 1st Time ECDA	Project Year	Project	Assessment Footage	Assessment Mileage (HPC)	Forecast Number of Digs (HPN) ^(a)	Compliance Due Date
Y	2023	EC23_HERMANN_STATION	458.9	0.09	4	12/31/2023
Y	2023	EC23-021B	11,499.3	2.18	4	12/31/2024
Y	2023	EC23-021G	18,260.5	3.46	6	11/14/2024
Y	2023	EC23-021H	33,397.0	6.33	8	12/31/2024
N	2023	EC23-0405	2,055.3	0.39	2	12/31/2023
Y	2023	EC23-050A	11,004.4	2.08	4	12/31/2024
Y	2023	EC23-0617	54,600.3	10.34	11	12/31/2024
Y	2023	EC23-0618	4,407.1	0.83	6	8/28/2023
Y	2023	EC23-0630	9,694.1	1.84	6	12/31/2024
Y	2023	EC23-0650	8,842.3	1.67	6	12/31/2024
Y	2023	EC23-0833	7,880.1	1.49	6	12/31/2023
Y	2023	EC23-103	1,025.6	0.19	4	2/13/2023
Y	2023	EC23-114	808.3	0.15	4	12/31/2024
Y	2023	EC23-1202	104.8	0.02	4	12/31/2023
Y	2023	EC23-138	13,134.4	2.49	6	12/31/2024
Y	2023	EC23-148	23,390.9	4.43	4	1/22/2023
Y	2023	EC23-1501	1,261.2	0.24	6	12/31/2023
Y	2023	EC23-1603	2,240.3	0.42	4	12/31/2024
Y	2023	EC23-1619	6,249.0	1.18	4	12/31/2023
Y	2023	EC23-169A	514.9	0.10	6	12/31/2023
Y	2023	EC23-1816	21,144.5	4.00	6	12/31/2023
Y	2023	EC23-1818	10,275.2	1.95	6	2/14/2023
N	2023	EC23-186	670.7	0.13	4	12/31/2023
Y	2023	EC23-197B	447.8	0.08	6	12/31/2023
N	2023	EC23-300A	727.4	0.14	4	12/31/2023
Y	2023	EC23-300A-1	4,128.8	0.78	6	12/31/2023
Y	2023	EC23-301B	2,133.6	0.40	6	12/31/2023
Y	2023	EC23-304	970.3	0.18	6	12/31/2023
Y	2023	EC23-331A	1,067.7	0.20	4	12/31/2023
Y	2023	EC23-6603	21,228.3	4.02	6	12/31/2024

Workpaper Table 5-12
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
External Corrosion Direct Assessment - MATs HPC and HPN

Line No.

42	Y	2023	EC23-DREG4436	1,007.8	0.19	4	12/31/2024
43	Y	2023	EC23-DREG5419	4,538.6	0.86	4	12/31/2023
44	Y	2023	EC23-SP5	1,361.9	0.26	4	12/31/2024
45	N	2023	EC23-Fairway Crossover	5,280.0	1.00	2	12/31/2023
46	N	2023	EC23-Willits	5,280.0	1.00	2	12/31/2023
47	N	2023	EC23-Coffee & Claratina	5,280.0	1.00	2	12/31/2023
48	Y	2023	EC23-Market St. & Del Norte Ave	5,280.0	1.00	4	12/31/2023
49	Y	2024	EC24-021F	22,744.1	4.31	6	11/14/2024
50	Y	2024	EC24-0141	1,019.1	0.19	6	12/23/2025
51	Y	2024	EC24-0213	2,209.6	0.42	6	12/16/2026
52	Y	2024	EC24-021E	111.8	0.02	6	12/31/2024
53	Y	2024	EC24-0401	53,305.2	10.10	11	12/16/2026
54	Y	2024	EC24-0404	13,076.1	2.48	6	12/16/2026
55	Y	2024	EC24-050A	18,615.0	3.53	6	12/16/2026
56	Y	2024	EC24-057A-T1	330.2	0.06	4	12/31/2024
57	Y	2024	EC24-0602	3,266.9	0.62	4	12/29/2025
58	Y	2024	EC24-0833	4,695.6	0.89	4	12/31/2025
59	Y	2024	EC24-103	56,851.3	10.77	11	12/31/2024
60	Y	2024	EC24-1035	11,878.7	2.25	4	12/29/2025
61	Y	2024	EC24-108	4,555.0	0.86	4	12/31/2024
62	Y	2024	EC24-118D	13,436.0	2.54	6	12/29/2025
63	Y	2024	EC24-119A	27,922.6	5.29	7	12/22/2025
64	Y	2024	EC24-131	3,942.3	0.75	4	12/29/2025
65	Y	2024	EC24-134A	11,194.7	2.12	6	3/8/2025
66	N	2024	EC24-1521	3,095.7	0.59	2	12/31/2025
67	Y	2024	EC24-1613	3,301.7	0.63	6	12/22/2025
68	Y	2024	EC24-1816	2,784.8	0.53	4	12/23/2025
69	Y	2024	EC24-1818	122.3	0.02	4	12/31/2024
70	Y	2024	EC24-191	7,621.4	1.44	4	4/22/2024
71	Y	2024	EC24-197	8,790.3	1.66	6	12/28/2025
72	Y	2024	EC24-301C	3,609.2	0.68	4	12/31/2024
73	N	2024	EC24-310	171.7	0.03	2	12/31/2025
74	Y	2024	EC24-331A	3,313.9	0.63	4	12/31/2024
75	Y	2024	EC24-375	29,556.2	5.60	5	12/24/2025
76	Y	2024	EC24-7222	1,901.8	0.36	4	12/29/2025
77	Y	2024	EC24-DREG3781	142.0	0.03	4	12/31/2024
78	Y	2024	EC24-X11102	180.1	0.03	4	12/31/2025
79	Y	2024	EC24-X15489	384.2	0.07	4	12/31/2024
80	N	2024	EC24-Shell	5,280.0	1.00	2	12/31/2024
81	N	2024	EC24-Warm Springs & Mayten	5,280.0	1.00	2	12/31/2024
82	N	2024	EC24-Warm Springs & WPRR	5,280.0	1.00	2	12/31/2024
83	N	2024	EC24-50th Ave	5,280.0	1.00	2	12/31/2024
84	N	2024	EC24-Crockett	5,280.0	1.00	2	12/31/2024
85	N	2024	EC24-McClellan Field	5,280.0	1.00	2	12/31/2024
86	N	2024	EC24-El Dorado Hills	5,280.0	1.00	2	12/31/2024
87	N	2024	EC24-North Sacramento	5,280.0	1.00	2	12/31/2024
88	N	2024	EC24-Santa Rita DFM	5,280.0	1.00	2	12/31/2024
89	Y	2024	EC24-E 2nd St & Reservoir Rd	5,280.0	1.00	4	12/31/2024
90	Y	2024	EC24-Enrico	5,280.0	1.00	4	12/31/2024
91	Y	2024	EC24-San Juan Rd	5,280.0	1.00	4	12/31/2024
92	Y	2025	EC25-0405	41,943.6	7.94	9	12/16/2026
93	Y	2025	EC25-050A	11,152.5	2.11	6	12/16/2026
94	Y	2025	EC25-057A-T2	620.3	0.12	4	12/16/2026
95	Y	2025	EC25-0600	16,848.4	3.19	6	12/16/2026

Workpaper Table 5-12
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
External Corrosion Direct Assessment - MATs HPC and HPN

<u>Line No.</u>							
96	Y	2025	EC25-0611	61,232.7	11.60	12	10/31/2026
97	Y	2025	EC25-0617	15,815.9	3.00	4	12/16/2026
98	Y	2025	EC25-0618	29,240.3	5.54	7	12/16/2026
99	Y	2025	EC25-0833	6,466.6	1.22	4	12/16/2026
100	Y	2025	EC25-1023	23,682.9	4.49	6	12/16/2026
101	Y	2025	EC25-1025	1,407.7	0.27	4	12/16/2026
102	Y	2025	EC25-1042	680.8	0.13	6	12/16/2026
103	Y	2025	EC25-105B-2	6,895.6	1.31	4	12/16/2026
104	Y	2025	EC25-118	106,819.4	20.23	19	10/31/2026
105	Y	2025	EC25-1303	740.7	0.14	5	12/21/2025
106	N	2025	EC25-Cal Pine	5,280.0	1.00	2	12/31/2025
107	N	2025	EC25-Aborn & White	5,280.0	1.00	2	12/31/2025
108	N	2025	EC25-Fontanoso	5,280.0	1.00	2	12/31/2025
109	Y	2026	EC26-0632	189.0	0.04	5	12/16/2026
110	Y	2026	EC26-0804	159.4	0.03	6	12/16/2026
111	Y	2026	EC26-119	55,610.6	10.53	11	10/31/2026
112	Y	2026	EC26-1202	100,256.8	18.99	18	10/31/2026
113	Y	2026	EC26-128	1,702.8	0.32	6	12/31/2026
114	Y	2026	EC26-137	11,509.9	2.18	6	12/16/2026
115	Y	2026	EC26-1425	24,648.8	4.67	6	10/31/2026
116	Y	2026	EC26-1501	1,818.6	0.34	6	12/16/2026
117	Y	2026	EC26-1601	6,869.5	1.30	6	12/16/2026
118	Y	2026	EC26-1606	41,615.4	7.88	9	12/16/2026
119	Y	2026	EC26-1614	27,781.5	5.26	7	10/31/2026
120	Y	2026	EC26-1805	3,423.5	0.65	6	12/16/2026
121	Y	2026	EC26-1815	2,982.0	0.56	6	10/31/2026
122	Y	2026	EC26-1816	1,020.0	0.19	6	12/16/2026
123	Y	2026	EC26-181B	13,760.0	2.61	6	12/16/2026
124	Y	2026	EC26-186	11,176.6	2.12	6	12/16/2026
125	Y	2026	EC26-1880	3,388.7	0.64	6	12/16/2026
126	Y	2026	EC26-196A	7,419.2	1.41	4	10/31/2026
127	Y	2026	EC26-2408	7,030.2	1.33	6	10/31/2026
128	Y	2026	EC26-3008	6,210.1	1.18	6	12/16/2026
129	Y	2026	EC26-3010	5,657.4	1.07	4	12/16/2026
130	Y	2026	EC26-306	8,985.3	1.70	4	10/31/2026
131	Y	2026	EC26-316N	1,944.9	0.37	4	10/31/2026
132	Y	2026	EC26-DREG3814	631.1	0.12	4	12/16/2026
133	Y	2026	EC26-DREG4567	171.9	0.03	4	12/16/2026
134	Y	2026	EC26-DREG5176	348.7	0.07	6	12/16/2026
135	Y	2026	EC26-GCUST6976	202.6	0.04	5	12/16/2026
136	N	2026	EC26-LaCassie	5,280.0	1.00	2	12/31/2026
137	N	2026	EC26-Albrae Street Pig Launcher	5,280.0	1.00	2	12/31/2026
138	N	2026	EC26-Coral Rd & Tunis Rd	5,280.0	1.00	2	12/31/2026
139	Y	2026	EC26-2nd & Alice Street Regulator Station	5,280.0	1.00	4	9/27/2026
140	Y	2026	EC26-Barstow "A" Tap Meter Station	5,280.0	1.00	4	9/27/2026
141	Y	2026	EC26-Lawrence And Stevens Creek Regulator Station	5,280.0	1.00	4	9/27/2026
142	Y	2026	EC26-Monroe Regulator Station	5,280.0	1.00	4	9/27/2026
143	Y	2026	EC26-Poinsettia Ave Regulator Station	5,280.0	1.00	4	9/27/2026
144	N	2026	EC26-Kiernan Rd & Hwy 99	5,280.0	1.00	2	12/31/2026
145	N	2026	EC26-Siskiyou Forest Product	5,280.0	1.00	2	12/31/2026

(a) If an ECDA project is a first time ECDA, procedures require a minimum of 4 digs per project. If a project is a re-assessment and < 1 mile is surveyed, then a minimum of 2 digs per project is required. Otherwise the number of digs is calculated as approximately 0.8 digs per mile surveyed. Additionally, where there was an ECDA project that also had the Selective Seam Weld Corrosion (SSWC) threat, an additional 2 digs were added, unless the footage of the SSWC threat was 10 feet or less in which case only 1 dig was added.

Workpaper Table 5-12
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
External Corrosion Direct Assessment - MATs HPC and HPN

Line No.

Historical ECDA Survey Cost Analysis				
Year	Miles Surveyed	Nominal \$	Escalation Factor	2020\$
2017	88.9	\$11,576,785	1.064	\$12,313,315
2018	67.82	\$7,763,817	1.027	\$7,972,414
2019	112.11	\$9,777,700	1.005	\$9,822,209
Totals:	268.83	\$29,118,302		\$30,107,938
Average Cost per Mile Surveyed (2020 \$)				\$111,996

Determination of Average DA Survey Miles per Year		
Year	Forecast Survey Miles	
2023	57.13	
2024	71.49	
2025	64.28	
2026	75.63	
Average Annual ECDA Survey Miles		67.13

Historical ECDA Dig Cost Analysis				
Year	Number of Digs	Cost of Digs (Nominal \$)	Escalation Factor	Cost of Digs (2020 \$)
2017	98	\$19,493,688	1.064	\$20,733,901
2018	73	\$12,185,175	1.027	\$12,512,564
2019	112	\$20,399,937	1.005	\$20,492,801
Totals	283	\$57,002,039		\$53,739,266
Average Cost Per Dig (2020 \$)				\$189,891

Determination of Average Number of Digs Per Year		
Year	Forecast Digs	
2023	181	
2024	188	
2025	102	
2026	199	
Average Annual ECDA Digs		168

Workpaper Table 5-13 (Revised)
Pacific Gas and Electric Company
2023 General Rate Case

(PG&E-3-E)

Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Internal Corrosion Direct Assessment - MATs HPJ, HPO, 34A

Line No.

1	Summary of ICDA Forecast		
2	Year	MAT	Forecast (\$)
3	2023	HPJ	\$811,941
4	2023	HPO	\$12,900,173
5	2023	34A	\$1,093,325

6	Summary of 2023 Forecast for ICDA Engineering (HPJ / 34A)			
7	MAT	Subtotal of Engineering Costs (2020 \$)	Escalation Rate	Forecast (\$)
8	HPJ	\$753,110	1.078	\$811,941
9	34A	\$60,049	1.078	\$64,739

10	Summary of 2023 Forecast for ICDA Digs (HPO / 34A)			
11	MAT	Subtotal of Digs Forecast (2020 \$)	Escalation Rate	Forecast (\$)
12	HPO	\$11,965,468	1.078	\$12,900,173
13	34A	\$954,057	1.078	\$1,028,585

14	Average Annual Engineering PG&E (not Stan Pac) Forecasts for 2023- 2026 ICDA			
15	Year	Number of ICDA PG&E Projects Forecast	Avg. Cost Per Project Assessed (2020 \$)	Forecast (2020 \$)
16	2023	25	\$70,057	\$1,751,419
17	2024	5	\$70,057	\$350,284
18	2025	4	\$70,057	\$280,227
19	2026	9	\$70,057	\$630,511
20	Average Annual Engineering Cost (2020 \$)			\$753,110

21	2023 StanPac Forecasts for ICDA Engineering (34A)				
22	Year	Number of Stan Pac ICDA Engineering Projects	Avg. Cost Per Project Assessed (2020 \$)	Forecast (2020 \$)	PG&E Portion [6/7th of Total] (2020 \$)
23	2023	1	\$70,057	\$70,057	\$60,049
24	2023 Stan Pac ICDA Engineering Forecast (2020 \$)				\$60,049

24	Average Annual PG&E (Not Stan Pac) Forecasts for 2023- 2026 ICDA Digs (HPO)			
25	Year	Number of ICDA Digs Forecast	Avg. Cost Per Dig (2020 \$)	Forecast (2020 \$)
26	2023	100	\$278,267	\$27,826,670
27	2024	20	\$278,267	\$5,565,334
28	2025	16	\$278,267	\$4,452,267
29	2026	36	\$278,267	\$10,017,601
30	Average Annual Digs Cost (2020 \$)			\$11,965,468

31	2023 StanPac Forecasts for ICDA Digs (34A)				
32	Year	Number of Stan Pac ICDA Digs Forecast	Avg. Cost Per Dig (2020 \$)	Forecast (2020 \$)	PG&E Portion [6/7th of Total] (2020 \$)
33	2023	4	\$278,267	\$1,113,067	\$954,057
34	2023 StanPac Digs Forecast (2020 \$)				\$954,057

35	2023 - 2026 Scope						
36	ICDA Project	Project Year	Contains 1st Time ICDA	Assessment Footage	Assessment Mileage	Number of Digs (a)	Compliance Due Date
37	IC23-0604	2023	Y	36,895.9	6.99	4	12/31/2023
38	IC23-108	2023	Y	31,865.6	6.04	4	12/31/2023
39	IC23-118A	2023	Y	6,219.9	1.18	4	12/31/2023
40	IC23-1509	2023	Y	633.7	0.12	4	12/31/2023
41	IC23-162A	2023	Y	9,240.7	1.75	4	12/31/2023
42	IC23-169A	2023	Y	514.9	0.10	4	12/31/2023
43	IC23-172A	2023	Y	2,923.1	0.55	4	12/31/2023

Workpaper Table 5-13 (Revised)
Pacific Gas and Electric Company

(PG&E-3-E)

2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Internal Corrosion Direct Assessment - MATs HPJ, HPO, 34A

Line No.

44	IC23-177A	2023	Y	7,998.0	1.51	4	12/31/2023
45	IC23-196A	2023	Y	8,056.0	1.53	4	12/31/2024
46	IC23-400-Antioch	2023	Y	19.2	0.00	4	12/31/2023
47	IC23-401	2023	Y	15,109.3	2.86	4	12/31/2023
48	IC23-AspenEmigh	2023	Y	201,403.7	38.14	4	12/31/2023
49	IC23-Frenso	2023	Y	113,909.9	21.57	4	4/30/2023
50	IC23-Mendota	2023	Y	5,734.5	1.09	4	12/31/2023
51	IC23-Merced	2023	Y	2,361.5	0.45	4	12/31/2023
52	IC23-Milpitas	2023	Y	143.3	0.03	4	12/31/2023
53	IC23-SP3-191	2023	Y	3,441.5	0.65	4	12/31/2024
54	IC23-Yuba	2023	Y	9,059.9	1.72	4	12/31/2023
55	IC23-057A	2023	Y	21215.8	4.0	4	12/31/2018
56	IC23-0617	2023	Y	65293.22	12.4	4	12/31/2022
57	IC23-0618	2023	Y	18564.14	3.5	4	8/28/2023
58	IC23-0833	2023	Y	20534.86	3.9	4	11/18/2019
59	IC23-114	2023	Y	27506.61	5.2	4	11/21/2024
60	IC23-142S	2023	Y	60528.63	11.5	4	12/31/2021
61	IC23-300B	2023	Y	10018.85	1.9	4	12/31/2023
62	IC23-DREG5419	2023	Y	4594.86	0.9	4	12/31/2023
63	IC24-131	2024	Y	10,986.9	2.08	4	12/29/2025
64	IC24-MCD	2024	Y	950.5	0.18	4	12/31/2024
65	IC24-0647-01	2024	Y	875.1	0.17	4	12/31/2024
66	IC24-103	2024	Y	4,917.8	0.93	4	12/31/2024
67	IC24-191	2024	Y	54,391.6	10.30	4	12/31/2024
68	IC25-GCUST5805	2025	Y	370.0	0.07	4	12/29/2025
69	IC25-0621	2025	Y	7,010.3	1.33	4	12/22/2025
70	IC25-119B	2025	Y	18,415.8	3.49	4	12/31/2025
71	IC25-DREG4093	2025	Y	2,368.7	0.45	4	12/22/2025
72	IC26_300B_Milpitas	2026	Y	197.0	0.04	4	12/31/2022
73	IC26-153STUBS	2026	Y	180.1	0.03	4	6/25/2025
74	IC26-Brentwood	2026	Y	1,917.2	0.36	4	10/31/2026
75	IC26-Galt	2026	Y	593.3	0.11	4	12/16/2026
76	IC26-0616	2026	Y	2,981.0	0.56	4	12/16/2026
77	IC26-0617-16	2026	Y	2,459.7	0.47	4	12/31/2026
78	IC26-0809-01	2026	Y	1,174.5	0.22	4	12/16/2026
79	IC26-111A-1	2026	Y	1,878.9	0.36	4	12/31/2019
80	IC26-6602-01	2026	Y	10117.85	1.92	4	12/16/2026

81 (a) Assumes 4 digs per ICDA project

82	Historical ICDA Engineering Cost Analysis				
83	Year	Projects Assessed	Nominal \$	Escalation Factor	2020\$
84	2017	0	\$93,677	1.064	\$99,637
85	2018	1	\$85,824	1.027	\$88,129
86	2019	3	\$92,042	1.005	\$92,461
87	Totals:	4	\$271,542		\$280,227
88	Average Cost per Project Assessed (2020 \$)				\$70,057

89	Determination of Average Forecast ICDA Assessment Projects per Year	
90	Year	Forecast Projects
91	2023	26
92	2024	5
93	2025	4
94	2026	9
95	Average Annual ICDA Assessment Projects Per	11

96	Historical ICDA Dig Cost Analysis				
97	Year	Number of Digs	Cost of Digs (Nominal \$)	Escalation Factor	Cost of Digs (2020 \$)
98	2017	0	\$226,141	1.064	\$240,529
99	2018	6	\$866,330	1.027	\$889,606
100	2019	9	\$3,030,073	1.005	\$3,043,866
101	Totals	15	\$57,002,039		\$4,174,001
102	Average Cost Per Dig (2020 \$)				\$278,267

Workpaper Table 5-14 (Revised)
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Stress Corrosion Cracking Direct Assessment - MATs HPK and HPP

Line No.

Summary of SCCDA Expenses				
Year	Average Annual Assessment Miles	Escalated Survey Costs (HPK)	Escalated Direct Examination Costs (HPP)	Forecast (\$)
2023	15.87	\$1,971,179	\$16,208,224	\$18,179,404

Summary of SCCDA Engineering/Surveys (HPK)					
Year	Average Annual Miles	Average Cost Per Mile Surveyed (2020 \$) ^(a)	Forecast Survey Costs (2020 \$)	Escalation Rate	Forecast Engineering / Survey (\$)
2023	15.87	\$115,212	\$1,828,354	1.078	\$1,971,179

(a) Forecast methodology uses the historical average cost per mile surveyed from ECDA.

Summary of SCCDA Digs (HPP)					
Year	Forecast Average Annual # Digs	Average Annual Cost Per Dig (2020\$) ^(b)	Dig Costs (2020 \$)	Escalation Rate	Forecast Dig Costs (\$)
2023	77	\$195,245	\$15,033,829	1.078	\$16,208,224

(b) Forecast methodology uses the average cost per dig from ECDA.

Scope of SCCDA Program						
Forecast Year	SCC Threat Type	Project ID	Assessment Footage	Assessment Mileage	Number of Digs	Compliance Due Date
2023	Axial	SCC23_021A	25138.35	4.76	4	12/31/2024
2023	Axial	SCC23_021C	1359.53	0.26	4	12/31/2024
2023	Axial	SCC23_021G	16833.74	3.19	4	12/31/2024
2023	Axial	SCC23_050A-1	196.3	0.04	4	12/31/2024
2023	Axial	SCC23_057A	4446.29	0.84	4	12/31/2023
2023	Axial	SCC23_1035-05	23087.8	4.37	4	12/31/2024
2023	Axial	SCC23_114	1087.61	0.21	4	12/31/2023
2023	Axial	SCC23_7216-03	825	0.16	4	12/31/2023
2024	Axial	SCC24_0639-01	53211.65	10.08	4	12/31/2024
2024	Axial	SCC24_1220-01	8463.07	1.60	4	12/31/2024
2024	Axial	SCC24_142S	210.49	0.04	4	12/31/2024
2024	Axial	SCC24_1521-01	1023.83	0.19	4	12/31/2024
2024	Axial	SCC24_1611-03	117.08	0.02	4	12/31/2024
2024	Axial	SCC24_169	105.2	0.02	4	12/31/2024
2024	Axial	SCC24_200A-1	714.15	0.14	4	12/31/2026
2024	Axial	SCC24_300A_MP0	160.64	0.03	4	12/31/2020
2024	Axial	SCC24_331A	4308.91	0.82	4	12/31/2024
2024	Axial	SCC24_DRIP7996	1657.77	0.31	4	12/31/2026
2025	Axial	SCC25_174-1-1	980.67	0.19	4	12/31/2026
2025	Axial	SCC25_3008-01	2635.63	0.50	4	12/31/2026
2025	Axial	SCC25_306	8934.5	1.69	4	12/31/2025
2026	Axial	SCC26_108	831.6	0.16	4	12/31/2026
2026	Axial	SCC26_1615-04	23385.23	4.43	4	12/31/2026
2026	Axial	SCC26_301A	1068.81	0.20	4	12/31/2026
2023	Circumferential	CSCC23-CentralCoast-1	11041.62	2.09	4	12/31/2024
2023	Circumferential	CSCC23-CentralCoast-2	4350.64	0.82	4	12/31/2024
2023	Circumferential	CSCC23-DeAnza	403.71	0.08	4	12/31/2024
2023	Circumferential	CSCC23-Diablo-1	4328.18	0.82	4	12/31/2024
2023	Circumferential	CSCC23-Diablo-2	1584.86	0.30	4	12/31/2024
2023	Circumferential	CSCC23-EastBay	2394.09	0.45	4	12/31/2024
2023	Circumferential	CSCC23-Fresno	632.18	0.12	4	12/31/2024
2023	Circumferential	CSCC23-Humboldt	2981.94	0.56	4	12/31/2024
2023	Circumferential	CSCC23-Kern	601.01	0.11	4	12/31/2024
2023	Circumferential	CSCC23-Mission	2134.1	0.40	4	12/31/2024

Workpaper Table 5-14 (Revised)
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Stress Corrosion Cracking Direct Assessment - MATs HPK and HPP

Line No.							
48	2023	Circumferential	CSCC23-NorthBay-1	467.97	0.09	4	12/31/2024
49	2024	Circumferential	CSCC24-NorthBay-2	19652.13	3.72	4	12/31/2024
50	2024	Circumferential	CSCC24-NorthValley	3250.22	0.62	4	12/31/2024
51	2024	Circumferential	CSCC24-Peninsula	1261.17	0.24	4	12/31/2024
52	2024	Circumferential	CSCC24-Sacramento-1	1093.64	0.21	4	12/31/2024
53	2024	Circumferential	CSCC24-Sacramento-2	1298.77	0.25	4	12/31/2024
54	2024	Circumferential	CSCC24-SanJose	293.18	0.06	4	12/31/2024
55	2024	Circumferential	CSCC24-Sierra	4731.06	0.90	4	12/31/2024
56	2024	Circumferential	CSCC24-Sonoma-1	2899.13	0.55	4	12/31/2024
57	2024	Circumferential	CSCC24-Sonoma-2	3711.34	0.70	4	12/31/2024
58	2024	Circumferential	CSCC24-Stockton	904.09	0.17	4	12/31/2024
59	2024	Circumferential	CSCC24-Yosemite	2941.24	0.56	4	12/31/2024
60	2025	Circumferential	CSCC25-CentralCoast-1	1318.73	0.25	4	12/31/2026
61	2025	Circumferential	CSCC25-CentralCoast-2	2557	0.48	4	12/31/2026
62	2025	Circumferential	CSCC25-CentralCoast-3	1863.19	0.35	4	12/31/2026
63	2025	Circumferential	CSCC25-DeAnza	2109.24	0.40	4	12/31/2026
64	2025	Circumferential	CSCC25-Diablo-1	3628.11	0.69	4	12/31/2026
65	2025	Circumferential	CSCC25-Diablo-2	3091.17	0.59	4	12/31/2026
66	2025	Circumferential	CSCC25-EastBay	24.04	0.00	4	12/31/2025
67	2025	Circumferential	CSCC25-EastBay	6318.97	1.20	4	12/31/2026
68	2025	Circumferential	CSCC25-Fresno	7014.96	1.33	4	12/31/2026
69	2025	Circumferential	CSCC25-Humboldt	1074.22	0.20	4	12/31/2025
70	2025	Circumferential	CSCC25-Humboldt	1049.11	0.20	4	12/31/2026
71	2025	Circumferential	CSCC25-Kern	539.42	0.10	4	12/31/2026
72	2025	Circumferential	CSCC25-NorthValley	703.1	0.13	4	12/31/2025
73	2025	Circumferential	CSCC25-Peninsula	202.18	0.04	4	12/31/2025
74	2025	Circumferential	CSCC25-Sacramento-1	466.38	0.09	4	12/31/2025
75	2025	Circumferential	CSCC25-Sierra	1030.28	0.20	4	12/31/2025
76	2025	Circumferential	CSCC25-Yosemite	276.74	0.05	4	12/31/2025
77	2026	Circumferential	CSCC26-Mission	5880.33	1.11	4	12/31/2026
78	2026	Circumferential	CSCC26-NorthBay-1	1503.55	0.28	4	12/31/2026
79	2026	Circumferential	CSCC26-NorthBay-2	4214.73	0.80	4	12/31/2026
80	2026	Circumferential	CSCC26-NorthValley	2146.18	0.41	4	12/31/2026
81	2026	Circumferential	CSCC26-Peninsula	4032.14	0.76	4	12/31/2026
82	2026	Circumferential	CSCC26-Sacramento-1	5065.6	0.96	4	12/31/2026
83	2026	Circumferential	CSCC26-Sacramento-2	5773.07	1.09	4	12/31/2026
84	2026	Circumferential	CSCC26-SanFrancisco	1036.55	0.20	4	12/31/2026
85	2026	Circumferential	CSCC26-SanJose	3109.19	0.59	4	12/31/2026
86	2026	Circumferential	CSCC26-Sierra	1638.17	0.31	4	12/31/2026
87	2026	Circumferential	CSCC26-Sonoma-1	5083.2	0.96	4	12/31/2026
88	2026	Circumferential	CSCC26-Sonoma-2	1719	0.33	4	12/31/2026
89	2026	Circumferential	CSCC26-Stockton	3900.74	0.74	4	12/31/2026
90	2026	Circumferential	CSCC26-Yosemite	3053.64	0.58	4	12/31/2026

Workpaper Table 5-15 (Revised)
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 5, Asset Family - Transmission Pipe
Direct Examination - MAT HPU

Line No.

1	Summary of Direct Examination Forecast			
2	Year	Forecast (2020 \$)	Escalation Rate	Forecast (\$)
3	2023	\$22,228,648	1.078	\$23,965,080

4	Average Annual Forecasts for Direct Examination			
5	Year	Number of Direct Examination Projects	Avg. Cost Per Direct Examination Project (2020 \$)	Forecast (2020 \$)
6	2023	23	\$926,194	\$21,302,454
7	2024	23	\$926,194	\$21,302,454
8	2025	23	\$926,194	\$21,302,454
9	2026	27	\$926,194	\$25,007,229
10	Average Annual Direct Examination Forecast (2020 \$)			\$22,228,648

11	Scope of Direct Examination Program				
12	Project Year	Project ID	Assessment Footage	Assessment Mileage	Compliance Due Date
13	2023	DE23_DCUST7729	8.4	0.0016	12/31/2024
14	2023	DE23_DREG5640	3.0	0.0006	12/31/2024
15	2023	DE23_GCUST5913	34.5	0.0065	12/31/2024
16	2023	DE23_STUB10105	1.5	0.0003	12/16/2026
17	2023	DE23_STUB10219	4.0	0.0008	12/31/2024
18	2023	DE23_STUB18254	5.1	0.0010	12/16/2026
19	2023	DE23_STUB18255	6.3	0.0012	12/16/2026
20	2023	DE23_STUB20159	1.7	0.0003	12/31/2026
21	2023	DE23_STUB9189	6.5	0.0012	12/31/2024
22	2023	DE23_STUB9190	20.8	0.0039	12/31/2024
23	2023	DE23_X6526	50.2	0.0095	12/31/2020
24	2023	DE23-0123	9.4	0.0018	12/31/2023
25	2023	DE23-0604-16	1.3	0.0002	12/31/2021
26	2023	DE23-0821-01	64.6	0.0122	12/16/2026
27	2023	DE23-105B	6.8	0.0013	12/31/2024
28	2023	DE23-1305-45	19.2	0.0036	12/31/2027
29	2023	DE23-300A	20.4	0.0039	12/31/2020
30	2023	DE23-BD128	21.9	0.0041	12/31/2024
31	2023	DE23-BD16457	21.9	0.0041	12/31/2024
32	2023	DE23-DCUST6893	0.0	0.0000	12/31/2024
33	2023	DE23-DF3305	9.2	0.0017	12/31/2023
34	2023	DE23-DREG4845	37.5	0.0071	12/31/2023
35	2023	DE23-STUB14072	0.7	0.0001	12/31/2023
36	2024	DE24-0617-01	10.4	0.0020	12/31/2022
37	2024	DE24-119A	578.8	0.1096	12/31/2025

Workpaper Table 5-15 (Revised)
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 5, Asset Family - Transmission Pipe
Direct Examination - MAT HPU

Line No.

38	2024	DE24-BD8025	60.1	0.0114	12/31/2024
39	2024	DE24-8807-01	0.1	0.0000	12/29/2025
40	2024	DE24-BD13597	3.4	0.0006	12/30/2025
41	2024	DE24-BD14513	2.8	0.0005	12/30/2025
42	2024	DE24-BD602	1.0	0.0002	12/31/2025
43	2024	DE24-DCUST1000	1.5	0.0003	12/31/2023
44	2024	DE24-DF14749	7.9	0.0015	12/31/2024
45	2024	DE24-DF3257	2.7	0.0005	12/31/2024
46	2024	DE24-DF3262	8.6	0.0016	12/31/2024
47	2024	DE24-DF3307	0.0	0.0000	12/31/2024
48	2024	DE24-DF3425	6.7	0.0013	12/31/2024
49	2024	DE24-DREG4904	40.4	0.0076	12/31/2024
50	2024	DE24-GCUST5786	38.7	0.0073	12/31/2024
51	2024	DE24-STUB11140	18.7	0.0035	12/31/2024
52	2024	DE24-STUB11153	46.9	0.0089	12/31/2024
53	2024	DE24-STUB11233	56.1	0.0106	2/2/2024
54	2024	DE24-STUB6162	1.3	0.0002	12/31/2024
55	2024	DE24-STUB6174	1.7	0.0003	12/31/2024
56	2024	DE24-STUB6288	0.5	0.0001	12/31/2024
57	2024	DE24-STUB7009	62.2	0.0118	12/31/2024
58	2024	DE24-X6337	0.0	0.0000	11/14/2024
59	2025	DE25_B25554	24.2	0.0046	12/31/2026
60	2025	DE25_BD11252	15.3	0.0029	11/5/2022
61	2025	DE25_BD25553	2.2	0.0004	12/31/2026
62	2025	DE25_DREG5251	46.3	0.0088	12/16/2026
63	2025	DE25_DREG5252	29.8	0.0056	12/16/2026
64	2025	DE25_STUB11077	41.7	0.0079	4/25/2022
65	2025	DE25_STUB15201	1.0	0.0002	12/31/2026
66	2025	DE25_STUB15202	1.0	0.0002	12/31/2026
67	2025	DE25-0401	3.5	0.0007	12/16/2026
68	2025	DE25-128	2.7	0.0005	12/31/2023
69	2025	DE25-1402-01	0.5	0.0001	12/16/2026
70	2025	DE25-1405-01	11.0	0.0021	12/16/2026
71	2025	DE25-19472	1.0	0.0002	12/16/2026
72	2025	DE25-BD11037	6.4	0.0012	12/16/2026
73	2025	DE25-BD14258	17.2	0.0033	12/16/2026
74	2025	DE25-BD14402	12.0	0.0023	12/16/2026
75	2025	DE25-BD14403	14.7	0.0028	12/16/2026
76	2025	DE25-BD14953	0.1	0.0000	12/16/2026
77	2025	DE25-DCUST2438	10.0	0.0019	12/29/2025
78	2025	DE25-DF3441	7.6	0.0014	12/30/2025
79	2025	DE25-DREG3870	11.4	0.0022	12/30/2025
80	2025	DE25-STUB10272	2.2	0.0004	12/28/2025

Workpaper Table 5-15 (Revised)
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 5, Asset Family - Transmission Pipe
Direct Examination - MAT HPU

Line No.

81	2025	DE25-STUB6151	1.1	0.0002	12/23/2025
82	2026	DE26-BD14954	4.9	0.0009	12/16/2026
83	2026	DE26-BD156	8.6	0.0016	12/16/2026
84	2026	DE26-BD16638	0.2	0.0000	12/16/2026
85	2026	DE26-BD526	106.3	0.0201	12/31/2024
86	2026	DE26-BD88	44.4	0.0084	12/16/2026
87	2026	DE26-DCUST14959	60.2	0.0114	12/16/2026
88	2026	DE26-DCUST8962	15.5	0.0029	12/16/2026
89	2026	DE26-DFDS3633	0.1	0.0000	12/16/2026
90	2026	DE26-DREG14963	43.8	0.0083	12/16/2026
91	2026	DE26-DREG17004	0.6	0.0001	12/16/2026
92	2026	DE26-DREG20009	6.2	0.0012	12/16/2026
93	2026	DE26-DREG3763	63.5	0.0120	12/16/2026
94	2026	DE26-DREG4926	57.9	0.0110	12/16/2026
95	2026	DE26-DREG5242	1.0	0.0002	12/16/2026
96	2026	DE26-DREG5256	24.2	0.0046	12/16/2026
97	2026	DE26-STUB17666	0.5	0.0001	12/16/2026
98	2026	DE26-STUB18427	1.0	0.0002	12/16/2026
99	2026	DE26-STUB18899	1.2	0.0002	12/16/2026
100	2026	DE26-STUB19040	1.0	0.0002	12/16/2026
101	2026	DE26-STUB19087	0.2	0.0000	12/16/2026
102	2026	DE26-STUB19088	0.2	0.0000	12/16/2026
103	2026	DE26-STUB19704	2.2	0.0004	12/16/2026
104	2026	DE26-STUB23165	6.8	0.0013	12/16/2026
105	2026	DE26-BD9863	81.9	0.0155	12/31/2026
106	2026	DE26-DRIP17076	21.3	0.0040	12/31/2026
107	2026	DE26-DRIP5723	37.3	0.0071	12/31/2026
108	2026	DE26-STUB8419	4.0	0.0008	12/31/2026

109 **Historical Direct Examination Cost Analysis^(a)**

Year	Number of Direct Examination Projects	Nominal \$	Escalation Factor	2020\$
2019	3	\$2,647,031	1.005	\$2,659,081
2020	10	\$9,381,437	1.000	\$9,381,437
Average Cost per Project Assessed (2020 \$)				\$926,194

114 (a) PG&E began its formal Direct Examination program in 2019. Therefore, it has no former history for this program.

Workpaper Table 5-22
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
LNG/CNG Expense Forecast Calculation, MAT GMD

Line No.

1	Summary of Forecast			
2	YEAR	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3	2023	\$2,358,220	1.078	\$2,542,437

4	Calculation of Annual Historical Average Cost ^(a)			
5	Expense Year	Subtotal of Expenses (nominal \$)	Escalation Factor	Recorded Costs (2020 \$)
6	2017	\$2,171,132	1.064	\$2,309,263
7	2018	\$2,578,751	1.027	\$2,648,036
8	2019	\$2,107,766	1.005	\$2,117,361
9	Annual Average (2020\$)			\$2,358,220

10 (a) Values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

Workpaper Table 5-25
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Earthquake Fault Crossing Forecast Calculation, MAT JT3

Line No.

1 **Summary of Costs:**

Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$939,670	1.078	\$1,013,074

4 **Calculation of Historical Average for Earthquake Fault Studies & Monitoring (2020 \$)**

Year	Nominal \$ ^(a)	Escalation Factor	2020 \$
2017	\$1,068,624	1.064	\$1,136,611
2018	\$1,023,217	1.027	\$1,050,709
2019	\$628,827	1.005	\$631,689
Average Annual Cost for Earthquake Fault Crossing Studies & Monitoring (2020 \$)			\$939,670

10 (a) The recorded costs reflected in this workpaper includes StanPac and will vary from the Results of the Operations (RO) model provided with
 11 PG&E's 2023 GRC Filing due to timing differences.

Workpaper Table 5-26
Pacific Gas and Electric Company
20203 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Geo-Hazard Expense Threat Identification and Mitigation Forecast Calculation
MATs HPS and JTT

Line No.

HPS + JTT Forecast Summary			
Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$2,722,445	1.078	\$2,935,114

MAT Level Forecast Summary in 2023 \$			
MAT	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
HPS	\$2,611,366	1.078	\$2,815,358
JTT	\$111,079	1.078	\$119,756

Calculation of Annual Historical HPS (Geo-Hazard Threat Identification) Cost in 2020 Base Year Dollars

Year ^(a)	Nominal \$	Escalation Factor	2020 \$
2018	\$1,832,236	1.027	\$1,881,464
2019	\$3,737,926	1.005	\$3,754,942
2020	\$2,197,693	1.000	\$2,197,693
Total 3 Year HPS Cost (2020 \$)			\$7,834,098
Average Annual HPS Cost (2020 \$)			\$2,611,366

(a) The three year average includes the 2020 forecast year because, as one can see, it is representative of the current spend rate, which is driven by additional LIDAR cost, which did not occur in 2017, the addition of focused risk assessment land movement affecting exposed pipe, and detailed field study to ascertain the need for capital or expense mitigation.

Calculation of Annual Historical JTT (Expense Mitigation) Cost in 2020 Base Year Dollars

Year	Nominal \$	Escalation Factor	2020 \$
2017	\$95,600	1.064	\$101,683
2018	\$126,872	1.027	\$130,281
2019	\$100,815	1.005	\$101,274
Total 3 Year JTT Cost (2020 \$)			\$333,238
Average Annual JTT Cost (2020 \$)			\$111,079

Expense Monitoring Unit Cost Analysis	
Task Description	Cost Estimate
Scheduling, Planning and Field Preparation	\$7,293
Borings and Inclinator and Piezometer Installation	\$15,379
Laboratory Testing	\$1,656
Monitoring and Interim Reporting	\$8,771
Reporting and Meeting	\$6,115
Pipe Stress/Strain Modeling:	
Deformation Analysis Input	\$3,308
Gas Line Deformation Analysis	\$15,435
Total:	\$57,957

Workpaper Table 5-26
Pacific Gas and Electric Company
20203 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Geo-Hazard Expense Threat Identification and Mitigation Forecast Calculation
MATs HPS and JTT

Line No.

Line No.

33 **Expense Mitigation Analysis**

34	Average Annual Forecast Analysis	
35	Total Expense Mitigation Sites	10
36	Number of Expense Mitigation Sites Tier 1, 2, and 3	6
37	Average annual expense mitigation sites	2
38	Unit Cost^(b)	\$185,081
39	Total Annual Mitigation Forecast	\$370,162

40 (b) Unit Cost is based on average cost per dig from the DA Program (\$185,081 per dig in old cost model - New Cost model conversion factor is 1.00 for GeoHazard Mitigations).

41 **Program Total Scope Analysis**

42	Type of Work	Landslides	Erosion	Totals
43	Exp-Mitigation	6	4	10
44	Exp-Monitor	12	2	14
45	Exp-Studies	27	66	93
46	Totals:	45	72	117

47	Landslides	Tiers				
48	Type of Work	1	2	3	4	Total
49	Exp-Mitigation	1	1	1	3	6
50	Exp-Monitor	1	1	7	3	12
51	Exp-Studies	2	1	12	12	27
52	Totals:	4	3	20	18	45

53	Erosion	Tiers				
54	Type of Work	1	2	3	4	Total
55	Exp-Mitigation	0	2	1	1	4
56	Exp-Monitor	0	0	0	2	2
57	Exp-Studies	7	7	12	40	66
58	Totals:	7	9	13	43	72

59	Erosion + Landslide	Tiers				
60	Type of Work	1	2	3	4	Total
61	Exp-Mitigation	1	3	2	4	10
62	Exp-Monitor	1	1	7	5	14
63	Exp-Studies	9	8	24	52	93
64	Totals:	11	12	33	61	117

Workpaper Table 5-27
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Risk Analysis Expense Forecast Calculation, MATs HPA and HPE

Line No.

1 **Summary of Costs**

Year	Program	Forecast (\$)
2023	Risk Analysis	\$9,414,460

4 **Calculation of 2023 Forecast by MAT Code**

Year	MAT	Forecast (2020 \$)	Escalation Rate	Forecast (\$)
2023	HPA	\$8,493,125	1.078	\$9,156,581
2023	HPE	\$239,193	1.078	\$257,878

8 **Conversion of Nominal Expense to 2020 \$ by MAT Code**

Escalation Factors	1.064	1.027	1.005	
MAT	2017 Recorded (2020 \$)	2018 Recorded (2020 \$)	2019 Recorded (2020 \$)	Average Annual (2020 \$)
HPA	\$8,661,322	\$8,578,896	\$8,239,157	\$8,493,125
HPE	\$434,945	\$145,017	\$137,617	\$239,193
Total	\$9,096,267	\$8,723,913	\$8,376,775	\$8,732,318

14 **Calculation of Recorded Nominal Expense by MAT Code ^(a)**

MAT	2017 Recorded	2018 Recorded	2019 Recorded	Average Annual
HPA (+HPH, HPL)	\$8,143,239	\$8,354,431	\$8,201,821	\$8,233,164
HPE	\$408,929	\$141,223	\$136,994	\$229,048
Total	\$8,552,168	\$8,495,654	\$8,338,815	\$8,462,212

19 (a) The recorded costs reflected in this workpaper will vary from the Results of the Operations (RO) model
 20 provided with PG&E's 2023 GRC Filing due to the cost adder applied to the RO model.

Workpaper Table 5-28
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Root Cause Analysis Forecast Calculation, MAT HPT

Line No.**1 Summary of Costs**

2	Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3	2023	\$2,487,093	1.078	\$2,681,376

4	Year	Recorded Expenses (Nominal \$)	Escalation Factor	Recorded Expenses (2020 \$)
5	2017	\$2,636,588	1.064	\$2,804,331
6	2018	\$2,872,620	1.027	\$2,949,801
7	2019	\$1,699,410	1.005	\$1,707,146
8	Total (2020 \$)			\$7,461,278
	Annual Forecast (2020 \$)			\$2,487,093

Workpaper Table 5-29
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Public Awareness Expense Forecast Calculation, MAT JT0

Line No.

1	Summary of Costs			
2	Year	Forecast (2020 \$)	Escalation Rate	Forecast (\$)
3	2023	\$ 4,068,487	1.078	\$4,386,305

4	Calculation of Historical Annual Average			
6	Year	Recorded (Nominal \$) ^(a)	Escalation Factor	2020 \$
7	2017	\$2,670,581	1.064	\$2,840,487
8	2018	\$1,903,164	1.027	\$1,954,298
9	2019	\$1,663,387	1.005	\$1,670,959
10	Total (2020 \$)			\$6,465,744
11	3-Year Average (2020\$)			\$2,155,248

(a) Values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

Calculation of Annual Average Forecast Cost for GPS-Based Excavation Equipment Motion Sensing Device Program

14	Program Year	2020 \$
15	2023	\$845,248
16	2024	\$2,087,236
17	2025	\$2,255,236
18	2026	\$2,465,236
19	Total (2020 \$)	\$7,652,956
20	Annual Forecast (2020\$)	\$1,913,239

Details for Calculation of GPS-Based Excavation Equipment Motion Sensing Device Program

Expense	2023				2024				2025				2026			
	FTEs	Unit Cost	Units	2020 \$	FTEs	Unit Cost	Units	2020 \$	FTEs	Unit Cost	Units	2020 \$	FTEs	Unit Cost	Units	2020 \$
Labor	4			\$644,800	7			\$1,739,633	7			\$1,739,633	7			\$1,739,633
Like DIRT Job	4	\$161,200		\$644,800	6	\$241,621		\$1,449,724	6	\$241,621		\$1,449,724	6	\$241,621		\$1,449,724
Project Manager	0				1	\$289,909		\$289,909	1	\$289,909		\$289,909	1	\$289,909		\$289,909
Employee Expenses	4			\$32,448	7			\$53,603	7			\$53,603	7			\$53,603
Mileage Expense	4	\$0.53		\$19,080	7	\$0.53		\$30,210	7	\$0.53		\$30,210	7	\$0.53		\$30,210
Like DIRT Job	4	\$0.53	9000	\$19,080	6	\$0.53	9000	\$28,620	6	\$0.53	9000	\$28,620	6	\$0.53	9000	\$28,620
Project Manager	0	\$0.53	3000	\$0	1	\$0.53	3000	\$1,590	1	\$0.53	3000	\$1,590	1	\$0.53	3000	\$1,590
Other Expenses	4	\$3,342	4	\$13,368	7	\$3,342	7	\$23,393	7	\$3,342	7	\$23,393	7	\$3,342	7	\$23,393
GPS Devices		\$840	200	\$168,000		\$840	350	\$294,000		\$840	550	\$462,000		\$840	800	\$672,000
Total Expense (2020 \$)				\$845,248				\$2,087,236				\$2,255,236				\$2,465,236

Workpaper Table 5-30
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Emergency Response Programs
Valve Safety and Reliability Expense Forecast Calculation - MAT JTR

Line No.**1 Summary of Costs**

2 Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3 2023	\$1,196,837	1.078	\$1,290,331

4	Year	Recorded Cost (Nominal \$) ^(a)	Escalation Factor	2020 \$
5	2017	\$1,374,573	1.064	\$1,462,025
6	2018	\$1,088,624	1.027	\$1,117,873
7	2019	\$1,006,034	1.005	\$1,010,614
8	Total (2020 \$):			\$3,590,512
9	Annual Forecast Valve Safety and Reliability Expense (2020\$):			\$1,196,837

10 (a) The recorded costs reflected in this workpaper includes historic PSEP costs and will vary from the
11 Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing.

Workpaper Table 5-31
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Class Location Studies Expense Forecast Calculation, MAT JTQ

Line No.**1 Forecast Summary**

2 Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3 2023	\$1,907,883	1.078	\$2,056,921

4 Calculation of average annual cost of Class Location Studies in 2020 \$

5 Year	Nominal \$ ^(a)	Escalation Factor	Total Expenses (2020 \$)
6 2017	\$538,162	1.064	\$572,401
7 2018	\$2,132,349	1.027	\$2,189,640
8 2019	\$2,948,188	1.005	\$2,961,609
Total (2020 \$):			\$5,723,650
Average Annual Cost (2020\$):			\$1,907,883

10 *(a) The recorded costs reflected in this workpaper includes recorded costs from MAT KF1 and will vary*
11 *from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing.*

Workpaper Table 5-32
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Class Location Strength Testing and Expense Replacements, MAT JT9

Line No.**1 Summary Forecast for Class Location Strength Testing**

2 Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$) ¹
3 2023	\$785,357	1.078	\$846,706

1. Forecast increased from \$835,009 to \$846,706 due to escalation factor change from 1.069 to 1.078

4 Calculation of average annual cost of Class Location Strength Testing

5	Year	Recorded Cost (Nominal \$)	Escalation Factor	Recorded Cost (2020 \$)
6	2018	\$429,802	1.064	\$457,147
7	2019	\$29,099	1.027	\$29,881
8	2020	\$1,860,574	1.005	\$1,869,043
9	Total (2020 \$):			\$2,356,071
10	Average Annual Cost of Class Location Strength Testing (2020 \$):			\$785,357

Workpaper Table 5-33
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Shallow/Exposed/Water and Levee Crossing Expense Mitigations Forecast Calculation, MAT JT4

Line No.

Summary of Forecast

Cost Summary Table			
Year	Forecast (2020 \$)	Escalation Factor	Total Annual Costs
2023	\$2,402,234	1.078	\$2,589,889

Summary Forecast Program Mangement Cost

Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$108,728	1.078	\$117,221

Summary Forecast Project Cost

Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$2,293,506	1.078	\$2,472,668

Project Calculation of Annual Forecast 2020 Base Year Dollars

Year	Average Cost Per SE (2020 \$)	Annual Forecast Number of Projects	Annual Cost Per project (2020 \$)
2023	\$573,377	4	\$2,293,506

Calculation of Average Cost Per Project in 2020 Base Year Dollars

Year	Annual Historical Cost (2020 \$)	Annual Project Count	Annual Cost Per project (2020 \$)
2017	\$1,897,500	3	\$632,500
2018	\$3,268,520	5	\$653,704
2019	\$1,735,702	4	\$433,926
Average Cost Per Project (2020 \$)			\$573,377

Project Calculation of Annual Historical Cost in 2020 Base Year Dollars

Year	Nominal Project \$	Escalation Factor	2020 Project \$
2017	\$1,784,000	1.064	\$1,897,500
2018	\$3,183,000	1.027	\$3,268,520
2019 ^(a)	\$1,727,837	1.005	\$1,735,702

(a) Excludes reimbursement costs, which is not typical for this work type.

Program Management Calculation of Annual Historical Cost in 2020 Base Year Dollars

Year	Nominal Program \$	Escalation Factor	2020 Project \$
2017	\$77,000	1.064	\$81,899
2018	\$98,000	1.027	\$100,633
2019	\$143,000	1.005	\$143,651
Total (2020 \$):			\$326,183
Annual Forecast Program Mangement Cost (2020\$):			\$108,728

2017-2019 Historical Water & Levee/Shallow/Exposed Project Count

(2020 projects excluded because not all costs have been accounted in these projects due to trailing costs due to site restoration, etc.)

Completion Year	2017	2018	2019	
Project ID	R-1065	R-895	R-1097	
	R-1048	R-1204	A-293	
	R-602	R-1056	D-992A	
		R-464	D-1118A	
		R-402 ^(a)		
Total Units	3	5	4	12
Average number of projects per year				4

Source: SD-05 Reports

(a) StanPac project

Workpaper Table 5-34
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 5, Asset Family - Transmission Pipe
Water and Levee Crossing Forecast Calculation, MAT JT2

Line No.**1 Summary of Costs**

2 Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3 2023	\$1,210,628	1.078	\$1,305,198

4 Year	Recorded Cost (Nominal \$)	Escalation Factor	2020 \$
5 2017	\$779,509	1.064	\$829,102
6 2018	\$755,103	1.027	\$775,391
7 2019	\$2,018,203	1.005	\$2,027,390
8 Total (2020 \$):			\$3,631,884
9 Annual Forecast Water and Levee Crossing Expense (2020\$) :			\$1,210,628

Workpaper Table 5-35
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Pipeline Field Engineering Expense Forecast Calculation, MAT JT1

Line No.**Summary of Costs**

Year	Forecast (2020 \$)	Escalation Rate	Forecast (\$)
2023	\$2,245,866	1.078	\$2,421,305

Year	Subtotal of Expenses (nominal \$)	Escalation Rate	2020 \$
2017	\$2,182	1.064	\$2,321,081
2018	\$2,245	1.027	\$2,305,519
2019	\$2,101	1.005	\$2,110,997
Total (2020\$)			\$6,737,597
Annual Forecast (2020\$)			\$2,245,866

Workpaper Table 5-36
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Pipeline Investigations Forecast Calculation, MAT JTD

Line No.

Forecast Summary

Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$16,576,487	1.078	\$17,871,390

Contribution to Forecast Calculation From Historic Costs

Year	Nominal \$	Escalation to 2020	Expenses in 2020 Dollars ^(a)
2017	\$3,873,356	1.064	\$4,119,784
2018	\$5,813,534	1.027	\$5,969,730
2019	\$3,331,735	1.005	\$3,346,901
3-Year Total (2020 \$)			\$13,436,416
Historic Spend Forecast Contribution (2020 \$)			\$4,478,805

(a) The recorded costs reflected in this workpaper includes PSEP Expense PFL costs and StanPac expenses AND excludes costs in 2018 and 2019 for pipe properties determinations. Therefore, the recorded costs in this workpaper will vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing.

Contribution to Forecast Calculation From Part 1 of Mega Rule Implementation (49 CFR §192.607)

§192.607 Compliance Opportunity - WorkStream	§192.607 Compliance Opportunity - Work Type	Historical Projects (Based on 2019 orders)	Historical Digs / project	Projected Digs for §192.607 Compliance	Forecast (2019 \$)
Digs	ILI	83		83	\$ 142,783
Digs	Direct Examination	5		5	\$ 8,249
Digs	ECDA	116		116	\$ 172,652
Digs	ICDA	8		8	\$ 15,134
Digs	Corrosion Dig / Casing	16		16	\$ 28,008
Digs	Station Dig	5		5	\$ 6,787
Digs	Base Transmission Dig	27		27	\$ 47,809
Digs	Weld Repairs	8		8	\$ 116,295
Replacement	Replacement	85	2	170	\$ 3,094,395
Strength Test	Strength Test	29	6.7	194	\$ 3,408,887
Valve Replacement	Valve Replacement	46	2.2	101	\$ 1,707,245
In-line Inspection	Upgrade	59	4.1	242	\$ 5,306,807
In-line Inspection	NTILI	12		12	\$ 28,387
Asset Engineering	Asset Engineering	50		50	\$ 88,535
Corrosion	Cathodic Protection / Miscellaneous	83		83	\$ -
Corrosion	Spans / Recoat	25		25	\$ 44,267
Valve Automation	Valve Automation	12		12	\$ 28,387
Subtotal (2019 \$)					\$ 14,244,626
Historic NDE QC Credits					\$ (3,747,006)
DCT Field Costs					-
Management Costs					\$ 500,000
§192.607 Additional Testing Program Total (2019 \$)					\$ 10,997,619
Escalation Factor					1.005
§192.607 Additional Testing Program Total (2020 \$)					\$11,047,682

39 **Notes:**

40 PG&E began adding "opportunistic" testing cut-out sections of pipe in 2019 to gain experience/understanding of the requirements of §192.607, in preparation for Part 1 of the "Mega Rule" that was to be implemented by July 1, 2020. This additional work is based on the number of cut outs from each program and the additional cost for material testing for the purpose of establishing TVC materials properties per the new section of code.

41 **§192.607 Compliance Opportunity - WorkStream:** represents workstreams with projects where excavation opportunities exist.

42 **§192.607 Compliance Opportunity - Work Type:** represents the work type with projects where excavation opportunities exist.

43 **Historical Projects (Based on 2019 orders):** The number of digs that were associated with 2019 projects (unique order #'s) based on mobilization dates in 2019.

44 **Historical Digs / project:** An estimate for number of digs based on historical project dig rates

45 **Projected Digs for §192.607 Compliance:** Historical Projects (Based on 2019 orders) multiplied by Historical Digs / project

46 **Forecast (2019 \$):** the estimated annual costs of potential inspections per workstream in 2019 dollars.

45 **Contribution to Forecast Calculation From Mega Rule Implementation (MCA Analyses)**

46	Mega Rule (Part 1), Impact	Forecast \$ per year (2020 \$)
47	MCA and Class (192.3 & 192.5) Added labor and QC of processing additional data + vendor support.	\$350,000
48	Assessments outside of HCAs (192.710) 1FTE additional AP support to ensure assessments for 500 additional miles are appropriately planned and managed into program	\$150,000
49	Continual Evaluation (192.712 & 192.937) ½ to 1 FTE crack like defect analysis for PAIRS and PEIRS: Mega Rule Procedure TD-4810P-17 - 192.937	\$150,000
50	Cyclic Fatigue Evaluation every 7 years on all covered segments (192.917) 1 FTE additional threat ID, risk analysis data collection and threat assessment planning.: Mega Rule Procedure Revisions 192.917	\$150,000
51	Cyclic Fatigue Evaluation every 7 years on all covered segments (192.917) additional vendor support for performing increased annual analysis	\$100,000
52	Risk Model improvement requirements 1 FTE coordinate risk model improvements and better align risk model with enterprise model(s)	\$150,000
53	Total annual Mega Rule (Part 1) Forecast Contribution (2020 \$)	\$1,050,000

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 6, ASSET FAMILY - FACILITIES

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GT Station Strength Testing Expense - JTV Revised	WP 6-13

Table 6-6
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities
GT Routine C&P Expense - MAT JTY

Program: GT Routine Compression and Processing (C&P) Expense, MAT JTY

Program Description

GT Routine C&P Expense program includes a wide assortment of expense projects within the C&P asset family such as equipment leases, service contracts, maintenance agreements, equipment overhauls and other expense-related repairs.

Table 1: GT Routine C&P Expense	
	2023
Total Expense	\$10,012,628

1

Table 2, Line 7

Table 2: Calculation		2018	2019	2020	
GT Routine C&P Expense Recorded		\$ 10,887,497	\$ 8,973,761	\$ 7,821,445	
Adjustments for Pleasant Creek Facility		\$ 122,790	\$ 7,789	\$ 20,726	Note #1
GT Routine C&P Expense Adjusted (unescalated)		\$ 10,764,707	\$ 8,965,972	\$ 7,800,719	Line 2 - Line 3
Escalation (2023)		1,1071	1,0830	1,0781	
GT Routine C&P Expense Recorded (in 2023 \$s)		\$ 11,917,430	\$ 9,710,368	\$ 8,410,087	Line 4 * Line 5
Adjusted 3-year Average				\$ 10,012,628	Note #2

7

Notes:

- #1 Pleasant Creek Storage Facility expected to be decommissioned in 2022. Historical project costs are removed from average calculation for 2023.
#2 Expense 3-year average (2018-2020)

Table 6-7
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities
GT Routine M&C Expense - MAT JTW

Program: GT Routine Measurement and Control (M&C) Expense, MAT JTW

Program Description:

GT Routine M&C Expense program includes a wide assortment of expense projects within the M&C asset family such as assessment and repair of valves, actuators, monitors & controllers, electrical circuits, SCADA units, meter repairs, etc.

Table 1: GT Routine M&C Expense	2023
Total Expense	\$4,402,757

Table 2, Line 5

Table 2: Calculation	2018	2019	2020
GT Routine M&C Expense Recorded	\$ 3,770,726	\$ 3,603,730	\$ 4,759,071
Escalation (2023)	1.1071	1.0830	1.0781
GT Routine M&C Expense Recorded (in 2023 \$s)	\$ 4,174,509	\$ 3,902,929	\$ 5,130,834
Adjusted 3-year Average		\$	\$ 4,402,757

Line 2 * Line 3
Note #1

Notes:

#1 Expense 3-year average (2018-2020)

Table 6-8
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities
GT Gas Quality Assessment Expense - MAT JT8

Program: GT Gas Quality Assessment Expense, MAT JT8

Program Description:

The GT Gas Quality Assessment Expense program ensures that the quality of the gas delivered into the PG&E system is suitable for transmission and distribution by PG&E and for the end users and meets the California Public Utilities Commission (CPUC) gas quality regulatory requirements. The GT Gas Quality Assessment Expense Program also ensures that natural gas is properly odorized for use in the system. The expense activities in this program are driven by PG&E's Gas Quality Management Plan. In addition to ongoing gas quality initiatives, PG&E is developing targeted odor fade mitigation activities under this program to address the processes and procedures impacting odor fade risk reduction. 2023 GRC forecast includes costs anticipated for projects to support both odor fade and gas quality initiatives.

Table 1: GT Gas Quality Assessment Expense		
		2023
1	Total Cost	\$2,000,000
2	Total GT Gas Quality Assessment Expense	\$2,000,000

Table 2, Line 9
Line 1

Table 2: Calculation		
Projects		2020
3	Gas Quality Assessment Recorded	\$1,113,088
4	Odor Fade Initiative - Review & Update Standards and Procedures (odorization and pipeline conditioning) ^[1]	\$250,000
5	Odor Fade Initiative - Testing & Research and Technical Support ^[1]	\$250,000
6	Odor Fade Mitigation - Restoration of Odorant Concentration ^[1]	\$200,000
7	Total Cost (2020 \$)	\$1,813,088
8	Escalation (2023)	1.0781
9	Total Cost (2023 \$) Rounded	\$2,000,000

Line 7 * Line 8

Notes:

#1 Based on the anticipated initiative costs by internal and external subject matter experts.

Table 6-9
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities
GT Station Overpressure Protection Enhancements Expense - MAT JTX

Program: GT Station Overpressure Protection (OPP) Enhancements Expense, MAT JTX

Program Description:

GT Station OPP program is a mitigation to prevent large overpressure (OP) events due to equipment-related failure at regulator stations. The expense projects related to this program include the following activities:

- Installing pilot filters (sulfur filters) to reduce the likelihood of pilot-operated regulator or monitor failure due to sulfur.
- System planning studies to identify the most effective secondary overpressure protection option for specific stations.
- Developing new design standards for primary Large Volume Customer (LVC) regulation sets.
- Program management for developing and maintaining the master overpressure elimination plan and schedule.
- Pilot studies on new valve technologies for applicability to the PG&E system.

Table 1: GT Station OPP Expense	
Total Expense	2023 \$1,073,278

1

Table 2, Line 5

Table 2: Calculation		2018		2019		2020	
GT Station OPP Expense Recorded		\$	1,074,642	\$	1,289,606	\$	587,544
Escalation (2023)			1,1071		1,0830		1,0781
GT Station OPP Expense (in 2023 \$s)		\$	1,189,719	\$	1,396,675	\$	633,441
Adjusted 3-year Average						\$	1,073,278

Line 2 * Line 3
Note #1

Notes:

#1 Expense 3-year average (2018-2020)

Table 6-10
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities
GT FIMP Risk Management Program - MAT JTL

Program: GT Facilities Integrity Management Program (FIMP) Risk Management Program, MAT JTL

Program Description:

GT FIMP Risk Management Program includes foundational activities that enable PG&E to (1) continuously improve its understanding of risks associated with its M&C and C&P stations and (2) identify appropriate risk mitigations. This program focuses on improving the quality of asset and condition information and contributes to the development of tools that enable easy access to that information. The following activities are included under the program:

- Risk Identification and Assessment: Execution of process safety studies at selected facilities to identify potential safety threats; causal analyses of facility-related events to identify emerging threats and risks; identification and specification of data needs and tools to provide for ongoing asset management decision-making; and continued development of probabilistic risk assessment models to support program evaluation.
- Identification of Risk Mitigation Strategies: Benchmarking studies in order to understand the performance, practices, and technologies of other operators.
- Technical Assessments: Targeted technical assessments (such as pressure vessel inspections, seismic studies, reliability-centered maintenance studies, etc.) to inform prioritization of future activities; and pilot programs to demonstrate and/or test new technology, identify process solutions, and develop work procedures prior to full implementation.

Table 1: GT FIMP Risk Management	
	2023
Total Expense	\$2,468,999
Shared Services Geo Services Forecast Allocation	\$158,217
Total Expense for MAT JTL	\$2,627,216

1
2
3

Table 2: Calculation		2018	2019	2020
FIMP Risk Management Recorded		\$ 1,851,316	\$ 2,333,545	\$ 2,625,085
Escalation (2023)		1,1071	1,0830	1,0781
FIMP Risk Management Recorded (in 2023 \$s)		\$ 2,049,561	\$ 2,527,287	\$ 2,830,149
Adjusted 3-year Average			\$ 2,468,999	

4
5
6
7

Notes:

#1 \$158,217 included in the forecast to support Geosciences. Please see Exhibit (PG&E 7), Chapter 10 for more information.

#2 Expense 3-year average (2018-2020)

Table 6-11 - Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities Supplemental Testimony
GT Engineering Critical Assessment Phase 2 Expense - MAT LV2

Program: GT Engineering Critical Assessment Phase 2 (ECA2) Expense, MAT LV2

Program Description:

GT ECA2 is a program of alternatives to traditional hydrostatic pressure testing. It is intended to mitigate discrepancies remaining after ECA Phase 1 activities that provide the desired reduction in risk to safety and reliability while limiting the risks introduced through the pressure testing of station components. ECA2 addresses this in a manner that is low-risk and minimally disruptive to gas operations by avoiding or limiting system outages, while simultaneously providing the desired reduction in risk to safety and reliability. ECA2 expense forecast includes the following activities:

- 1) Program development and administration.
- 2) Material verification.

Non-destructive examination (NDE) portion of the ECA2 activity is moved to capital MAT 76S following FERC Accounting Guidance. The summary of the impact of the FERC Accounting Guidance, and a description of the costs affected by the FERC Accounting Guidance are provided in more detail in Exhibit (PG&E-3), Chapter 5S.

Table 1: GT ECA2 Expense		2023 GRC
Engineering Critical Assessments Phase 2 Expense (Costs to address station components installed on or before 12/31/1955) ⁽¹⁾		\$5,025,493
Escalation (2023)		1,0317
Total Engineering Critical Assessments Phase 2 Expense		\$5,184,993

Table 2, Line 7
Note #1

Line 1 * Line 2

Table 2: GT ECA2 Estimate		Unescalated
Engineering Critical Assessments Phase 2 Expense		2023
Program		
ECA2 - Program Development		\$750,000
ECA2 - NDE		\$0
ECA2 - Material Verification		\$4,275,493
Total Engineering Critical Assessments Phase 2 Expense (Costs to address station components installed on or before 12/31/1955) ⁽¹⁾		\$5,025,493

From WP 6-12 Table A
Moved to Capital MAT 76S. See WP 5S-12 New
From WP 6-12 Table B

Note #1

Notes:

#1 Per 2015 GT&S Final decision D. 16-06-056, Engineering Critical Assessments Phase 2 Balancing Account includes only costs associated with station components installed on or before 12/31/1955.

Table 6-12 - Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities Supplemental Testimony
GT Station Strength Testing Expense - MAT JTV

Program: GT Station Strength Testing Expense, MAT JTV

Program Description:

The GT Station Strength Testing Program will perform station pressure testing when warranted as a result of Engineering Critical Assessment (ECA) Phase 1 and Phase 2 findings. The Station Strength Testing Program forecast includes the following activities:
1) Program development and administration.
2) Material verification.
Strength testing of station (station piping and components identified as requiring strength testing by ECA Phases 1 and 2) is moved to capital MAT 76V following FERC Accounting Guidance. The summary of the FERC Accounting Guidance, a description of the impact of the FERC Accounting Guidance, and a description of the costs affected by the FERC Accounting Guidance are provided in more detail in Exhibit (PG&E-3), Chapter 5S.

Table 1: GT Station Strength Testing Expense	2023
Station Strength Testing Expense (Costs to address station components installed on or before 12/31/1955) ⁽¹⁾	\$2,079,621
Escalation (2023)	1.0317
Total Expense	\$2,145,624

Table 2, Line 7
Note #1

Line 1 * Line 2

Table 2: GT Station Strength Testing Program Estimate	Unescalated
2023	
Program Development and Administration	\$750,000
Strength Testing of Stations	\$0
Station Strength Testing - Material Verification (per CFR § 192.607)	\$1,329,621
Total Station Strength Testing Expense (Costs to address station components installed on or before 12/31/1955)⁽¹⁾	\$2,079,621

From WP 6-14 Table A
Moved to Capital MAT 76V
From WP 6-14 Table B

Note #1

Notes:

#1 Per 2015 GT&S Final Decision D. 16-06-056, Station Strength Testing Memorandum Account includes only costs associated with station components installed on or before 12/31/1955.

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 7, ASSET FAMILY – STORAGE

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Workpaper Table 7-6 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
Summary - MAT AH1

Line No.	Expense Program	MAT	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1	Noise and Temperature Surveys	AH1	\$1,465,184	\$1,556,773	\$1,666,478	\$1,704,470	WP 7-7 Line 5
2	Thru-Tubing Casing Inspections	AH1	\$2,906,101	\$3,087,762	\$3,305,355	\$3,380,711	WP 7-8 Line 5
3	Barrier Inspection Surveys (MFL, USIT, Caliper, CBL/GRN)	AH1	\$3,651,997	\$3,594,124	\$1,030,023	\$2,859,515	WP 7-9 Line 5
4	Pressure Testing (Post Conversion to T&P)	AH1	\$1,153,354	\$1,401,820	\$2,001,153	\$2,201,249	WP 7-10 Line 5
5	Total Expense	AH1	\$9,176,636	\$9,640,479	\$8,003,010	\$10,145,946	WP 7-5 Line 2

Workpaper Table 7-7
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
Noise and Temperature Survey Cost Calculation
MAT AH1

Line
No

		<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	Reference
1						
2	Unit Cost Escalation	1.060	1.085	1.111	1.136	
3	Final Unit Cost (2020 Year Unit Cost * Unit Cost Escalation)	\$13,954	\$14,282	\$14,618	\$14,951	
4	Total Units	105	109	114	114	
5	Total	\$1,465,184	\$1,556,773	\$1,666,478	\$1,704,470	WP 7-6 Line 1

	Storage Field	Actual 2020 Well Count	Contractor Unit Costs ⁽¹⁾	PG&E Internal Costs ⁽²⁾	2020 Total Cost Estimate	2020 Unit Cost
6	Los Medanos --- Noise Temp	18	\$102,665	\$133,989	\$236,654	
7	Pleasant Creek --- Noise Temp	6	\$43,275	\$44,663	\$87,938	
8	McDonald Island --- Noise Temp	85	\$462,608	\$647,614	\$1,110,222	
9	<i>Subtotals</i>	<i>109</i>	<i>\$608,548</i>	<i>\$826,266</i>	<i>\$1,434,814</i>	<i>\$13,163</i>
10	Total 2020 Unit Cost					\$13,163
11						

		Forecast Well Count			
	Storage Field	2023	2024	2025	2026
12	Los Medanos ⁽³⁾	18	18	18	18
13	Pleasant Creek	0	0	0	0
14	McDonald Island	87	91	96	96
15	Total	105	109	114	114
16					
17					

18 **NOTES**

19 ⁽¹⁾ Contractor Costs are from quotes provided by the contractor in 2020.

20 ⁽²⁾ PG&E Internal Costs are based on 2020 costs, excluding overhead.

21 ⁽³⁾ The number of wells in 2018 and 2019 accounts for the abandonment of two wells at Los Medanos.

Workpaper Table 7-8 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
Thru-Tubing (MTD) Survey Cost Calculation
MAT AH1

Line
No

1		2023	2024	2025	2026	Reference
2	Unit Cost Escalation	1.060	1.085	1.111	1.136	
3	(Prior Year Unit Cost * Unit Cost Escalation)	\$27,677	\$28,328	\$28,994	\$29,655	
4	Total Units	105	109	114	114	
5	Total	\$2,906,101	\$3,087,762	\$3,305,355	\$3,380,711	WP 7-6 Line 2

6	Storage Field	Actual 2020 Well Count	Contractor Unit Costs ⁽¹⁾	PG&E Internal Costs ⁽²⁾	2020 Total Cost Estimate	2020 Unit Cost
7	Los Medanos --- Thru-Tubing	7	\$130,655	\$52,107	\$182,762	
8	Pleasant Creek --- Thru-Tubing	1	\$18,665	\$7,444	\$26,109	
9	McDonald Island --- Thru-Tubing	32	\$597,280	\$238,203	\$835,483	
10	<i>Subtotals</i>	40	\$746,600	\$297,754	\$1,044,354	\$26,109
11	Total 2020 Unit Cost					\$26,109

12	Storage Field	Well Inspected ⁽³⁾	2023	2024	2025	2026
13	2023 Wells (LM + PC + McD)	105	\$2,906,101			
14	2024 Wells (LM + PC + McD)	109		\$3,087,762		
15	2025 Wells (LM + PC + McD)	114			\$3,305,355	
16	2026 Wells (LM + PC + McD)	114				\$3,380,711
17	⁽⁴⁾ Total	442	\$2,906,101	\$3,087,762	\$3,305,355	\$3,380,711

18 **NOTES**

19 ⁽¹⁾ Contractor Costs are from quotes provided by the contractor in 2020.

20 ⁽²⁾ PG&E Internal Costs are based on 2020 costs, excluding overhead allocations.

21 ⁽³⁾ Forecast units, subject to change pending CalGEM approval.

22 ⁽⁴⁾ The costs reflected are vendor specific and may be different should another cost competitive vendor be used.

Workpaper Table 7-9 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
Rework Logging Survey Cost Calculation
MAT AH1

Line
No

		<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	Reference
1						
2	Unit Cost Escalation	1.060	1.085	1.111	1.136	
	Final Unit Cost (Prior Year Unit Cost * Unit Cost Escalation)	\$140,461	\$143,765	\$147,146	\$150,501	
3						
4	Total Units	26	25	7	19	
5	Total	\$3,651,997	\$3,594,124	\$1,030,023	\$2,859,515	WP 7-6 Line 3

	Storage Field	Actual 2020 Well Count	Contractor Unit Costs ⁽¹⁾	PG&E Internal Costs ⁽²⁾	2020 Total Cost Estimate	2020 Unit Cost
6						
7	Los Medanos --- Rework Logging	3	\$357,801	\$0	\$357,801	
8	McDonald Island --- Rework Logging	14	\$1,894,738	\$0	\$1,894,738	
9	<i>Subtotals</i>	17	\$2,252,539	\$0	\$2,252,539	\$132,502
10	Total 2020 Unit Cost					\$132,502

	Storage Field	Well Inspected ⁽³⁾	2023	2024	2025	2026
11						
12	2023 Wells (LM + PC + McD)	26	\$3,651,997			
13	2024 Wells (LM + PC + McD)	25		\$3,594,124		
14	2025 Wells (LM + PC + McD)	7			\$1,030,023	
15	2026 Wells (LM + PC + McD)	19				\$2,859,515
16	Total	77	\$3,651,997	\$3,594,124	\$1,030,023	\$2,859,515

17 **NOTES**

18 ⁽¹⁾ Contractor Costs are from quotes provided by the contractor in 2020.

19 ⁽²⁾ PG&E Internal Costs are included in 3L3.

20 ⁽³⁾ Forecast units, subject to change pending CalGEM approval of risk based reinspections. Includes emergent and planned work.

Workpaper Table 7-10 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
Pressure Testing Cost Calculation
MAT AH1

Line
No

		<u>2023</u>	<u>2024</u>	<u>2025</u>	<u>2026</u>	Reference
1						
2	Unit Cost Escalation	1.060	1.085	1.111	1.136	
3	Final Unit Cost (Prior Year Unit Cost * Unit Cost Escalation)	\$36,042	\$36,890	\$37,758	\$38,618	
4	Total Units	32	38	53	57	
5	Total	\$1,153,354	\$1,401,820	\$2,001,153	\$2,201,249	WP 7-6 Line 4

	Activity	2020 Unit Costs (¹)	
6			
7	Pressure testing Casing Annuli	\$21,000	Vendor Estimate
8	Contractor Support	\$2,500	WSM Oversight
9	Internal Labor (²)	\$10,500	GPOM, Eng, Clearance Devel, PM
10	<i>Subtotals</i>	<i>\$34,000</i>	
11	Total 2020 Unit Cost	\$34,000	

	Storage Field	Well Pressure Tests (³)	2023	2024	2025	2026
12						
13	2023 Wells (LM + PC + McD)	32	\$1,153,354			
14	2024 Wells (LM + PC + McD)	38		\$1,401,820		
15	2025 Wells (LM + PC + McD)	53			\$2,001,153	
	2026 Wells (LM + PC + McD)	57				\$2,201,249
	Total	180	\$1,153,354	\$1,401,820	\$2,001,153	\$2,201,249

NOTES

- 16 (¹) Contractor Costs are from quotes provided by the contractor in 2020.
- 17 (²) PG&E Internal Costs are based on 2020 costs, excluding overhead allocations.
- 18 (³) Forecast units, subject to change pending CalGEM approval; assumes 5 year pressure testing cycle post conversion.

Workpaper Table 7-11 Revised
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers
 Chapter 7. Asset Family - Storage
 Storage Well Rework Reassessment Project Cost Calculator
 MAT AH2

Line No.	Year	Escalation	Unit Cost	Units ⁽¹⁾	Cost	Reference
1	2020		\$1,512,825			
2	2023	1.060	\$1,603,697	2	\$3,207,395	
3	2024	1.085	\$1,641,415	2	\$3,282,829	
4	2025	1.111	\$1,680,019	3	\$5,040,058	
5	2026	1.136	\$1,718,320	14	\$24,056,485	WP 7-5 Line 3

⁽¹⁾ The units noted are based on performing well reworks at Los Medanos and McDonald Island storage fields.

7 STORAGE WELL REWORK & REASSESSMENT:

Well Rework (Post T&P Conversion), Assess Condition, Recomplete T&P (10 Rig Days)

	Unit (\$)	Quantity	Unit	Total (\$)	Source of Data
DHSV, Rate Restoration, & Packer Assembly	360,000	1	job	360,000	Vendor Quote
Down Hole Safety Valve					
(E) Liner Retrieval/Fishing					
8-5/8" Packer Assembly					
Pressure Testing x2					
4.5" Steel Tubing	17	5,000	feet	85,000	Vendor Quote
Total for DHSV & Rate Restoration				445,000	

Rig & Remaining Rework Cost

Rig	Daily Rate	15	daily	412,500	Vendor Quote
	Mobilization	1	job	50,000	Vendor Quote
Rig Subtotal				462,500	
Remaining Rework Cost:					
Auxiliary Rig Support Services	147,016	1	job	147,016	Vendor Quote
(WSM, fishing, crane, rat holes, PUI/LD, guard shack, drill bits, etc)					
Fluids & Fluid Handling					
Drilling Fluids	70,000	1	job	70,000	Vendor Quote
Fluid transport, storage, and disposal	120,000	1	job	120,000	Vendor Quote
				190,000	
WSM, Engineering and PM Support Services					
Day WSM (Incl. Per Diem/ Mileage)	2,600	15	daily	39,000	Vendor Quote
Night WSM (Incl. Per Diem/ Mileage)	2,600	15	daily	39,000	Vendor Quote
Engineering Support (Above/below ground)	70,000	1	job	70,000	Vendor Quote
Project Management Support	70,000	1	job	70,000	Vendor Quote
Services Subtotal				218,000	
Total for Rig and the remaining Rework Cost				870,500	

DHSV, Rate Restoration, Rig, & Remaining Rework Total

Overhead Allocations	1,315,500				15% Overhead allocations were based on Internal PG&E standard labor and material factors.
Total 2020 Unit Cost	197,325				
	1,512,825				

Workpaper Table 7-12 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
MAT AH3 & AH# Engineering & Support

Line No.	Escalation Rates		1.088	1.122	1.156	1.192	Reference
	MAT		2023	2024	2025	2026	
	1	AH3	2,650,170	6,292,999	7,862,467	7,155,764	WP 7-13 Line 1 + WP 7-14 Line 3
	2	AH#	2,120,136	2,169,999	2,221,036	2,271,671	WP 7-13 Line 2
	3	Total Costs (\$M)	4,770,306	\$8,462,998.03	\$10,083,502.71	\$9,427,434.82	

Workpaper Table 7-13 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
MAT AH3 & AH# Engineering & Support

Line No.	Escalation Rates	1.060	1.085	1.111	1.136	Reference
	MAT	2023	2024	2025	2026	
1	AH3	\$1,060.07	\$868.00	\$1,110.52	\$908.67	WP 7-12 Line 1
2	AH#	\$2,120.14	\$2,170.00	\$2,221.04	\$2,271.67	WP 7-12 Line 2
3	Total Costs (\$M)	\$3,180.20	\$3,038.00	\$3,331.55	\$3,180.34	

Line No.	Activity	2020 Cost	MAT	
4	Wellhead Program Engineering and Contract Support	\$ 70	AH3	engineering estimate
5	Isochronal Gas Sampling Program	\$ 200	AH3	engineering estimate
6	Well Control School Training(every 2 Years)	\$ 200	AH3	vendor quote
7	Well Control Support & Emergency Preparedness	\$ 130	AH3	vendor quote
8	General Engineering/Integrity Management/R&D Contract Support	\$ 400	AH3	engineering estimate
9	Internal Engineering/Integrity Management/Program Support	\$ 2,000	AH#	engineering estimate

Workpaper Table 7-14
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
MAT AH3 Non-High Consequence Area (HCA) Hydrotest Testing Cost Calculator

Line No.	Storage Field	Escalation Rates	1.060	1.085	1.111	1.136	Reference
		MAT					
1	McDonald Island	AH3	\$1.59	\$5.42	\$2.89	\$6.25	
2	Los Medanos	AH3	\$0.00	\$0.00	\$3.86	\$0.00	
3	Total Costs (\$M)		\$1.59	\$5.42	\$6.75	\$6.25	WP 7-12 Line 1

Line No.	Facility	Execution Year	Project Designation (a)	Route(s) (b)	Mile Point 1	Mile Point 2	Est. Hydrotest Costs (\$M)
4	McDonald Island	2023	McD-11	057A-MC79S	0	0.17	1.5
5	McDonald Island	2024	McD-5	057A-MC STUB7134	0	0.42 0	5.0
6	McDonald Island	2025	McD-6	057A-MT	0	0.61	2.6
7	Los Medanos	2025	LM-1	065 065-2	0	0.87 0.29	3.5
8	McDonald Island	2026	McD-7	057A-M10 057A-WT 057A-MD3	0	0.01 0.69 0.29	5.5

Notes

- (a) These projects are part of the 10-year Storage Pipe Plan that is being developed to perform assessments on all pipe at the storage facilities regardless of HCA classification. The planned assessments under the 10-yr Storage Pipe Plan include hydrotest, NT-ILI, ECDA, and pipe replacement. The assessments address the highest risks we have to the pipe and overall to the storage asset family stemming from internal corrosion. The pipe classified as HCA (all 2.5 miles of HCA pipe within storage asset family are located at McDonald Island) are currently assessed under the purview of TIMP per compliance schedule and typically only include ECDA assessment. The remaining miles of pipe would not otherwise normally receive assessments other than a hydrotest at install, if performed.
- (b) As part of this effort, TIMP and FIMP coordinated project bundles at each facility to minimize outages to perform hydrotests in lieu of, or in addition to ECDAs planned for compliance due dates. The projects are prioritized to address the highest risk pipe.

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 8, GAS OPERATIONS AND MAINTENANCE

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Right-Of-Way (ROW) Maintenance – MATs JOS, JOT, and JTO Forecast Calculator	WP 8-28
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Updated
Workpaper Table 8-14
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 3, Chapter 8, Operations and Maintenance
Transmission Damage Prevention
MATs DFA and DFB Forecast Calculator

Line No.

Forecast Summary Table - Gas Transmission

Description	2023 Units	2023 Unit Cost	2023 Forecast	Notes
Locate and Mark (DFA)	6,073	\$219	\$1,328,570	Units: Line 14, Unit Cost: Line 13
Standby Governance (DFB)	7,280	\$994	\$7,237,121	Units: Line 47, Unit Cost: Line 46

Locate and Mark (DFA) Forecast Detail

	2017 Recorded	2018 Recorded	2019 Recorded	2023 Forecast	Notes
Costs	\$1,029,001	\$1,119,968	\$910,561		
Units	6,166	5,198	4,355		Line 31
Unit cost (Nominal)	\$167	\$215	\$209		Line 9 + Line 10
Unit cost (Escalated to 2023 \$)	\$191	\$239	\$226		Line 11 * Line 53
Unit Cost Forecast				\$219	Sum Line 12 + 3
Unit Forecast				6,073	Line 10 (2019 Units) * Line 54
Forecast Total				\$1,328,570	Line 13 * Line 14

Transmission and Distribution Ticket %

	2017	2018	2019	2020
Sample Size for 3rd Party Tickets	1,350	1,350	1,500	3,000
# of tickets with GT Only Assests (No GD or ED Assests)	15	12	10	21
Proportion of Transmission tickets	1%	1%	1%	1%
Proportion of Distribution tickets	99%	99%	99%	99%

Transmission and Distribution Ticket Split

	2017	2018	2019	Notes
Total 3rd Party L&M Tickets	554,788	584,728	653,252	
Proportion of Transmission tickets	1%	1%	1%	Line 22
Proportion of Distribution tickets	99%	99%	99%	Line 23
# of Transmission tickets	6,166	5,198	4,355	Line 28 * Line 29
#of Distribution tickets	548,622	579,530	648,897	Line 28 * Line 30
Total	554,788	584,728	653,252	Line 28
Year Over Year Change	12%	5%	12%	(a)

Notes:

(a) 12% percent seen in 2019 was used for the forecast year over year escalation.

Standby Governance (DFB) Unit Cost Forecast Detail

	2017 Recorded	2018 Recorded	2019 Recorded	Notes
Costs	\$8,548,264	\$8,291,631	\$4,765,531	
Units	10,165	8,917	5,221	
Unit cost (Nominal)	\$841	\$930	\$913	Line 42 + Line 43
Unit cost (Escalated to 2023 \$)	\$964	\$1,029	\$989	Line 44 * Line 53
2023 Unit Cost Forecast			\$994.10	Line 45 + 3
2023 Unit Forecast			7,280	Line 43 (2019 Units) * Line 54
2023 Forecast Total			\$7,237,121	Line 46 * Line 47

Escalation Factors

	2018	2019	2020	2021	2022	2023
Escalation Factor ^(a)	3.58%	2.22%	0.46%	1.45%	3.01%	3.17%
Units Escalation	-	-	12%	12%	12%	12%

Notes:

(a) See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

Workpaper Table 8-15
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Transmission Pipeline Patrol
MATs JOF and JOV Forecast Calculator

Line No.

Forecast Summary Table

MAT	Description	Units	Unit Cost	2023 Forecast	Notes
JOF	Required Ground Pipeline Patrol	10,461	\$ 96	\$ 1,002,201	Line 16
JOV	Required Aerial Pipeline Patrol	125,656	\$ 37	\$ 4,662,293	Line 30 * Line 69

Required Ground Pipeline Patrol (MAT JOF) Forecast Detail

JOF	Costs (Nominal \$)	Escalation Factor	Costs (Escalated \$)	Units ^(a)	Unit Cost
2017 Recorded	\$1,006,019	1.1467	\$1,153,610	11,831	\$98
2018 Recorded	\$857,868	1.1071	\$949,732	10,253	\$93
2019 Recorded	\$862,766	1.0830	\$934,397	9,615	\$97
2023 Forecast Sub-total (3-year average)	\$908,884	N/A	\$1,012,579	10,566	\$96
StanPac Adjustment ^(b)			(\$10,378)	105	N/A
2023 Forecast Total			\$1,002,201	10,461	\$96

Notes:

(a) The forecast unit for MAT JOF is a forecast for the number of hours to provide ground response to Aerial Observations and patrol areas obscured by the air from vegetation.

(b) The 2023 forecast was adjusted to remove StanPac. See Exhibit (PG&E-3), Chapter 13 for the StanPac forecast.

Required Aerial Pipeline Patrol (MAT JOV) Forecast Detail**Units ^(a)**

System Patrols	79,404
Additional patrol of high consequence areas as conditions permit	
Sub-total	47,514
StanPac Adjustment ^(b)	1,262
Total	125,656

(a) The forecast unit for MAT JOV is the number of miles patrolled.

(b) The 2023 forecast was adjusted to remove StanPac. See Exhibit (PG&E-3), Chapter 13 for the StanPac forecast.

Unit Cost

Cost	2019 Recorded	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	Notes
Aerial Patrollers (labor cost)	\$741,109	\$784,705	\$756,169	\$778,902	\$803,623	
GIS (labor)	\$277,338	\$284,179	\$352,641	\$363,242	\$374,771	
Staff Augmentation - Labor	\$515,708	\$544,650	\$552,523	\$569,133	\$587,196	
Applied Overheads ^(a)	\$443,910	\$439,973	\$423,973	\$436,719	\$450,580	
Helicopter	\$644,634	\$518,080	\$637,770	\$656,943	\$677,793	
Fixed Wing	\$694,317	\$1,563,823	\$1,694,783	\$1,694,783	\$1,694,783	
Video Storage Fees	\$0	\$100,641	\$102,096	\$105,165	\$108,503	
Other	\$309,779	\$11,014	\$11,173	\$11,509	\$11,874	
StanPac Adjustment	-	(\$44,040)	-	-	-	(b)
Total	\$3,626,796	\$4,203,026	\$4,531,128	\$4,616,397	\$4,709,124	Sum Lines 38-46

Notes:

(a) The 2021-2023 forecast applies a 56% overhead.

(b) The 2023 forecast was adjusted to remove StanPac. See Exhibit (PG&E-3), Chapter 13 for the StanPac forecast.

Labor Hours	2019 Recorded	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast
Aerial Patrollers (hours)	12,597	13,291	12,625	12,625	12,625
Aerial Patrollers Labor Hours per Mile Patrolled (minutes)	6	10	6	6	6
Geographic Information System (GIS)	3,803	3,116	3,812	3,812	3,812
GIS Labor Hours per Mile Patrolled (minutes)	2	2	2	2	2

Units	2019 Recorded	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	Notes
Miles Patrolled	126,632	83,614	126,918	126,918	126,918	Line 28
Helicopter Hours	450	372	451	451	451	
Fixed Wing Hours	1,078	825	1,081	1,081	1,081	

Costs / Hours	2019 Recorded	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	Notes
Aerial Patrollers Rate	\$58.83	\$59.04	\$59.89	\$61.69	\$63.65	
GIS Rate	\$73	\$91	\$92.52	\$95.30	\$98.32	
Helicopter Rate ^(a)						
(Cost / Flight Hours)	\$1,431	\$1,393	\$1,413	\$1,455	\$1,501	
Fixed Wing Rate ^(a)						
(Cost / Flight Hours)	\$644	\$1,896	\$1,568	\$1,568	\$1,568	

Unit Cost	\$29	\$50	\$36	\$36	\$37	Line 47 ÷ Line 59
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Escalation Factor ^(b)	1.445%	3.006%	3.174%
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Notes:

(a) See Exhibit (PG&E-7), Chapter 2 for more information.

(b) See Exhibit (PG&E-3), Chapter 2 Workpapers for more information.

WP Table 8-16
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Transmission Pipeline Preventative and Corrective Maintenance
MATs JO1, JO2, JOG, JOH, JOI, JOJ, JOK, JOL, JOM, JON, JOO, JOX, JOY Forecast Calculator

Line No.

Forecast Summary Table

MAT	Program Description	2023 Forecast	Notes
Preventative Maintenance (PM)			
JO1	PM SCADA Maintenance	\$ 337,395	Line 26
JOG	PM Regulator Stations	\$ 3,825,314	Line 34
JOH	PM Manual Valve	\$ 1,445,666	Line 38
JOI	PM Automated Valve	\$ 38,268	Line 41
JOX	PM Meter Maintenance	\$ 1,883,698	Line 63
Corrective Maintenance (CM)			
JO2	CM SCADA Maintenance	\$ 243,043	Line 29
JOM	CM Regulator Stations	\$ 1,079,943	Line 53
JON	CM Manual Valve	\$ 918,401	Line 56
JOO	CM Automated Valve	\$ 214,859	Line 59
JOY	CM Meter Maintenance	\$ 279,238	Line 66
PM and CM			
JOJ	Gas Holders Maintenance	\$ 122,365	Line 44
Operational			
JOK	Operate Transmission Pipelines	\$ 706,575	Line 47
JOL	Operate Transmission Regulator Stations	\$ 445,971	Line 50

Forecast Details by MAT

MAT	Program Description	2018 Recorded (Nominal \$)	2018 Recorded (Escalated to 2020 \$)	2019 Recorded (Nominal \$)	2019 Recorded (Escalated to 2020 \$)	2020 Recorded (Nominal \$)	2018-2020 Average (In 2020 \$)	MAT JOL Re-Allocation ^(a) / Land Department Adjustments ^(b)	Forecast Base	2021 Forecast Adders ^(c)	2022 Forecast Adders ^(c)	2023 Forecast Adders ^(c)	Notes
JO1	PM SCADA Maintenance	\$ 186,144	\$ 191,146	\$ 173,617	\$ 174,407	\$ 328,170	\$ 231,241	\$ 81,707	Escalation Factor 1.0145	N/A	1.0301	1.0317	(d)
									Forecast Total	\$ 312,948	\$ 317,472	\$ 327,016	(e)
										\$ 317,472	\$ 327,016	\$ 337,395	Line 25 * Line 24
JO2 ^(f)	CM SCADA Maintenance	\$ 141,835	\$ 145,645	\$ 226,131	\$ 227,161	\$ 303,493	\$ 225,433	N/A	\$ 225,433	N/A	N/A	N/A	(d)
									Forecast Total	\$ 228,692	\$ 235,567	\$ 243,043	Line 28 * Line 24
JOG	PM Regulator Stations	\$ 2,029,214	\$ 2,083,734	\$ 2,090,828	\$ 2,100,346	\$ 2,855,216	\$ 2,346,432	\$ 428,883	\$ 2,775,315	\$ 784,000	\$ 807,569	\$ 833,200	(e)
									Additional Resources	\$ 609,000	\$ 627,308	\$ 647,218	Line 93
									Large Volume Customers	\$ 175,000	\$ 180,261	\$ 185,982	Line 112
									Forecast Total	\$ 3,599,430	\$ 3,707,640	\$ 3,825,314	Line 31 * Line 24 + Adders (Line 31)
JOH	PM Manual Valve	\$ 1,215,600	\$ 1,248,261	\$ 1,185,346	\$ 1,190,742	\$ 1,313,828	\$ 1,250,944	\$ 53,009	\$ 1,303,952	\$ 37,500	\$ 38,627	\$ 39,853	(e)
									Large Volume Customers	\$ 37,500	\$ 38,627	\$ 39,853	Line 114
									Forecast Total	\$ 1,360,300	\$ 1,401,195	\$ 1,445,666	Line 36 * Line 24 + Adders (Line 36)
JOI	PM Automated Valve	\$ 42,902	\$ 44,054	\$ 32,319	\$ 32,467	\$ 29,964	\$ 35,495	N/A	\$ 35,495	N/A	N/A	N/A	
									Forecast Total	\$ 36,008	\$ 37,091	\$ 38,268	Line 40 * Line 24
JOJ	Gas Holders Maintenance	\$ 81,357	\$ 83,543	\$ 145,179	\$ 145,840	\$ 111,113	\$ 113,498	N/A	\$ 113,498	N/A	N/A	N/A	
									Forecast Total	\$ 115,139	\$ 118,600	\$ 122,365	Line 43 * Line 24
JOK	Operate Transmission Pipelines	\$ 907,707	\$ 932,095	\$ 1,107,383	\$ 1,112,424	\$ 1,007,618	\$ 1,017,379	\$ (362,000)	\$ 655,379	N/A	N/A	N/A	(e)
									Forecast Total	\$ 664,852	\$ 684,839	\$ 706,575	Line 46 * Line 24
JOL	Operate Transmission Regulator Stations	\$ 2,291,567	\$ 2,353,136	\$ 1,967,033	\$ 1,975,988	\$ 438,825	\$ 1,589,316	\$ (1,175,659)	\$ 413,657	N/A	N/A	N/A	(e)
									Forecast Total	\$ 419,636	\$ 432,252	\$ 445,971	Line 49 * Line 24
JOM	CM Regulator Stations	\$ 825,657	\$ 847,840	\$ 1,013,713	\$ 1,018,327	\$ 1,138,915	\$ 1,001,694	N/A	\$ 1,001,694	N/A	N/A	N/A	
									Forecast Total	\$ 1,016,173	\$ 1,046,722	\$ 1,079,943	Line 52 * Line 24
JON	CM Manual Valve	\$ 1,128,943	\$ 1,159,275	\$ 730,407	\$ 733,732	\$ 662,563	\$ 851,857	N/A	\$ 851,857	N/A	N/A	N/A	
									Forecast Total	\$ 864,170	\$ 890,149	\$ 918,401	Line 55 * Line 24
JOO	CM Automated Valve	\$ 245,772	\$ 252,375	\$ 193,842	\$ 194,724	\$ 150,774	\$ 199,291	N/A	\$ 199,291	N/A	N/A	N/A	
									Forecast Total	\$ 202,172	\$ 208,250	\$ 214,859	Line 58 * Line 24
JOX	PM Meter Maintenance	\$ 616,294	\$ 632,852	\$ 833,639	\$ 837,433	\$ 1,824,273	\$ 1,098,186	\$ 612,060	\$ 1,710,246	\$ 37,500	\$ 38,627	\$ 39,853	(e)
									Large Volume Customers	\$ 37,500	\$ 38,627	\$ 39,853	Line 114
									Forecast Total	\$ 1,772,467	\$ 1,825,752	\$ 1,883,698	Line 61 * Line 24 + Adders (Line 61)
JOY	CM Meter Maintenance	\$ 187,720	\$ 192,764	\$ 156,000	\$ 156,710	\$ 427,542	\$ 259,005	N/A	\$ 259,005	N/A	N/A	N/A	
									Forecast Total ^(f)	\$ 262,749	\$ 270,648	\$ 279,238	Line 65 * Line 24

Notes:

CELL WAS HARD CODED, ADDED FORMULA

(a) See Table below for MAT JOL re-allocation methodology.

(b) MAT JOK land department costs (approximately \$360,000) were removed from the forecast base as these costs will now be under MAT JTO. This amount was based on the 3-year average of land department charges from 2018-2020.

(c) See tables below for forecast adders methodology. The adders are with reference to the base forecast and are full value amounts (not incremental year-over-year adders).

(d) The escalation factors used for escalating 2018 to 2019 is 1.0222. The escalation factor used for escalating 2019 to 2020 is 1.0046. See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

(e) The forecast base is the escalated 2018-2020 average cost plus the MAT JOL re-allocation for MATs JO1, JOG, JOH, and JOX. For MAT JO1 it also includes the land department adjustments.

(f) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.

76 **MAT JOL Re-Allocation ^(a)**

77

MAT	Program Description	2020 Recorded	2018-2020 Average	Difference	% of Total Difference	% of JOL
JO1	PM SCADA Maintenance	\$ 328,170	\$ 231,241	\$ 96,929	6.95%	\$ 81,707
JOG	PM Gas Regulator General	\$ 2,855,216	\$ 2,346,432	\$ 508,784	36.48%	\$ 428,883
JOH	PM Manual Valve	\$ 1,313,828	\$ 1,250,944	\$ 62,884	4.51%	\$ 53,009
JOX	PM Meter Maintenance	\$ 1,824,273	\$ 1,098,186	\$ 726,087	52.06%	\$ 612,060
Subtotal		\$ 6,321,487	\$ 4,926,803	\$ 1,394,684	100%	\$ 1,175,659
MAT JOL Recorded		\$ 438,825	\$ 1,614,485	\$ (1,175,659)		

85

86 Notes:

87 (a) Costs are being shifted from MAT JOL to MATs JO1, JOG, JOH, and JOX to better align ongoing work with program scope.

88

89 **Forecast Adders**90 **1. Additional resources - Split between MATs JOG and JPE**

MAT	Program Description	% Split	2021	2022	2023	Notes
Escalation Factor			1.0145	1.0301	1.0317	
JOG	PM Regulator Stations	60%	\$ 609,000	\$ 627,308	\$ 647,218	(a), (b)
JPE	PM Storage/Compressor Station Support	40%	\$ 406,000	\$ 418,206	\$ 431,479	(a)
Total		100%	\$ 1,015,000	\$ 1,045,514	\$ 1,078,697	

96

97 Notes:

98 (a) Increases in maintenance work expected in the future, this forecast estimate accounts for the additional resources that will be needed. Gas Pipeline Operations and Maintenance technicians go through a state certified 3-year apprenticeship program.

99 (b) This is full value adder amount, i.e. these are adders with reference to the base forecast (and not incremental year-over-year adders).

100

101 **2. Large Volume Customers (LVC) - Transition from 5-year to annual Class A inspections**

	# of stations	# of hours per station/job	Hours	Standard labor rate	Total	Notes
LVC (Large Volume Customers)	384	10	3,840	65.10	\$ 250,000	(a), (b)

104

105 Notes:

106 (a) Forecast assumes 10 hrs per job (10 x 384) using a standard labor rate which is then escalated to 2023.

107 (b) The total is split between MATs JOG, JOH, and JOX, see table below. Most of the additional work is expected to be at regulator stations.

108

109 **3. LVC Cost Split**

MAT	Program Description	Split	2021 Adder	2022 Adder	2023 Adder
Escalation Factor			1.0145	1.0301	1.0317
JOG	PM Regulator Stations	70%	\$ 175,000	\$ 180,261	\$ 185,982
JOH	PM Manual Valve	15%	\$ 37,500	\$ 38,627	\$ 39,853
JOX	PM Meter Maintenance	15%	\$ 37,500	\$ 38,627	\$ 39,853
Total		100%	\$ 250,000	\$ 257,516	\$ 265,689

115

WP Table 8-17
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Station Maintenance
MATs JPA, JPB, JPC, JPD, JPE, JPG, JPH, JPI, JPK, JPL, JPN, JPO, JPP Forecast Calculator

Line No.

Forecast Summary Table

MAT	Program Description	2023 Forecast	Note
Preventative Maintenance (PM)			
JPA	PM Station Piping Assets Outside Compressor Building	\$ 946,402	Line 29
JPC	PM Gas Processing Equipment	\$ 1,852,778	Line 35
JPD	PM Inside Compressor Building	\$ 1,747,216	Line 38
JPE	PM Storage/Compressor Station Support	\$ 2,200,548	Line 41
JKP	PM Power Units	\$ 134,361	Line 53
JPO	PM Storage Wells	\$ 550,399	Line 62
Corrective Maintenance (PM)			
JPB	CM Station Piping Assets Outside Compressor Building	\$ 456,641	Line 32
JPG	CM Gas Processing Equipment	\$ 949,300	Line 44
JPH	CM Inside Compressor Building	\$ 1,999,181	Line 47
JPI	CM Storage/Compressor Station Support	\$ 1,472,328	Line 50
JPL	CM Power Units	\$ 267,244	Line 56
JPP	CM Storage Wells	\$ 78,468	Line 65
Operational			
JPN	Station Operations	\$ 5,816,785	Line 59

Notes:

(a) See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

Forecast Details by MAT

MAT	Program Description	2018 Recorded (Nominal \$)	2018 Recorded (Escalated to 2020 \$) ^(a)	2019 Recorded (Nominal \$)	2019 Recorded (Escalated to 2020 \$) ^(a)	2020 Recorded (Nominal \$)	2018-2020 Average (ln 2020 \$)	Forecast Base	2021 Forecast Adders ^(b)	2022 Forecast Adders ^(b)	2023 Forecast Adders ^(b)	Notes
JPA	PM Station Piping Assets Outside Compressor Building	\$ 593,880	\$ 609,836	\$ 1,008,748	\$ 1,013,340	\$ 1,010,311	\$ 877,829	Escalation Factor \$ 877,829	1.0145	1.0301	1.0317	(a)
								Forecast Total	\$ 890,517	\$ 917,289	\$ 946,402	Line 28 * Line 27
JPB	CM Station Piping Assets Outside Compressor Building	\$ 140,404	\$ 144,176	\$ 238,980	\$ 240,068	\$ 886,419	\$ 423,554	\$ 423,554	N/A	N/A	N/A	Line 31 * Line 27
								Forecast Total	\$ 429,677	\$ 442,594	\$ 456,641	
JPC	PM Gas Processing Equipment	\$ 1,489,360	\$ 1,529,376	\$ 1,826,455	\$ 1,834,769	\$ 1,791,450	\$ 1,718,532	\$ 1,718,532	N/A	N/A	N/A	Line 34 * Line 27
								Forecast Total	\$ 1,743,372	\$ 1,795,783	\$ 1,852,778	
JPD	PM Inside Compressor Building	\$ 1,191,481	\$ 1,223,493	\$ 1,787,558	\$ 1,795,695	\$ 1,842,668	\$ 1,620,619	\$ 1,620,619	N/A	N/A	N/A	Line 37 * Line 27
								Forecast Total	\$ 1,644,044	\$ 1,693,469	\$ 1,747,216	
JPE	PM Storage/Compressor Station Support	\$ 1,683,962	\$ 1,729,206	\$ 1,477,038	\$ 1,483,762	\$ 1,709,698	\$ 1,640,888	\$ 1,640,888	\$ 406,000	\$ 418,206	\$ 431,479	Line 39 Line 40 * Line 27 + Adders (Line 40)
								Forecast Total	\$ 2,070,606	\$ 2,132,855	\$ 2,200,548	
JPG	CM Gas Processing Equipment	\$ 939,114	\$ 964,346	\$ 823,846	\$ 827,596	\$ 849,608	\$ 880,516	\$ 880,516	N/A	N/A	N/A	Line 43 * Line 27
								Forecast Total	\$ 893,244	\$ 920,097	\$ 949,300	
JPH	CM Inside Compressor Building	\$ 934,274	\$ 959,376	\$ 2,743,155	\$ 2,755,642	\$ 1,847,963	\$ 1,854,327	\$ 1,854,327	N/A	N/A	N/A	Line 46 * Line 27
								Forecast Total	\$ 1,881,130	\$ 1,937,683	\$ 1,999,181	
JPI	CM Storage/Compressor Station Support	\$ 1,593,943	\$ 1,636,769	\$ 1,600,572	\$ 1,607,858	\$ 852,316	\$ 1,365,648	\$ 1,365,648	N/A	N/A	N/A	Line 49 * Line 27
								Forecast Total	\$ 1,385,387	\$ 1,427,036	\$ 1,472,328	
JKP	PM Power Units	\$ 104,236	\$ 107,037	\$ 137,489	\$ 138,114	\$ 128,724	\$ 124,625	\$ 124,625	N/A	N/A	N/A	Line 52 * Line 27
								Forecast Total	\$ 126,427	\$ 130,227	\$ 134,361	
JPL	CM Power Units	\$ 279,896	\$ 287,416	\$ 303,220	\$ 304,600	\$ 151,624	\$ 247,880	\$ 247,880	N/A	N/A	N/A	Line 55 * Line 27
								Forecast Total	\$ 251,463	\$ 259,023	\$ 267,244	
JPN ^(c)	Station Operations	\$ 4,837,995	\$ 4,967,981	\$ 5,376,523	\$ 5,400,997	\$ 5,816,980	\$ 5,395,320	\$ 5,395,320	N/A	N/A	N/A	Line 58 * Line 27
								Forecast Total	\$ 5,473,305	\$ 5,637,850	\$ 5,816,785	
JPO	PM Storage Wells	\$ 431,745	\$ 443,345	\$ 393,575	\$ 395,367	\$ 510,519	N/A ^(d)	\$ 510,519	N/A	N/A	N/A	Line 61 * Line 27
								Forecast Total	\$ 517,898	\$ 533,468	\$ 550,399	
JPP	CM Storage Wells	\$ 24,178	\$ 24,828	\$ 45,894	\$ 46,103	\$ 72,783	N/A ^(d)	\$ 72,783	N/A	N/A	N/A	Line 64 * Line 27
								Forecast Total	\$ 73,835	\$ 76,054	\$ 78,468	

Notes:

(a) The escalation factors used for escalating 2018 to 2019 is 1.0222. The escalation factor used for escalating 2019 to 2020 is 1.0046. See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

(b) See Table below for forecast adders methodology. The adders are with reference to the base forecast and are full value amounts (not incremental year-over-year adders).

(c) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.

(d) Instead of a 3-year average, JPO and JPP use 2020 recorded as the foundation of the 2023 forecast because 2020 reflects the current regulations related to valve maintenance compared to prior years.

Forecast Adders**1. Additional resources - costs split between JOG and JPE**

MAT	Program Description	% Split	2021 Adder	2022 Adder	2023 Adder	Notes
		Escalation Factor	1.0145	1.0301	1.0317	
JOG	PM Regulator Stations	60%	\$ 609,000	\$ 627,308	\$ 647,218	
JPE	PM Storage/Compressor Station Support	40%	\$ 406,000	\$ 418,206	\$ 431,479	(a), (b)
	Total	100%	\$ 1,015,000	\$ 1,045,514	\$ 1,078,697	

Notes:

(a) Increases in maintenance work expected in the future, this forecast estimate accounts for the additional resources that will be needed. Gas Pipeline Operations and Maintenance technicians go through a state certified 3-year apprenticeship program.

(b) This is full value adder amount, i.e. these are adders with reference to the base forecast (and not incremental year-over-year adders).

Workpaper 8-18
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Right Of Way (ROW) Maintenance
MATs JTO, JOT, and JOS Forecast Calculator

Line No.

Forecast Summary Table

MAT	Description	2023 Forecast	Note
JTO	Encroachments Structures & ROW Clean Up	\$ 1,190,429	Line 13
JOT	Routine Weed Abatement	\$ 1,470,913	Line 24
JOS	Pipeline Marker Maintenance	\$ 1,703,332	Line 35 * Line 45

Encroachments Structures & ROW Clean Up (MAT JTO) Forecast Detail

	2019 Recorded (a)	Escalation Factor (b)	2023 Forecast	Note
Encroachments Structures & ROW	\$ 580,255	1.0830	\$ 628,431	
Land (Access F Access Road)	\$ 518,915	1.0830	\$ 561,998	
Total	\$ 1,099,170	N/A	\$ 1,190,429	Line 11 + Line 12

Notes:

(a) Land costs were re-allocated from MAT JOK (Operate Transmission Pipelines) to MAT JTO to align costs better with work moving forward.

(b) See Exhibit (PG&E-3), Chapter 2 Workpapers for more information.

Routine Weed Abatement (MAT JOT) Forecast Detail

	2021 Forecast	Escalation Factor	2022 Forecast	Escalation Factor	2023 Forecast	Note
inside Facilities Perimeter or Footprint	\$ 1,294,056	3.01%	\$ 1,332,959	3.17%	\$ 1,375,265	(a)
Maintenance around Facilities Border	\$ 90,000	3.01%	\$ 92,706	3.17%	\$ 95,648	(b)
Total	\$ 1,384,056	N/A	\$ 1,425,665	N/A	\$ 1,470,913	

Notes:

(a) This work consists of routine vegetation control and herbicide applications to PG&E facilities inside the perimeter or "footprint" of the facility if unfenced to ensure weed-free conditions for site safety and line of site for gas personnel and inspectors. Forecasts are based on vendor estimates with escalation.

(b) This compliance maintenance includes: weed abatement/control, brush and flammable debris removal and hazard tree mitigation as needed to maintain a defined border extending out 100 feet around the perimeter of a facility footprint. 24 Critical facilities are treated three times a year, while smaller facilities are treated twice a year. Forecasts are based on vendor estimates with escalation.

Pipeline Marker Maintenance (MAT JOS) Forecast Detail**Historic Maintenance Performed**

MAT	2017	2018	2019	2017-2019 Average
JOS	2,525	2,623	2,018	2,389

Costs

	2017 Recorded (Nominal \$)	2018 Recorded (Nominal \$)	2019 Recorded (Nominal \$)	Note
Recorded Adjusted Costs	\$1,414,260	\$1,930,076	\$1,271,460	(a)
Maintenance Performed on Markers	2,525	2,623	2,018	Line 35
Cost per marker maintained (Nominal \$)	\$560	\$736	\$630	Line 40 ÷ Line 41
Escalation Factor	1.1467	1.1071	1.0830	(b)
Cost per marker maintained (Escalated to 2023 \$)	\$642	\$815	\$682	Line 42 * Line 43
2017-2019 Average	\$713			

Notes:

(a) Scouting and inventory charges that are not expected to be recurring costs were removed to calculate the unit cost more accurately.

(b) See Exhibit (PG&E-3), Chapter 2 Workpapers for more information.

WP Table 8-20
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Transmission Permits and Fees
MAT JTH Forecast Calculator

Line No.

Forecast Summary Table

MAT ^(a)	Program Description	2023 Forecast	Note
JTH	Permits & Fees Projects	\$ 7,443,048	Line 13

Notes:

(a) This is a non-unitized MAT.

(b) See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

Forecast Detail

MAT	Program Description	2018 Recorded (Nominal \$)	2018 Recorded (Escalated to 2020 \$)	2019 Recorded (Nominal \$)	2019 Recorded (Escalated to 2020 \$)	2020 Recorded (Nominal \$)	2020 Recorded (In 2020 \$)	2018-2020 Average (In 2020 \$)	Forecast Base	2021 Adder	2022 Adder	2023 Adder	Notes
JTH	Permits & Fees Projects	\$ 6,917,476	\$ 7,103,334	\$ 6,651,603	\$ 6,681,882	\$ 6,926,031	\$ 6,903,749	\$ 6,903,749	Escalation Factor	N/A	1,0301	1,0317	
Total										\$ 7,003,538	\$ 7,214,086	\$ 7,443,048	Line 11 * Line 12

Notes:

(a) The escalation factors used for escalating 2018 to 2019 is 1.0222. The escalation factor used for escalating 2019 to 2020 is 1.0046. See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 9, GAS OPERATIONS CORROSION CONTROL

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Workpaper Table 9-18
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT JOA - Forecast Calculator

Line No.**1 MAT JOA (UNIT OF MEASURE: # OF RECTIFIERS MAINTAINED)**

2	Description	Value	Note
3	2016-2020 Total Average Recorded Cost	\$158,215.51	
4	2016-2020 Total Average Recorded Units	1370.6	
5	Cost Basis for Forecast	\$115.44	Line (3)/Line (4)

6		2021 (C)	2022 (D)	2023	Note
7					
8	Escalation Factor	1.45%	3.01%	3.17%	(A)
9	Escalation Amount	\$1.67	\$3.52	\$3.83	(B)
10	Forecast Unit Cost	\$117.10	\$120.62	\$124.45	
11	Forecast Units	962	919	919	
12	Total Forecast	\$112,653.81	\$110,853.69	\$114,371.99	

14 Notes and References

15 (A) Escalation factors provided by GRC PMT

16 (B) Previous year unit cost x Escalation Factor.

17 (C) The 2021 unit cost shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

18 (D) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-19
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT JOB - Forecast Calculator

Line No.**1 MAT JOB (UNIT OF MEASURE: # OF CP MONITORING POINTS READS)**

Description	Value	Note
2016-2020 Total Average Recorded Costs	\$1,239,464.85	
2016-2020 Total Average Recorded Units	14653.6	
2016-2020 Total Average Unit Cost	\$84.58	
Cost Basis for Forecast	\$84.58	Line (3)/ Line (4)

	2021 (C)	2022 (D)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(A)
Escalation Amount	\$1.22	\$2.58	\$2.81	(B)
Forecast Unit Cost	\$85.81	\$88.39	\$91.19	
Forecast Units	17887	13674	13674	
SubTotal Forecast	\$1,534,828.60	\$1,208,597.76	\$1,246,956.46	
Forecast Units for RMU Modem Upgrades		22		(E)
Forecast Unit Cost for RMU Modem Upgrades		\$655.12		
Total Forecast for RMU Modem Upgrades		\$14,412.72		(F)
Total Forecast	\$1,534,828.60	\$1,223,010.48	\$1,246,956.46	

Notes and References

(A) Escalation factors provided by GRC PMT

(B) Previous year unit cost x Escalation Factor.

(C) The 2021 unit cost shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

(D) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

(E) Intentionally left blank in Errata

(F) Intentionally left blank in Errata

Workpaper Table 9-20
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT JOC - Forecast Calculator

Line No.

1 **MAT JOC (UNIT OF MEASURE: # OF CPA'S TROUBLESHOT)**

2	Description	Value	Note
3	2016-2020 Total Average Recorded Cost	\$517,102.33	
4	2016-2020 Total Average Recorded Units	1268	
5	Cost Basis for Forecast	\$407.81	Line (3)/Line (4)

7		2021 (C)	2022 (D)	2023	Note
8	Escalation Factor	1.45%	3.01%	3.17%	(A)
9	Escalation Amount	\$5.89	\$12.44	\$13.52	(B)
10	Forecast Unit Cost	\$413.70	\$426.14	\$439.67	
11	Forecast Units	1787	1787	1787	
12	Total Forecast	\$739,289.07	\$761,514.40	\$785,683.48	

15 **Notes and References**

16 (A) Escalation factors provided by GRC PMT

17 (B) Previous year unit cost x Escalation Factor.

18 (C) The 2021 unit cost shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

19 (D) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-21
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT JOQ - Forecast Calculator

Line No.**1 MAT JOQ (UNIT OF MEASURE: # OF CORRECTIVE WORK ORDERS COMPLETED)**

2 Description	Value	Note
3 2016-2020 Total Average Recorded Cost	\$390,023.14	
4 2016-2020 Total Average Recorded Units	393.6	
5 Cost Basis for Forecast	\$990.91	Line (3)/Line (4)

7	2021 (C)	2022 (D)	2023	Note
8 Escalation Factor	1.45%	3.01%	3.17%	(A)
9 Escalation Amount	\$14.32	\$30.22	\$32.86	(B)
11 Forecast Unit Cost	\$1,005.24	\$1,035.46	\$1,068.32	
12 Forecast Units	324	324	324	
13 Total Forecast	\$325,696.27	\$335,487.71	\$346,135.48	

15 Notes and References

16 (A) Escalation factors provided by GRC PMT

17 (B) Previous year unit cost x Escalation Factor.

18 (C) The 2021 unit cost shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

19 (D) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-22
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT JOZ - Forecast Calculator

Line No.**1 MAT JOZ (UNIT OF MEASURE: # OF SPANS PATROLLED)**

2 Description	Value	Note
3 2020 Recorded Cost	\$107,786.00	(E)
4 2020 Recorded Units	117	
5 Cost Basis for Forecast	\$921.25	Line (3)/ Line (4)

6	2021 (C)	2022 (D)	2023	Note
7				
8 Escalation Factor	1.45%	3.01%	3.17%	(A)
9 Escalation Amount	\$13.32	\$28.10	\$30.55	(B)
11 Forecast Unit Cost	\$934.56	\$962.66	\$993.21	
12 Forecast Units	690	313	487	
13 Total Forecast	\$644,849.07	\$301,312.51	\$483,694.65	

14 Notes and References

15 (A) Escalation factors provided by GRC PMT

16 (B) Previous year unit cost x Escalation Factor.

17 (C) The 2021 unit cost shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

18 (D) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

19 (E) Historical costs were not used as this work was previously being worked under MAT JOB.

Workpaper Table 9-23
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJA - Forecast Calculator

Line No.

1 MAT GJA (Electric Poles/Towers Investigated)

2	Line	Description	Value	Notes and References
3	3	2016/2019 Total Cost (In 2020 Dollars)	\$2,430,148.55	(A)
4	4	2016/2019 Total Units	1481.00	(B)
5	5	Cost Basis for Forecast	\$1,640.88	Line (3) / Line (4)

6		2021 (F)	2022 (G)	2023	Note
8	Escalation Factor	1.45%	3.01%	3.17%	(C)
9	Escalation Amount	\$23.72	\$50.04	\$54.42	(D)
10	Forecast Unit Cost	\$1,664.60	\$1,714.64	\$1,769.06	(E)
11	Forecast Units	765	300	300	(H)
12	Total Forecast	\$1,273,420.08	\$514,393.35	\$530,719.26	

14 Notes and References

(A) PG&E forecast costs for this workstream using contract costs from vendors that performed the work. PG&E took the total cost divided by total units from 2016 and total units from 2019. PG&E used two years of historical data (2016 and 2019) due to 2017 and 2018 being excluded. This was due to a low volume of work being completed in those years which resulted in an inaccurate unit cost for this typical style of project. 2016 and 2019 are more representative of what is typically seen in this program.

(B) Intentionally left blank in Errata

(C) Escalation factors provided by GRC PMT.

(D) Previous year unit cost x Escalation Factor.

(E) Previous year unit cost + Escalation Amount.

(F) The 2021 total forecast are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

(G) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

(H) Unit forecast based on engineer estimate

24 MAT GJA (Electric Poles/Mitigated)

25	Line	Description	Value	Notes and References
26	26	2016 Recorded Total Cost (In 2020 Dollars)	\$105,558.51	(I)
27	27	2016 Recorded Total Units	5	(J)
28	28	Cost Basis for Forecast	\$21,111.70	Line (26) / Line (27)

30		2021 (N)	2022 (O)	2023	Note
31	Escalation Factor	1.45%	3.01%	3.17%	(K)
32	Escalation Amount	\$305.16	\$643.86	\$700.17	(L)
33	Forecast Unit Cost	\$21,416.86	\$22,060.71	\$22,760.88	(M)
34	Forecast Units	6	20	25	(P)
35	Total Forecast	\$128,501.14	\$441,214.30	\$569,022.05	

Workpaper Table 9-23
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJA - Forecast Calculator

Line No.

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Notes and References

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(I) There is little historical data due to the program starting with investigations and then transition into the mitigation phase starting in 2021. The PG&E forecast for Arc Fault Mitigation at electric poles and towers co-located with gas facilities is based on the average cost of mitigations that PG&E completed in 2016 with escalation rates applied.

39

(J) Intentionally left blank in Errata

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(K) Escalation factors provided by GRC PMT.

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(L) Previous year unit cost x Escalation Factor.

42

(M) Previous year unit cost + Escalation Amount.

43

(N) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

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(O) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

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(P) Unit forecast based on an engineer estimate of 25 units per year requiring remediation

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MAT GJA (AC Induced Investigations)

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Line	Description	Value	Notes and References
49	2016 -2019 Total Cost (In 2020 Dollars)	\$634,054.69	(Q)
50	2016 -2019 Total Units	8.00	(R)
51	Cost Basis for Forecast	\$79,256.84	Line (49) / Line (50)

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	2021 (V)	2022 (W)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(S)
Escalation Amount	\$1,145.60	\$2,417.15	\$2,628.54	(T)
Forecast Unit Cost	\$80,402.44	\$82,819.59	\$85,448.13	(U)
Forecast Units	2	7	4	(X)
Total Forecast	\$160,804.88	\$579,737.11	\$341,792.52	

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Notes and References

61

(Q) PG&E forecast costs for this workstream using contract costs from vendors who performed work. PG&E took the four-year average from 2016-2019

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(R) Intentionally left blank in Errata

63

(S) Escalation factors provided by GRC PMT.

64

(T) Previous year unit cost x Escalation Factor.

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(U) Previous year unit cost + Escalation Amount.

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(V) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

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(W) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

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(X) Unit forecast based on program lead estimate

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	2021	2022	2023	Note
Total Forecast	\$1,562,726	\$1,535,345	\$1,441,534	Line (12) + Line (35) + Line (58)

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Workpaper Table 9-24
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJB - Forecast Calculator

Line No.1 **MAT GJB (Atmospheric Corrosion Mitigation)**

2	Line	Description	Value	Note
3	3	2020 Average Cost	\$35,500.00	(A)
4	4	Adjustments to Forecast Basis	\$0	
5	5	Cost Basis for Forecast	\$35,500.00	Line (1) + Line (2)

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	2021 (E)	2022 (F)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(B)
Escalation Amount	\$513.13	\$1,082.67	\$1,177.35	(C)
Forecast Unit Cost	\$36,013.13	\$37,095.79	\$38,273.15	(D)
Forecast Units	306	124	94	
Total Forecast	\$11,020,017.22	\$4,599,878.56	\$3,597,675.90	

Notes and References

(A) PG&E utilized the 2020 average cost which accounts for cost increases in Topock, Hinkley and Kettleman regions where PG&E expects the work to be more expensive due to costly permitting and additional equipment being required to complete the mitigations.

(B) Escalation factors provided by GRC PMT.

(C) Previous year unit cost x Escalation Factor.

(D) Previous year unit cost + Escalation Amount.

(E) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit

(F) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1),

Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-25
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJC - Forecast Calculator

Line No.**MAT GJC (Bonds, Insulators, and other CP Expenses (Non-Unitized))**

Line	Description	Value	Notes and References
3	2019 Recorded Cost	\$247,534.73	(A)
4	Adjustments to Forecast Basis	\$1,126.81	(B)
5	Cost Basis for Forecast	\$248,661.54	Line (4) + Line (5)

	2021 (F)	2022 (G)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(C)
Escalation Amount	\$3,594.23	\$7,583.59	\$8,246.83	(D)
Forecast Unit Cost	\$252,255.78	\$259,839.37	\$268,086.20	(E)
Forecast Units	1	1	1	
Total Forecast	\$252,255.78	\$259,839.37	\$268,086.20	

Notes and References

(A) PG&E calculated a unit cost using 2019 actuals and applying escalation factors for the following years due to 2019 having no Enhanced CP Criterion costs thus utilizing a more accurate representation of what future costs will look like once that program is complete.

(B) Added 2020 escalation amount (1.91%)

(C) Escalation factors provided by GRC PMT.

(D) Previous year unit cost x Escalation Factor.

(E) Previous year unit cost + Escalation Amount.

(F) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(G) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJC (RMU Covered by Service Fees)

Line	Description	Value (H)	Notes and References
25	2020 Service Fee per RMU	\$96.00	
26	2021 Service Fee per RMU	\$120.00	(I)
27	Adjustments to Forecast Basis	\$0.00	
28	Cost Basis for Forecast	\$120.00	Line (25) + Line (26)

	2021 (K)	2022 (L)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	
Escalation Amount	\$0	\$0	\$0	(J)
Forecast Unit Cost	\$120.00	\$120.00	\$120.00	
Forecast Unit	970	1,000	1,000	(M)
Total Forecast	\$116,400.00	\$120,000.00	\$120,000.00	

Notes and References

(H) Cost estimates provided by Elecsys for 2019-2023

(I) Cost will increase from \$96 to \$120 in 2021 due to new contract agreement

(J) No escalation amounts due to contracted price agreement

(K) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(L) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

(M) Forecast units are the current amount of RMUs in the system with additional forecast to grow to 1,000 total in 2022 and 2023.

	2021	2022	2023	Note
Total Forecast	\$368,656	\$379,839	\$388,086	Line (12) + Line (35)

Workpaper Table 9-26
 Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-3), Chapter 9, Corrosion Control
 MAT GJD - Forecast Calculator

Line No.

MAT GJD (Test Stations)

Line	Description	Value	Notes and References
3	2019 Recorded Unit Cost	\$21,364.75	(A)
4	Adjustments to Forecast Basis	\$97.26	(B)
5	Cost Basis for Forecast	\$21,462.01	Line (3) + Line (4)

	2021 (F)	2022 (G)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(C)
Escalation Amount	\$310.22	\$654.54	\$711.78	(D)
Forecast Unit Cost	\$21,772.22	\$22,426.76	\$23,138.55	(E)
Forecast Units	3	10	10	
Total Forecast	\$65,316.67	\$224,267.65	\$231,385.50	

Notes and References

(A) PG&E calculated unit cost based on the 2019 actuals of completed projects as this was more representative of a typical project in this program.

(B) Added 2020 escalation amount (1.91%)

(C) Escalation factors provided by GRC PMT.

(D) Previous year unit cost x Escalation Factor.

(E) Previous year unit cost + Escalation Amount.

(F) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(G) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-27
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJE - Forecast Calculator

Line No.

MAT GJE (CIS – Miles Surveyed)

Line	Description	Value	Notes and References
3	2016 -2019 Total Cost (In 2020 Dollars)	\$13,392,410.87	(A)
4	2016 -2019 Total Units	1784.20	
5	Cost Basis for Forecast	\$7,506.12	Line (3) / Line (4)

	2021 (E)	2022 (F)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(B)
Escalation Amount	\$108.50	\$228.92	\$248.94	(C)
Forecast Unit Cost	\$7,614.61	\$7,843.53	\$8,092.47	(D)
Forecast Units	457.6	450	450	
Total Forecast	\$3,484,446.01	\$3,529,588.46	\$3,641,611.19	

Notes and References

(A) PG&E took a four-year average from 2016-2019.

(B) Escalation factors provided by GRC PMT.

(C) Previous year unit cost x Escalation Factor.

(D) Previous year unit cost + Escalation Amount.

(E) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(F) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJE (Digs Excavations)

Line	Description	Value	Note
25	ECDA Cost Estimate for Similar Work	\$220,000	(G)
26	Cost Basis for Forecast	\$220,000	

	2021 (K)	2022 (L)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(H)
Escalation Amount	\$3,179.95	\$6,709.48	\$7,296.27	(I)
Forecast Unit Cost	\$223,179.95	\$229,889.43	\$237,185.71	(J)
Forecast Units	1	1	1	
Total Forecast	\$223,179.95	\$229,889.43	\$237,185.71	

Notes and References

(G) PG&E utilized a cost estimate provided by Digs workstream since no excavations have been performed in this workstream before.

(H) Escalation factors provided by GRC PMT.

(I) Previous year unit cost x Escalation Factor.

(J) Previous year unit cost + Escalation Amount.

(K) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(L) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

	2021	2022	2023	Note
Total Forecast	\$3,707,626	\$3,759,478	\$3,878,797	Line (12) + Line (33)

Workpaper Table 9-28
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJF - Forecast Calculator

Line No.**1 MAT GJF (DC Investigations, Non-Unitized)**

2 Line	Description	Value	Notes and References
3 3	2020 Recorded Cost	\$696,560.17	(A)
4 4	Adjustments to Forecast Basis	\$0.00	
5 5	Cost Basis for Forecast	\$696,560.17	Line (3) + Line (4)

6	2021 (E)	2022 (F)	2023	Note
7 Escalation Factor	1.45%	3.01%	3.17%	(B)
8 Escalation Amount	\$10,068.30	\$21,243.45	\$23,101.33	(C)
9 Forecast Unit Cost	\$706,628.47	\$727,871.92	\$750,973.25	(D)
10 Forecast Units	1	1	1	
11 Total Forecast	\$706,628.47	\$727,871.92	\$750,973.25	

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14 Notes and References

15 (A) PG&E used 2020 recorded cost plus escalation factors to forecast 2021-2023.

16 (B) Escalation factors provided by GRC PMT.

17 (C) Previous year unit cost x Escalation Factor.

18 (D) Previous year unit cost + Escalation Amount.

19 (E) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

20 (F) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Corrected Workpaper Table 9-29
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJH - Forecast Calculator

Line No.**1 MAT GJH (IC Investigations (Digs))**

2	Line	Description	Value	Note
3	3	ICDA Cost Estimate for Similar Work	\$333,125	(A)
4	4	Adjustments to Forecast Basis	\$0	
5	5	Cost Basis for Forecast	\$333,125	Line (3) + Line (4)

7		2021 (E)	2022 (F)	2023	Note
8	Escalation Factor	1.45%	3.01%	3.17%	(B)
9	Escalation Amount	\$4,815.09	\$10,159.53	\$11,048.05	(C)
10	Forecast Unit Cost	\$337,940.09	\$348,099.62	\$359,147.67	(D)
11	Forecast Units	3	3	3	
12	Total Forecast	\$1,013,820.28	\$1,044,298.87	\$1,077,443.02	

14 Notes and References

- (A) PG&E is using the 2020 Internal Corrosion dig unit cost (\$333,125 / dig).
(B) Escalation factors provided by GRC PMT.
(C) Previous year unit cost x Escalation Factor.
(D) Previous year unit cost + Escalation Amount.
(E) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.
(F) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

22 MAT GJH (IC Non-Destructive Examinations)

23	Line	Description	Value	Note
24	24	2020 Recorded Costs	\$155,548.00	(G)
25	25	2020 Recorded Units	15.00	
26	26	2020 Unit Cost	\$10,369.87	Line (24) / Line (25)

28		2021 (L)	2022 (M)	2023	Note
29	Escalation Factor	1.45%	3.01%	3.17%	(H)
30	Escalation Amount	\$149.89	\$316.26	\$343.915	(I)
31	Forecast Unit Cost	\$10,519.76	\$10,836.01	\$11,179.93	(J)
32	Forecast Units	15	5	5	(K)
33	Total Forecast	\$157,796.34	\$54,180.06	\$55,899.64	

35 Notes and References

- (G) Slow start to program due to a key vacancy on the IC team which led to a lack of historical costs prior to 2020. PG&E forecast costs for this workstream using 2020 average unit costs.
(H) Escalation factors provided by GRC PMT.
(I) Previous year unit cost x Escalation Factor.
(J) Previous year unit cost + Escalation Amount.
(K) End of 2021 is when PG&E will finish assessment then PG&E will do a fraction each year based on the initial assessment
(L) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.
(M) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJH (IC Equipment Monitoring (Coupon/Sensor/ER Probe))

Line	Description	Value	Note
46	IC Equipment Monitoring (Coupon/Sensor/ER Probe) Cost Per Year	\$60,000	(N)
47	2020 Recorded Units	932	
48	Average Unit Cost	\$64.38	Line (47) / Line (48)
49	Adjustments to Forecast Basis	\$0	
50	Cost Basis for Forecast	\$64.38	Line (48) + Line (49)

	2021 (R)	2022 (S)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(O)
Escalation Amount	\$0.93	\$1.96	\$2.14	(P)
Forecast Unit Cost	\$65.31	\$67.27	\$69.41	(Q)
Forecast Units	1,254	1,374	1,404	
Total Forecast	\$81,896.50	\$92,431.16	\$97,446.96	

Notes and References

- (N) ATS charges \$10k bi-monthly for all reads. This will be approximately \$60K per year based on contractor cost estimates.
- (O) Escalation factors provided by GRC PMT.
- (P) Previous year unit cost x Escalation Factor.
- (Q) Previous year unit cost + Escalation Amount.
- (R) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.
- (S) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJH (Inline Cleaning)

Line	Description	Value	Note
69	2021 Inline Cleaning Estimate Cost	\$500,000	(T)
70	Adjustments to Forecast Basis	\$0	
71	Cost Basis for Forecast	\$500,000	Line (69) + Line (70)

	2022 (Z)	2023	Note
Escalation Factor	3.01%	3.17%	(U)
Escalation Amount	\$30,497.65 (X)	\$33,164.88	(V)
Forecast Unit Cost	\$1,044,951.97 (Y)	\$1,078,116.85	(W)
Forecast Units	1	1	
Total Forecast	\$1,044,951.97	\$1,078,116.85	

Notes and References

- (T) Based on engineer estimate due to lack of historical data and slow start to program from key vacancy on IC team; note that the cost estimates of 2021 were half of 2022-2023 due to the timing of larger, more complex projects (i.e. cleaning more total lines in one project).
- (U) Escalation factors provided by GRC PMT.
- (V) Previous year unit cost x Escalation Factor.
- (W) Previous year unit cost + Escalation Amount.
- (X) Escalation amount of 2020 and 2021 were used
- (Y) Cost estimate increased due to timing of larger, more complex cleaning projects (cleaning more total lines per project)
- (Z) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJH (IC Liquids Monitoring (Drip, ILI, EFS))

Line	Description	Value	Note
91	IC Liquids Monitoring Cost Estimate	\$675.00	(AA)
92	Adjustments to Forecast Basis	\$0	
93	Cost Basis for Forecast	\$675.00	Line (91) + Line (92)

	2021 (EE)	2022 (FF)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(BB)
Escalation Amount	\$9.76	\$20.59	\$22.39	(CC)
Forecast Unit Cost	\$684.76	\$705.34	\$727.73	(DD)
Forecast Units	1,100	1,200	1,300	
Total Forecast	\$753,232.33	\$846,411.09	\$946,047.53	

Notes and References

(AA) Slow start to program due to a key vacancy on the IC team which led to a lack of historical costs. PG&E forecast costs for this workstream using engineer costs estimates.

(BB) Escalation factors provided by GRC PMT.

(CC) Previous year unit cost x Escalation Factor.

(DD) Previous year unit cost + Escalation Amount.

(EE) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(FF) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJH (IC Equipment Monitoring Installations (Coupon/Sensor/ER Probe))

Line	Description	Value	Note
112	IC Equipment Monitoring Installations Forecast Cost Estimate Per Unit	\$ 134,000	(GG)
113	Adjustments to Forecast Basis	\$ (59,000)	
114	Cost Basis for Forecast	\$ 75,000	Line (112) + Line (113)

	2021 (KK)	2022 (LL)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(HH)
Escalation Amount	\$1,084.07	\$2,287.32	\$2,487.37	(II)
Forecast Unit Cost	\$76,084	\$78,371	\$80,859	(JJ)
Forecast Units	30	30	30	
Total Forecast	\$2,282,522.21	\$2,351,141.92	\$2,425,762.90	

Notes and References

(GG) Representative projects have shown an average forecast unit cost of approximately \$134k per unit. Moving forward PG&E plans to combine this work with existing projects, and we believe that a \$75k unit cost is achievable for this work.

(HH) Escalation factors provided by GRC PMT.

(II) Previous year unit cost x Escalation Factor.

(JJ) Previous year unit cost + Escalation Amount.

(KK) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(LL) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

	2021	2022	2023	Note
Total Forecast	\$4,789,268	\$5,433,415	\$5,680,717	Line (12) + Line (33) + Line (57) + Line (78) + Line (100) + Line (121)

Workpaper Table 9-30
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJJ - Forecast Calculator

Line No.**1 MAT GJJ (Investigations (Non-Unitized))**

2	Line	Description	Value	Notes and References
3	3	2021 Forecast Cost	\$256,375.00	(A)
4	4	Adjustments to Forecast Basis	\$0.00	
5	5	Cost Basis for Forecast	\$256,375.00	Line (3) + Line (4)

7		2021	2022 (E)	2023	Note
8	Escalation Factor	1.45%	3.01%	3.17%	(B)
9	Escalation Amount	\$0	\$7,707.43	\$8,381.50	(C)
10	Forecast Unit Cost	\$256,375.00	\$264,082.43	\$272,463.93	(D)
11	Forecast Units	1	1	1	
12	Total Forecast	\$256,375.00	\$264,082.43	\$272,463.93	

14 Notes and References

(A) Due to completion of the Enhanced CP Criterion program, historical costs were high which would have led to an inaccurate forecast if PG&E used historical data to determine future costs since cost is going down over time. PG&E instead used an engineering estimate to forecast this MAT. The average four year spend (2016-2019) was \$1,985,467.04 which PG&E can reduce to \$256,375 per year starting in 2021 due to completion of the Enhanced CP Criterion program.

(B) Escalation factors provided by GRC PMT.

(C) Previous year unit cost x Escalation Factor.

(D) Previous year unit cost + Escalation Amount.

(E) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-31
 Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit (PG&E-3), Chapter 9, Corrosion Control
 MAT GJK - Forecast Calculator

Line No.

1 MAT GJK (Corrosion – Other, Non-Unitized)

2	Line	Description	Value	Notes and References
3	3	2020 Recorded Cost	\$2,488,746.27	(A)
4	4	Adjustments to Forecast Basis	\$0.00	
5	5	Cost Basis for Forecast	\$2,488,746.27	Line (3) + Line (4)

6		2021	2022 (B)	2023	Note
7					
8	Escalation Factor	1.45%	3.01%	3.17%	(C)
9	Escalation Amount	\$35,973.12	\$75,900.92	\$82,538.96	(D)
10	Forecast Unit Cost	\$2,524,719.39	\$2,600,620.31	\$2,683,159.27	(E)
11	Forecast Units	1	1	1	
12	Total Forecast	\$2,524,719.39	\$2,600,620.31	\$2,683,159.27	

13

14 Notes and References

15 (A) PG&E used 2020 recorded cost plus escalation factors to forecast 2021-2023.

16 (B) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

17 (C) Escalation factors provided by GRC PMT.

18 (D) Previous year unit cost x Escalation Factor.

19 (E) Previous year unit cost + Escalation Amount.

Workpaper Table 9-32
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJM - Forecast Calculator

Line No.

1 **MAT GJM (Contacted Casing Remediation)**

2	Line	Description	Value	Notes and References
3	3	2016 -2019 Total Cost (In 2020 Dollars)	\$28,602,711.41	(A)
4	4	2016 -2019 Total Units	45.00	
5	5	Cost Basis for Forecast	\$635,615.81	Line (3) / Line (4)

6		2021 (E)	2022 (F)	2023	Note
7					
8	Escalation Factor	1.45%	3.01%	3.17%	(B)
9	Escalation Amount	\$9,187.39	\$19,384.79	\$21,080.12	(C)
10	Forecast Unit Cost	\$644,803.20	\$664,187.99	\$685,268.11	(D)
11	Forecast Units	4	4	4	
12	Total Forecast	\$2,579,212.80	\$2,656,751.96	\$2,741,072.44	

15 **Notes and References**

- 16 (A) Unit cost per year reflects actual units divided by total cost of those projects (Excludes cancelled projects and outliers). PG&E took the four-year average from 2016-2019.
- 17 (B) Escalation factors provided by GRC PMT.
- 18 (C) Previous year unit cost x Escalation Factor.
- 19 (D) Previous year unit cost + Escalation Amount.
- 20 (E) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.
- 21 (F) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

23 **MAT GJM (Casing Test Stations)**

24	Line	Description	Value	Notes and References
25	25	2017/2019 Total Cost (In 2020 Dollars)	\$443,208.61	(G)
26	26	2017/2019 Total Units	3.00	
27	27	Cost Basis for Forecast	\$147,736.20	Line (25) / Line (26)

31		2021 (K)	2022 (L)	2023	Note
32					
33	Escalation Factor	1.45%	3.01%	3.17%	(H)
34	Escalation Amount	\$2,135.43	\$4,505.61	\$4,899.65	(I)
35	Forecast Unit Cost	\$149,871.63	\$154,377.24	\$159,276.89	(J)
36	Forecast Units	9	6	6	
37	Total Forecast	\$1,348,844.66	\$926,263.42	\$955,661.33	

38 **Notes and References**

- 39 (G) Unit cost per year reflects actual units divided by total cost of those projects (Excludes cancelled projects and outliers). PG&E took the average of 2017 and 2019 then escalated to 2020 base year. No test stations were installed in 2016 and 2018 thus those years were excluded from unit cost basis.
- 40 (H) Escalation factors provided by GRC PMT.
- 41 (I) Previous year unit cost x Escalation Factor.
- 42 (J) Previous year unit cost + Escalation Amount.
- 43 (K) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.
- 44 (L) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-32
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJM - Forecast Calculator

Line No.

45

46

MAT GJM (Leak Surveys Performed on Cased Crossings)

47

Line	Description	Value	Note
48	Gas Leak Survey Cost Estimate	\$243.00	(M)
49	Adjustments to Forecast Basis	\$1.11	(T)
50	Cost Basis for Forecast	\$244.11	Line (48) + Line (49)

51

52

	2021 (Q)	2022 (R)	2023	Note
Escalation Factor	1.45%	3.01%	3.17%	(N)
Escalation Amount	\$3.53	\$7.44	\$8.096	(O)
Forecast Unit Cost	\$247.63	\$255.08	\$263.17	(P)
Forecast Units	828	1,065	1,171	(S)
Total Forecast	\$205,041.42	\$271,659.37	\$308,177.90	

58

59

Notes and References

60

(M) Based on cost estimate from leak survey department for average cased crossings due to historic costs being charged to another MAT code.

61

(N) Escalation factors provided by GRC PMT.

62

(O) Previous year unit cost x Escalation Factor.

63

(P) Previous year unit cost + Escalation Amount.

64

(Q) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

65

(R) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

66

(S) PG&E forecasts completion of 1,171 contacted casing leak surveys in 2023 based on a 2020 population of approximately 250 contacted casings that require quarterly leak monitoring with a 10 percent growth rate based on historic trends.

67

(T) Added 2020 escalation amount

68

	2021	2022	2023	Note
Total Forecast	\$4,133,099	\$3,854,675	\$4,004,912	Line (12) + Line (36) + Line (57)

69

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 10, GAS OPERATIONS LEAK MANAGEMENT

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MAT JPQ - CARB Leak Survey - Unit Cost Forecast	WP 10-75
MAT JPR - CARB Leak Repair - Unit Cost Forecast	WP 10-76

Table 10-58
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 10, Leak Management
Workpapers Supporting Chapter 10 Forecast
MAT JOE - Ground Leak Survey - Unit Cost Forecast

Line

MAT JOE (UNIT OF MEASURE: MILES SURVEYED)

Description	Value	Notes and References
2020 Recorded Cost	\$895,269.01	(A)
2020 Recorded Units	444	
2020 Average Unit Cost	\$2,016.37	Line 3/Line 4
2020 Adjustments to Forecast Basis	\$0.00	(B)
Cost Basis for Forecast	\$2,016.37	Line 5 + Line 6

	2021	2022	2023	Notes and References
Escalation Factor	1.45%	3.01%	3.17%	(C)
Escalation Amount	\$29.15	\$61.49	\$66.87	(D)
Forecast Unit Cost	\$2,045.52	\$2,107.01	\$2,173.88	(E)
Forecast Units	440	440	440	WP 10-70, Line 1
Forecast Total Cost	\$900,027.44	\$927,085.07	\$956,509.06	Line 12 * Line 13

Notes:

(A) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.

(B) No adjustments were made to the forecast basis.

(C) See Exhibit (PG&E-3), Chapter 2.

(D) Previous year unit cost x Escalation Factor.

(E) Previous year unit cost + Escalation Amount.

(F) Line 12, Column C-E values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

Table 10-60
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 10, Leak Management
Workpapers Supporting Chapter 10 Forecast
MAT JOR - Transmission Leak Rechecks - Unit Cost Forecast

Line

MAT JOR (UNIT OF MEASURE: # OF RECHECKS PERFORMED)

Description	Value	Notes and References
2020 Recorded Cost	\$229,066.07	(A)
2020 Recorded Units	2,818	
2020 Average Unit Cost	\$81.29	Line 3/Line 4
2020 Adjustments to Forecast Basis	\$0.00	(B)
Cost Basis for Forecast	\$81.29	Line 5 + Line 6

	2021 (F)	2022	2023	Notes and References
Escalation Factor	-	3.01%	3.17%	(C)
Escalation Amount	-	\$2.56	\$2.79	(D)
Forecast Unit Cost	\$85.00	\$88.00	\$90.79	(E)
Forecast Units	2,816	2,816	2,816	WP 10-72, Line 1
Forecast Total Cost	\$239,360.00	\$247,808.00	\$255,672.98	Line 12 * Line 13

Notes:

- (A) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.
- (B) No adjustments were made to the forecast basis.
- (C) See Exhibit (PG&E-3), Chapter 2.
- (D) Previous year unit cost x Escalation Factor.
- (E) Previous year unit cost + Escalation Amount.
- (F) 2021 unit cost forecast was originally \$155. As part of an internal, leadership driven affordability challenge, the unit cost was reduced to \$85. It used 2020 actuals as the base with an additional buffer.

Table 10-62
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 10, Leak Management
Workpapers Supporting Chapter 10 Forecast
MAT JOW - Aerial Leak Survey - Unit Cost Forecast

Line

MAT JOW (UNIT OF MEASURE: MILES SURVEYED)

Description	Value	Notes and References
2020 Recorded Cost	\$1,454,729.27	(A), (F)
2020 Recorded Units	12,832	
2020 Average Unit Cost	\$113.37	Line 3/Line 4
2020 Adjustments to Forecast Basis	-\$198,408.46	(B)
Cost Basis for Forecast	\$128.83	Line 5 + Line 6

2021 (F)	2022	2023	Notes and References
-	3.01%	3.17%	(C)
-	\$5.32	\$5.79	(D)
\$177.11	\$182.43	\$188.22	(E)
12,807	12,807	12,807	WP 10-74, Line 1
\$2,268,186.00	\$2,336,374.72	\$2,410,527.01	Line 12 * Line 13

Notes:

- (A) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.
- (B) In 2020, MAT JOW started with a \$0.2M negative balance due to a double accrual error.
- (C) See Exhibit (PG&E-3), Chapter 2.
- (D) Previous year unit cost x Escalation Factor.
- (E) Previous year unit cost + Escalation Amount.
- (F) 2021 forecast is based on vendor invoice. 2020 recorded costs are shown for comparison only.
- (G) Line 12, Column D and E values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

Table 10-64
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 10, Leak Management
Workpapers Supporting Chapter 10 Forecast
MAT JPQ - CARB Leak Survey - Unit Cost Forecast

Line	MAT JPQ (UNIT OF MEASURE: NON-UNITIZED)				Notes and References
	Description	Value	2022	2023	
1	2020 Recorded Cost	\$2,961,979.41	(A)		(C)
2	2020 Recorded Units	1			(D)
3	2020 Average Unit Cost	\$2,961,979.41	Line 3/Line 4		(E)
4	2020 Adjustments to Forecast Basis	\$0.00	(B)		
5	Cost Basis for Forecast	\$2,961,979.41	Line 5 + Line 6		
6					
7					
8					
9					
10	Escalation Factor	-	3.01%	3.17%	(C)
11	Escalation Amount	-	\$89,046.31	\$97,091.29	(D)
12	Forecast Unit Cost	\$2,961,979.41	\$3,059,131.91	\$3,156,223.20	(E)

Notes:

- (A) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.
- (B) No adjustments were made to the forecast basis.
- (C) See Exhibit (PG&E-3), Chapter 2.
- (D) Previous year unit cost x Escalation Factor.
- (E) Previous year unit cost + Escalation Amount.

Table 10-65
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 10, Leak Management
Workpapers Supporting Chapter 10 Forecast
MAT JPR - CARB Leak Repair - Unit Cost Forecast

Line

MAT JPR (UNIT OF MEASURE: NON-UNITIZED)

Description	Value	Notes and References	2023	Notes and References
2018 Recorded Cost	\$1,114,264.17	(A)		(C)
2019 Recorded Cost	\$922,323.48	(A)		(D)
2020 Recorded Cost	\$1,744,096.57	(A)		(E)
2020 Recorded Units	1			
Average Unit Cost	\$1,260,228.07	(Sum of Line 3, Line 4, Line 5/3)/Line 6		
2020 Adjustments to Forecast Basis	\$1,000,000.00	(B)		
Cost Basis for Forecast	\$2,260,228.07	Line 7 + Line 8		
Escalation Factor	1.45%	2022	3.17%	
Escalation Amount	\$32,670.05		\$75,548.71	
Forecast Unit Cost	\$2,310,900.00	\$2,380,372.84	\$2,455,921.55	

Notes:

- (A) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.
 (B) Adjustments made to the forecast basis to account for additional funding needed for GPM resources to support CARB leak repairs.
 (C) See Exhibit (PG&E-3), Chapter 2.
 (D) Previous year unit cost x Escalation Factor.
 (E) Previous year unit cost + Escalation Amount.
 (F) The 2021 unit costs shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 11, GAS SYSTEM OPERATIONS

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Workpaper Table 11-14
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 3, Chapter 11, Gas System Operations
Cost Forecast Workpapers Supporting Chapter 11 Forecast
MAT AH4 - Gill Ranch Storage Expense

Line

1 **MAT AH4 - Gill Ranch Storage Expense - (Unit of Measure: Non-Unitized)**

2 **Cost Estimating Methodology:** MAT AH4 was forecast using 2020 recorded costs plus escalation to 2023.

Description	Value	Note
2020 Recorded Cost	\$ 2,811,606	(A)
2020 Recorded Units	1	(A)
2020 Average Unit Cost	\$ 2,811,606	Line 4 / 5
Cost Basis for Forecast	\$ 2,811,606	Line 6

WP 11-14

	2021 ^(E)	2022 ^(E)	2023	Note
Escalation Factor	0.482%	2.640%	2.785%	(B)
Escalation Amount	\$ 13,550	\$ 74,593	\$ 80,744	(C)
Forecast Unit Cost	\$ 2,825,156	\$ 2,899,749	\$ 2,980,493	(D)

12 **Notes**

13 (A) See Exhibit (PG&E-3), Chapter 11, WP 11-5.

14 (B) Escalation rates are based on the Gas Storage expense composite rate.

15 (C) Previous year unit cost x Escalation Factor.

16 (D) Previous year unit cost + Escalation amount.

17 (E) The 2021 and 2022 forecast presented is for illustrative escalation purposes only and does not necessarily reflect the 2021 or 2022 forecast.

Workpaper Table 11-16
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 3, Chapter 11, Gas System Operations
Cost Forecast Workpapers Supporting Chapter 11 Forecast
MAT CMB - Electric Power for Compressor Fuel and Other Electric Equipment

Line

1 **MAT CMB - Electric Power for Compressor Fuel and Other Electric Equipment - (Unit of Measure: Non-Unitized)**

2 **Cost Estimating Methodology:** MAT CMB was forecast using 2020 recorded costs plus escalation to 2023.

Description	Value	Note
2020 Recorded Cost	\$ 27,014,504	(A)
2020 Recorded Units	1	(A)
2020 Average Unit Cost	\$ 27,014,504	Line 4 / 5
Cost Basis for Forecast	\$ 27,014,504	Line 6

	2021 ^(E)	2022 ^(E)	2023	Note
Escalation Factor	1.445%	3.006%	3.174%	(B)
Escalation Amount	\$ 390,476	\$ 823,879	\$ 895,933	(C)
Forecast Unit Cost	\$ 27,404,981	\$ 28,228,860	\$ 29,124,792	(D)

12 **Notes**

13 (A) See Exhibit (PG&E-3), Chapter 11, WP 11-5.

14 (B) Escalation rates are based on the Gas Transmission expense composite rate.

15 (C) Previous year unit cost x Escalation Factor.

16 (D) Previous year unit cost + Escalation amount.

17 (E) The 2021 and 2022 forecast presented is for illustrative escalation purposes only and does not necessarily reflect the 2021 or 2022 forecast.

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 13, OTHER GAS OPERATIONS SUPPORT

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MWC - GF Mapping Support	WP 13-12
MWC - AB Other General Support	WP 13-13

Workpaper Table 13-6
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers Supporting Chapter 13, Gas Other Support
 MWC AK - Transmission Hazardous Waste Management

Program Description:

Expense - PG&E's management of hazardous materials specifically for Gas Transmission projects.

Line	MWC	Transmission/ Distribution % Split	2017 Recorded Adjusted	2018 Recorded Adjusted (c)	2019 Recorded Adjusted (c)	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	MWC AK Total		\$ 2,545,722	\$ 2,805,464	\$ 2,706,730	\$ 2,965,401	\$ 2,279,888	\$ 2,336,103	\$ 2,985,512	
2	MAT AKA - Hazardous Waste	100%(b)								
3	Management - Transmission		\$ 2,545,720	\$ 2,805,463	\$ 2,706,729	\$ 2,965,400	\$ 2,279,887	\$ 2,336,102	\$ 2,985,511	

4 Notes:

5 (a) Expense 3-year average (2017-2019)

6 (b) Gas Transmission Only

7 (c) 2018 and 2019 recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.

Workpaper Table 13-7
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers Supporting Chapter 13, Gas Other Support
 MWC CR - Transmission Hazardous Waste Disposal and Transportation

Program Description:

Expense - PG&E's management of disposing hazardous waste specifically for Gas Transmission projects.

Line	MWC	Expense - Transmission/Distribution % Split	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	MWC CR Total		\$ 460,518	\$ 525,183	\$ 792,314	\$ 538,314	\$ 534,567	\$ 546,060	\$ 655,866	
	MAT CRA - GT Hazardous Waste Disposal	100% ^(b)								
2	Transportation - Transmission		\$ 460,518	\$ 525,183	\$ 792,314	\$ 538,314	\$ 534,567	\$ 546,060	\$ 655,866	
3	Notes:									
4	(a) Expense 3-year average (2017-2019)									
5	(b) Gas Transmission Only									

Workpaper Table 13-9
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers Supporting Chapter 13, Gas Other Support
 MWC - DN Gas Qualifications

Program Description:

Expense - MWC DN are the activities related to the administration of Gas Distribution and Gas Transmission qualification programs that assess the competency of employees performing covered tasks.

Line	MAT	Transmission/Distribution % Split	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	MAT DN2 Total		\$ 2,380,581	\$ 4,881,057	\$ 4,317,162	\$ 1,636,453	\$ 2,098,102	\$ 2,144,789	\$ 4,350,750 (a)	
2	MAT DN2 - Distribution	59%	\$ 1,345,104	\$ 2,735,508	\$ 2,608,640	\$ 882,715	\$ 1,085,990	\$ 1,110,915	\$ 2,546,396	Line 1 * 59%
3	MAT DN2 - Transmission	41%	\$ 1,035,476	\$ 2,145,549	\$ 1,708,522	\$ 753,737	\$ 1,012,112	\$ 1,033,874	\$ 1,804,354	Line 1 * 41%
4										
5	Notes:									
6	(a)Expense 3-year average (2017-2019)									
7	(b) For information regarding the Gas Training Program, see Exhibit (PG&E-8), Ch. 6, Section B.3.									

Program Description:

Expense - This program detects, develops, tests and introduces new methods and technologies in Gas Operations to improve gas safety, reliability and efficiency.

Line	MWC	Transmission/Distribution % Split	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	MWC GZ Total		\$ 3,595,529	\$ 3,602,354	\$ 5,338,948	\$ 6,572,426	\$ 6,769,599	\$ 11,496,597	
2	MAT GZA - Distribution	51%	\$ 2,062,612	\$ 1,756,546	\$ 3,289,641	\$ 3,487,699	\$ 3,592,331	\$ 5,850,034	Line 1 * 51%
3	MAT GZA - Transmission	49%	\$ 1,532,917	\$ 1,845,808	\$ 2,049,307	\$ 3,084,727	\$ 3,177,268	\$ 5,646,563	Line 1 * 49%
4									
5	Category	2018 recorded	2019 Recorded	2020 Recorded	2021 Recorded	2022 Forecast	2023 Forecast	Methodology	
6	NYSEARCH	\$ 574,129	\$ 672,715	\$ 627,382	\$ 700,000	\$ 700,000	\$ 710,000	PG&E has increased its contribution to NYSEARCH to bring it to about \$700k for the 2020-2022 GRC period with successful results. We plan to keep the funding at this level or higher moving forward with an increased emphasis on decarbonization.	
7	OTD	\$ 726,256	\$ 630,587	\$ 750,000	\$ 750,000	\$ 750,000	\$ 750,000	The contribution to OTD is expected to stay flat for the next GRC period. The main focus areas will stay methane emission abatement, dig-in prevention, mobile as-built and material properties with a new emphasis on hydrogen.	
8	PRCI	\$ 256,980	\$ 305,233	\$ 249,344	\$ 400,000	\$ 450,000	\$ 500,000	PG&E forecasts its contribution to PRCI to increase with the development of a new field dedicated to emerging fuels. PRCI focus is on transmission pipelines, compressor stations and underground storage facilities.	
9	NGI	\$ 250,000	\$ -	\$ 75,000	\$ 75,000	\$ 175,000	\$ 475,000	The contribution to the Natural Gas Initiative at Stanford University will grow to include additional research on impact of hydrogen on natural gas infrastructure and carbon capture sequestration and utilization.	
10	UTD	\$ -	\$ -	\$ 350,000	\$ 350,000	\$ 350,000	\$ 350,000	PG&E has joined UTD (Utilization Technologies Development) in 2020 to explore the impact of renewable natural gas and hydrogen on its customers applications. The contribution is expected to stay stable over the next GRC period.	
11	Others	\$ 444,393	\$ 659,413	\$ 1,777,248	\$ 2,451,477	\$ 2,163,527	\$ 5,862,829	PG&E forecasts to continue to grow its R&D efforts beyond the traditional industry consortia. This investment includes support to deployment of new technologies within its operations to ensure that their benefits are rapidly captured. It will also include broader collaborations to accelerate and optimize the sourcing of innovation especially in the context of decarbonization.	

Worksheet Table 13-10
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 13, Gas Other Support
MWC - GZ Gas R&D Deployment

12	Team Costs	\$	1,343,771	\$	1,334,406	\$	1,509,973	\$	1,845,523	\$	2,181,072	\$	2,852,171	The R&D and Innovation team will grow as it extends its project portfolio towards low-carbon no-carbon solutions, diversifies its collaborations and accelerates the transition of new technologies into the business. Its workforce will grow from 9 FTE in 2020 to 17 FTE in 2023.
13	Reducing Methane Emissions ^(a)	\$	1,091,213	\$	1,515,490	\$	-	\$	-	\$	-	\$	-	The R&D activity related to methane emission abatement has been transferred into the regular GRC budget in 2020. It will continue to be a main topic of research, technology development and deployment through the next GRC periods in order to reach methane abatement goals of 20% in 2025 and towards 40% by 2030 compared to 2015 emissions.
14	Therapeutics	\$	1,738,171	\$	3,085,121	\$	1,234,942	\$	1,066,431	\$	-	\$	-	The therapeutics program will be completed in 2021 with three important innovations for leak detection, mobile as-built data collection and traceability and dig-in prevention of bored pipelines. Such deployment and industrialization efforts will continue on other topics, integrated in the R&D and Innovation's project portfolio.
15	Total R&D and Innovation	\$	6,424,913	\$	8,202,965	\$	6,573,889	\$	7,838,431	\$	6,769,599	\$	11,500,000	

Notes:

(a) Expense amounts for 2018 and 2019 related to the Leak Abatement Best Practices required by D.17-06-015 will be recovered through a balancing account established in that proceeding. Starting in 2020, these costs will be recorded in MWC GZ (Research and Development) and cost recovery will be through the GRC.

Workpaper Table 13-11
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers Supporting Chapter 13, Gas Other Support
 MWC - GF Mapping Support

Program Description:

Expense - The Gas Mapping Support Program maintain gas distribution (GFO) and gas transmission (GFP) asset information in our systems of record, that are not directly charged to an order.

Line	MWC	Transmission/D istribution % Split	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	MWC GF Total		\$ 11,851,884	\$ 11,011,165	\$ 6,315,712	\$ 7,965,340	\$ 8,523,093	\$ 8,622,644	\$ 9,630,638	(c)
2	MAT GFO - Distribution	44%	\$ 3,948,056	\$ 3,909,647	\$ 3,090,218	\$ 3,393,922	\$ 4,399,801	\$ 4,401,275	\$ 4,202,710	(a)
3	MAT GFP - Transmission	56%	\$ 7,903,827	\$ 7,101,518	\$ 3,225,494	\$ 4,571,418	\$ 4,123,292	\$ 4,221,369	\$ 5,427,928	(b)
4										
5	Notes:									

6 (a) Expense 3-year average (2017-2019) MAT GFO

7 (b) Expense 3-year average (2018-2020) MAT GFP

8 (c) Line 1: MWC GF MAT code setup allows Distribution and Transmission allocation for the Mapping Support Program.

Program Description:
 Expense - General support expenses for Gas Operations.

Line	MWC	Transmission/Distribution % Split	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference	Notes	Notes
1	MWC AB Total		\$ 116,272,302	\$ 38,568,040	\$ 23,749,127	\$ 23,276,897	\$ 28,724,896	\$ 34,484,375	\$ 35,606,464	(a)		
2	MAT AB# Distribution Total	43%	\$ 18,556,104	\$ 15,785,042	\$ 4,833,797	\$ 19,429,846	\$ 13,318,507	\$ 15,838,314	\$ 16,367,717			
3	MAT AB# Transmission Total	57%	\$ 16,879,301	\$ 18,603,196	\$ 10,855,684	\$ 7,011,290	\$ 14,208,489	\$ 17,446,060	\$ 17,999,767			
4	MAT AB# Misc Contracts McKinney		\$ 80,836,897	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -			
5	MAT AB# Subtotal		\$ 116,272,302	\$ 34,388,238	\$ 21,699,481	\$ 26,441,136	\$ 27,524,986	\$ 33,264,375	\$ 34,367,484			
6	MAT AB# Distribution Total	40%	\$ -	\$ 1,000,607	\$ 791,139	\$ 825,459	\$ 480,000	\$ 480,000	\$ 486,119	(b)		
7	MAT AB# Transmission Total	60%	\$ -	\$ 1,179,195	\$ 1,268,507	\$ 1,009,592	\$ 720,000	\$ 720,000	\$ 742,851	(b)		
8	MAT AB# Subtotal		\$ -	\$ 2,179,802	\$ 2,059,646	\$ 1,834,951	\$ 1,200,000	\$ 1,200,000	\$ 1,228,970			
9	MAT AB# Subtotal		\$ -	\$ 2,179,802	\$ 2,059,646	\$ 1,834,951	\$ 1,200,000	\$ 1,200,000	\$ 1,228,970			
10	MWC AB - Distribution Total		\$ 16,879,301	\$ 18,603,196	\$ 10,855,684	\$ 7,011,290	\$ 14,208,489	\$ 17,446,060	\$ 17,999,767			
11	MAT AB# Other Support - Type B		\$ 7,128,526	\$ 7,508,900	\$ 7,667,592	\$ 5,738,114	\$ 4,212,308	\$ 4,914,037	\$ 5,071,947	(c)		
12	MAT AB# Other Support - CEBA		\$ -	\$ -	\$ -	\$ -	\$ 2,695,000	\$ 2,780,000	\$ 2,878,900			
13	MAT AB# Misc. Contracts (excluding McKinney)		\$ 11,427,578	\$ 8,276,142	\$ (2,823,765)	\$ 13,691,732	\$ 6,421,199	\$ 8,144,278	\$ 8,417,770			
14	MWC AB - Transmission Total		\$ 16,879,301	\$ 18,603,196	\$ 10,855,684	\$ 7,011,290	\$ 14,208,489	\$ 17,446,060	\$ 17,999,767			
15	MAT AB# Other Support - Type B		\$ 3,541,904	\$ 3,733,644	\$ 4,867,204	\$ 3,713,684	\$ 5,627,692	\$ 6,565,210	\$ 6,773,578	(c)		
16	MAT AB# Misc. Contracts (excluding McKinney)		\$ 13,337,397	\$ 14,869,552	\$ 11,988,480	\$ 3,297,606	\$ 8,578,797	\$ 10,860,850	\$ 11,226,189			
17	MWC AB - Misc Contracts Total		\$ 105,601,872	\$ 23,145,684	\$ 9,164,715	\$ 16,989,338	\$ 14,999,997	\$ 19,025,128	\$ 19,643,568			
18	MAT AB# Misc Contracts (excluding McKinney) Total		\$ 24,764,975	\$ 23,145,684	\$ 9,164,715	\$ 16,989,338	\$ 14,999,997	\$ 19,025,128	\$ 19,643,568			
19	MAT AB# Misc Contracts McKinney		\$ 80,836,897	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -			
20	Notes											
21	(a) Expense 3-year average (2017-2019) MAT AB# (excluding McKinney)											
22	(b) Expense 2021 Forecast MAT AB#7: The forecast was based on the 2021 forecast which used 2020 actuals with a reduction in the number of contractors, and standard escalation was applied. This is a non-utilized MAT.											
23	(c) MAT AB# Other Support - Type B Allocation - refer to line 25 to 26 in this worksheet for calculation of Type B allocation											
24												
25	CC Type		45	45	45	45	1	2				
26	B											
										2021 Fully Loaded Total per FTE		
										Overhead Percentages		
										2021 Without OH per FTE		
										2021 Fully Loaded Total per FTE		
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PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 14, NEW BUSINESS AND WORK AT THE REQUEST OF OTHERS

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Workpaper Table 14-7
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 3, Chapter 14, New Business and Work at the Request of Others
Transmission Expense Forecast, MWC JT

<u>Line No.</u>	MAT JTA (Thousands of Dollars)				
	Year	EOY	2023 Esc Amount	2023 Total	
1	2015	3,407	665	4,072	Actuals Escalated
2	2016	610	109	718	Actuals Escalated
3	2017	76	11	87	Actuals Escalated
4	2018	541	58	599	Actuals Escalated
5	2019	153	13	165	Actuals Escalated

Note1: The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.

<u>Line No.</u>	MAT JTA (Thousands of Dollars)			Average Lines 1-5, 2023 Total
		SAP EOY Average	2023 Escalated Average	
6	5 Yr Ave '15-'19	\$ 957	\$ 1,129	

Note 1: MAT JTA is one of many MATs under MWC JT. Only MAT JTA is covered under chapter 14 (WRO Transmission Expense).

Note 2: Forecasts were developed in 2020 thus the 5-year average is calculated based on 2015 through 2019. When 2020 recorded costs became available in 2021, it was determined that 2020 had been impacted by COVID restrictions and were not consistent with historical costs. A decision was made to keep the forecast based on 2015-2019 and not use the 2020 actuals.

ORIGINAL WORKPAPERS
[INCLUDES ERRATA THROUGH JULY 11, 2022]

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 5, ASSET FAMILY - TRANSMISSION PIPE

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Workpaper Table 5-11
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
ILI Direct Exam and Repair Expense Forecast Calculation, MAT HPI

Line No.

1	Summary of ILI DE&R					
2	Year	Average Miles Per Previous Year ILI	Average Historical DE&R Cost Per Previous Year ILI Mile (2020 \$)	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3	2023	524.75	\$129,738	\$68,080,157	1.092	\$74,333,743

4	Average Annual ILI Miles Forecast for (2022 - 2025) ^(a)			
5	Year	Forecast Miles of Traditional ILI Runs	Forecast Miles of NTILI Runs	Inspected Miles
6	2022	548.15	14.35	562.50
7	2023	424.28	5.12	429.40
8	2024	504.21	6.28	510.49
9	2025	592.91	3.70	596.61
10	Average Miles Per Previous Year ILI			524.75

11 (a) Miles come from PG&E's ILI forecast for 2022 combined with the ILI forecast miles for 2023 through 2025 from this General Rate Case. Digs are assumed to be completed the year following the ILI runs.

12	Calculation of Average Annual DE&R Cost Per Previous Year ILI Mile					
13	DE&R Year	Nominal \$ ^(b)	Escalation Factor	2020 \$	Miles of Traditional ILI Runs ^(c)	Miles of NTILI Runs
14	2016	\$49,456,219	1.120	\$55,376,963	220.77	38.48
15	2017	\$28,937,737	1.094	\$31,671,808	228.99	9.76
16	2018	\$22,761,067	1.063	\$24,195,016	295.01	6.06
17	2019	\$30,514,464	1.028	\$31,361,016	295.95	4.15
18	Totals:			\$142,604,803	1040.72	58.45
19	Average Historical DE&R Cost Per Previous Year ILI Mile			\$129,738		

20 (b) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC
 21 Filing due to timing differences.

22 (c) Miles of Traditional ILI Runs is from the year before, due to the fact that most DE&R digs occur as a result of findings from Traditional ILI in the preceding year.

Workpaper Table 5-12
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
External Corrosion Direct Assessment - MATs HPC and HPN

Line No.

Summary of ECDA Expenses				
Year	Average Annual Assessment Miles	Escalated Survey Costs (HPC)	Escalated Direct Examination Costs (HPN)	Forecast (\$)
2023	67.13	\$8,444,960	\$35,814,064	\$44,259,025

Summary of ECDA Digs (HPN)					
Year	Forecast Average Annual # Digs	Average Cost Per Dig (2020\$)	Dig Costs (2020 \$)	Escalation Rate	Forecast Dig Costs (\$)
2023	168	\$195,245	\$32,801,081	1.092	\$35,814,064

Summary of ECDA Surveys (HPC)					
Year	Average Annual Miles	Average Cost Per Mile Surveyed (2020 \$)	Forecast Survey Costs (2020 \$)	Escalation Rate	Forecast Survey Costs (\$)
2023	67.13	\$115,212	\$7,734,499	1.092	\$8,444,960

Scope						
Contains 1st Time ECDA	Project Year	Project	Assessment Footage	Assessment Mileage (HPC)	Forecast Number of Digs (HPN) ^(a)	Compliance Due Date
Y	2023	EC23_HERMANN_STATION	458.9	0.09	4	12/31/2023
Y	2023	EC23-021B	11,499.3	2.18	4	12/31/2024
Y	2023	EC23-021G	18,260.5	3.46	6	11/14/2024
Y	2023	EC23-021H	33,397.0	6.33	8	12/31/2024
N	2023	EC23-0405	2,055.3	0.39	2	12/31/2023
Y	2023	EC23-050A	11,004.4	2.08	4	12/31/2024
Y	2023	EC23-0617	54,600.3	10.34	11	12/31/2024
Y	2023	EC23-0618	4,407.1	0.83	6	8/28/2023
Y	2023	EC23-0630	9,694.1	1.84	6	12/31/2024
Y	2023	EC23-0650	8,842.3	1.67	6	12/31/2024
Y	2023	EC23-0833	7,880.1	1.49	6	12/31/2023
Y	2023	EC23-103	1,025.6	0.19	4	2/13/2023
Y	2023	EC23-114	808.3	0.15	4	12/31/2024
Y	2023	EC23-1202	104.8	0.02	4	12/31/2023
Y	2023	EC23-138	13,134.4	2.49	6	12/31/2024
Y	2023	EC23-148	23,390.9	4.43	4	1/22/2023
Y	2023	EC23-1501	1,261.2	0.24	6	12/31/2023
Y	2023	EC23-1603	2,240.3	0.42	4	12/31/2024
Y	2023	EC23-1619	6,249.0	1.18	4	12/31/2023
Y	2023	EC23-169A	514.9	0.10	6	12/31/2023
Y	2023	EC23-1816	21,144.5	4.00	6	12/31/2023
Y	2023	EC23-1818	10,275.2	1.95	6	2/14/2023
N	2023	EC23-186	670.7	0.13	4	12/31/2023
Y	2023	EC23-197B	447.8	0.08	6	12/31/2023
N	2023	EC23-300A	727.4	0.14	4	12/31/2023
Y	2023	EC23-300A-1	4,128.8	0.78	6	12/31/2023
Y	2023	EC23-301B	2,133.6	0.40	6	12/31/2023
Y	2023	EC23-304	970.3	0.18	6	12/31/2023
Y	2023	EC23-331A	1,067.7	0.20	4	12/31/2023
Y	2023	EC23-6603	21,228.3	4.02	6	12/31/2024

Workpaper Table 5-12
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
External Corrosion Direct Assessment - MATs HPC and HPN

Line No.							
42	Y	2023	EC23-DREG4436	1,007.8	0.19	4	12/31/2024
43	Y	2023	EC23-DREG5419	4,538.6	0.86	4	12/31/2023
44	Y	2023	EC23-SP5	1,361.9	0.26	4	12/31/2024
45	N	2023	EC23-Fairway Crossover	5,280.0	1.00	2	12/31/2023
46	N	2023	EC23-Willits	5,280.0	1.00	2	12/31/2023
47	N	2023	EC23-Coffee & Claratina	5,280.0	1.00	2	12/31/2023
48	Y	2023	EC23-Market St. & Del Norte Ave	5,280.0	1.00	4	12/31/2023
49	Y	2024	EC24-021F	22,744.1	4.31	6	11/14/2024
50	Y	2024	EC24-0141	1,019.1	0.19	6	12/23/2025
51	Y	2024	EC24-0213	2,209.6	0.42	6	12/16/2026
52	Y	2024	EC24-021E	111.8	0.02	6	12/31/2024
53	Y	2024	EC24-0401	53,305.2	10.10	11	12/16/2026
54	Y	2024	EC24-0404	13,076.1	2.48	6	12/16/2026
55	Y	2024	EC24-050A	18,615.0	3.53	6	12/16/2026
56	Y	2024	EC24-057A-T1	330.2	0.06	4	12/31/2024
57	Y	2024	EC24-0602	3,266.9	0.62	4	12/29/2025
58	Y	2024	EC24-0833	4,695.6	0.89	4	12/31/2025
59	Y	2024	EC24-103	56,851.3	10.77	11	12/31/2024
60	Y	2024	EC24-1035	11,878.7	2.25	4	12/29/2025
61	Y	2024	EC24-108	4,555.0	0.86	4	12/31/2024
62	Y	2024	EC24-118D	13,436.0	2.54	6	12/29/2025
63	Y	2024	EC24-119A	27,922.6	5.29	7	12/22/2025
64	Y	2024	EC24-131	3,942.3	0.75	4	12/29/2025
65	Y	2024	EC24-134A	11,194.7	2.12	6	3/8/2025
66	N	2024	EC24-1521	3,095.7	0.59	2	12/31/2025
67	Y	2024	EC24-1613	3,301.7	0.63	6	12/22/2025
68	Y	2024	EC24-1816	2,784.8	0.53	4	12/23/2025
69	Y	2024	EC24-1818	122.3	0.02	4	12/31/2024
70	Y	2024	EC24-191	7,621.4	1.44	4	4/22/2024
71	Y	2024	EC24-197	8,790.3	1.66	6	12/28/2025
72	Y	2024	EC24-301C	3,609.2	0.68	4	12/31/2024
73	N	2024	EC24-310	171.7	0.03	2	12/31/2025
74	Y	2024	EC24-331A	3,313.9	0.63	4	12/31/2024
75	Y	2024	EC24-375	29,556.2	5.60	5	12/24/2025
76	Y	2024	EC24-7222	1,901.8	0.36	4	12/29/2025
77	Y	2024	EC24-DREG3781	142.0	0.03	4	12/31/2024
78	Y	2024	EC24-X11102	180.1	0.03	4	12/31/2025
79	Y	2024	EC24-X15489	384.2	0.07	4	12/31/2024
80	N	2024	EC24-Shell	5,280.0	1.00	2	12/31/2024
81	N	2024	EC24-Warm Springs & Mayten	5,280.0	1.00	2	12/31/2024
82	N	2024	EC24-Warm Springs & WPRR	5,280.0	1.00	2	12/31/2024
83	N	2024	EC24-50th Ave	5,280.0	1.00	2	12/31/2024
84	N	2024	EC24-Crockett	5,280.0	1.00	2	12/31/2024
85	N	2024	EC24-McClellan Field	5,280.0	1.00	2	12/31/2024
86	N	2024	EC24-El Dorado Hills	5,280.0	1.00	2	12/31/2024
87	N	2024	EC24-North Sacramento	5,280.0	1.00	2	12/31/2024
88	N	2024	EC24-Santa Rita DFM	5,280.0	1.00	2	12/31/2024
89	Y	2024	EC24-E 2nd St & Reservoir Rd	5,280.0	1.00	4	12/31/2024
90	Y	2024	EC24-Enrico	5,280.0	1.00	4	12/31/2024
91	Y	2024	EC24-San Juan Rd	5,280.0	1.00	4	12/31/2024
92	Y	2025	EC25-0405	41,943.6	7.94	9	12/16/2026
93	Y	2025	EC25-050A	11,152.5	2.11	6	12/16/2026
94	Y	2025	EC25-057A-T2	620.3	0.12	4	12/16/2026
95	Y	2025	EC25-0600	16,848.4	3.19	6	12/16/2026

Workpaper Table 5-12
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
External Corrosion Direct Assessment - MATs HPC and HPN

Line No.							
96	Y	2025	EC25-0611	61,232.7	11.60	12	10/31/2026
97	Y	2025	EC25-0617	15,815.9	3.00	4	12/16/2026
98	Y	2025	EC25-0618	29,240.3	5.54	7	12/16/2026
99	Y	2025	EC25-0833	6,466.6	1.22	4	12/16/2026
100	Y	2025	EC25-1023	23,682.9	4.49	6	12/16/2026
101	Y	2025	EC25-1025	1,407.7	0.27	4	12/16/2026
102	Y	2025	EC25-1042	680.8	0.13	6	12/16/2026
103	Y	2025	EC25-105B-2	6,895.6	1.31	4	12/16/2026
104	Y	2025	EC25-118	106,819.4	20.23	19	10/31/2026
105	Y	2025	EC25-1303	740.7	0.14	5	12/21/2025
106	N	2025	EC25-Cal Pine	5,280.0	1.00	2	12/31/2025
107	N	2025	EC25-Aborn & White	5,280.0	1.00	2	12/31/2025
108	N	2025	EC25-Fontanoso	5,280.0	1.00	2	12/31/2025
109	Y	2026	EC26-0632	189.0	0.04	5	12/16/2026
110	Y	2026	EC26-0804	159.4	0.03	6	12/16/2026
111	Y	2026	EC26-119	55,610.6	10.53	11	10/31/2026
112	Y	2026	EC26-1202	100,256.8	18.99	18	10/31/2026
113	Y	2026	EC26-128	1,702.8	0.32	6	12/31/2026
114	Y	2026	EC26-137	11,509.9	2.18	6	12/16/2026
115	Y	2026	EC26-142S	24,648.8	4.67	6	10/31/2026
116	Y	2026	EC26-1501	1,818.6	0.34	6	12/16/2026
117	Y	2026	EC26-1601	6,869.5	1.30	6	12/16/2026
118	Y	2026	EC26-1606	41,615.4	7.88	9	12/16/2026
119	Y	2026	EC26-1614	27,781.5	5.26	7	10/31/2026
120	Y	2026	EC26-1805	3,423.5	0.65	6	12/16/2026
121	Y	2026	EC26-1815	2,982.0	0.56	6	10/31/2026
122	Y	2026	EC26-1816	1,020.0	0.19	6	12/16/2026
123	Y	2026	EC26-181B	13,760.0	2.61	6	12/16/2026
124	Y	2026	EC26-186	11,176.6	2.12	6	12/16/2026
125	Y	2026	EC26-1880	3,388.7	0.64	6	12/16/2026
126	Y	2026	EC26-196A	7,419.2	1.41	4	10/31/2026
127	Y	2026	EC26-2408	7,030.2	1.33	6	10/31/2026
128	Y	2026	EC26-3008	6,210.1	1.18	6	12/16/2026
129	Y	2026	EC26-3010	5,657.4	1.07	4	12/16/2026
130	Y	2026	EC26-306	8,985.3	1.70	4	10/31/2026
131	Y	2026	EC26-316N	1,944.9	0.37	4	10/31/2026
132	Y	2026	EC26-DREG3814	631.1	0.12	4	12/16/2026
133	Y	2026	EC26-DREG4567	171.9	0.03	4	12/16/2026
134	Y	2026	EC26-DREG5176	348.7	0.07	6	12/16/2026
135	Y	2026	EC26-GCUST6976	202.6	0.04	5	12/16/2026
136	N	2026	EC26-LaCassie	5,280.0	1.00	2	12/31/2026
137	N	2026	EC26-Albrae Street Pig Launcher	5,280.0	1.00	2	12/31/2026
138	N	2026	EC26-Coral Rd & Tunis Rd	5,280.0	1.00	2	12/31/2026
139	Y	2026	EC26-2nd & Alice Street Regulator Station	5,280.0	1.00	4	9/27/2026
140	Y	2026	EC26-Barstow "A" Tap Meter Station	5,280.0	1.00	4	9/27/2026
141	Y	2026	EC26-Lawrence And Stevens Creek Regulator Station	5,280.0	1.00	4	9/27/2026
142	Y	2026	EC26-Monroe Regulator Station	5,280.0	1.00	4	9/27/2026
143	Y	2026	EC26-Poinsettia Ave Regulator Station	5,280.0	1.00	4	9/27/2026
144	N	2026	EC26-Kiernan Rd & Hwy 99	5,280.0	1.00	2	12/31/2026
145	N	2026	EC26-Siskiyou Forest Product	5,280.0	1.00	2	12/31/2026

(a) If an ECDA project is a first time ECDA, procedures require a minimum of 4 digs per project. If a project is a re-assessment and < 1 mile is surveyed, then a minimum of 2 digs per project is required. Otherwise the number of digs is calculated as approximately 0.8 digs per mile surveyed. Additionally, where there was an ECDA project that also had the Selective Seam Weld Corrosion (SSWC) threat, an additional 2 digs were added, unless the footage of the SSWC threat was 10 feet or less in which case only 1 dig was added.

Workpaper Table 5-12
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
External Corrosion Direct Assessment - MATs HPC and HPN

Line No.

Historical ECDA Survey Cost Analysis				
Year	Miles Surveyed	Nominal \$	Escalation Factor	2020\$
2017	88.9	\$11,576,785	1.094	\$12,670,573
2018	67.82	\$7,763,817	1.063	\$8,252,938
2019	112.11	\$9,777,700	1.028	\$10,048,959
Totals:	268.83	\$29,118,302		\$30,972,470
Average Cost per Mile Surveyed (2020 \$)				\$115,212

Determination of Average DA Survey Miles per Year		
Year	Forecast Survey Miles	
2023	57.13	
2024	71.49	
2025	64.28	
2026	75.63	
Average Annual ECDA Survey Miles		67.13

Historical ECDA Dig Cost Analysis				
Year	Number of Digs	Cost of Digs (Nominal \$)	Escalation Factor	Cost of Digs (2020 \$)
2017	98	\$19,493,688	1.094	\$21,335,474
2018	73	\$12,185,175	1.063	\$12,952,842
2019	112	\$20,399,937	1.028	\$20,965,885
Totals	283	\$57,002,039		\$55,254,202
Average Cost Per Dig (2020 \$)				\$195,245

Determination of Average Number of Digs Per Year		
Year	Forecast Digs	
2023	181	
2024	188	
2025	102	
2026	199	
Average Annual ECDA Digs		168

Workpaper Table 5-13 (Revised)
Pacific Gas and Electric Company

(PG&E-3)

2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Internal Corrosion Direct Assessment - MATs HPJ, HPO, 34A

Line No.

1	Summary of ICDA Forecast		
2	Year	MAT	Forecast (\$)
3	2023	HPJ	\$846,134
4	2023	HPO	\$13,404,331
5	2023	34A	\$1,136,250

6	Summary of 2023 Forecast for ICDA Engineering (HPJ / 34A)			
7	MAT	Subtotal of Engineering Costs (2020 \$)	Escalation Rate	Forecast (\$)
8	HPJ	\$774,950	1.092	\$846,134
9	34A	\$61,790	1.092	\$67,466

10	Summary of 2023 Forecast for ICDA Digs (HPO / 34A)			
11	MAT	Subtotal of Digs Forecast (2020 \$)	Escalation Rate	Forecast (\$)
12	HPO	\$12,276,645	1.092	\$13,404,331
13	34A	\$978,869	1.092	\$1,068,784

14	Average Annual Engineering PG&E (not Stan Pac) Forecasts for 2023- 2026 ICDA			
15	Year	Number of ICDA PG&E Projects Forecast	Avg. Cost Per Project Assessed (2020 \$)	Forecast (2020 \$)
16	2023	25	\$72,088	\$1,802,209
17	2024	5	\$72,088	\$360,442
18	2025	4	\$72,088	\$288,353
19	2026	9	\$72,088	\$648,795
20	Average Annual Engineering Cost (2020 \$)			\$774,950

21	2023 StanPac Forecasts for ICDA Engineering (34A)				
22	Year	Number of Stan Pac ICDA Engineering Projects	Avg. Cost Per Project Assessed (2020 \$)	Forecast (2020 \$)	PG&E Portion [6/7th of Total] (2020 \$)
23	2023	1	\$72,088	\$72,088	\$61,790
24	2023 Stan Pac ICDA Engineering Forecast (2020 \$)				\$61,790

24	Average Annual PG&E (Not Stan Pac) Forecasts for 2023- 2026 ICDA Digs (HPO)			
25	Year	Number of ICDA Digs Forecast	Avg. Cost Per Dig (2020 \$)	Forecast (2020 \$)
26	2023	100	\$285,503	\$28,550,337
27	2024	20	\$285,503	\$5,710,067
28	2025	16	\$285,503	\$4,568,054
29	2026	36	\$285,503	\$10,278,121
30	Average Annual Digs Cost (2020 \$)			\$12,276,645

31	2023 StanPac Forecasts for ICDA Digs (34A)				
32	Year	Number of Stan Pac ICDA Digs Forecast	Avg. Cost Per Dig (2020 \$)	Forecast (2020 \$)	PG&E Portion [6/7th of Total] (2020 \$)
33	2023	4	\$285,503	\$1,142,013	\$978,869
34	2023 StanPac Digs Forecast (2020 \$)				\$978,869

35	2023 - 2026 Scope						
36	ICDA Project	Project Year	Contains 1st Time ICDA	Assessment Footage	Assessment Mileage	Number of Digs (a)	Compliance Due Date
37	IC23-0604	2023	Y	36,895.9	6.99	4	12/31/2023
38	IC23-108	2023	Y	31,865.6	6.04	4	12/31/2023
39	IC23-118A	2023	Y	6,219.9	1.18	4	12/31/2023
40	IC23-1509	2023	Y	633.7	0.12	4	12/31/2023
41	IC23-162A	2023	Y	9,240.7	1.75	4	12/31/2023
42	IC23-169A	2023	Y	514.9	0.10	4	12/31/2023
43	IC23-172A	2023	Y	2,923.1	0.55	4	12/31/2023

Workpaper Table 5-13 (Revised)
Pacific Gas and Electric Company

(PG&E-3)

2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Internal Corrosion Direct Assessment - MATs HPJ, HPO, 34A

Line No.

44	IC23-177A	2023	Y	7,998.0	1.51	4	12/31/2023
45	IC23-196A	2023	Y	8,056.0	1.53	4	12/31/2024
46	IC23-400-Antioch	2023	Y	19.2	0.00	4	12/31/2023
47	IC23-401	2023	Y	15,109.3	2.86	4	12/31/2023
48	IC23-AspenEmigh	2023	Y	201,403.7	38.14	4	12/31/2023
49	IC23-Frenso	2023	Y	113,909.9	21.57	4	4/30/2023
50	IC23-Mendota	2023	Y	5,734.5	1.09	4	12/31/2023
51	IC23-Merced	2023	Y	2,361.5	0.45	4	12/31/2023
52	IC23-Milpitas	2023	Y	143.3	0.03	4	12/31/2023
53	IC23-SP3-191	2023	Y	3,441.5	0.65	4	12/31/2024
54	IC23-Yuba	2023	Y	9,059.9	1.72	4	12/31/2023
55	IC23-057A	2023	Y	21215.8	4.0	4	12/31/2018
56	IC23-0617	2023	Y	65293.22	12.4	4	12/31/2022
57	IC23-0618	2023	Y	18564.14	3.5	4	8/28/2023
58	IC23-0833	2023	Y	20534.86	3.9	4	11/18/2019
59	IC23-114	2023	Y	27506.61	5.2	4	11/21/2024
60	IC23-142S	2023	Y	60528.63	11.5	4	12/31/2021
61	IC23-300B	2023	Y	10018.85	1.9	4	12/31/2023
62	IC23-DREG5419	2023	Y	4594.86	0.9	4	12/31/2023
63	IC24-131	2024	Y	10,986.9	2.08	4	12/29/2025
64	IC24-MCD	2024	Y	950.5	0.18	4	12/31/2024
65	IC24-0647-01	2024	Y	875.1	0.17	4	12/31/2024
66	IC24-103	2024	Y	4,917.8	0.93	4	12/31/2024
67	IC24-191	2024	Y	54,391.6	10.30	4	12/31/2024
68	IC25-GCUST5805	2025	Y	370.0	0.07	4	12/29/2025
69	IC25-0621	2025	Y	7,010.3	1.33	4	12/22/2025
70	IC25-119B	2025	Y	18,415.8	3.49	4	12/31/2025
71	IC25-DREG4093	2025	Y	2,368.7	0.45	4	12/22/2025
72	IC26_300B_Milpitas	2026	Y	197.0	0.04	4	12/31/2022
73	IC26-153STUBS	2026	Y	180.1	0.03	4	6/25/2025
74	IC26-Brentwood	2026	Y	1,917.2	0.36	4	10/31/2026
75	IC26-Galt	2026	Y	593.3	0.11	4	12/16/2026
76	IC26-0616	2026	Y	2,981.0	0.56	4	12/16/2026
77	IC26-0617-16	2026	Y	2,459.7	0.47	4	12/31/2026
78	IC26-0809-01	2026	Y	1,174.5	0.22	4	12/16/2026
79	IC26-111A-1	2026	Y	1,878.9	0.36	4	12/31/2019
80	IC26-6602-01	2026	Y	10117.85	1.92	4	12/16/2026

(a) Assumes 4 digs per ICDA project

Historical ICDA Engineering Cost Analysis				
Year	Projects Assessed	Nominal \$	Escalation Factor	2020\$
2017	0	\$93,677	1.094	\$102,528
2018	1	\$85,824	1.063	\$91,230
2019	3	\$92,042	1.028	\$94,595
Totals:	4	\$271,542		\$288,353
Average Cost per Project Assessed (2020 \$)				\$72,088

Determination of Average Forecast ICDA Assessment Projects per Year		
Year	Forecast Projects	
2023	26	
2024	5	
2025	4	
2026	9	
Average Annual ICDA Assessment Projects Per		11

Historical ICDA Dig Cost Analysis				
Year	Number of Digs	Cost of Digs (Nominal \$)	Escalation Factor	Cost of Digs (2020 \$)
2017	0	\$226,141	1.094	\$247,507
2018	6	\$866,330	1.063	\$920,908
2019	9	\$3,030,073	1.028	\$3,114,135
Totals	15	\$57,002,039		\$4,282,551
Average Cost Per Dig (2020 \$)				\$285,503

Workpaper Table 5-14
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Stress Corrosion Cracking Direct Assessment - MATs HPK and HPP

Line No.

Summary of SCCDA Expenses				
Year	Average Annual Assessment Miles	Escalated Survey Costs (HPK)	Escalated Direct Examination Costs (HPP)	Forecast (\$)
2023	15.87	\$1,996,300	\$16,414,779	\$18,411,079

Summary of SCCDA Engineering/Surveys (HPK)					
Year	Average Annual Miles	Average Cost Per Mile Surveyed (2020 \$) ^(a)	Forecast Survey Costs (2020 \$)	Escalation Rate	Forecast Engineering / Survey (\$)
2023	15.87	\$115,212	\$1,828,354	1.092	\$1,996,300

(a) Forecast methodology uses the historical average cost per mile surveyed from ECDA.

Summary of SCCDA Digs (HPP)					
Year	Forecast Average Annual # Digs	Average Annual Cost Per Dig (2020\$) ^(b)	Dig Costs (2020 \$)	Escalation Rate	Forecast Dig Costs (\$)
2023	77	\$195,245	\$15,033,829	1.092	\$16,414,779

(b) Forecast methodology uses the average cost per dig from ECDA.

Scope of SCCDA Program						
Forecast Year	SCC Threat Type	Project ID	Assessment Footage	Assessment Mileage	Number of Digs	Compliance Due Date
2023	Axial	SCC23_021A	25138.35	4.76	4	12/31/2024
2023	Axial	SCC23_021C	1359.53	0.26	4	12/31/2024
2023	Axial	SCC23_021G	16833.74	3.19	4	12/31/2024
2023	Axial	SCC23_050A-1	196.3	0.04	4	12/31/2024
2023	Axial	SCC23_057A	4446.29	0.84	4	12/31/2023
2023	Axial	SCC23_1035-05	23087.8	4.37	4	12/31/2024
2023	Axial	SCC23_114	1087.61	0.21	4	12/31/2023
2023	Axial	SCC23_7216-03	825	0.16	4	12/31/2023
2024	Axial	SCC24_0639-01	53211.65	10.08	4	12/31/2024
2024	Axial	SCC24_1220-01	8463.07	1.60	4	12/31/2024
2024	Axial	SCC24_142S	210.49	0.04	4	12/31/2024
2024	Axial	SCC24_1521-01	1023.83	0.19	4	12/31/2024
2024	Axial	SCC24_1611-03	117.08	0.02	4	12/31/2024
2024	Axial	SCC24_169	105.2	0.02	4	12/31/2024
2024	Axial	SCC24_200A-1	714.15	0.14	4	12/31/2026
2024	Axial	SCC24_300A_MP0	160.64	0.03	4	12/31/2020
2024	Axial	SCC24_331A	4308.91	0.82	4	12/31/2024
2024	Axial	SCC24_DRIP7996	1657.77	0.31	4	12/31/2026
2025	Axial	SCC25_174-1-1	980.67	0.19	4	12/31/2026
2025	Axial	SCC25_3008-01	2635.63	0.50	4	12/31/2026
2025	Axial	SCC25_306	8934.5	1.69	4	12/31/2025
2026	Axial	SCC26_108	831.6	0.16	4	12/31/2026
2026	Axial	SCC26_1615-04	23385.23	4.43	4	12/31/2026
2026	Axial	SCC26_301A	1068.81	0.20	4	12/31/2026
2023	Circumferential	CSCC23-CentralCoast-1	11041.62	2.09	4	12/31/2024
2023	Circumferential	CSCC23-CentralCoast-2	4350.64	0.82	4	12/31/2024
2023	Circumferential	CSCC23-DeAnza	403.71	0.08	4	12/31/2024
2023	Circumferential	CSCC23-Diablo-1	4328.18	0.82	4	12/31/2024
2023	Circumferential	CSCC23-Diablo-2	1584.86	0.30	4	12/31/2024
2023	Circumferential	CSCC23-EastBay	2394.09	0.45	4	12/31/2024
2023	Circumferential	CSCC23-Fresno	632.18	0.12	4	12/31/2024
2023	Circumferential	CSCC23-Humboldt	2981.94	0.56	4	12/31/2024
2023	Circumferential	CSCC23-Kern	601.01	0.11	4	12/31/2024
2023	Circumferential	CSCC23-Mission	2134.1	0.40	4	12/31/2024

Workpaper Table 5-14
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Stress Corrosion Cracking Direct Assessment - MATs HPK and HPP

Line No.							
48	2023	Circumferential	CSCC23-NorthBay-1	467.97	0.09	4	12/31/2024
49	2024	Circumferential	CSCC24-NorthBay-2	19652.13	3.72	4	12/31/2024
50	2024	Circumferential	CSCC24-NorthValley	3250.22	0.62	4	12/31/2024
51	2024	Circumferential	CSCC24-Peninsula	1261.17	0.24	4	12/31/2024
52	2024	Circumferential	CSCC24-Sacramento-1	1093.64	0.21	4	12/31/2024
53	2024	Circumferential	CSCC24-Sacramento-2	1298.77	0.25	4	12/31/2024
54	2024	Circumferential	CSCC24-SanJose	293.18	0.06	4	12/31/2024
55	2024	Circumferential	CSCC24-Sierra	4731.06	0.90	4	12/31/2024
56	2024	Circumferential	CSCC24-Sonoma-1	2899.13	0.55	4	12/31/2024
57	2024	Circumferential	CSCC24-Sonoma-2	3711.34	0.70	4	12/31/2024
58	2024	Circumferential	CSCC24-Stockton	904.09	0.17	4	12/31/2024
59	2024	Circumferential	CSCC24-Yosemite	2941.24	0.56	4	12/31/2024
60	2025	Circumferential	CSCC25-CentralCoast-1	1318.73	0.25	4	12/31/2026
61	2025	Circumferential	CSCC25-CentralCoast-2	2557	0.48	4	12/31/2026
62	2025	Circumferential	CSCC25-CentralCoast-3	1863.19	0.35	4	12/31/2026
63	2025	Circumferential	CSCC25-DeAnza	2109.24	0.40	4	12/31/2026
64	2025	Circumferential	CSCC25-Diablo-1	3628.11	0.69	4	12/31/2026
65	2025	Circumferential	CSCC25-Diablo-2	3091.17	0.59	4	12/31/2026
66	2025	Circumferential	CSCC25-EastBay	24.04	0.00	4	12/31/2025
67	2025	Circumferential	CSCC25-EastBay	6318.97	1.20	4	12/31/2026
68	2025	Circumferential	CSCC25-Fresno	7014.96	1.33	4	12/31/2026
69	2025	Circumferential	CSCC25-Humboldt	1074.22	0.20	4	12/31/2025
70	2025	Circumferential	CSCC25-Humboldt	1049.11	0.20	4	12/31/2026
71	2025	Circumferential	CSCC25-Kern	539.42	0.10	4	12/31/2026
72	2025	Circumferential	CSCC25-NorthValley	703.1	0.13	4	12/31/2025
73	2025	Circumferential	CSCC25-Peninsula	202.18	0.04	4	12/31/2025
74	2025	Circumferential	CSCC25-Sacramento-1	466.38	0.09	4	12/31/2025
75	2025	Circumferential	CSCC25-Sierra	1030.28	0.20	4	12/31/2025
76	2025	Circumferential	CSCC25-Yosemite	276.74	0.05	4	12/31/2025
77	2026	Circumferential	CSCC26-Mission	5880.33	1.11	4	12/31/2026
78	2026	Circumferential	CSCC26-NorthBay-1	1503.55	0.28	4	12/31/2026
79	2026	Circumferential	CSCC26-NorthBay-2	4214.73	0.80	4	12/31/2026
80	2026	Circumferential	CSCC26-NorthValley	2146.18	0.41	4	12/31/2026
81	2026	Circumferential	CSCC26-Peninsula	4032.14	0.76	4	12/31/2026
82	2026	Circumferential	CSCC26-Sacramento-1	5065.6	0.96	4	12/31/2026
83	2026	Circumferential	CSCC26-Sacramento-2	5773.07	1.09	4	12/31/2026
84	2026	Circumferential	CSCC26-SanFrancisco	1036.55	0.20	4	12/31/2026
85	2026	Circumferential	CSCC26-SanJose	3109.19	0.59	4	12/31/2026
86	2026	Circumferential	CSCC26-Sierra	1638.17	0.31	4	12/31/2026
87	2026	Circumferential	CSCC26-Sonoma-1	5083.2	0.96	4	12/31/2026
88	2026	Circumferential	CSCC26-Sonoma-2	1719	0.33	4	12/31/2026
89	2026	Circumferential	CSCC26-Stockton	3900.74	0.74	4	12/31/2026
90	2026	Circumferential	CSCC26-Yosemite	3053.64	0.58	4	12/31/2026

Workpaper Table 5-15 (Revised)
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 5, Asset Family - Transmission Pipe
Direct Examination - MAT HPU

Line No.

1	Summary of Direct Examination Forecast			
2	Year	Forecast (2020 \$)	Escalation Rate	Forecast (\$)
3	2023	\$22,341,976	1.092	\$24,394,225

4	Average Annual Forecasts for Direct Examination			
5	Year	Number of Direct Examination Projects	Avg. Cost Per Direct Examination Project (2020 \$)	Forecast (2020 \$)
6	2023	23	\$930,916	\$21,411,060
7	2024	23	\$930,916	\$21,411,060
8	2025	23	\$930,916	\$21,411,060
9	2026	27	\$930,916	\$25,134,723
10	Average Annual Direct Examination Forecast (2020 \$)			\$22,341,976

11	Scope of Direct Examination Program				
12	Project Year	Project ID	Assessment Footage	Assessment Mileage	Compliance Due Date
13	2023	DE23_DCUST7729	8.4	0.0016	12/31/2024
14	2023	DE23_DREG5640	3.0	0.0006	12/31/2024
15	2023	DE23_GCUST5913	34.5	0.0065	12/31/2024
16	2023	DE23_STUB10105	1.5	0.0003	12/16/2026
17	2023	DE23_STUB10219	4.0	0.0008	12/31/2024
18	2023	DE23_STUB18254	5.1	0.0010	12/16/2026
19	2023	DE23_STUB18255	6.3	0.0012	12/16/2026
20	2023	DE23_STUB20159	1.7	0.0003	12/31/2026
21	2023	DE23_STUB9189	6.5	0.0012	12/31/2024
22	2023	DE23_STUB9190	20.8	0.0039	12/31/2024
23	2023	DE23_X6526	50.2	0.0095	12/31/2020
24	2023	DE23-0123	9.4	0.0018	12/31/2023
25	2023	DE23-0604-16	1.3	0.0002	12/31/2021
26	2023	DE23-0821-01	64.6	0.0122	12/16/2026
27	2023	DE23-105B	6.8	0.0013	12/31/2024
28	2023	DE23-1305-45	19.2	0.0036	12/31/2027
29	2023	DE23-300A	20.4	0.0039	12/31/2020
30	2023	DE23-BD128	21.9	0.0041	12/31/2024
31	2023	DE23-BD16457	21.9	0.0041	12/31/2024
32	2023	DE23-DCUST6893	0.0	0.0000	12/31/2024
33	2023	DE23-DF3305	9.2	0.0017	12/31/2023
34	2023	DE23-DREG4845	37.5	0.0071	12/31/2023
35	2023	DE23-STUB14072	0.7	0.0001	12/31/2023
36	2024	DE24-0617-01	10.4	0.0020	12/31/2022
37	2024	DE24-119A	578.8	0.1096	12/31/2025

Workpaper Table 5-15 (Revised)
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 5, Asset Family - Transmission Pipe
Direct Examination - MAT HPU

Line No.

38	2024	DE24-BD8025	60.1	0.0114	12/31/2024
39	2024	DE24-8807-01	0.1	0.0000	12/29/2025
40	2024	DE24-BD13597	3.4	0.0006	12/30/2025
41	2024	DE24-BD14513	2.8	0.0005	12/30/2025
42	2024	DE24-BD602	1.0	0.0002	12/31/2025
43	2024	DE24-DCUST1000	1.5	0.0003	12/31/2023
44	2024	DE24-DF14749	7.9	0.0015	12/31/2024
45	2024	DE24-DF3257	2.7	0.0005	12/31/2024
46	2024	DE24-DF3262	8.6	0.0016	12/31/2024
47	2024	DE24-DF3307	0.0	0.0000	12/31/2024
48	2024	DE24-DF3425	6.7	0.0013	12/31/2024
49	2024	DE24-DREG4904	40.4	0.0076	12/31/2024
50	2024	DE24-GCUST5786	38.7	0.0073	12/31/2024
51	2024	DE24-STUB11140	18.7	0.0035	12/31/2024
52	2024	DE24-STUB11153	46.9	0.0089	12/31/2024
53	2024	DE24-STUB11233	56.1	0.0106	2/2/2024
54	2024	DE24-STUB6162	1.3	0.0002	12/31/2024
55	2024	DE24-STUB6174	1.7	0.0003	12/31/2024
56	2024	DE24-STUB6288	0.5	0.0001	12/31/2024
57	2024	DE24-STUB7009	62.2	0.0118	12/31/2024
58	2024	DE24-X6337	0.0	0.0000	11/14/2024
59	2025	DE25_B25554	24.2	0.0046	12/31/2026
60	2025	DE25_BD11252	15.3	0.0029	11/5/2022
61	2025	DE25_BD25553	2.2	0.0004	12/31/2026
62	2025	DE25_DREG5251	46.3	0.0088	12/16/2026
63	2025	DE25_DREG5252	29.8	0.0056	12/16/2026
64	2025	DE25_STUB11077	41.7	0.0079	4/25/2022
65	2025	DE25_STUB15201	1.0	0.0002	12/31/2026
66	2025	DE25_STUB15202	1.0	0.0002	12/31/2026
67	2025	DE25-0401	3.5	0.0007	12/16/2026
68	2025	DE25-128	2.7	0.0005	12/31/2023
69	2025	DE25-1402-01	0.5	0.0001	12/16/2026
70	2025	DE25-1405-01	11.0	0.0021	12/16/2026
71	2025	DE25-19472	1.0	0.0002	12/16/2026
72	2025	DE25-BD11037	6.4	0.0012	12/16/2026
73	2025	DE25-BD14258	17.2	0.0033	12/16/2026
74	2025	DE25-BD14402	12.0	0.0023	12/16/2026
75	2025	DE25-BD14403	14.7	0.0028	12/16/2026
76	2025	DE25-BD14953	0.1	0.0000	12/16/2026
77	2025	DE25-DCUST2438	10.0	0.0019	12/29/2025
78	2025	DE25-DF3441	7.6	0.0014	12/30/2025
79	2025	DE25-DREG3870	11.4	0.0022	12/30/2025
80	2025	DE25-STUB10272	2.2	0.0004	12/28/2025

Workpaper Table 5-15 (Revised)
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 5, Asset Family - Transmission Pipe
Direct Examination - MAT HPU

Line No.

81	2025	DE25-STUB6151	1.1	0.0002	12/23/2025
82	2026	DE26-BD14954	4.9	0.0009	12/16/2026
83	2026	DE26-BD156	8.6	0.0016	12/16/2026
84	2026	DE26-BD16638	0.2	0.0000	12/16/2026
85	2026	DE26-BD526	106.3	0.0201	12/31/2024
86	2026	DE26-BD88	44.4	0.0084	12/16/2026
87	2026	DE26-DCUST14959	60.2	0.0114	12/16/2026
88	2026	DE26-DCUST8962	15.5	0.0029	12/16/2026
89	2026	DE26-DFDS3633	0.1	0.0000	12/16/2026
90	2026	DE26-DREG14963	43.8	0.0083	12/16/2026
91	2026	DE26-DREG17004	0.6	0.0001	12/16/2026
92	2026	DE26-DREG20009	6.2	0.0012	12/16/2026
93	2026	DE26-DREG3763	63.5	0.0120	12/16/2026
94	2026	DE26-DREG4926	57.9	0.0110	12/16/2026
95	2026	DE26-DREG5242	1.0	0.0002	12/16/2026
96	2026	DE26-DREG5256	24.2	0.0046	12/16/2026
97	2026	DE26-STUB17666	0.5	0.0001	12/16/2026
98	2026	DE26-STUB18427	1.0	0.0002	12/16/2026
99	2026	DE26-STUB18899	1.2	0.0002	12/16/2026
100	2026	DE26-STUB19040	1.0	0.0002	12/16/2026
101	2026	DE26-STUB19087	0.2	0.0000	12/16/2026
102	2026	DE26-STUB19088	0.2	0.0000	12/16/2026
103	2026	DE26-STUB19704	2.2	0.0004	12/16/2026
104	2026	DE26-STUB23165	6.8	0.0013	12/16/2026
105	2026	DE26-BD9863	81.9	0.0155	12/31/2026
106	2026	DE26-DRIP17076	21.3	0.0040	12/31/2026
107	2026	DE26-DRIP5723	37.3	0.0071	12/31/2026
108	2026	DE26-STUB8419	4.0	0.0008	12/31/2026

109	Historical Direct Examination Cost Analysis^(a)				
110	Year	Number of Direct Examination Projects	Nominal \$	Escalation Factor	2020\$
111	2019	3	\$2,647,031	1.028	\$2,720,467
112	2020	10	\$9,381,437	1.000	\$9,381,437
113	Average Cost per Project Assessed (2020 \$)				\$930,916

114 (a) PG&E began its formal Direct Examination program in 2019. Therefore, it has no former history for this program.

Workpaper Table 5-22
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
LNG/CNG Expense Forecast Calculation, MAT GMD

Line No.

1	Summary of Forecast			
2	YEAR	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3	2023	\$2,427,889	1.092	\$2,651,012

4	Calculation of Annual Historical Average Cost ^(a)			
5	Expense Year	Subtotal of Expenses (nominal \$)	Escalation Factor	Recorded Costs (2020 \$)
6	2017	\$2,171,132	1.095	\$2,376,304
7	2018	\$2,578,751	1.063	\$2,741,212
8	2019	\$2,107,766	1.028	\$2,166,151
9	Annual Average (2020\$)			\$2,427,889

10 (a) Values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

Workpaper Table 5-25
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Earthquake Fault Crossing Forecast Calculation, MAT JT3

Line No.1 **Summary of Costs:**

Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$967,847	1.092	\$1,056,750

4 **Calculation of Historical Average for Earthquake Fault Studies & Monitoring (2020 \$)**

Year	Nominal \$ ^(a)	Escalation Factor	2020 \$
2017	\$1,068,624	1.094	\$1,169,589
2018	\$1,023,217	1.063	\$1,087,680
2019	\$628,827	1.028	\$646,272
Average Annual Cost for Earthquake Fault Crossing Studies & Monitoring (2020 \$)			\$967,847

10 (a) The recorded costs reflected in this workpaper includes StanPac and will vary from the Results of the Operations (RO) model
 11 provided with PG&E's 2023 GRC Filing due to timing differences.

Workpaper Table 5-26
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Geo-Hazard Expense Threat Identification and Mitigation Forecast Calculation
MATs HPS and JTT

Line No.

HPS + JTT Forecast Summary			
Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$2,776,699	1.092	\$3,031,756

MAT Level Forecast Summary in 2023 \$			
MAT	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
HPS	\$2,662,329	1.092	\$2,906,880
JTT	\$114,370	1.092	\$124,876

Calculation of Annual Historical HPS (Geo-Hazard Threat Identification) Cost in 2020 Base Year Dollars

Year ^(a)	Nominal \$	Escalation Factor	2020 \$
2018	\$1,832,236	1.063	\$1,947,667
2019	\$3,737,926	1.028	\$3,841,626
2020	\$2,197,693	1.000	\$2,197,693
Total 3 Year HPS Cost (2020 \$)			\$7,986,986
Average Annual HPS Cost (2020 \$)			\$2,662,329

(a) The three year average includes the 2020 forecast year because, as one can see, it is representative of the current spend rate, which is driven by additional LIDAR cost, which did not occur in 2017, the addition of focused risk assessment land movement affecting exposed pipe, and detailed field study to ascertain the need for capital or expense mitigation.

Calculation of Annual Historical JTT (Expense Mitigation) Cost in 2020 Base Year Dollars

Year	Nominal \$	Escalation Factor	2020 \$
2017	\$95,600	1.094	\$104,633
2018	\$126,872	1.063	\$134,865
2019	\$100,815	1.028	\$103,612
Total 3 Year JTT Cost (2020 \$)			\$343,110
Average Annual JTT Cost (2020 \$)			\$114,370

Expense Monitoring Unit Cost Analysis	
Task Description	Cost Estimate
Scheduling, Planning and Field Preparation	\$7,293
Borings and Inclinator and Piezometer Installation	\$15,379
Laboratory Testing	\$1,656
Monitoring and Interim Reporting	\$8,771
Reporting and Meeting	\$6,115
Pipe Stress/Strain Modeling:	
Deformation Analysis Input	\$3,308
Gas Line Deformation Analysis	\$15,435
Total:	\$57,957

Workpaper Table 5-26
Pacific Gas and Electric Company
20203 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Geo-Hazard Expense Threat Identification and Mitigation Forecast Calculation
MATs HPS and JTT

Line No.

33 **Expense Mitigation Analysis**

34	Average Annual Forecast Analysis	
35	Total Expense Mitigation Sites	10
36	Number of Expense Mitigation Sites Tier 1, 2, and 3	6
37	Average annual expense mitigation sites	2
38	Unit Cost^(b)	\$185,081
39	Total Annual Mitigation Forecast	\$370,162

(b) Unit Cost is based on average cost per dig from the DA Program (\$185,081 per dig in old cost model - New Cost model conversion factor is 1.00 for GeoHazard Mitigations).

41 **Program Total Scope Analysis**

42	Type of Work	Landslides	Erosion	Totals
43	Exp-Mitigation	6	4	10
44	Exp-Monitor	12	2	14
45	Exp-Studies	27	66	93
46	Totals:	45	72	117

47	Landslides	Tiers			
48	Type of Work	1	2	3	Total
49	Exp-Mitigation	1	1	1	6
50	Exp-Monitor	1	1	7	12
51	Exp-Studies	2	1	12	27
52	Totals:	4	3	20	45

53	Erosion	Tiers			
54	Type of Work	1	2	3	Total
55	Exp-Mitigation	0	2	1	4
56	Exp-Monitor	0	0	0	2
57	Exp-Studies	7	7	12	66
58	Totals:	7	9	13	72

59	Erosion + Landslide	Tiers			
60	Type of Work	1	2	3	Total
61	Exp-Mitigation	1	3	2	10
62	Exp-Monitor	1	1	7	14
63	Exp-Studies	9	8	24	93
64	Totals:	11	12	33	117

Workpaper Table 5-27
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Risk Analysis Expense Forecast Calculation, MATs HPA and HPE

Line No.

1 **Summary of Costs**

Year	Program	Forecast (\$)
2023	Risk Analysis	\$9,812,593

4 **Calculation of 2023 Forecast by MAT Code**

Year	MAT	Forecast (2020 \$)	Escalation Rate	Forecast (\$)
2023	HPA	\$8,740,915	1.092	\$9,543,822
2023	HPE	\$246,160	1.092	\$268,771

8 **Conversion of Nominal Expense to 2020 \$ by MAT Code**

Escalation Factors	1.094	1.063	1.028	
MAT	2017 Recorded (2020 \$)	2018 Recorded (2020 \$)	2019 Recorded (2020 \$)	Average Annual (2020 \$)
HPA	\$8,912,622	\$8,880,761	\$8,429,362	\$8,740,915
HPE	\$447,565	\$150,120	\$140,794	\$246,160
Total	\$9,360,186	\$9,030,881	\$8,570,156	\$8,987,074

14 **Calculation of Recorded Nominal Expense by MAT Code ^(a)**

MAT	2017 Recorded	2018 Recorded	2019 Recorded	Average Annual
HPA (+HPH, HPL)	\$8,143,239	\$8,354,431	\$8,201,821	\$8,233,164
HPE	\$408,929	\$141,223	\$136,994	\$229,048
Total	\$8,552,168	\$8,495,654	\$8,338,815	\$8,462,212

19 (a) The recorded costs reflected in this workpaper will vary from the Results of the Operations (RO) model
 20 provided with PG&E's 2023 GRC Filing due to the cost adder applied to the RO model.

Workpaper Table 5-28
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Root Cause Analysis Forecast Calculation, MAT HPT

Line No.1 **Summary of Costs**

2 Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3 2023	\$2,561,941	1.092	\$2,797,384

4 Year	Recorded Expenses (Nominal \$)	Escalation Factor	Recorded Expenses (2020 \$)
5 2017	\$2,636,588	1.095	\$2,885,746
6 2018	\$2,872,620	1.063	\$3,053,595
7 2019	\$1,699,410	1.028	\$1,746,484
8 Total (2020 \$)			\$7,685,824
	Annual Forecast (2020 \$)		\$2,561,941

Workpaper Table 5-29
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Public Awareness Expense Forecast Calculation, MAT JT0

Line No.

Summary of Costs

Year	Forecast (2020 \$)	Escalation Rate	Forecast (\$)
2023	\$ 4,131,732	1.092	\$4,511,438

Calculation of Historical Annual Average

Year	Recorded (Nominal \$) ^(a)	Escalation Factor	2020 \$
2017	\$2,670,581	1.095	\$2,922,951
2018	\$1,903,164	1.063	\$2,023,063
2019	\$1,663,387	1.028	\$1,709,463
Total (2020 \$)			\$6,655,478
3-Year Average (2020\$)			\$2,218,493

(a) Values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

Calculation of Annual Average Forecast Cost for GPS-Based Excavation Equipment Motion Sensing Device Program

Program Year	2020 \$	
2023	\$845,248	
2024	\$2,087,236	
2025	\$2,255,236	
2026	\$2,465,236	
Total (2020 \$)		\$7,652,956
Annual Forecast (2020\$)		\$1,913,239

Details for Calculation of GPS-Based Excavation Equipment Motion Sensing Device Program

Expense	2023				2024				2025				2026			
	FTEs	Unit Cost	Units	2020 \$	FTEs	Unit Cost	Units	2020 \$	FTEs	Unit Cost	Units	2020 \$	FTEs	Unit Cost	Units	2020 \$
Labor	4			\$644,800	7			\$1,739,633	7			\$1,739,633	7			\$1,739,633
Like DIRT Job	4	\$161,200		\$644,800	6	\$241,621		\$1,449,724	6	\$241,621		\$1,449,724	6	\$241,621		\$1,449,724
Project Manager	0				1	\$289,909		\$289,909	1	\$289,909		\$289,909	1	\$289,909		\$289,909
Employee Expenses	4			\$32,448	7			\$53,603	7			\$53,603	7			\$53,603
Mileage Expense	4	\$0.53		\$19,080	7	\$0.53		\$30,210	7	\$0.53		\$30,210	7	\$0.53		\$30,210
Like DIRT Job	4	\$0.53	9000	\$19,080	6	\$0.53	9000	\$28,620	6	\$0.53	9000	\$28,620	6	\$0.53	9000	\$28,620
Project Manager	0	\$0.53	3000	\$0	1	\$0.53	3000	\$1,590	1	\$0.53	3000	\$1,590	1	\$0.53	3000	\$1,590
Other Expenses	4	\$3,342	4	\$13,368	7	\$3,342	7	\$23,393	7	\$3,342	7	\$23,393	7	\$3,342	7	\$23,393
GPS Devices		\$840	200	\$168,000		\$840	350	\$294,000		\$840	550	\$462,000		\$840	800	\$672,000
Total Expense (2020 \$)				\$845,248				\$2,087,236				\$2,255,236				\$2,465,236

Workpaper Table 5-30
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Emergency Response Programs
Valve Safety and Reliability Expense Forecast Calculation - MAT JTR

Line No.**1 Summary of Costs**

2	Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3	2023	\$1,231,860	1.0919	\$1,345,068

4	Year	Recorded Cost (Nominal \$) ^(a)	Escalation Factor	2020 \$
5	2017	\$1,374,573	1.095	\$1,504,470
6	2018	\$1,088,624	1.063	\$1,157,207
7	2019	\$1,006,034	1.028	\$1,033,902
8	Total (2020 \$):			\$3,695,579
9	Annual Forecast Valve Safety and Reliability Expense (2020\$):			\$1,231,860

10 *(a) The recorded costs reflected in this workpaper includes historic PSEP costs and will vary from the*
 11 *Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing.*

Workpaper Table 5-31
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Class Location Studies Expense Forecast Calculation, MAT JTQ

Line No.**1 Forecast Summary**

Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$1,961,853	1.092	\$2,142,147

4 Calculation of average annual cost of Class Location Studies in 2020 \$

Year	Nominal \$ ^(a)	Escalation Factor	Total Expenses (2020 \$)
2017	\$538,162	1.095	\$589,019
2018	\$2,132,349	1.063	\$2,266,687
2019	\$2,948,188	1.028	\$3,029,853
Total (2020 \$):			\$5,885,558
Average Annual Cost (2020\$):			\$1,961,853

10 (a) The recorded costs reflected in this workpaper includes recorded costs from MAT KF1 and will vary
11 from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing.

Workpaper Table 5-32
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Class Location Strength Testing and Expense Replacements, MAT JT9

Line No.**1 Summary Forecast for Class Location Strength Testing**

2 Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$) ¹
3 2023	\$782,456	1.092	\$854,363

1. Forecast increased from \$835,009 to \$854,363 due to escalation factor change from 1.069 to 1.092

4 Calculation of average annual cost of Class Location Strength Testing

5	Year	Recorded Cost (Nominal \$)	Escalation Factor	Recorded Cost (2020 \$)
6	2018	\$429,802	1.063	\$456,880
7	2019	\$29,099	1.028	\$29,913
8	2020	\$1,860,574	1.000	\$1,860,574
9	Total (2020 \$):			\$2,347,367
10	Average Annual Cost of Class Location Strength Testing (2020 \$):			\$782,456

Workpaper Table 5-33
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Shallow/Exposed/Water and Levee Crossing Expense Mitigations Forecast Calculation, MAT JT4

Line No.

1 **Summary of Forecast**

Cost Summary Table			
Year	Forecast (2020 \$)	Escalation Factor	Total Annual Costs
2023	\$2,473,795	1.092	\$2,701,136

5 **Summary Forecast Program Mangement Cost**

Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$111,804	1.092	\$122,079

8 **Summary Forecast Project Cost**

Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$2,361,991	1.092	\$2,579,058

11 **Project Calculation of Annual Forecast 2020 Base Year Dollars**

Year	Average Cost Per SE (2020 \$)	Annual Forecast Number of Projects	Annual Cost Per project (2020 \$)
2023	\$590,498	4	\$2,361,991

14 **Calculation of Average Cost Per Project in 2020 Base Year Dollars**

Year	Annual Historical Cost (2020 \$)	Annual Project Count	Annual Cost Per project (2020 \$)
2017	\$1,952,588	3	\$650,863
2018	\$3,383,529	5	\$676,706
2019	\$1,775,698	4	\$443,925
Average Cost Per Project (2020 \$)			\$590,498

20 **Project Calculation of Annual Historical Cost in 2020 Base Year Dollars**

Year	Nominal Project \$	Escalation Factor	2020 Project \$
2017	\$1,784,000	1.0945	\$1,952,588
2018	\$3,183,000	1.063	\$3,383,529
2019 ^(a)	\$1,727,837	1.0277	\$1,775,698

25 (a) Excludes reimbursement costs, which is not typical for this work type.

26 **Program Management Calculation of Annual Historical Cost in 2020 Base Year Dollars**

Year	Nominal Program \$	Escalation Factor	2020 Project \$
2017	\$77,000	1.0945	\$84,277
2018	\$98,000	1.063	\$104,174
2019	\$143,000	1.0277	\$146,961
Total (2020 \$):			\$335,412
Annual Forecast Program Mangement Cost (2020\$):			\$111,804

33 **2017-2019 Historical Water & Levee/Shallow/Exposed Project Count**
(2020 projects excluded because not all costs have been accounted in these projects due to trailing costs due to site restoration, etc.)

Completion Year	2017	2018	2019	
Project ID	R-1065	R-895	R-1097	
	R-1048	R-1204	A-293	
	R-602	R-1056	D-992A	
		R-464	D-1118A	
		R-402 ^(a)		
Total Units	3	5	4	12
Average number of projects per year				4

42 Source: SD-05 Reports

43 (a) StanPac project

Workpaper Table 5-34
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 5, Asset Family - Transmission Pipe
Water and Levee Crossing Forecast Calculation, MAT JT2

Line No.**1 Summary of Costs**

2 Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
3 2023	\$1,243,318	1.092	\$1,357,579

4 Year	Recorded Cost (Nominal \$)	Escalation Factor	2020 \$
5 2017	\$779,509	1.095	\$853,173
6 2018	\$755,103	1.063	\$802,675
7 2019	\$2,018,203	1.028	\$2,074,107
8	Total (2020 \$):		\$3,729,955
9	Annual Forecast Water and Levee Crossing Expense (2020\$) :		\$1,243,318

Workpaper Table 5-35
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Pipeline Field Engineering Expense Forecast Calculation, MAT JT1

Line No.**1 Summary of Costs**

2	Year	Forecast (2020 \$)	Escalation Rate	Forecast (\$)
3	2023	\$2,311,583	1.092	\$2,524,017

4	Year	Subtotal of Expenses (nominal \$)	Escalation Rate	2020 \$
5	2017	\$2,182	1.095	\$2,388,465
6	2018	\$2,245	1.063	\$2,386,643
7	2019	\$2,101	1.028	\$2,159,640
8	Total (2020\$)			\$6,934,749
9	Annual Forecast (2020\$)			\$2,311,583

Workpaper Table 5-36
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 5, Asset Family Transmission Pipe
Pipeline Investigations Forecast Calculation, MAT JTD

Line No.

Forecast Summary

Year	Forecast (2020 \$)	Escalation Factor	Forecast (\$)
2023	\$16,966,653	1.092	\$18,525,888

Contribution to Forecast Calculation From Historic Costs

Year	Nominal \$	Escalation to 2020	Expenses in 2020 Dollars ^(a)
2017	\$3,873,356	1.095	\$4,239,388
2018	\$5,813,534	1.063	\$6,179,786
2019	\$3,331,735	1.028	\$3,424,024
3-Year Total (2020 \$)			\$13,843,198
Historic Spend Forecast Contribution (2020 \$)			\$4,614,399

(a) The recorded costs reflected in this workpaper includes PSEP Expense PFL costs and StanPac expenses AND excludes costs in 2018 and 2019 for pipe properties determinations. Therefore, the recorded costs in this workpaper will vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing.

Contribution to Forecast Calculation From Part 1 of Mega Rule Implementation (49 CFR §192.607)

§192.607 Compliance Opportunity - WorkStream	§192.607 Compliance Opportunity - Work Type	Historical Projects (Based on 2019 orders)	Historical Digs / project	Projected Digs for §192.607 Compliance	Forecast (2019 \$)
Digs	ILI	83		83	\$ 142,783
Digs	Direct Examination	5		5	\$ 8,249
Digs	ECDA	116		116	\$ 172,652
Digs	ICDA	8		8	\$ 15,134
Digs	Corrosion Dig / Casing	16		16	\$ 28,008
Digs	Station Dig	5		5	\$ 6,787
Digs	Base Transmission Dig	27		27	\$ 47,809
Digs	Weld Repairs	8		8	\$ 116,295
Replacement	Replacement	85	2	170	\$ 3,094,395
Strength Test	Strength Test	29	6.7	194	\$ 3,408,887
Valve Replacement	Valve Replacement	46	2.2	101	\$ 1,707,245
In-line Inspection	Upgrade	59	4.1	242	\$ 5,306,807
In-line Inspection	NTILI	12		12	\$ 28,387
Asset Engineering	Asset Engineering	50		50	\$ 88,535
Corrosion	Cathodic Protection / Miscellaneous	83		83	\$ -
Corrosion	Spans / Recoat	25		25	\$ 44,267
Valve Automation	Valve Automation	12		12	\$ 28,387
Subtotal (2019 \$)					\$ 14,244,626
Historic NDE QC Credits					\$ (3,747,006)
DCT Field Costs					-
Management Costs					\$ 500,000
§192.607 Additional Testing Program Total (2019 \$)					\$ 10,997,619
Escalation Factor					1.028
§192.607 Additional Testing Program Total (2020 \$)					\$11,302,254

39 **Notes:**

40 PG&E began adding "opportunistic" testing cut-out sections of pipe in 2019 to gain experience/understanding of the requirements of §192.607, in preparation for Part 1 of the "Mega Rule" that was to be implemented by July 1, 2020. This additional work is based on the number of cut outs from each program and the additional cost for material testing for the purpose of establishing TVC materials properties per the new section of code.

41 **§192.607 Compliance Opportunity - WorkStream:** represents workstreams with projects where excavation opportunities exist.

42 **§192.607 Compliance Opportunity - Work Type:** represents the work type with projects where excavation opportunities exist.

43 **Historical Projects (Based on 2019 orders):** The number of digs that were associated with 2019 projects (unique order #'s) based on mobilization dates in 2019.

44 **Historical Digs / project:** An estimate for number of digs based on historical project dig rates

45 **Projected Digs for §192.607 Compliance:** Historical Projects (Based on 2019 orders) multiplied by Historical Digs / project

46 **Forecast (2019 \$):** the estimated annual costs of potential inspections per workstream in 2019 dollars.

45 **Contribution to Forecast Calculation From Mega Rule Implementation (MCA Analyses)**

Mega Rule (Part 1), Impact	Forecast \$ per year (2020 \$)
47 MCA and Class (192.3 & 192.5) Added labor and QC of processing additional data + vendor support.	\$350,000
48 Assessments outside of HCAs (192.710) 1FTE additional AP support to ensure assessments for 500 additional miles are appropriately planned and managed into program	\$150,000
49 Continual Evaluation (192.712 & 192.937) ½ to 1 FTE crack like defect analysis for PAIRS and PEIRS: Mega Rule Procedure TD-4810P-17 - 192.937	\$150,000
50 Cyclic Fatigue Evaluation every 7 years on all covered segments (192.917) 1 FTE additional threat ID, risk analysis data collection and threat assessment planning.: Mega Rule Procedure Revisions 192.917	\$150,000
51 Cyclic Fatigue Evaluation every 7 years on all covered segments (192.917) additional vendor support for performing increased annual analysis	\$100,000
52 Risk Model improvement requirements 1 FTE coordinate risk model improvements and better align risk model with enterprise model(s)	\$150,000
53 Total annual Mega Rule (Part 1) Forecast Contribution (2020 \$)	\$1,050,000

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 6, ASSET FAMILY - FACILITIES

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GT FIMP Risk Management - JT	WP 6-10
GT Engineering Critical Assessment (ECA) Phase 2 Expense - LV2 Revised	WP 6-11
GT Station Strength Testing Expense - JTV Revised	WP 6-13

Table 6-6
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities
GT Routine C&P Expense - MAT JTY

Program: GT Routine Compression and Processing (C&P) Expense, MAT JTY

Program Description

GT Routine C&P Expense program includes a wide assortment of expense projects within the C&P asset family such as equipment leases, service contracts, maintenance agreements, equipment overhauls and other expense-related repairs.

Table 1: GT Routine C&P Expense	2023
Total Expense	\$10,267,713

Table 2, Line 7

Table 2: Calculation	2018	2019	2020	
GT Routine C&P Expense Recorded	\$ 10,887,497	\$ 8,973,761	\$ 7,821,445	
Adjustments for Pleasant Creek Facility	\$ 122,790	\$ 7,789	\$ 20,726	Note #1
GT Routine C&P Expense Adjusted (unescalated)	\$ 10,764,707	\$ 8,965,972	\$ 7,800,719	Line 2 - Line 3
Escalation (2023)	1,1435	1,1127	1,0919	
GT Routine C&P Expense Recorded (in 2023 \$s)	\$ 12,309,774	\$ 9,976,101	\$ 8,517,264	Line 4 * Line 5
Adjusted 3-year Average		\$ 10,267,713		Note #2

Notes:

- #1 Pleasant Creek Storage Facility expected to be decommissioned in 2022. Historical project costs are removed from average calculation for 2023.
#2 Expense 3-year average (2018-2020)

Table 6-7
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities
GT Routine M&C Expense - MAT JTW

Program: GT Routine Measurement and Control (M&C) Expense, MAT JTW

Program Description:

GT Routine M&C Expense program includes a wide assortment of expense projects within the M&C asset family such as assessment and repair of valves, actuators, monitors & controllers, electrical circuits, SCADA units, meter repairs, etc.

Table 1: GT Routine M&C Expense	
Total Expense	2023 \$4,505,966

Table 2, Line 5

Table 2: Calculation		2018	2019	2020
GT Routine M&C Expense Recorded		\$ 3,770,726	\$ 3,603,730	\$ 4,759,071
Escalation (2023)		1.1435	1.1127	1.0919
GT Routine M&C Expense Recorded (in 2023 \$s)		\$ 4,311,942	\$ 4,009,736	\$ 5,196,221
Adjusted 3-year Average			\$	4,505,966

Line 2 * Line 3
Note #1

Notes:

#1 Expense 3-year average (2018-2020)

Table 6-8
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities
GT Gas Quality Assessment Expense - MAT JT8

Program: GT Gas Quality Assessment Expense, MAT JT8

Program Description:

The GT Gas Quality Assessment Expense program ensures that the quality of the gas delivered into the PG&E system is suitable for transmission and distribution by PG&E and for the end users and meets the California Public Utilities Commission (CPUC) gas quality regulatory requirements. The GT Gas Quality Assessment Expense Program also ensures that natural gas is properly odorized for use in the system. The expense activities in this program are driven by PG&E's Gas Quality Management Plan. In addition to ongoing gas quality initiatives, PG&E is developing targeted odor fade mitigation activities under this program to address the processes and procedures impacting odor fade risk reduction. 2023 GRC forecast includes costs anticipated for projects to support both odor fade and gas quality initiatives.

Table 1: GT Gas Quality Assessment Expense		2023
Total Cost		\$2,000,000
Total GT Gas Quality Assessment Expense		\$2,000,000

Table 2, Line 9
Line 1

Table 2: Calculation		2020
Projects		
Gas Quality Assessment Recorded		\$1,113,088
Odor Fade Initiative - Review & Update Standards and Procedures (odorization and pipeline conditioning) ^[1]		\$250,000
Odor Fade Initiative - Testing & Research and Technical Support ^[1]		\$250,000
Odor Fade Mitigation - Restoration of Odorant Concentration ^[1]		\$200,000
Total Cost (2020 \$)		\$1,813,088
Escalation (2023)		1,0919
Total Cost (2023 \$) Rounded		\$2,000,000

Line 7 * Line 8

Notes:

#1 Based on the anticipated initiative costs by internal and external subject matter experts.

Table 6-9
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities
GT Station Overpressure Protection Enhancements Expense - MAT JTX

Program: GT Station Overpressure Protection (OPP) Enhancements Expense, MAT JTX

Program Description:

GT Station OPP program is a mitigation to prevent large overpressure (OP) events due to equipment-related failure at regulator stations. The expense projects related to this program include the following activities:

- Installing pilot filters (sulfur filters) to reduce the likelihood of pilot-operated regulator or monitor failure due to sulfur.
- System planning studies to identify the most effective secondary overpressure protection option for specific stations.
- Developing new design standards for primary Large Volume Customer (LVC) regulation sets.
- Program management for developing and maintaining the master overpressure elimination plan and schedule.
- Pilot studies on new valve technologies for applicability to the PG&E system.

Table 1: GT Station OPP Expense	
2023	
Total Expense	\$1,101,765

Table 2, Line 5

Table 2: Calculation		2018	2019	2020
GT Station OPP Expense Recorded	\$	1,074,642	\$ 1,289,606	\$ 587,544
Escalation (2023)		1.1435	1.1127	1.0919
GT Station OPP Expense (in 2023 \$s)	\$	1,228,886	\$ 1,434,896	\$ 641,513
Adjusted 3-year Average			\$ 1,101,765	

Line 2 * Line 3
Note #1

Notes:

#1 Expense 3-year average (2018-2020)

Table 6-10
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities
GT FIMP Risk Management Program -MAT JTL

Program: GT Facilities Integrity Management Program (FIMP) Risk Management Program, MAT JTL

Program Description:

GT FIMP Risk Management Program includes foundational activities that enable PG&E to (1) continuously improve its understanding of risks associated with its M&C and C&P stations and (2) identify appropriate risk mitigations. This program focuses on improving the quality of asset and condition information and contributes to the development of tools that enable easy access to that information. The following activities are included under the program:

- Risk Identification and Assessment: Execution of process safety studies at selected facilities to identify potential safety threats; causal analyses of facility-related events to identify emerging threats and risks; identification and specification of data needs and tools to provide for ongoing asset management decision-making; and continued development of probabilistic risk assessment models to support program evaluation.
- Identification of Risk Mitigation Strategies: Benchmarking studies in order to understand the performance, practices, and technologies of other operators.
- Technical Assessments: Targeted technical assessments (such as pressure vessel inspections, seismic studies, reliability-centered maintenance studies, etc.) to inform prioritization of future activities; and pilot programs to demonstrate and/or test new technology, identify process solutions, and develop work procedures prior to full implementation.

Table 1: GT FIMP Risk Management

	2023
Total Expense	\$2,526,567
Shared Services Geo Services Forecast Allocation	\$158,217
Total Expense for MAT JTL	\$2,684,784

Table 2, Line 7
Note #1

Table 2: Calculation

	2018	2019	2020
FIMP Risk Management Recorded	\$ 1,851,316	\$ 2,333,545	\$ 2,625,085
Escalation (2023)	1.1435	1.1127	1.0919
FIMP Risk Management Recorded (in 2023 \$s)	\$ 2,117,037	\$ 2,596,448	\$ 2,866,216
Adjusted 3-year Average		\$	\$ 2,526,567

Line 4 * Line 5
Note #2

Notes:

- #1 \$158,217 included in the forecast to support Geosciences. Please see Exhibit (PG&E 7), Chapter 10 for more information.
 #2 Expense 3-year average (2018-2020)

Table 6-11 - Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities Supplemental Testimony
GT Engineering Critical Assessment Phase 2 Expense - MAT LV2

Program: GT Engineering Critical Assessment Phase 2 (ECA2) Expense, MAT LV2

Program Description:

GT ECA2 is a program of alternatives to traditional hydrostatic pressure testing. It is intended to mitigate discrepancies remaining after ECA Phase 1 activities that provide the desired reduction in risk to safety and reliability while limiting the risk introduced through the pressure testing of station components. ECA2 addresses this in a manner that is low-risk and minimally disruptive to gas operations by avoiding or limiting system outages, while simultaneously providing the desired reduction in risk to safety and reliability. ECA2 expense forecast includes the following activities:

- 1) Program development and administration.
- 2) Material verification.
- Non-destructive examination (NDE) portion of the ECA2 activity is moved to capital MAT 76S following FERC Accounting Guidance. The summary of the FERC Accounting Guidance, a description of the impact of the FERC Accounting Guidance, and a description of the costs affected by the FERC Accounting Guidance are provided in more detail in Exhibit (PG&E-3), Chapter 5S.

Table 1: GT ECA2 Expense	
Engineering Critical Assessments Phase 2 Expense (Costs to address station components installed on or before 12/31/1955) ⁽¹⁾	2023 GRC
Escalation (2023)	\$5,025,493
	1.0336
Total Engineering Critical Assessments Phase 2 Expense	\$5,194,253

1
2
3

Table 2, Line 7
Note #1

Line 1 * Line 2

Table 2: GT ECA2 Estimate	
Engineering Critical Assessments Phase 2 Expense Program	Unescalated 2023
ECA2 - Program Development	\$750,000
ECA2 - NDE	\$0
ECA2 - Material Verification	\$4,275,493
Total Engineering Critical Assessments Phase 2 Expense (Costs to address station components installed on or before 12/31/1955) ⁽¹⁾	\$5,025,493

4
5
6

From WP 6-12 Table A
Moved to Capital MAT 76S. See WP 5S-12 New
From WP 6-12 Table B

Note #1

Notes:

#1 Per 2015 GT&S Final decision D. 16-06-056, Engineering Critical Assessments Phase 2 Balancing Account includes only costs associated with station components installed on or before 12/31/1955.

Table 6-12 - Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 6, Asset Family - Facilities Supplemental Testimony
GT Station Strength Testing Expense - MAT JTV

Program: GT Station Strength Testing Expense, MAT JTV

Program Description:

The GT Station Strength Testing Program will perform station pressure testing when warranted as a result of Engineering Critical Assessment (ECA) Phase 1 and Phase 2 findings. The Station Strength Testing Program forecast includes the following activities:
1) Program development and administration.
2) Material verification.
Strength testing of station (station piping and components identified as requiring strength testing by ECA Phases 1 and 2) is moved to capital MAT 76V following FERC Accounting Guidance. The summary of the FERC Accounting Guidance, a description of the impact of the FERC Accounting Guidance, and a description of the costs affected by the FERC Accounting Guidance are provided in more detail in Exhibit (PG&E-3), Chapter 5S.

Table 1: GT Station Strength Testing Expense		2023
1	Station Strength Testing Expense (Costs to address station components installed on or before 12/31/1955) ^[1]	\$2,079,621
2	Escalation (2023)	1.0336
3	Total Expense	\$2,149,456

Table 2, Line 7
Note #1

Line 1 * Line 2

Table 2: GT Station Strength Testing Program Estimate		Unescalated
		2023
4	Program Development and Administration	\$750,000
5	Strength Testing of Stations	\$0
6	Station Strength Testing - Material Verification (per CFR § 192.607)	\$1,329,621
7	Total Station Strength Testing Expense (Costs to address station components installed on or before 12/31/1955) ^[1]	\$2,079,621

From WP 6-14 Table A
Moved to Capital MAT 76V
From WP 6-14 Table B

Note #1

Notes:

#1 Per 2015 GT&S Final Decision D. 16-06-056, Station Strength Testing Memorandum Account includes only costs associated with station components installed on or before 12/31/1955.

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 7, ASSET FAMILY – STORAGE

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Workpaper Table 7-6 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
Summary - MAT AH1

Line No.	Expense Program	MAT	2023 Forecast	2024 Forecast	2025 Forecast	2026 Forecast	Reference
1	Noise and Temperature Surveys	AH1	\$1,503,675	\$1,609,347	\$1,735,349	\$1,788,624	WP 7-7 Line 5
2	Thru-Tubing Casing Inspections	AH1	\$2,982,446	\$3,192,041	\$3,441,957	\$3,547,625	WP 7-8 Line 5
3	Barrier Inspection Surveys (MFL, USIT, Caliper, CBL/GRN)	AH1	\$3,747,937	\$3,715,503	\$1,072,591	\$3,000,697	WP 7-9 Line 5
4	Pressure Testing (Post Conversion to T&P)	AH1	\$1,183,653	\$1,449,161	\$2,083,856	\$2,309,930	WP 7-10 Line 5
5	Total Expense	AH1	\$9,417,710	\$9,966,052	\$8,333,753	\$10,646,876	WP 7-5 Line 2

Workpaper Table 7-7
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
Noise and Temperature Survey Cost Calculation
MAT AH1

Line
No

		2023	2024	2025	2026	Reference
1						
2	Unit Cost Escalation	1.08791634	1.121641747	1.156412641	1.191914509	
3	Final Unit Cost (2020 Year Unit Cost * Unit Cost Escalation)	\$14,321	\$14,765	\$15,222	\$15,690	
4	Total Units	105	109	114	114	
5	Total	\$1,503,675	\$1,609,347	\$1,735,349	\$1,788,624	WP 7-6 Line 1

	Storage Field	Actual 2020 Well Count	Contractor Unit Costs ⁽¹⁾	PG&E Internal Costs ⁽²⁾	2020 Total Cost Estimate	2020 Unit Cost
6	Los Medanos --- Noise Temp	18	\$102,665	\$133,989	\$236,654	
7	Pleasant Creek --- Noise Temp	6	\$43,275	\$44,663	\$87,938	
8	McDonald Island --- Noise Temp	85	\$462,608	\$647,614	\$1,110,222	
9	<i>Subtotals</i>	109	\$608,548	\$826,266	\$1,434,814	\$13,163
10						
11	Total 2020 Unit Cost					\$13,163

		Forecast Well Count			
	Storage Field	2023	2024	2025	2026
12	Los Medanos ⁽³⁾	18	18	18	18
13	Pleasant Creek	0	0	0	0
14	McDonald Island	87	91	96	96
15	Total	105	109	114	114

18 NOTES

19 ⁽¹⁾ Contractor Costs are from quotes provided by the contractor in 2020.

20 ⁽²⁾ PG&E Internal Costs are based on 2020 costs, excluding overhead.

21 ⁽³⁾ The number of wells in 2018 and 2019 accounts for the abandonment of two wells at Los Medanos.

Workpaper Table 7-8 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
Thru-Tubing (MTD) Survey Cost Calculation
MAT AH1

Line
No

1		2023	2024	2025	2026	Reference
2	Unit Cost Escalation	1.08791634	1.121641747	1.156412641	1.191914509	
3	Final Unit Cost					
4	(Prior Year Unit Cost * Unit Cost	\$28,404	\$29,285	\$30,193	\$31,120	
5	Total Units	105	109	114	114	
5	Total	\$2,982,446	\$3,192,041	\$3,441,957	\$3,547,625	WP 7-6 Line 2

6	Storage Field	Actual 2020 Well Count	Contractor Unit Costs ⁽¹⁾	PG&E Internal Costs ⁽²⁾	2020 Total Cost Estimate	2020 Unit Cost
7	Los Medanos --- Thru-Tubing	7	\$130,655	\$52,107	\$182,762	
8	Pleasant Creek --- Thru-Tubing	1	\$18,665	\$7,444	\$26,109	
9	McDonald Island --- Thru-Tubing	32	\$597,280	\$238,203	\$835,483	
10	<i>Subtotals</i>	40	\$746,600	\$297,754	\$1,044,354	\$26,109
11	Total 2020 Unit Cost					\$26,109

12	Storage Field	Well Inspected ⁽³⁾	2023	2024	2025	2026
13	2023 Wells (LM + PC + McD)	105	\$2,982,446			
14	2024 Wells (LM + PC + McD)	109		\$3,192,041		
15	2025 Wells (LM + PC + McD)	114			\$3,441,957	
16	2026 Wells (LM + PC + McD)	114				\$3,547,625
17	⁽⁴⁾ Total	442	\$2,982,446	\$3,192,041	\$3,441,957	\$3,547,625

18 NOTES

19 ⁽¹⁾ Contractor Costs are from quotes provided by the contractor in 2020.

20 ⁽²⁾ PG&E Internal Costs are based on 2020 costs, excluding overhead allocations.

21 ⁽³⁾ Forecast units, subject to change pending CalGEM approval.

22 ⁽⁴⁾ The costs reflected are vendor specific and may be different should another cost competitive vendor be used.

Workpaper Table 7-9 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
Rework Logging Survey Cost Calculation
MAT AH1

Line
No

		2023	2024	2025	2026	Reference
1						
2	Unit Cost Escalation	1.08791634	1.121641747	1.156412641	1.191914509	
	Final Unit Cost (Prior Year Unit Cost * Unit Cost Escalation)	\$144,151	\$148,620	\$153,227	\$157,931	
3						
4	Total Units	26	25	7	19	
5	Total	\$3,747,937	\$3,715,503	\$1,072,591	\$3,000,697	WP 7-6 Line 3

	Storage Field	Actual 2020 Well Count	Contractor Unit Costs ⁽¹⁾	PG&E Internal Costs ⁽²⁾	2020 Total Cost Estimate	2020 Unit Cost
6						
7	Los Medanos --- Rework Logging	3	\$357,801	\$0	\$357,801	
8	McDonald Island --- Rework Logging	14	\$1,894,738	\$0	\$1,894,738	
9	<i>Subtotals</i>	17	\$2,252,539	\$0	\$2,252,539	\$132,502
10	Total 2020 Unit Cost					\$132,502

	Storage Field	Well Inspected ⁽³⁾	2023	2024	2025	2026
11						
12	2023 Wells (LM + PC + McD)	26	\$3,747,937			
13	2024 Wells (LM + PC + McD)	25		\$3,715,503		
14	2025 Wells (LM + PC + McD)	7			\$1,072,591	
15	2026 Wells (LM + PC + McD)	19				\$3,000,697
16	Total	77	\$3,747,937	\$3,715,503	\$1,072,591	\$3,000,697

17 NOTES

18 ⁽¹⁾ Contractor Costs are from quotes provided by the contractor in 2020.

19 ⁽²⁾ PG&E Internal Costs are included in 3L3.

20 ⁽³⁾ Forecast units, subject to change pending CalGEM approval of risk based reinspections. Includes emergent and planned \

Workpaper Table 7-10 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
Pressure Testing Cost Calculation
MAT AH1

Line
No

		2023	2024	2025	2026	Reference
1						
2	Unit Cost Escalation	1.08791634	1.121641747	1.156412641	1.191914509	
3	Final Unit Cost (Prior Year Unit Cost * Unit Cost Escalation)	\$36,989	\$38,136	\$39,318	\$40,525	
4	Total Units	32	38	53	57	
5	Total	\$1,183,653	\$1,449,161	\$2,083,856	\$2,309,930	WP 7-6 Line 4

	2020 Unit Costs (1)	
6	Activity	
7	Pressure testing Casing Annuli	\$21,000
8	Contractor Support	\$2,500
9	Internal Labor (2)	\$10,500
10	<i>Subtotals</i>	<i>\$34,000</i>
11	Total 2020 Unit Cost	\$34,000

Vendor Estimate
WSM Oversight
GPOM, Eng, Clearance Devel, PM

	Storage Field	Well Pressure Tests (3)	2023	2024	2025	2026
12	2023 Wells (LM + PC + McD)	32	\$1,183,653			
13	2024 Wells (LM + PC + McD)	38		\$1,449,161		
14	2025 Wells (LM + PC + McD)	53			\$2,083,856	
15	2026 Wells (LM + PC + McD)	57				\$2,309,930
	Total	180	\$1,183,653	\$1,449,161	\$2,083,856	\$2,309,930

NOTES

- 16 (1) Contractor Costs are from quotes provided by the contractor in 2020.
 17 (2) PG&E Internal Costs are based on 2020 costs, excluding overhead allocations.
 18 (3) Forecast units, subject to change pending CalGEM approval; assumes 5 year pressure testing cycle post conversion.

Workpaper Table 7-11 Revised
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers
 Chapter 7, Asset Family - Storage
 Storage Well Rework Reassessment Project Cost Calculator
 MAT AH2

Line No.	Year	Escalation	Unit Cost	Units ⁽¹⁾	Cost	Reference
1	2020		\$1,512,825			
2	2023	1.08791634	\$1,645,827	2	\$3,291,654	
3	2024	1.121641747	\$1,696,848	2	\$3,393,695	
4	2025	1.156412641	\$1,749,450	3	\$5,248,350	
5	2026	1.191914509	\$1,803,158	14	\$25,244,213	WP 7-5 Line 3

⁽¹⁾ The units noted are based on performing well reworks at Los Medanos and McDonald Island storage fields.

7 STORAGE WELL REWORK & REASSESSMENT:

8 Well Rework (Post T&P Conversion), Assess Condition, Recomplete T&P (10 Rig Days)

	Unit (\$)	Quantity	Unit	Total (\$)	Source of Data
DHSV, Rate Restoration, & Packer Assembly Down Hole Safety Valve (E) Liner Retrieval/Fishing 8-5/8" Packer Assembly Pressure Testing x2 4.5" Steel Tubing	360,000	1	job	360,000	Vendor Quote
Total for DHSV & Rate Restoration	17	5,000	feet	85,000	Vendor Quote
				445,000	

Rig & Remaining Rework Cost

Rig	Daily Rate	15	daily	412,500	Vendor Quote
	Mobilization	1	job	50,000	Vendor Quote
Rig Subtotal				462,500	
<u>Remaining Rework Cost:</u>					
Auxiliary Rig Support Services (WSM, fishing, crane, rat holes, PUJ/LD, guard shack, drill bits, etc)	147,016	1	job	147,016	Vendor Quote
Fluids & Fluid Handling					
Drilling Fluids	70,000	1	job	70,000	Vendor Quote
Fluid transport, storage, and disposal	120,000	1	job	120,000	Vendor Quote
				190,000	
WSM, Engineering and PM Support Services					
Day WSM (Incl. Per Diem/ Mileage)	2,600	15	daily	39,000	Vendor Quote
Night WSM (Incl. Per Diem/ Mileage)	2,600	15	daily	39,000	Vendor Quote
Engineering Support (Above/below ground)	70,000	1	job	70,000	Vendor Quote
Project Management Support	70,000	1	job	70,000	Vendor Quote
Services Subtotal				218,000	
Total for Rig and the remaining Rework Cost				870,500	

DHSV, Rate Restoration, Rig, & Remaining Rework Total

Overhead Allocations	1,315,500
	197,325
Total 2020 Unit Cost	1,512,825

15% Overhead allocations were based on internal PG&E standard labor and material factors.

Workpaper Table 7-12 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
MAT AH3 & AH# Engineering & Support

Line No.	Escalation Rates	1.08792	1.12164	1.15641	1.19191	Reference
	MAT	2023	2024	2025	2026	
1	AH3	3,764,064	7,582,168	9,297,423	8,653,161	WP 7-13 Line 1 + WP 7-14 Line 3
2	AH#	2,175,833	2,243,283	2,312,825	2,383,829	WP 7-13 Line 2
3	Total Costs (\$M)	5,939,897	\$9,825,451.59	\$11,610,248.77	\$11,036,990.09	

Workpaper Table 7-13 Revised
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
MAT AH3 & AH# Engineering & Support

Line No.	Escalation Rates		1.088	1.122	1.156	1.192	Reference
	MAT						
1	AH3		\$1,087.92	\$897.31	\$1,156.41	\$953.53	WP 7-12 Line 1
2	AH#		\$2,175.83	\$2,243.28	\$2,312.83	\$2,383.83	WP 7-12 Line 2
3	Total Costs (\$M)		\$3,263.75	\$3,140.60	\$3,469.24	\$3,337.36	

Line No.	Activity	2020 Cost	MAT	
4	Wellhead Program Engineering and Contract Support	\$ 70	AH3	engineering estimate
5				
6	Isochronal Gas Sampling Program	\$ 200	AH3	engineering estimate
7	Well Control School Training(every 2 Years)	\$ 200	AH3	vendor quote
8	Well Control Support & Emergency Preparedness	\$ 130	AH3	vendor quote
9	General Engineering/Integrity Management/R&D Contract Support	\$ 400	AH3	engineering estimate
10	Internal Engineering/Integrity Management/Program Support	\$ 2,000	AH#	engineering estimate

Workpaper Table 7-14
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers
Chapter 7, Asset Family - Storage
MAT AH3 Non-High Consequence Area (HCA) Hydrotestic Testing Cost Calculator

Line No.	Storage Field	Escalation Rates	1.08792	1.12164	1.15641	1.19191	Reference
		MAT	2023	2024	2025	2026	
1	McDonald Island	AH3	\$1.63	\$5.61	\$3.01	\$6.56	
2	Los Medanos	AH3	\$0.00	\$0.00	\$4.02	\$0.00	
3	Total Costs (\$M)		\$1.63	\$5.61	\$7.03	\$6.56	WP 7-12 Line 1

Line No.	Facility	Execution Year	Project Designation (a)	Route(s) (b)	Mile Point 1	Mile Point 2	Est. Hydrotest Costs (\$M)
4	McDonald Island	2023	McD-11	057A-MC79S	0	0.17	1.5
5	McDonald Island	2024	McD-5	057A-MC STUB7134	0	0.42 0	5.0
6	McDonald Island	2025	McD-6	057A-MT	0	0.61	2.6
7	Los Medanos	2025	LM-1	065 065-2	0	0.87 0.29	3.5
8	McDonald Island	2026	McD-7	057A-M10 057A-WT 057A-MD3	0	0.01 0.69 0.29	5.5

Notes

- (a) These projects are part of the 10-year Storage Pipe Plan that is being developed to perform assessments on all pipe at the storage facilities regardless of HCA classification. The planned assessments under the 10-yr Storage Pipe Plan include hydrotest, NT-IL, ECDA, and pipe replacement. The assessments address the highest risks we have to the pipe and overall to the storage asset family stemming from internal corrosion. The pipe classified as HCA (all 2.5 miles of HCA pipe within storage asset family are located at McDonald Island) are currently assessed under the purview of TIMP per compliance schedule and typically only include ECDA assessment. The remaining miles of pipe would not otherwise receive assessments other than a hydrotest at install, if performed.
- (b) As part of this effort, TIMP and FIMP coordinated project bundles at each facility to minimize outages to perform hydrotests in lieu of, or in addition to ECDAs planned for compliance due dates. The projects are prioritized to address the highest risk pipe.

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 8, GAS OPERATIONS AND MAINTENANCE

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Right-Of-Way (ROW) Maintenance – MATs JOS, JOT, and JTO Forecast Calculator	WP 8-28
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Updated
Workpaper Table 8-14
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 3, Chapter 8, Operations and Maintenance
Transmission Damage Prevention
MATs DFA and DFB Forecast Calculator

Line No.

Forecast Summary Table - Gas Transmission

Description	2023 Units	2023 Unit Cost	2023 Forecast	Notes
Locate and Mark (DFA)	6,073	\$225	\$1,369,189	Units: Line 14, Unit Cost: Line 13
Standby Governance (DFB)	7,280	\$1,025	\$7,458,584	Units: Line 47, Unit Cost: Line 46

Locate and Mark (DFA) Forecast Detail

	2017 Recorded	2018 Recorded	2019 Recorded	2023 Forecast	Notes
Costs	\$1,029,001	\$1,119,968	\$910,561		
Units	6,166	5,198	4,355		Line 31
Unit cost (Nominal)	\$167	\$215	\$209		Line 9 + Line 10
Unit cost (Escalated to 2023 \$)	\$197	\$246	\$233		Line 11 * Line 53
Unit Cost Forecast				\$225	Sum Line 12 + 3
Unit Forecast				6,073	Line 10 (2019 Units) * Line 54
Forecast Total				\$1,369,189	Line 13 * Line 14

Transmission and Distribution Ticket %

	2017	2018	2019	2020
Sample Size for 3rd Party Tickets	1,350	1,350	1,500	3,000
# of tickets with GT Only Assests (No GD or ED Assests)	15	12	10	21
Proportion of Transmission tickets	1%	1%	1%	1%
Proportion of Distribution tickets	99%	99%	99%	99%

Transmission and Distribution Ticket Split

	2017	2018	2019	Notes
Total 3rd Party L&M Tickets	554,788	584,728	653,252	
Proportion of Transmission tickets	1%	1%	1%	Line 22
Proportion of Distribution tickets	99%	99%	99%	Line 23
# of Transmission tickets	6,166	5,198	4,355	Line 28 * Line 29
#of Distribution tickets	548,622	579,530	648,897	Line 28 * Line 30
Total	554,788	584,728	653,252	Line 28
Year Over Year Change	12%	5%	12%	(a)

Notes:

(a) 12% percent seen in 2019 was used for the forecast year over year escalation.

Standby Governance (DFB) Unit Cost Forecast Detail

	2017 Recorded	2018 Recorded	2019 Recorded	Notes
Costs	\$8,548,264	\$8,291,631	\$4,765,531	
Units	10,165	8,917	5,221	
Unit cost (Nominal)	\$841	\$930	\$913	Line 42 + Line 43
Unit cost (Escalated to 2023 \$)	\$995	\$1,063	\$1,016	Line 44 * Line 53
2023 Unit Cost Forecast			\$1,024.52	Line 45 + 3
2023 Unit Forecast			7,280	Line 43 (2019 Units) * Line 54
2023 Forecast Total			\$7,458,584	Line 46 * Line 47

Escalation Factors

	2018	2019	2020	2021	2022	2023
Escalation Factor ^(a)	3.43%	2.77%	1.91%	2.28%	3.28%	3.36%
Units Escalation	-	-	12%	12%	12%	12%

Notes:

(a) See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

Workpaper Table 8-15
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Transmission Pipeline Patrol
MATs JOF and JOV Forecast Calculator

Line No.

Forecast Summary Table

MAT	Description	Units	Unit Cost	2023 Forecast	Notes
JOF	Required Ground Pipeline Patrol	10,461	\$ 99	\$ 1,033,237	Line 16
JOV	Required Aerial Pipeline Patrol	125,656	\$ 37	\$ 4,700,326	Line 30 * Line 69

Required Ground Pipeline Patrol (MAT JOF) Forecast Detail

JOF	Costs (Nominal \$)	Escalation Factor	Costs (Escalated \$)	Units ^(a)	Unit Cost
2017 Recorded	\$1,006,019	1.1828	\$1,189,879	11,831	\$101
2018 Recorded	\$857,868	1.1435	\$980,999	10,253	\$96
2019 Recorded	\$862,766	1.1127	\$959,967	9,615	\$100
2023 Forecast Sub-total (3-year average)	\$908,884	N/A	\$1,043,615	10,566	\$99
StanPac Adjustment ^(b)			(\$10,378)	105	N/A
2023 Forecast Total			\$1,033,237	10,461	\$99

Notes:

(a) The forecast unit for MAT JOF is a forecast for the number of hours to provide ground response to Aerial Observations and patrol areas obscured by the air from vegetation.

(b) The 2023 forecast was adjusted to remove StanPac. See Exhibit (PG&E-3), Chapter 13 for the StanPac forecast.

Required Aerial Pipeline Patrol (MAT JOV) Forecast Detail**Units ^(a)**

System Patrols	79,404
Additional patrol of high consequence areas as conditions permit	47,514
Sub-total	126,918
StanPac Adjustment ^(b)	1,262
Total	125,656

(a) The forecast unit for MAT JOV is the number of miles patrolled.

(b) The 2023 forecast was adjusted to remove StanPac. See Exhibit (PG&E-3), Chapter 13 for the StanPac forecast.

Unit Cost

Cost	2019 Recorded	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	Notes
Aerial Patrollers (labor cost)	\$741,109	\$784,705	\$762,417	\$787,422	\$813,964	
GIS (labor)	\$277,338	\$284,179	\$355,554	\$367,216	\$379,547	
Staff Augmentation - Labor	\$515,708	\$544,650	\$557,087	\$575,358	\$594,679	
Applied Overheads ^(a)	\$443,910	\$439,973	\$427,476	\$441,496	\$456,322	
Helicopter	\$644,634	\$518,080	\$643,039	\$664,129	\$686,431	
Fixed Wing	\$694,317	\$1,563,823	\$1,694,783	\$1,694,783	\$1,694,783	
Video Storage Fees	\$0	\$100,641	\$102,939	\$106,316	\$109,886	
Other	\$309,779	\$11,014	\$11,265	\$11,635	\$12,026	
StanPac Adjustment	-	(\$44,040)	-	-	-	(b)
Total	\$3,626,796	\$4,203,026	\$4,554,561	\$4,648,355	\$4,747,538	Sum Lines 38-46

Notes:

(a) The 2021-2023 forecast applies a 56% overhead.

(b) The 2023 forecast was adjusted to remove StanPac. See Exhibit (PG&E-3), Chapter 13 for the StanPac forecast.

Labor Hours	2019 Recorded	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast
Aerial Patrollers (hours)	12,597	13,291	12,625	12,625	12,625
Aerial Patrollers Labor Hours per Mile Patrolled (minutes)	6	10	6	6	6
Geographic Information System (GIS)	3,803	3,116	3,812	3,812	3,812
GIS Labor Hours per Mile Patrolled (minutes)	2	2	2	2	2

Units	2019 Recorded	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	Notes
Miles Patrolled	126,632	83,614	126,918	126,918	126,918	Line 28
Helicopter Hours	450	372	451	451	451	
Fixed Wing Hours	1,078	825	1,081	1,081	1,081	

Costs / Hours	2019 Recorded	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	Notes
Aerial Patrollers Rate	\$58.83	\$59.04	\$60.39	\$62.37	\$64.46	
GIS Rate	\$73	\$91	\$93.28	\$96.34	\$99.58	
Helicopter Rate ^(a) (Cost / Flight Hours)	\$1,431	\$1,393	\$1,424	\$1,471	\$1,521	
Fixed Wing Rate ^(a) (Cost / Flight Hours)	\$644	\$1,896	\$1,568	\$1,568	\$1,568	

Unit Cost	\$29	\$50	\$36	\$37	\$37	Line 47 ÷ Line 59
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Escalation Factor ^(b)	2.284%	3.280%	3.358%
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Notes:

(a) See Exhibit (PG&E-7), Chapter 2 for more information.

(b) See Exhibit (PG&E-3), Chapter 2 Workpapers for more information.

WP Table 8-16
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Transmission Pipeline Preventative and Corrective Maintenance
MATs JO1, JO2, JOG, JOH, JOI, JOJ, JOK, JOL, JOM, JON, JOO, JOX, JOY Forecast Calculator

Line No.

Forecast Summary Table

MAT	Program Description	2023 Forecast	Notes
Preventative Maintenance (PM)			
JO1	PM SCADA Maintenance	\$ 345,188	Line 26
JOG	PM Regulator Stations	\$ 3,887,269	Line 34
JOH	PM Manual Valve	\$ 1,467,763	Line 38
JOI	PM Automated Valve	\$ 39,245	Line 41
JOX	PM Meter Maintenance	\$ 1,932,502	Line 63
Corrective Maintenance (CM)			
JO2	CM SCADA Maintenance	\$ 248,391	Line 29
JOM	CM Regulator Stations	\$ 1,105,207	Line 53
JON	CM Manual Valve	\$ 942,366	Line 56
JOO	CM Automated Valve	\$ 220,451	Line 59
JOY	CM Meter Maintenance	\$ 285,017	Line 66
PM and CM			
JOJ	Gas Holders Maintenance	\$ 125,297	Line 44
Operational			
JOK	Operate Transmission Pipelines	\$ 728,192	Line 47
JOL	Operate Transmission Regulator Stations	\$ 479,128	Line 50

Forecast Details by MAT

MAT	Program Description	2018 Recorded (Nominal \$)	2018 Recorded (Escalated to 2020 \$)	2019 Recorded (Nominal \$)	2019 Recorded (Escalated to 2020 \$)	2020 Recorded (Nominal \$)	2018-2020 Average (In 2020 \$)	MAT JOL Re- Allocation ^(a) / Land Department Adjustments ^(b)	Forecast Base	2021 Forecast Adders ^(c)	2022 Forecast Adders ^(c)	2023 Forecast Adders ^(c)	Notes
JO1	PM SCADA Maintenance	\$ 186,144	\$ 194,955	\$ 173,617	\$ 176,933	\$ 328,170	\$ 233,353	\$ 82,799	Escalation Factor \$ 316,152	1.0228	1.0328	1.0336	(d)
									Forecast Total	\$ 323,360	\$ 333,966	\$ 345,188	Line 25 * Line 24
JO2 ^(f)	CM SCADA Maintenance	\$ 141,835	\$ 148,548	\$ 226,131	\$ 230,451	\$ 303,493	\$ 227,497	N/A	\$ 227,497	N/A	N/A	N/A	
									Forecast Total	\$ 232,684	\$ 240,316	\$ 248,391	Line 28 * Line 24
JOG	PM Regulator Stations	\$ 2,029,214	\$ 2,125,255	\$ 2,090,828	\$ 2,130,763	\$ 2,855,216	\$ 2,370,411	\$ 423,354	\$ 2,793,765	\$ 794,000	\$ 809,715	\$ 836,922	(e)
									Additional Resources	\$ 609,000	\$ 628,975	\$ 650,109	Line 38
									Large Volume Customers	\$ 175,000	\$ 180,740	\$ 186,813	Line 112
									Forecast Total	\$ 3,641,463	\$ 3,760,903	\$ 3,887,269	Line 31 * Line 24 + Adders (Line 31)
JOH	PM Manual Valve	\$ 1,215,600	\$ 1,273,133	\$ 1,185,346	\$ 1,207,986	\$ 1,313,828	\$ 1,264,983	\$ 42,654	\$ 1,307,637	\$ 37,500	\$ 38,730	\$ 40,031	(e)
									Large Volume Customers	\$ 37,500	\$ 38,730	\$ 40,031	Line 114
									Forecast Total	\$ 1,374,951	\$ 1,420,049	\$ 1,467,763	Line 36 * Line 24 + Adders (Line 36)
JOI	PM Automated Valve	\$ 42,902	\$ 44,932	\$ 32,319	\$ 32,937	\$ 29,964	\$ 35,944	N/A	\$ 35,944	N/A	N/A	N/A	
									Forecast Total	\$ 36,764	\$ 37,970	\$ 39,245	Line 40 * Line 24
JOJ	Gas Holders Maintenance	\$ 81,357	\$ 85,207	\$ 145,179	\$ 147,952	\$ 111,113	\$ 114,757	N/A	\$ 114,757	N/A	N/A	N/A	
									Forecast Total	\$ 117,374	\$ 121,224	\$ 125,297	Line 43 * Line 24
JOK	Operate Transmission Pipelines	\$ 907,707	\$ 950,668	\$ 1,107,383	\$ 1,128,534	\$ 1,007,618	\$ 1,028,940	\$ (362,000)	\$ 666,940	N/A	N/A	N/A	(e)
									Forecast Total	\$ 682,146	\$ 704,520	\$ 728,192	Line 46 * Line 24
JOL	Operate Transmission Regulator Stations	\$ 2,291,567	\$ 2,400,024	\$ 1,967,033	\$ 2,004,604	\$ 438,825	\$ 1,614,485	\$ (1,175,659)	\$ 438,825	N/A	N/A	N/A	(e)
									Forecast Total	\$ 448,831	\$ 463,552	\$ 479,128	Line 49 * Line 24
JOM	CM Regulator Stations	\$ 825,657	\$ 864,734	\$ 1,013,713	\$ 1,033,074	\$ 1,138,915	\$ 1,012,241	N/A	\$ 1,012,241	N/A	N/A	N/A	
									Forecast Total	\$ 1,035,320	\$ 1,069,279	\$ 1,105,207	Line 52 * Line 24
JON	CM Manual Valve	\$ 1,128,943	\$ 1,182,374	\$ 730,407	\$ 744,357	\$ 662,563	\$ 863,098	N/A	\$ 863,098	N/A	N/A	N/A	
									Forecast Total	\$ 882,777	\$ 911,732	\$ 942,366	Line 55 * Line 24
JOO	CM Automated Valve	\$ 245,772	\$ 257,404	\$ 193,842	\$ 197,544	\$ 150,774	\$ 201,908	N/A	\$ 201,908	N/A	N/A	N/A	
									Forecast Total	\$ 206,511	\$ 213,285	\$ 220,451	Line 58 * Line 24
JOX	PM Meter Maintenance	\$ 616,294	\$ 645,463	\$ 833,639	\$ 849,561	\$ 1,824,273	\$ 1,106,432	\$ 626,852	\$ 1,733,284	\$ 37,500	\$ 38,730	\$ 40,031	(e)
									Large Volume Customers	\$ 37,500	\$ 38,730	\$ 40,031	Line 114
									Forecast Total	\$ 1,810,303	\$ 1,869,681	\$ 1,932,502	Line 61 * Line 24 + Adders (Line 61)
JOY	CM Meter Maintenance	\$ 187,720	\$ 196,604	\$ 156,000	\$ 158,980	\$ 427,542	\$ 261,042	N/A	\$ 261,042	N/A	N/A	N/A	
									Forecast Total ^(f)	\$ 266,994	\$ 275,751	\$ 285,017	Line 65 * Line 24

Notes:

(a) See Table below for MAT JOL re-allocation methodology.

(b) MAT JOK land department costs (approximately \$360,000) were removed from the forecast base as these costs will now be under MAT JTO. This amount was based on the 3-year average of land department charges from 2018-2020.

(c) See tables below for forecast adders methodology. The adders are with reference to the base forecast and are full value amounts (not incremental year-over-year adders).

(d) The escalation factors used for escalating 2018 to 2019 is 1.0277. The escalation factor used for escalating 2019 to 2020 is 1.0191. See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

(e) The forecast base is the escalated 2018-2020 average cost plus the MAT JOL re-allocation used for MATs JO1, JOG, JOH, and JOX. For MAT JO1 it also includes the land department adjustments.

(f) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.

WP Table 8-16
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Transmission Pipeline Preventative and Corrective Maintenance
MATs JO1, JO2, JOG, JOH, JOI, JOJ, JOK, JOL, JOM, JON, JOO, JOX, JOY Forecast Calculator

Line No.

MAT JOL Re-Allocation ^(a)

MAT	Program Description	2020 Recorded	2018-2020 Average	Difference	% of Total Difference	% of JOL
JO1	PM SCADA Maintenance	\$ 328,170	\$ 233,353	\$ 94,818	7.04%	\$ 82,799
JOG	PM Gas Regulator General	\$ 2,855,216	\$ 2,370,411	\$ 484,805	36.01%	\$ 423,354
JOH	PM Manual Valve	\$ 1,313,828	\$ 1,264,983	\$ 48,845	3.63%	\$ 42,654
JOX	PM Meter Maintenance	\$ 1,824,273	\$ 1,106,432	\$ 717,841	53.32%	\$ 626,852
	Subtotal	\$ 6,321,487	\$ 4,975,178	\$ 1,346,309	100%	\$ 1,175,659
	MAT JOL Recorded	\$ 438,825	\$ 1,614,485	\$ (1,175,659)		

Notes:

(a) Costs are being shifted from MAT JOL to MATs JO1, JOG, JOH, and JOX to better align ongoing work with program scope.

Forecast Adders**1. Additional resources - Split between MATs JOG and JPE**

MAT	Program Description	% Split	2021	2022	2023	Notes
	Escalation Factor		1.0228	1.0328	1.0336	
JOG	PM Regulator Stations	60%	\$ 609,000	\$ 628,975	\$ 650,109	(a), (b)
JPE	PM Storage/Compressor Station Support	40%	\$ 406,000	\$ 419,317	\$ 433,406	(a)
	Total	100%	\$ 1,015,000	\$ 1,048,292	\$ 1,083,515	

Notes:

(a) Increases in maintenance work expected in the future, this forecast estimate accounts for the additional resources that will be needed. Gas Pipeline Operations and Maintenance technicians go through a state certified 3-year apprenticeship program.

(b) This is full value adder amount, i.e. these are adders with reference to the base forecast (and not incremental year-over-year adders).

2. Large Volume Customers (LVC) - Transition from 5-year to annual Class A inspections

	# of stations	# of hours per station/job	Hours	Standard labor rate	Total	Notes
LVC (Large Volume Customers)	384	10	3,840	65.10	\$ 250,000	(a), (b)

Notes:

(a) Forecast assumes 10 hrs per job (10 x 384) using a standard labor rate which is then escalated to 2023.

(b) The total is split between MATs JOG, JOH, and JOX, see table below. Most of the additional work is expected to be at regulator stations.

3. LVC Cost Split

MAT	Program Description	Split	2021 Adder	2022 Adder	2023 Adder
	Escalation Factor		1.0228	1.0328	1.0336
JOG	PM Regulator Stations	70%	\$ 175,000	\$ 180,740	\$ 186,813
JOH	PM Manual Valve	15%	\$ 37,500	\$ 38,730	\$ 40,031
JOX	PM Meter Maintenance	15%	\$ 37,500	\$ 38,730	\$ 40,031
	Total	100%	\$ 250,000	\$ 258,200	\$ 266,876

WP Table 8-17
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Station Maintenance
MATs JPA, JPB, JPC, JPD, JPE, JPG, JPH, JPI, JPK, JPL, JPN, JPO, JPP Forecast Calculator

Line No.

Forecast Summary Table

MAT	Program Description	2023 Forecast	Note
Preventative Maintenance (PM)			
JPA	PM Station Piping Assets Outside Compressor Building	\$ 968,213	Line 29
JPC	PM Gas Processing Equipment	\$ 1,897,125	Line 35
JPD	PM Inside Compressor Building	\$ 1,787,795	Line 38
JPE	PM Storage/Compressor Station Support	\$ 2,245,356	Line 41
JPK	PM Power Units	\$ 137,575	Line 53
JPO	PM Storage Wells	\$ 557,406	Line 62
Corrective Maintenance (PM)			
JPB	CM Station Piping Assets Outside Compressor Building	\$ 464,765	Line 32
JPG	CM Gas Processing Equipment	\$ 972,739	Line 44
JPH	CM Inside Compressor Building	\$ 2,046,112	Line 47
JPI	CM Storage/Compressor Station Support	\$ 1,511,415	Line 50
JPL	CM Power Units	\$ 274,336	Line 56
JPP	CM Storage Wells	\$ 79,467	Line 65
Operational			
JPN	Station Operations	\$ 5,955,326	Line 59

Notes:

(a) See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

Forecast Details by MAT

MAT	Program Description	2018 Recorded (Nominal \$)	2018 Recorded (Escalated to 2020 \$) ^(a)	2019 Recorded (Nominal \$)	2019 Recorded (Escalated to 2020 \$) ^(a)	2020 Recorded (Nominal \$)	2018-2020 Average (In 2020 \$)	Forecast Base	2021 Forecast Adders ^(b)	2022 Forecast Adders ^(b)	2023 Forecast Adders ^(b)	Notes
Escalation Factor									1.0228	1.0328	1.0336	(a)
JPA	PM Station Piping Assets Outside Compressor Building	\$ 593,880	\$ 621,988	\$ 1,008,748	\$ 1,028,015	\$ 1,010,311	\$ 886,771	\$ 886,771	N/A	N/A	N/A	
Forecast Total									\$ 906,990	\$ 936,739	\$ 968,213	Line 28 * Line 27
JPB	CM Station Piping Assets Outside Compressor Building	\$ 140,404	\$ 147,049	\$ 238,980	\$ 243,544	\$ 886,419	\$ 425,671	\$ 425,671	N/A	N/A	N/A	
Forecast Total									\$ 435,376	\$ 449,657	\$ 464,765	Line 31 * Line 27
JPC	PM Gas Processing Equipment	\$ 1,489,360	\$ 1,559,850	\$ 1,826,455	\$ 1,861,340	\$ 1,791,450	\$ 1,737,547	\$ 1,737,547	N/A	N/A	N/A	
Forecast Total									\$ 1,777,163	\$ 1,835,454	\$ 1,897,125	Line 34 * Line 27
JPD	PM Inside Compressor Building	\$ 1,191,481	\$ 1,247,873	\$ 1,787,558	\$ 1,821,700	\$ 1,842,668	\$ 1,637,413	\$ 1,637,413	N/A	N/A	N/A	
Forecast Total									\$ 1,674,746	\$ 1,729,678	\$ 1,787,795	Line 37 * Line 27
JPE	PM Storage/Compressor Station Support	\$ 1,683,962	\$ 1,763,662	\$ 1,477,038	\$ 1,505,249	\$ 1,709,698	\$ 1,659,536	\$ 1,659,536	\$ 406,000	\$ 419,317	\$ 433,406	Line 39
Forecast Total									\$ 2,103,374	\$ 2,172,364	\$ 2,245,356	Line 40 * Line 27 + Adders (Line 40)
JPG	CM Gas Processing Equipment	\$ 939,114	\$ 983,561	\$ 823,846	\$ 839,581	\$ 849,608	\$ 890,917	\$ 890,917	N/A	N/A	N/A	
Forecast Total									\$ 911,230	\$ 941,118	\$ 972,739	Line 43 * Line 27
JPH	CM Inside Compressor Building	\$ 934,274	\$ 978,493	\$ 2,743,155	\$ 2,795,549	\$ 1,847,963	\$ 1,874,002	\$ 1,874,002	N/A	N/A	N/A	
Forecast Total									\$ 1,916,729	\$ 1,979,598	\$ 2,046,112	Line 46 * Line 27
JPI	CM Storage/Compressor Station Support	\$ 1,593,943	\$ 1,669,383	\$ 1,600,572	\$ 1,631,143	\$ 852,316	\$ 1,384,281	\$ 1,384,281	N/A	N/A	N/A	
Forecast Total									\$ 1,415,842	\$ 1,462,282	\$ 1,511,415	Line 49 * Line 27
JPK	PM Power Units	\$ 104,236	\$ 109,170	\$ 137,489	\$ 140,115	\$ 128,724	\$ 126,003	\$ 126,003	N/A	N/A	N/A	
Forecast Total									\$ 128,876	\$ 133,103	\$ 137,575	Line 52 * Line 27
JPL	CM Power Units	\$ 279,896	\$ 293,143	\$ 303,220	\$ 309,012	\$ 151,624	\$ 251,260	\$ 251,260	N/A	N/A	N/A	
Forecast Total									\$ 256,988	\$ 265,418	\$ 274,336	Line 55 * Line 27
JPN ^(c)	Station Operations	\$ 4,837,995	\$ 5,066,973	\$ 5,376,523	\$ 5,479,214	\$ 5,816,980	\$ 5,454,389	\$ 5,454,389	N/A	N/A	N/A	
Forecast Total									\$ 5,578,749	\$ 5,761,732	\$ 5,955,326	Line 58 * Line 27
JPO	PM Storage Wells	\$ 431,745	\$ 452,179	\$ 393,575	\$ 401,092	\$ 510,519	N/A ^(b)	\$ 510,519	N/A	N/A	N/A	
Forecast Total									\$ 522,159	\$ 539,286	\$ 557,406	Line 61 * Line 27
JPP	CM Storage Wells	\$ 24,178	\$ 25,322	\$ 45,894	\$ 46,771	\$ 72,783	N/A ^(b)	\$ 72,783	N/A	N/A	N/A	
Forecast Total									\$ 74,442	\$ 76,884	\$ 79,467	Line 64 * Line 27

Notes:

(a) The escalation factors used for escalating 2018 to 2019 is 1.0277. The escalation factor used for escalating 2019 to 2020 is 1.0191. See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

(b) See Table below for forecast adders methodology. The adders are with reference to the base forecast and are full value amounts (not incremental year-over-year adders).

(c) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.

(d) Instead of a 3-year average, JPO and JPP use 2020 recorded as the foundation of the 2023 forecast because 2020 reflects the current regulations related to valve maintenance compared to prior years.

Forecast Adders**1. Additional resources - costs split between JOG and JPE**

MAT	Program Description	% Split	2021 Adder	2022 Adder	2023 Adder	Notes
Escalation Factor			1.0228	1.0328	1.0336	
JOG	PM Regulator Stations	60%	\$ 609,000	\$ 628,975	\$ 650,109	
JPE	PM Storage/Compressor Station Support	40%	\$ 406,000	\$ 419,317	\$ 433,406	(a), (b)
Total			\$ 1,015,000	\$ 1,048,292	\$ 1,083,515	

Notes:

(a) Increases in maintenance work expected in the future, this forecast estimate accounts for the additional resources that will be needed. Gas Pipeline Operations and Maintenance technicians go through a state certified 3-year apprenticeship program.

(b) This is full value adder amount, i.e. these are adders with reference to the base forecast (and not incremental year-over-year adders).

Workpaper 8-18
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Right Of Way (ROW) Maintenance
MATs JTO, JOT, and JOS Forecast Calculator

Line No.

Forecast Summary Table

MAT	Description	2023 Forecast	Note
JTO	Encroachments Structures & ROW Clean Up	\$ 1,223,006	Line 13
JOT	Routine Weed Abatement	\$ 1,477,452	Line 24
JOS	Pipeline Marker Maintenance	\$ 1,755,632	Line 35 * Line 45

Encroachments Structures & ROW Clean Up (MAT JTO) Forecast Detail

	2019 Recorded ^(a)	Escalation Factor ^(b)	2023 Forecast	Note
Encroachments Structures & ROW	\$ 580,255	1.1127	\$ 645,628	
Land (Access Roads)	\$ 518,915	1.1127	\$ 577,378	
Total	\$ 1,099,170	N/A	\$ 1,223,006	Line 11 + Line 12

Notes:

(a) Land costs were re-allocated from MAT JOK (Operate Transmission Pipelines) to MAT JTO to align costs better with work moving forward.

(b) See Exhibit (PG&E-3), Chapter 2 Workpapers for more information.

Routine Weed Abatement (MAT JOT) Forecast Detail

	2021 Forecast	Escalation Factor	2022 Forecast	Escalation Factor	2023 Forecast	Note
Routine Weed Abatement inside Facilities Perimeter or Maintenance around Facilities Border	\$ 1,294,056	3.28%	\$ 1,336,501	3.36%	\$ 1,381,382	(a)
	\$ 90,000	3.28%	\$ 92,952	3.36%	\$ 96,073	(b)
Total	\$ 1,384,056	N/A	\$ 1,429,453	N/A	\$ 1,477,455	

Notes:

(a) This work consists of routine vegetation control and herbicide applications to PG&E facilities inside the perimeter or "footprint" of the facility if unfenced to ensure weed-free conditions for site safety and line of site for gas personnel and inspectors. Forecasts are based on vendor estimates with escalation.

(b) This compliance maintenance includes: weed abatement/control, brush and flammable debris removal and hazard tree mitigation as needed to maintain a defined border extending out 100 feet around the perimeter of a facility footprint. 24 Critical facilities are treated three times a year, while smaller facilities are treated twice a year. Forecasts are based on vendor estimates with escalation.

Pipeline Marker Maintenance (MAT JOS) Forecast Detail**Historic Maintenance Performed**

MAT	2017	2018	2019	2017-2019 Average
JOS	2,525	2,623	2,018	2,389

Costs

	2017 Recorded (Nominal \$)	2018 Recorded (Nominal \$)	2019 Recorded (Nominal \$)	Note
Recorded Adjusted Costs	\$1,414,260	\$1,930,076	\$1,271,460	(a)
Maintenance Performed on Markers	2,525	2,623	2,018	Line 35
Cost per marker maintained (Nominal \$)	\$560	\$736	\$630	Line 40 ÷ Line 41
Escalation Factor	1.1828	1.1435	1.1127	(b)
Cost per marker maintained (Escalated to 2023 \$)	\$662	\$841	\$701	Line 42 * Line 43
2017-2019 Average		\$735		

Notes:

(a) Scouting and inventory charges that are not expected to be recurring costs were removed to calculate the unit cost more accurately.

(b) See Exhibit (PG&E-3), Chapter 2 Workpapers for more information.

WP Table 8-20
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 8, Operations and Maintenance
Transmission Permits and Fees
MAT JTH Forecast Calculator

Line No.

Forecast Summary Table

MAT^(a)	Program Description	2023 Forecast	Note
JTH	Permits & Fees Projects	\$ 7,624,528	Line 13

Notes:

(a) This is a non-unitized MAT.

(b) See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

Forecast Detail

MAT	Program Description	2018 Recorded (Nominal \$)	2018 Recorded (Escalated to 2020 \$)	2019 Recorded (Nominal \$)	2019 Recorded (Escalated to 2020 \$)	2020 Recorded (Nominal \$)	2018-2020 Average (In 2020 \$)	Forecast Base	2021 Adder	2022 Adder	2023 Adder	Notes
JTH	Permits & Fees Projects	\$ 6,917,476	\$ 7,244,874	\$ 6,651,603	\$ 6,778,649	\$ 6,926,031	\$ 6,983,184	\$ 6,983,184	N/A	N/A	N/A	
Total									1,0228	1,0328	1,0336	(a)
									\$ 7,142,401	\$ 7,376,672	\$ 7,624,528	Line 11 * Line 12

Notes:

(a) The escalation factors used for escalating 2018 to 2019 is 1.0277. The escalation factor used for escalating 2019 to 2020 is 1.0191. See Exhibit (PG&E-3), Chapter 2 Workpapers for escalation factors.

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 9, GAS OPERATIONS CORROSION CONTROL

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Workpaper Table 9-18
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT JOA - Forecast Calculator

Line No.**1 MAT JOA (UNIT OF MEASURE: # OF RECTIFIERS MAINTAINED)**

2 Description	Value	Note
3 2016-2020 Total Average Recorded Cost	\$160,519.45	
4 2016-2020 Total Average Recorded Units	1370.6	
5 Cost Basis for Forecast	\$117.12	Line (3)/Line (4)

6	2021 (C)	2022 (D)	2023	Note
7				
8 Escalation Factor	2.28%	3.28%	3.36%	(A)
9 Escalation Amount	\$2.67	\$3.93	\$4.16	(B)
10 Forecast Unit Cost	\$119.79	\$123.72	\$127.87	
11 Forecast Units	962	919	919	
12 Total Forecast	\$115,234.56	\$113,694.49	\$117,514.62	

14 Notes and References

15 (A) Escalation factors provided by GRC PMT

16 (B) Previous year unit cost x Escalation Factor.

17 (C) The 2021 unit cost shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

18 (D) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-19
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT JOB - Forecast Calculator

Line No.**1 MAT JOB (UNIT OF MEASURE: # OF CP MONITORING POINTS READS)**

Description	Value	Note
2016-2020 Total Average Recorded Costs	\$1,256,470.08	
2016-2020 Total Average Recorded Units	14653.6	
2016-2020 Total Average Unit Cost	\$85.74	
Cost Basis for Forecast	\$85.74	Line (3)/ Line (4)

	2021 (C)	2022 (D)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(A)
Escalation Amount	\$1.95	\$2.88	\$3.04	(B)
Forecast Unit Cost	\$87.70	\$90.58	\$93.62	
Forecast Units	17887	13674	13674	
SubTotal Forecast	\$1,568,686.09	\$1,238,540.87	\$1,280,155.85	
Forecast Units for RMU Modem Upgrades		22		(E)
Forecast Unit Cost for RMU Modem Upgrades		\$655.12		
Total Forecast for RMU Modem Upgrades		\$14,412.72		(F)
Total Forecast	\$1,568,686.09	\$1,252,953.60	\$1,280,155.85	

Notes and References

(A) Escalation factors provided by GRC PMT

(B) Previous year unit cost x Escalation Factor.

(C) The 2021 unit cost shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

(D) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

(E) Intentionally left blank in Errata

(F) Intentionally left blank in Errata

Workpaper Table 9-20
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT JOC - Forecast Calculator

Line No.

1 **MAT JOC (UNIT OF MEASURE: # OF CPA'S TROUBLESHOT)**

2	Description	Value	Note
3	2016-2020 Total Average Recorded Cost	\$523,924.87	
4	2016-2020 Total Average Recorded Units	1268	
5	Cost Basis for Forecast	\$413.19	Line (3)/Line (4)

6		2021 (C)	2022 (D)	2023	Note
7					
8	Escalation Factor	2.28%	3.28%	3.36%	(A)
9	Escalation Amount	\$9.42	\$13.86	\$14.67	(B)
10	Forecast Unit Cost	\$422.61	\$436.47	\$451.14	
11	Forecast Units	1787	1787	1787	
12	Total Forecast	\$755,205.30	\$779,976.03	\$806,183.23	

13

14

15 **Notes and References**

16 (A) Escalation factors provided by GRC PMT

17 (B) Previous year unit cost x Escalation Factor.

18 (C) The 2021 unit cost shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

19 (D) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-21
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT JOQ - Forecast Calculator

Line No.

1 **MAT JOQ (UNIT OF MEASURE: # OF CORRECTIVE WORK ORDERS COMPLETED)**

Description	Value	Note
2016-2020 Total Average Recorded Cost	\$395,293.85	
2016-2020 Total Average Recorded Units	393.6	
Cost Basis for Forecast	\$1,004.30	Line (3)/Line (4)

	2021 (C)	2022 (D)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(A)
Escalation Amount	\$22.90	\$33.69	\$35.65	(B)
Forecast Unit Cost	\$1,027.20	\$1,060.89	\$1,096.54	
Forecast Units	324	324	324	
Total Forecast	\$332,813.32	\$343,729.60	\$355,278.91	

Notes and References

(A) Escalation factors provided by GRC PMT

(B) Previous year unit cost x Escalation Factor.

(C) The 2021 unit cost shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

(D) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-22
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT JOZ - Forecast Calculator

Line No.**1 MAT JOZ (UNIT OF MEASURE: # OF SPANS PATROLLED)**

2 Description	Value	Note
3 2020 Recorded Cost	\$107,786.00	(E)
4 2020 Recorded Units	117	
5 Cost Basis for Forecast	\$921.25	Line (3)/ Line (4)

7	2021 (C)	2022 (D)	2023	Note
8 Escalation Factor	2.28%	3.28%	3.36%	(A)
9 Escalation Amount	\$21.00	\$30.91	\$32.70	(B)
11 Forecast Unit Cost	\$942.25	\$973.16	\$1,005.86	
12 Forecast Units	690	313	487	
13 Total Forecast	\$650,154.10	\$304,598.51	\$489,852.02	

15 Notes and References

16 (A) Escalation factors provided by GRC PMT

17 (B) Previous year unit cost x Escalation Factor.

18 (C) The 2021 unit cost shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

19 (D) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

20 (E) Historical costs were not used as this work was previously being worked under MAT JOB.

Workpaper Table 9-23
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJA - Forecast Calculator

Line No.

1 MAT GJA (Electric Poles/Towers Investigated)

2	Line	Description	Value	Notes and References
3	3	2016/2019 Total Cost (In 2020 Dollars)	\$2,471,982.72	(A)
4	4	2016/2019 Total Units	1481.00	(B)
5	5	Cost Basis for Forecast	\$1,669.13	Line (3) / Line (4)

6		2021 (F)	2022 (G)	2023	Note
8	Escalation Factor	2.28%	3.28%	3.36%	(C)
9	Escalation Amount	\$38.06	\$56.00	\$59.24	(D)
10	Forecast Unit Cost	\$1,707.19	\$1,763.18	\$1,822.43	(E)
11	Forecast Units	765	300	300	(H)
12	Total Forecast	\$1,305,998.04	\$528,954.82	\$546,727.70	

14 Notes and References

(A) PG&E forecast costs for this workstream using contract costs from vendors that performed the work. PG&E took the total cost divided by total units from 2016 and total units from 2019. PG&E used two years of historical data (2016 and 2019) due to 2017 and 2018 being excluded. This was due to a low volume of work being completed in those years which resulted in an inaccurate unit cost for this typical style of project. 2016 and 2019 are more representative of what is typically seen in this program.

(B) Intentionally left blank in Errata

(C) Escalation factors provided by GRC PMT.

(D) Previous year unit cost x Escalation Factor.

(E) Previous year unit cost + Escalation Amount.

(F) The 2021 total forecast are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

(G) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

(H) Unit forecast based on engineer estimate

24 MAT GJA (Electric Poles/Mitigated)

25	Line	Description	Value	Notes and References
26	26	2016 Recorded Total Cost (In 2020 Dollars)	\$107,741.57	(I)
27	27	2016 Recorded Total Units	5	(J)
28	28	Cost Basis for Forecast	\$21,548.31	Line (26) / Line (27)

30		2021 (N)	2022 (O)	2023	Note
31	Escalation Factor	2.28%	3.28%	3.36%	(K)
32	Escalation Amount	\$491.30	\$722.90	\$764.82	(L)
33	Forecast Unit Cost	\$22,039.62	\$22,762.51	\$23,527.34	(M)
34	Forecast Units	6	20	25	(P)
35	Total Forecast	\$132,237.69	\$455,250.30	\$588,183.39	

Workpaper Table 9-23
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJA - Forecast Calculator

Line No.

36

37

Notes and References

38

(I) There is little historical data due to the program starting with investigations and then transition into the mitigation phase starting in 2021. The PG&E forecast for Arc Fault Mitigation at electric poles and towers co-located with gas facilities is based on the average cost of mitigations that PG&E completed in 2016 with escalation rates applied.

39

(J) Intentionally left blank in Errata

40

(K) Escalation factors provided by GRC PMT.

41

(L) Previous year unit cost x Escalation Factor.

42

(M) Previous year unit cost + Escalation Amount.

43

(N) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

44

(O) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

45

(P) Unit forecast based on an engineer estimate of 25 units per year requiring remediation

46

47

MAT GJA (AC Induced Investigations)

48

Line	Description	Value	Notes and References
49	2016 -2019 Total Cost (In 2020 Dollars)	\$646,267.46	(Q)
50	2016 -2019 Total Units	8.00	(R)
51	Cost Basis for Forecast	\$80,783.43	Line (49) / Line (50)

52

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	2021 (V)	2022 (W)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(S)
Escalation Amount	\$1,841.86	\$2,710.11	\$2,867.27	(T)
Forecast Unit Cost	\$82,625.29	\$85,335.40	\$88,202.67	(U)
Forecast Units	2	7	4	(X)
Total Forecast	\$165,250.59	\$597,347.83	\$352,810.69	

59

60

Notes and References

61

(Q) PG&E forecast costs for this workstream using contract costs from vendors who performed work. PG&E took the four-year average from 2016-2019

62

(R) Intentionally left blank in Errata

63

(S) Escalation factors provided by GRC PMT.

64

(T) Previous year unit cost x Escalation Factor.

65

(U) Previous year unit cost + Escalation Amount.

66

(V) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts

67

(W) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

68

(X) Unit forecast based on program lead estimate

69

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	2021	2022	2023	Note
Total Forecast	\$1,603,486	\$1,581,553	\$1,487,722	Line (12) + Line (35) + Line (58)

71

Workpaper Table 9-24
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJB - Forecast Calculator

Line No.**1 MAT GJB (Atmospheric Corrosion Mitigation)**

2 Line	Description	Value	Note
3 3	2020 Average Cost	\$35,500.00	(A)
4 4	Adjustments to Forecast Basis	\$0	
5 5	Cost Basis for Forecast	\$35,500.00	Line (1) + Line (2)

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	2021 (E)	2022 (F)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(B)
Escalation Amount	\$809.40	\$1,190.95	\$1,260.01	(C)
Forecast Unit Cost	\$36,309.40	\$37,500.35	\$38,760.36	(D)
Forecast Units	306	124	94	
Total Forecast	\$11,110,676.40	\$4,650,043.19	\$3,643,473.84	

Notes and References

15

(A) PG&E utilized the 2020 average cost which accounts for cost increases in Topock, Hinkley and Kettleman regions where PG&E expects the work to be more expensive due to costly permitting and additional equipment being required to complete the mitigations.

16

(B) Escalation factors provided by GRC PMT.

17

(C) Previous year unit cost x Escalation Factor.

18

(D) Previous year unit cost + Escalation Amount.

19

(E) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit

20

(F) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-25
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJC - Forecast Calculator

Line No.**MAT GJC (Bonds, Insulators, and other CP Expenses (Non-Unitized))**

Line	Description	Value	Notes and References
3	2019 Recorded Cost	\$247,534.73	(A)
4	Adjustments to Forecast Basis	\$4,727.91	(B)
5	Cost Basis for Forecast	\$252,262.64	Line (4) + Line (5)

	2021 (F)	2022 (G)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(C)
Escalation Amount	\$5,751.59	\$8,462.87	\$8,953.63	(D)
Forecast Unit Cost	\$258,014.23	\$266,477.10	\$275,430.73	(E)
Forecast Units	1	1	1	
Total Forecast	\$258,014.23	\$266,477.10	\$275,430.73	

Notes and References

(A) PG&E calculated a unit cost using 2019 actuals and applying escalation factors for the following years due to 2019 having no Enhanced CP Criterion costs thus utilizing a more accurate representation of what future costs will look like once that program is complete.

(B) Added 2020 escalation amount (1.91%)

(C) Escalation factors provided by GRC PMT.

(D) Previous year unit cost x Escalation Factor.

(E) Previous year unit cost + Escalation Amount.

(F) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(G) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJC (RMU Covered by Service Fees)

Line	Description	Value (H)	Notes and References
25	2020 Service Fee per RMU	\$96.00	
26	2021 Service Fee per RMU	\$120.00	(I)
27	Adjustments to Forecast Basis	\$0.00	
28	Cost Basis for Forecast	\$120.00	Line (25) + Line (26)

	2021 (K)	2022 (L)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	
Escalation Amount	\$0	\$0	\$0	(J)
Forecast Unit Cost	\$120.00	\$120.00	\$120.00	
Forecast Unit	970	1,000	1,000	(M)
Total Forecast	\$116,400.00	\$120,000.00	\$120,000.00	

Notes and References

(H) Cost estimates provided by Elecsys for 2019-2023

(I) Cost will increase from \$96 to \$120 in 2021 due to new contract agreement

(J) No escalation amounts due to contracted price agreement

(K) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(L) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

(M) Forecast units are the current amount of RMUs in the system with additional forecast to grow to 1,000 total in 2022 and 2023.

	2021	2022	2023	Note
Total Forecast	\$374,414	\$386,477	\$395,431	Line (12) + Line (35)

Workpaper Table 9-26
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJD - Forecast Calculator

Line No.**MAT GJD (Test Stations)**

Line	Description	Value	Notes and References
3	2019 Recorded Unit Cost	\$21,364.75	(A)
4	Adjustments to Forecast Basis	\$408.07	(B)
5	Cost Basis for Forecast	\$21,772.82	Line (3) + Line (4)

	2021 (F)	2022 (G)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(C)
Escalation Amount	\$496.42	\$730.43	\$772.79	(D)
Forecast Unit Cost	\$22,269.24	\$22,999.67	\$23,772.46	(E)
Forecast Units	3	10	10	
Total Forecast	\$66,807.71	\$229,996.68	\$237,724.57	

Notes and References

(A) PG&E calculated unit cost based on the 2019 actuals of completed projects as this was more representative of a typical project in this program.

(B) Added 2020 escalation amount (1.91%)

(C) Escalation factors provided by GRC PMT.

(D) Previous year unit cost x Escalation Factor.

(E) Previous year unit cost + Escalation Amount.

(F) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(G) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-27
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJE - Forecast Calculator

Line No.

MAT GJE (CIS – Miles Surveyed)

Line	Description	Value	Notes and References
3	2016 -2019 Total Cost (In 2020 Dollars)	\$13,620,211.12	(A)
4	2016 -2019 Total Units	1784.20	
5	Cost Basis for Forecast	\$7,633.79	Line (3) / Line (4)

	2021 (E)	2022 (F)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(B)
Escalation Amount	\$174.05	\$256.10	\$270.95	(C)
Forecast Unit Cost	\$7,807.84	\$8,063.94	\$8,334.89	(D)
Forecast Units	457.6	450	450	
Total Forecast	\$3,572,868.56	\$3,628,772.71	\$3,750,699.47	

Notes and References

- (A) PG&E took a four-year average from 2016-2019.
 (B) Escalation factors provided by GRC PMT.
 (C) Previous year unit cost x Escalation Factor.
 (D) Previous year unit cost + Escalation Amount.
 (E) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.
 (F) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJE (Digs Excavations)

Line	Description	Value	Note
25	ECDA Cost Estimate for Similar Work	\$220,000	(G)
26	Cost Basis for Forecast	\$220,000	

	2021 (K)	2022 (L)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(H)
Escalation Amount	\$5,016.00	\$7,380.52	\$7,808.52	(I)
Forecast Unit Cost	\$225,016.00	\$232,396.52	\$240,205.05	(J)
Forecast Units	1	1	1	
Total Forecast	\$225,016.00	\$232,396.52	\$240,205.05	

Notes and References

- (G) PG&E utilized a cost estimate provided by Digs workstream since no excavations have been performed in this workstream before.
 (H) Escalation factors provided by GRC PMT.
 (I) Previous year unit cost x Escalation Factor.
 (J) Previous year unit cost + Escalation Amount.
 (K) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.
 (L) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

	2021	2022	2023	Note
Total Forecast	\$3,797,885	\$3,861,169	\$3,990,905	Line (12) + Line (33)

Workpaper Table 9-28
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJF - Forecast Calculator

Line No.**1 MAT GJF (DC Investigations, Non-Unitized)**

2 Line	Description	Value	Notes and References
3 3	2020 Recorded Cost	\$696,560.17	(A)
4 4	Adjustments to Forecast Basis	\$0.00	
5 5	Cost Basis for Forecast	\$696,560.17	Line (3) + Line (4)

6					
7		2021 (E)	2022 (F)	2023	Note
8	Escalation Factor	2.28%	3.28%	3.36%	(B)
9	Escalation Amount	\$15,881.57	\$23,368.09	\$24,723.21	(C)
10	Forecast Unit Cost	\$712,441.74	\$735,809.83	\$760,533.04	(D)
11	Forecast Units	1	1	1	
12	Total Forecast	\$712,441.74	\$735,809.83	\$760,533.04	

14 Notes and References

- 15** (A) PG&E used 2020 recorded cost plus escalation factors to forecast 2021-2023.
- 16** (B) Escalation factors provided by GRC PMT.
- 17** (C) Previous year unit cost x Escalation Factor.
- 18** (D) Previous year unit cost + Escalation Amount.
- 19** (E) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.
- 20** (F) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Corrected Workpaper Table 9-29
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJH - Forecast Calculator

Line No.

1 MAT GJH (IC Investigations (Digs))

2	Line	Description	Value	Note
3	3	ICDA Cost Estimate for Similar Work	\$333,125	(A)
4	4	Adjustments to Forecast Basis	\$0	
5	5	Cost Basis for Forecast	\$333,125	Line (3) + Line (4)

7		2021 (E)	2022 (F)	2023	Note
8	Escalation Factor	2.28%	3.28%	3.36%	(B)
9	Escalation Amount	\$7,595.25	\$11,175.62	\$11,823.70	(C)
10	Forecast Unit Cost	\$340,720.25	\$351,895.87	\$363,719.58	(D)
11	Forecast Units	3	3	3	
12	Total Forecast	\$1,022,160.75	\$1,055,687.62	\$1,091,158.73	

14 Notes and References

- 15 (A) PG&E is using the 2020 Internal Corrosion dig unit cost (\$333,125 / dig).
16 (B) Escalation factors provided by GRC PMT.
17 (C) Previous year unit cost x Escalation Factor.
18 (D) Previous year unit cost + Escalation Amount.
19 (E) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.
20 (F) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

22 MAT GJH (IC Non-Destructive Examinations)

23	Line	Description	Value	Note
24	24	2020 Recorded Costs	\$155,548.00	(G)
25	25	2020 Recorded Units	15.00	
26	26	2020 Unit Cost	\$10,369.87	Line (24) / Line (25)

28		2021 (L)	2022 (M)	2023	Note
29	Escalation Factor	2.28%	3.28%	3.36%	(H)
30	Escalation Amount	\$236.43	\$347.89	\$368.061	(I)
31	Forecast Unit Cost	\$10,606.30	\$10,954.19	\$11,322.25	(J)
32	Forecast Units	15	5	5	(K)
33	Total Forecast	\$159,094.49	\$54,770.93	\$56,611.23	

35 Notes and References

- 36 (G) Slow start to program due to a key vacancy on the IC team which led to a lack of historical costs prior to 2020. PG&E forecast costs for this workstream using 2020 average unit costs.
37 (H) Escalation factors provided by GRC PMT.
38 (I) Previous year unit cost x Escalation Factor.
39 (J) Previous year unit cost + Escalation Amount.
40 (K) End of 2021 is when PG&E will finish assessment then PG&E will do a fraction each year based on the initial assessment
41 (L) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.
42 (M) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJH (IC Equipment Monitoring (Coupon/Sensor/ER Probe))

Line	Description	Value	Note
46	IC Equipment Monitoring (Coupon/Sensor/ER Probe) Cost Per Year	\$60,000	(N)
47	2020 Recorded Units	932	
48	Average Unit Cost	\$64.38	Line (47) / Line (48)
49	Adjustments to Forecast Basis	\$0	
50	Cost Basis for Forecast	\$64.38	Line (48) + Line (49)

	2021 (R)	2022 (S)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(O)
Escalation Amount	\$1.47	\$2.16	\$2.28	(P)
Forecast Unit Cost	\$65.85	\$68.01	\$70.29	(Q)
Forecast Units	1,254	1,374	1,404	
Total Forecast	\$82,570.25	\$93,439.18	\$98,687.44	

Notes and References

(N) ATS charges \$10k bi-monthly for all reads. This will be approximately \$60K per year based on contractor cost estimates.

(O) Escalation factors provided by GRC PMT.

(P) Previous year unit cost x Escalation Factor.

(Q) Previous year unit cost + Escalation Amount.

(R) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(S) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJH (Inline Cleaning)

Line	Description	Value	Note
69	2021 Inline Cleaning Estimate Cost	\$500,000	(T)
70	Adjustments to Forecast Basis	\$0	
71	Cost Basis for Forecast	\$500,000	Line (69) + Line (70)

	2022 (Z)	2023	Note
Escalation Factor	3.28%	3.36%	(U)
Escalation Amount	\$56,347.84 (X)	\$35,493.29	(V)
Forecast Unit Cost	\$1,056,348 (Y)	\$1,091,841	(W)
Forecast Units	1	1	
Total Forecast	\$1,056,348	\$1,091,841	

Notes and References

(T) Based on engineer estimate due to lack of historical data and slow start to program from key vacancy on IC team; note that the cost estimates of 2021 were half of 2022-2023 due to the timing of larger, more complex projects (i.e. cleaning more total lines in one project).

(U) Escalation factors provided by GRC PMT.

(V) Previous year unit cost x Escalation Factor.

(W) Previous year unit cost + Escalation Amount.

(X) Escalation amount of 2020 and 2021 were used

(Y) Cost estimate increased due to timing of larger, more complex cleaning projects (cleaning more total lines per project)

(Z) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJH (IC Liquids Monitoring (Drip, ILI, EFS))

Line	Description	Value	Note
91	IC Liquids Monitoring Cost Estimate	\$675.00	(AA)
92	Adjustments to Forecast Basis	\$0	
93	Cost Basis for Forecast	\$675.00	Line (91) + Line (92)

	2021 (EE)	2022 (FF)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(BB)
Escalation Amount	\$15.39	\$22.64	\$23.96	(CC)
Forecast Unit Cost	\$690.39	\$713.03	\$736.99	(DD)
Forecast Units	1,100	1,200	1,300	
Total Forecast	\$759,429.00	\$855,641.75	\$958,090.59	

Notes and References

(AA) Slow start to program due to a key vacancy on the IC team which led to a lack of historical costs. PG&E forecast costs for this workstream using engineer costs estimates.

(BB) Escalation factors provided by GRC PMT.

(CC) Previous year unit cost x Escalation Factor.

(DD) Previous year unit cost + Escalation Amount.

(EE) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(FF) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

MAT GJH (IC Equipment Monitoring Installations (Coupon/Sensor/ER Probe))

Line	Description	Value	Note
112	IC Equipment Monitoring Installations Forecast Cost Estimate Per Unit	\$ 134,000	(GG)
113	Adjustments to Forecast Basis	\$ (59,000)	
114	Cost Basis for Forecast	\$ 75,000	Line (112) + Line (113)

	2021 (KK)	2022 (LL)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(HH)
Escalation Amount	\$1,710.00	\$2,516.09	\$2,662.00	(II)
Forecast Unit Cost	\$76,710	\$79,226	\$81,888	(JJ)
Forecast Units	30	30	30	
Total Forecast	\$2,301,300.00	\$2,376,782.64	\$2,456,642.54	

Notes and References

(GG) Representative projects have shown an average forecast unit cost of approximately \$134k per unit. Moving forward PG&E plans to combine this work with existing projects, and we believe that a \$75k unit cost is achievable for this work.

(HH) Escalation factors provided by GRC PMT.

(II) Previous year unit cost x Escalation Factor.

(JJ) Previous year unit cost + Escalation Amount.

(KK) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

(LL) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

	2021	2022	2023	Note
Total Forecast	\$4,824,554	\$5,492,670	\$5,753,032	Line (12) + Line (33) + Line (57) + Line (78) + Line (100) + Line (121)

Workpaper Table 9-30
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJJ - Forecast Calculator

Line No.**1 MAT GJJ (Investigations (Non-Unitized))**

2 Line	Description	Value	Notes and References
3 3	2021 Forecast Cost	\$256,375.00	(A)
4 4	Adjustments to Forecast Basis	\$0.00	
5 5	Cost Basis for Forecast	\$256,375.00	Line (3) + Line (4)

	2021	2022 (E)	2023	Note
8 Escalation Factor	2.28%	3.28%	3.36%	(B)
9 Escalation Amount	\$0	\$8,409.10	\$8,896.75	(C)
10 Forecast Unit Cost	\$256,375.00	\$264,784.10	\$273,680.85	(D)
11 Forecast Units	1	1	1	
12 Total Forecast	\$256,375.00	\$264,784.10	\$273,680.85	

Notes and References

(A) Due to completion of the Enhanced CP Criterion program, historical costs were high which would have led to an inaccurate forecast if PG&E used historical data to determine future costs since cost is going down over time. PG&E instead used an engineering estimate to forecast this MAT. The average four year spend (2016-2019) was \$1,985,467.04 which PG&E can reduce to \$256,375 per year starting in 2021 due to completion of the Enhanced CP Criterion program.

(B) Escalation factors provided by GRC PMT.

(C) Previous year unit cost x Escalation Factor.

(D) Previous year unit cost + Escalation Amount.

(E) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-31
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJK - Forecast Calculator

Line No.**1 MAT GJK (Corrosion – Other, Non-Unitized)**

2	Line	Description	Value	Notes and References
3	3	2020 Recorded Cost	\$2,488,746.27	(A)
4	4	Adjustments to Forecast Basis	\$0.00	
5	5	Cost Basis for Forecast	\$2,488,746.27	Line (3) + Line (4)

6		2021	2022 (B)	2023	Note
7					
8	Escalation Factor	2.28%	3.28%	3.36%	(C)
9	Escalation Amount	\$56,743.41	\$83,492.06	\$88,333.79	(D)
10	Forecast Unit Cost	\$2,545,489.68	\$2,628,981.75	\$2,717,315.53	(E)
11	Forecast Units	1	1	1	
12	Total Forecast	\$2,545,489.68	\$2,628,981.75	\$2,717,315.53	

13

14 Notes and References

- 15 (A) PG&E used 2020 recorded cost plus escalation factors to forecast 2021-2023.
- 16 (B) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.
- 17 (C) Escalation factors provided by GRC PMT.
- 18 (D) Previous year unit cost x Escalation Factor.
- 19 (E) Previous year unit cost + Escalation Amount.

Workpaper Table 9-32
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJM - Forecast Calculator

Line No.

1 **MAT GJM (Contacted Casing Remediation)**

2	Line	Description	Value	Notes and References
3	3	2016 -2019 Total Cost (In 2020 Dollars)	\$29,134,209.27	(A)
4	4	2016 -2019 Total Units	45.00	
5	5	Cost Basis for Forecast	\$647,426.87	Line (3) / Line (4)

6		2021 (E)	2022 (F)	2023	Note
7					
8	Escalation Factor	2.28%	3.28%	3.36%	(B)
9	Escalation Amount	\$14,761.33	\$21,719.77	\$22,979.31	(C)
10	Forecast Unit Cost	\$662,188.21	\$683,907.98	\$706,887.29	(D)
11	Forecast Units	4	4	4	
12	Total Forecast	\$2,648,752.82	\$2,735,631.91	\$2,827,549.15	

13
14
15 **Notes and References**

16 (A) Unit cost per year reflects actual units divided by total cost of those projects (Excludes cancelled projects and outliers). PG&E took the four-year average from 2016-2019.

17 (B) Escalation factors provided by GRC PMT.

18 (C) Previous year unit cost x Escalation Factor.

19 (D) Previous year unit cost + Escalation Amount.

20 (E) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

21 (F) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

22
23 **MAT GJM (Casing Test Stations)**

24	Line	Description	Value	Notes and References
25	25	2017/2019 Total Cost (In 2020 Dollars)	\$450,662.89	(G)
26	26	2017/2019 Total Units	3.00	
27	27	Cost Basis for Forecast	\$150,220.96	Line (25) / Line (26)

31		2021 (K)	2022 (L)	2023	Note
32					
33	Escalation Factor	2.28%	3.28%	3.36%	(H)
34	Escalation Amount	\$3,425.04	\$5,039.59	\$5,331.84	(I)
35	Forecast Unit Cost	\$153,646.00	\$158,685.59	\$164,017.43	(J)
36	Forecast Units	9	6	6	
37	Total Forecast	\$1,382,814.01	\$952,113.54	\$984,104.55	

38 **Notes and References**

39 (G) Unit cost per year reflects actual units divided by total cost of those projects (Excludes cancelled projects and outliers). PG&E took the average of 2017 and 2019 then escalated to 2020 base year. No test stations were installed in 2016 and 2018 thus those years were excluded from unit cost basis.

40 (H) Escalation factors provided by GRC PMT.

41 (I) Previous year unit cost x Escalation Factor.

42 (J) Previous year unit cost + Escalation Amount.

43 (K) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

44 (L) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

Workpaper Table 9-32
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 9, Corrosion Control
MAT GJM - Forecast Calculator

Line No.

45

46

MAT GJM (Leak Surveys Performed on Cased Crossings)

47

Line	Description	Value	Note
48	Gas Leak Survey Cost Estimate	\$243.00	(M)
49	Adjustments to Forecast Basis	\$4.64	(T)
50	Cost Basis for Forecast	\$247.64	Line (48) + Line (49)

51

52

	2021 (Q)	2022 (R)	2023	Note
Escalation Factor	2.28%	3.28%	3.36%	(N)
Escalation Amount	\$5.65	\$8.31	\$8.790	(O)
Forecast Unit Cost	\$253.29	\$261.60	\$270.38	(P)
Forecast Units	828	1,065	1,171	(S)
Total Forecast	\$209,722.07	\$278,599.05	\$316,620.78	

58

59

Notes and References

60

(M) Based on cost estimate from leak survey department for average cased crossings due to historic costs being charged to another MAT code.

61

(N) Escalation factors provided by GRC PMT.

62

(O) Previous year unit cost x Escalation Factor.

63

(P) Previous year unit cost + Escalation Amount.

64

(Q) The 2021 total forecast shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

65

(R) PG&E's 2022 forecast has yet to be finalized as the 2022 budget. See Exhibit (PG&E-1), Chapter 2 and Exhibit (PG&E-2), Chapter 3 for further information about the 2023 GRC forecast process.

66

(S) PG&E forecasts completion of 1,171 contacted casing leak surveys in 2023 based on a 2020 population of approximately 250 contacted casings that require quarterly leak monitoring with a 10 percent growth rate based on historic trends.

67

(T) Added 2020 escalation amount

68

	2021	2022	2023	Note
Total Forecast	\$4,241,289	\$3,966,345	\$4,128,274	Line (12) + Line (36) + Line (57)

69

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 10, GAS OPERATIONS LEAK MANAGEMENT

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MAT JOE - Ground Leak Survey - Unit Cost Forecast	WP 10-69
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MAT JOW - Aerial Leak Survey - Unit Cost Forecast	WP 10-73
MAT JPQ - CARB Leak Survey - Unit Cost Forecast	WP 10-75
MAT JPR - CARB Leak Repair - Unit Cost Forecast	WP 10-76

Table 10-58
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 10, Leak Management
Workpapers Supporting Chapter 10 Forecast
MAT JOE - Ground Leak Survey - Unit Cost Forecast

Line

1

MAT JOE (UNIT OF MEASURE: MILES SURVEYED)

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Description	Value	Notes and References		
2020 Recorded Cost	\$895,269.01	(A)		
2020 Recorded Units	444			
2020 Average Unit Cost	\$2,016.37	Line 3/Line 4		
2020 Adjustments to Forecast Basis	\$0.00	(B)		
Cost Basis for Forecast	\$2,016.37	Line 5 + Line 6		

	2021	2022	2023	Notes and References
Escalation Factor	2.24%	3.28%	3.36%	(C)
Escalation Amount	\$45.17	\$67.62	\$71.54	(D)
Forecast Unit Cost	\$2,061.54	\$2,129.16	\$2,200.70	(E)
Forecast Units	440	440	440	WP 10-70, Line 1
Forecast Total Cost	\$907,076.88	\$936,829.00	\$968,306.46	Line 12 * Line 13

Notes:

(A) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.

(B) No adjustments were made to the forecast basis.

(C) See Exhibit (PG&E-3), Chapter 2.

(D) Previous year unit cost x Escalation Factor.

(E) Previous year unit cost + Escalation Amount.

(F) Line 12, Column C-E values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

Table 10-60
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 10, Leak Management
Workpapers Supporting Chapter 10 Forecast
MAT JOR - Transmission Leak Rechecks - Unit Cost Forecast

Line	MAT JOR (UNIT OF MEASURE: # OF RECHECKS PERFORMED)				
	Description	Value	Notes and References	2022	2023
1	2020 Recorded Cost	\$229,066.07	(A)		
2	2020 Recorded Units	2,818			
3	2020 Average Unit Cost	\$81.29	Line 3/Line 4		
4	2020 Adjustments to Forecast Basis	\$0.00	(B)		
5	Cost Basis for Forecast	\$81.29	Line 5 + Line 6		
6					
7					
8					
9					
10	Escalation Factor	-	3.28%		3.36%
11	Escalation Amount	-	\$3.00		\$2.96
12	Forecast Unit Cost	\$85.00	\$88.00		\$90.96
13	Forecast Units	2,816	2,816		2,816
14	Forecast Total Cost	\$239,360.00	\$247,808.00		\$256,134.35
15					
16	Notes:				
17	(A) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.				
18	(B) No adjustments were made to the forecast basis.				
19	(C) See Exhibit (PG&E-3), Chapter 2.				
20	(D) Previous year unit cost x Escalation Factor.				
21	(E) Previous year unit cost + Escalation Amount.				
22	(F) 2021 unit cost forecast was originally \$155. As part of an internal, leadership driven affordability challenge, the unit cost was reduced to \$85. It used 2020 actuals as the base with an additional buffer.				

Table 10-62
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 10, Leak Management
Workpapers Supporting Chapter 10 Forecast
MAT JOW - Aerial Leak Survey - Unit Cost Forecast

Line

MAT JOW (UNIT OF MEASURE: MILES SURVEYED)

Description	Value	Notes and References
2020 Recorded Cost	\$1,454,729.27	(A), (F)
2020 Recorded Units	12,832	
2020 Average Unit Cost	\$113.37	Line 3/Line 4
2020 Adjustments to Forecast Basis	-\$198,408.46	(B)
Cost Basis for Forecast	\$128.83	Line 5 + Line 6

	2021 (F)	2022	2023	Notes and References
Escalation Factor	-	3.28%	3.36%	(C)
Escalation Amount	-	\$5.81	\$6.15	(D)
Forecast Unit Cost	\$177.11	\$182.91	\$189.06	(E)
Forecast Units	12,807	12,807	12,807	WP 10-74, Line 1
Forecast Total Cost	\$2,268,186.00	\$2,342,582.50	\$2,421,293.27	Line 12 * Line 13

Notes:

- (A) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.
- (B) In 2020, MAT JOW started with a \$0.2M negative balance due to a double accrual error.
- (C) See Exhibit (PG&E-3), Chapter 2.
- (D) Previous year unit cost x Escalation Factor.
- (E) Previous year unit cost + Escalation Amount.
- (F) 2021 forecast is based on vendor invoice. 2020 recorded costs are shown for comparison only.
- (G) Line 12, Column D and E values vary from the values listed in the Standard Workpapers and Results of Operations (RO) Model due to errata. These amounts do not align to the RO Model provided to the Public Advocates Office at the time of filing. The RO will be updated to incorporate these errata with the Joint Comparison Exhibit submittal.

Table 10-64
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 10, Leak Management
Workpapers Supporting Chapter 10 Forecast
MAT JPQ - CARB Leak Survey - Unit Cost Forecast

Line

MAT JPQ (UNIT OF MEASURE: NON-UNITIZED)

Description	Value	Notes and References
2020 Recorded Cost	\$2,961,979.41	(A)
2020 Recorded Units	1	
2020 Average Unit Cost	\$2,961,979.41	Line 3/Line 4
2020 Adjustments to Forecast Basis	\$0.00	(B)
Cost Basis for Forecast	\$2,961,979.41	Line 5 + Line 6

	2021	2022	2023	Notes and References
Escalation Factor	-	3.28%	3.36%	(C)
Escalation Amount	-	\$97,152.50	\$102,786.83	(D)
Forecast Unit Cost	\$2,961,979.41	\$3,059,131.91	\$3,161,918.74	(E)

Notes:

- (A) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.
- (B) No adjustments were made to the forecast basis.
- (C) See Exhibit (PG&E-3), Chapter 2.
- (D) Previous year unit cost x Escalation Factor.
- (E) Previous year unit cost + Escalation Amount.

Table 10-65
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit (PG&E-3), Chapter 10, Leak Management
Workpapers Supporting Chapter 10 Forecast
MAT JPR - CARB Leak Repair - Unit Cost Forecast

Line

MAT JPR (UNIT OF MEASURE: NON-UNITIZED)

Description	Value	Notes and References
2018 Recorded Cost	\$1,114,264.17	(A)
2019 Recorded Cost	\$922,323.48	(A)
2020 Recorded Cost	\$1,744,096.57	(A)
2020 Recorded Units	1	
Average Unit Cost	\$1,260,228.07	(Sum of Line 3, Line 4, Line 5/3)/Line 6
2020 Adjustments to Forecast Basis	\$1,000,000.00	(B)
Cost Basis for Forecast	\$2,260,228.07	Line 7 + Line 8

2021 (F)	2022	2023	Notes and References
Escalation Factor	2.24%	3.36%	(C)
Escalation Amount	\$50,629.11	\$80,193.04	(D)
Forecast Unit Cost	\$2,310,900.00	\$2,466,890.56	(E)

Notes:

- (A) The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.
- (B) Adjustments made to the forecast basis to account for additional funding needed for GPOM resources to support CARB leak repairs.
- (C) See Exhibit (PG&E-3), Chapter 2.
- (D) Previous year unit cost x Escalation Factor.
- (E) Previous year unit cost + Escalation Amount.
- (F) The 2021 unit costs shown are for illustrative purposes only to demonstrate the unit cost methodology and do not tie to the 2021 forecast amounts.

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 11, GAS SYSTEM OPERATIONS

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Electric Power for Compressor Fuel and Other Electric Equipment - MAT CMB	WP 11-16

Worksheet Table 11-14
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 3, Chapter 11, Gas System Operations
Cost Forecast Worksheets Supporting Chapter 11 Forecast
MAT AH4 - Gill Ranch Storage Expense

Line

1 **MAT AH4 - Gill Ranch Storage Expense - (Unit of Measure: Non-Unitized)**

2 **Cost Estimating Methodology:** MAT AH4 was forecast using 2020 recorded costs plus escalation to 2023.

Description	Value	Note
2020 Recorded Cost	\$ 2,811,606	(A)
2020 Recorded Units	1	(A)
2020 Average Unit Cost	\$ 2,811,606	Line 4 / 5
Cost Basis for Forecast	\$ 2,811,606	Line 6

	2021 ^(E)	2022 ^(E)	2023	Note
Escalation Factor	2.101%	3.201%	3.254%	(B)
Escalation Amount	\$ 59,065	\$ 91,902	\$ 96,391	(C)
Forecast Unit Cost	\$ 2,870,671	\$ 2,962,573	\$ 3,058,964	(D)

Notes

- (A) See Exhibit (PG&E-3), Chapter 11, WP 11-5.
 (B) Escalation rates are based on the Gas Storage expense composite rate.
 (C) Previous year unit cost x Escalation Factor.
 (D) Previous year unit cost + Escalation amount.
 (E) The 2021 and 2022 forecast presented is for illustrative escalation purposes only and does not necessarily reflect the 2021 or 2022 forecast.

Workpaper Table 11-16
 Pacific Gas and Electric Company
 2023 General Rate Case
 Exhibit 3, Chapter 11, Gas System Operations
 Cost Forecast Workpapers Supporting Chapter 11 Forecast
 MAT CMB - Electric Power for Compressor Fuel and Other Electric Equipment

Line

1 **MAT CMB - Electric Power for Compressor Fuel and Other Electric Equipment - (Unit of Measure: Non-Unitized)**

2 **Cost Estimating Methodology:** MAT CMB was forecast using 2020 recorded costs plus escalation to 2023.

Description	Value	Note
2020 Recorded Cost	\$ 27,014,504	(A)
2020 Recorded Units	1	(A)
2020 Average Unit Cost	\$ 27,014,504	Line 4 / 5
Cost Basis for Forecast	\$ 27,014,504	Line 6

	2021 ^(E)	2022 ^(E)	2023	Note
Escalation Factor	2.284%	3.280%	3.358%	(B)
Escalation Amount	\$ 616,893	\$ 906,239	\$ 958,319	(C)
Forecast Unit Cost	\$ 27,631,397	\$ 28,537,636	\$ 29,495,955	(D)

Notes

- 12 (A) See Exhibit (PG&E-3), Chapter 11, WP 11-5.
- 13 (B) Escalation rates are based on the Gas Transmission expense composite rate.
- 14 (C) Previous year unit cost x Escalation Factor.
- 15 (D) Previous year unit cost + Escalation amount.
- 16 (E) The 2021 and 2022 forecast presented is for illustrative escalation purposes only and does not necessarily reflect the 2021 or 2022 forecast.
- 17

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 13, OTHER GAS OPERATIONS SUPPORT

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MWC - GZ Gas R&D Deployment	WP 13-10
MWC - GF Mapping Support	WP 13-12
MWC - AB Other General Support	WP 13-13

Workpaper Table 13-6
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers Supporting Chapter 13, Gas Other Support
 MWC AK - Transmission Hazardous Waste Management

Program Description:

Expense - PG&E's management of hazardous materials specifically for Gas Transmission projects.

Line	MWC	Transmission/ Distribution % Split	2017 Recorded Adjusted	2018 Recorded Adjusted (c)	2019 Recorded Adjusted (c)	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	MWC AK Total		\$ 2,545,720	\$ 2,805,463	\$ 2,706,729	\$ 2,965,400	\$ 2,279,887	\$ 2,336,102	\$ 3,070,728	
2	MAT AKA - Hazardous Waste	100% ^(b)								
3	Management - Transmission		\$ 2,545,720	\$ 2,805,463	\$ 2,706,729	\$ 2,965,400	\$ 2,279,887	\$ 2,336,102	\$ 3,070,728	^(a)
4	Notes:									
5	(a) Expense 3-year average (2017-2019)									
6	(b) Gas Transmission Only									
7	(c) 2018 and 2019 recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.									

Workpaper Table 13-7
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers Supporting Chapter 13, Gas Other Support
 MWC CR - Transmission Hazardous Waste Disposal and Transportation

Program Description:

Expense - PG&E's management of disposing hazardous waste specifically for Gas Transmission projects.

Line	MWC	Expense - Transmission/Distribution % Split	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	MWC CR Total		\$ 460,518	\$ 525,183	\$ 792,314	\$ 538,314	\$ 534,567	\$ 546,060	\$ 675,608	
	MAT CRA - GT Hazardous Waste Disposal									
	Transportation -	100% ^(b)								
2	Transmission		\$ 460,518	\$ 525,183	\$ 792,314	\$ 538,314	\$ 534,567	\$ 546,060	\$ 675,608	^(a)
3	Notes:									
4	(a) Expense 3-year average (2017-2019)									
5	(b) Gas Transmission Only									

Workpaper Table 13-9
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers Supporting Chapter 13, Gas Other Support
 MWC - DN Gas Qualifications

Program Description:

Expense - MWC DN are the activities related to the administration of Gas Distribution and Gas Transmission qualification programs that assess the competency of employees performing covered tasks.

Line	MAT	Transmission/Distribution % Split	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	MAT DN2 Total		\$ 2,380,581	\$ 4,881,057	\$ 4,317,162	\$ 1,636,453	\$ 2,098,102	\$ 2,144,789	\$ 4,406,139	
2	MAT DN2 - Distribution	58%	\$ 1,345,104	\$ 2,735,508	\$ 2,608,640	\$ 882,715	\$ 1,085,990	\$ 1,110,915	\$ 2,546,396	Line 1 * 58%
3	MAT DN2 - Transmission	42%	\$ 1,035,476	\$ 2,145,549	\$ 1,708,522	\$ 753,737	\$ 1,012,112	\$ 1,033,874	\$ 1,859,743	Line 1 * 42%

Notes:

(a) Expense 3-year average (2017-2019)

(b) For information regarding the Gas Training Program, see Exhibit (PG&E-8), Ch. 6, Section B.3.

Workpaper Table 13-10
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers Supporting Chapter 13, Gas Other Support
 MWC - GZ Gas R&D Deployment

Program Description:

Expense - This program detects, develops, tests and introduces new methods and technologies in Gas Operations to improve gas safety, reliability and efficiency.

Line	MWC	Transmission/Distribution % Split	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	MWC GZ Total		\$ 3,595,529	\$ 3,602,354	\$ 5,338,948	\$ 6,572,426	\$ 6,769,599	\$ 11,500,000	
2	MAT GZA - Distribution	51%	\$ 2,062,612	\$ 1,756,546	\$ 3,289,641	\$ 3,487,699	\$ 3,592,331	\$ 5,850,000	Line 1 * 51%
3	MAT GZA - Transmission	49%	\$ 1,532,917	\$ 1,845,808	\$ 2,049,307	\$ 3,084,727	\$ 3,177,268	\$ 5,650,000	Line 1 * 49%
4									
5	Category	2018 recorded	2019 Recorded	2020 Recorded	2021 Forecast	2022 Forecast	2023 Forecast	Methodology	
6	NYSEARCH	\$ 574,129	\$ 672,715	\$ 627,382	\$ 700,000	\$ 700,000	\$ 710,000	PG&E has increased its contribution to NYSEARCH to bring it to about \$700k for the 2020-2022 GRC period with successful results. We plan to keep the funding at this level or higher moving forward with an increased emphasis on decarbonization.	
7	OTD	\$ 726,256	\$ 630,587	\$ 750,000	\$ 750,000	\$ 750,000	\$ 750,000	The contribution to OTD is expected to stay flat for the next GRC period. The main focus areas will stay methane emission abatement, dig-in prevention, mobile as-built and material properties with a new emphasis on hydrogen.	
8	PRCI	\$ 256,980	\$ 305,233	\$ 249,344	\$ 400,000	\$ 450,000	\$ 500,000	PG&E forecasts its contribution to PRCI to increase with the development of a new field dedicated to emerging fuels. PRCI focus is on transmission pipelines, compressor stations and underground storage facilities.	
9	NGI	\$ 250,000	\$ -	\$ 75,000	\$ 75,000	\$ 175,000	\$ 475,000	The contribution to the Natural Gas Initiative at Stanford University will grow to include additional research on impact of hydrogen on natural gas infrastructure and carbon capture sequestration and utilization.	
10	UTD	\$ -	\$ -	\$ 350,000	\$ 350,000	\$ 350,000	\$ 350,000	PG&E has joined UTD (Utilization Technologies Development) in 2020 to explore the impact of renewable natural gas and hydrogen on its customers applications. The contribution is expected to stay stable over the next GRC period.	
11	Others	\$ 444,393	\$ 659,413	\$ 1,777,248	\$ 2,451,477	\$ 2,163,527	\$ 5,862,829	PG&E forecasts to continue to grow its R&D efforts beyond the traditional industry consortia. This investment includes support to deployment of new technologies within its operations to ensure that their benefits are rapidly captured. It will also include broader collaborations to accelerate and optimize the sourcing of innovation especially in the context of decarbonization.	

Contributions to Collaborations and Consortiums

Worksheet Table 13-10
Pacific Gas and Electric Company
2023 General Rate Case
Workpapers Supporting Chapter 13, Gas Other Support
MWC - GZ Gas R&D Deployment

12	Team Costs	\$	1,343,771	\$	1,334,406	\$	1,509,973	\$	1,845,523	\$	2,181,072	\$	2,852,171	The R&D and Innovation team will grow as it extends its project portfolio towards low-carbon no-carbon solutions, diversifies its collaborations and accelerates the transition of new technologies into the business. Its workforce will grow from 9 FTE in 2020 to 17 FTE in 2023.
13	Reducing Methane Emissions ^(a)	\$	1,091,213	\$	1,515,490	\$	-	\$	-	\$	-	\$	-	The R&D activity related to methane emission abatement has been transferred into the regular GRC budget in 2020. It will continue to be a main topic of research, technology development and deployment through the next GRC periods in order to reach methane abatement goals of 20% in 2025 and towards 40% by 2030 compared to 2015 emissions.
14	Therapeutics	\$	1,738,171	\$	3,085,121	\$	1,234,942	\$	1,066,431	\$	-	\$	-	The therapeutics program will be completed in 2021 with three important innovations for leak detection, mobile as-built data collection and traceability and dig-in prevention of bored pipelines. Such deployment and industrialization efforts will continue on other topics, integrated in the R&D and Innovation's project portfolio.
15	Total R&D and Innovation	\$	6,424,913	\$	8,202,965	\$	6,573,889	\$	7,638,431	\$	6,769,599	\$	11,500,000	

Notes:

(a) Expense amounts for 2018 and 2019 related to the Leak Abatement Best Practices required by D.17-06-015 will be recovered through a balancing account established in that proceeding. Starting in 2020, these costs will be recorded in MWC GZ (Research and Development) and cost recovery will be through the GRC.

Workpaper Table 13-11
 Pacific Gas and Electric Company
 2023 General Rate Case
 Workpapers Supporting Chapter 13, Gas Other Support
 MWC - GF Mapping Support

Program Description:

Expense - The Gas Mapping Support Program maintain gas distribution (GFO) and gas transmission (GFP) asset information in our systems of record, that are not directly charged to an order.

Line	MWC	Transmission/ Distribution % Split	2017 Recorded Adjusted	2018 Recorded Adjusted	2019 Recorded Adjusted	2020 Recorded Adjusted	2021 Forecast	2022 Forecast	2023 Forecast	Reference
1	MWC GF Total		\$ 11,851,884	\$ 11,011,165	\$ 6,315,712	\$ 7,965,340	\$ 8,523,093	\$ 8,622,644	\$ 9,769,631	(c)
2	MAT GFO - Distribution	43%	\$ 3,948,056	\$ 3,909,647	\$ 3,090,218	\$ 3,393,922	\$ 4,399,801	\$ 4,401,275	\$ 4,202,624	(a)
3	MAT GFP - Transmission	57%	\$ 7,903,827	\$ 7,101,518	\$ 3,225,494	\$ 4,571,418	\$ 4,123,292	\$ 4,221,369	\$ 5,567,007	(b)
4										
5	Notes:									
6	(a) Expense 3-year average (2017-2019) MAT GFO									
7	(b) Expense 3-year average (2018-2020) MAT GFP									
8	(c) Line 1: MWC GF MAT code setup allows Distribution and Transmission allocation for the Mapping Support Program.									

[illegible]

PACIFIC GAS AND ELECTRIC COMPANY
2023 GENERAL RATE CASE
EXHIBIT (PG&E-3) GAS OPERATIONS

WORKPAPERS SUPPORTING
CHAPTER 14, NEW BUSINESS AND WORK AT THE REQUEST OF OTHERS

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Workpaper Table 14-7
Pacific Gas and Electric Company
2023 General Rate Case
Exhibit 3, Chapter 14, New Business and Work at the Request of Others
Transmission Expense Forecast, MWC JT

MAT JTA (Thousands of Dollars)

<u>Line No.</u>	Year	EOY	2023 Esc Amount	2023 Total	
1	2015	3,407	837	4,244	Actuals Escalated
2	2016	610	133	742	Actuals Escalated
3	2017	76	14	90	Actuals Escalated
4	2018	541	78	619	Actuals Escalated
5	2019	153	17	170	Actuals Escalated

Note1: The recorded costs reflected in this workpaper may vary from the Results of the Operations (RO) model provided with PG&E's 2023 GRC Filing due to timing differences.

MAT JTA (Thousands of Dollars)

<u>Line No.</u>		SAP EOY Average	2023 Escalated Average	
6	5 Yr Ave '15-'19	\$ 957	\$ 1,173	Average Lines 1-5, 2023 Total

Note 1: MAT JTA is one of many MATs under MWC JT. Only MAT JTA is covered under chapter 14 (WRO Transmission Expense).

Note 2: Forecasts were developed in 2020 thus the 5-year average is calculated based on 2015 through 2019. When 2020 recorded costs became available in 2021, it was determined that 2020 had been impacted by COVID restrictions and were not consistent with historical costs. A decision was made to keep the forecast based on 2015-2019 and not use the 2020 actuals.