BEFORE THE OFFICE OF ENERGY INFRASTRUCTURE SAFETY

OF THE STATE OF CALIFORNIA

APPENDICES

TO THE
OPENING COMMENTS OF THE UTILITY REFORM NETWORK
ON SAN DIEGO GAS AND ELECTRIC COMPANY'S
2023-2025 WILDFIRE MITIGATION PLAN

Thomas J. Long, Legal Director
THE UTILITY REFORM NETWORK
785 Market Street, Suite 1400
San Francisco, CA 94103
(415) 929-8876 x303 (office)
TLong@turn.org

Eric Borden
Principal Associate
Synapse Energy Economics
485 Massachusetts Ave, Suite 3
Cambridge, MA 02139
Main: 617-661-3248
eborden@synapse-energy.com

May 26, 2023

APPENDIX A

TURN Testimony of Eric Borden in SDG&E 2024 GRC Addressing Wildfire Mitigation Hardening Measures and Related Wildfire Risk Modeling Issues

March 27, 2023

CPUC Docket: A.22-05-016
Witness: Borden
Exhibit: TURN-08

PREPARED TESTIMONY OF
ERIC BORDEN

ADDRESSING SAN DIEGO GAS AND ELECTRIC'S TEST YEAR 2024 WILDFIRE MITIGATION HARDENING MEASURES AND RELATED WILDFIRE RISK MODELING ISSUES

Submitted on Behalf of

THE UTILITY REFORM NETWORK

785 Market Street, Suite 1400
San Francisco, CA 94103

Telephone: (415) 929-8876
Facsimile: (415) 929-1132

March 27, 2023

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. Introduction and Overview of Recommendations[1]

Compared with the other 187 Investor Owned Utilities (IOUs) in the United States, San Diego Gas and Electric (SDG&E) has the *fifth* highest electric rates as of 2021,[2] including a summer on-peak rate of *83 cents* for the utility's default time of use rate.[3] Given these circumstances, one would think SDG&E might utilize its over-a-decade head start on wildfire mitigations, along with vastly improving wildfire risk modeling efforts, to carefully target its wildfire mitigations in a manner that maximizes risk reduction benefits while minimizing rate impacts on their customers. Rather than take advantage of its experience in wildfire mitigation and risk management, however, the utility makes virtually no use of risk analysis, risk spend efficiency (RSE) calculations, nor any other data at its disposal to make a case to the Commission for why its massive cost proposals for hardening measures should be adopted. Under even a minimal standard of review, SDG&E's failure to support its request with adequate evidence would support the rejection of its entire proposal.

That said, we certainly recognize and agree that the utilities, even SDG&E, must continue to act aggressively to mitigate the risk of catastrophic wildfire. That's why we show, unequivocally with the utility's own risk data, that wildfire risk mitigation can be done in a much more reasoned and cost-effective manner to reduce the risk of wildfire caused by SDG&E's system while moderating the impact on customer rates.

The purpose of this testimony is to address SDG&E's largest wildfire capital expenditures, "strategic undergrounding" and covered conductor deployment, both considered grid "hardening" activities. We wish to note upfront that these are not the only two programs SDG&E has proposed to mitigate wildfire and Power Safety Public Shutoff (PSPS) risk. In addition to its $1.9 billion in proposed hardening programs SDG&E's programs include $400 million in capital

---

[1] This testimony is sponsored by Eric Borden from Synapse Energy Economics. His resume and a summary of previous testimonies is provided as an attachment to this testimony.

[2] Electricity Information Administration (EIA), Table 6, https://www.eia.gov/electricity/data.php.

[3] SDG&E TOU-DR1, as of 1/1/23, https://www.sdge.com/sites/default/files/regulatory/1-1-23%20Schedule%20TOU-DR1%20Total%20Rates%20Table.pdf.

and $700 million in O&M expenditures from 2024-2027 (in 2021 constant dollars).[4] This testimony does not address that spending.

We make the following findings and recommendations regarding SDG&E's proposal in the ensuing sections:

- Proportionally, SDG&E faces less wildfire risk than the other large IOUs, yet its proposal would spend significantly more on wildfire mitigation on a per customer and per mile basis;
    - In addition to facing less risk, SDG&E has already mitigated substantial wildfire risk since the Witch Fire, the impact of which is not reflected in the utility's proposal;
- SDG&E's undergrounding-first proposal was proposed with no affordability constraints, and has little rationale other than to maximize capital spending.
    - SDG&E seeks to underground a slightly *higher* percentage of its High Fire Threat District (HFTD) as PG&E over the next ten years;
- When corrected, SDG&E's cost-effectiveness analysis shows the risk reduction benefits of undergrounding for mitigating wildfire risk are significantly less than the costs.
- Analysis of SDG&E's risk data demonstrates that covered conductor is significantly more cost-effective than undergrounding across the utility's High Fire Threat District (HFTD).
- A more reasoned approach to undergrounding and covered conductor deployment allows TURN's proposal to provide 78 percent of the wildfire risk reduction benefits for 35 percent of the costs compared with SDG&E's proposal, a savings of over $1 billion (shown below) from 2024-2027.
    - The difference in risk reduction between the proposals **represents a less than 1 percent impact compared with total statewide wildfire risk.**[5]

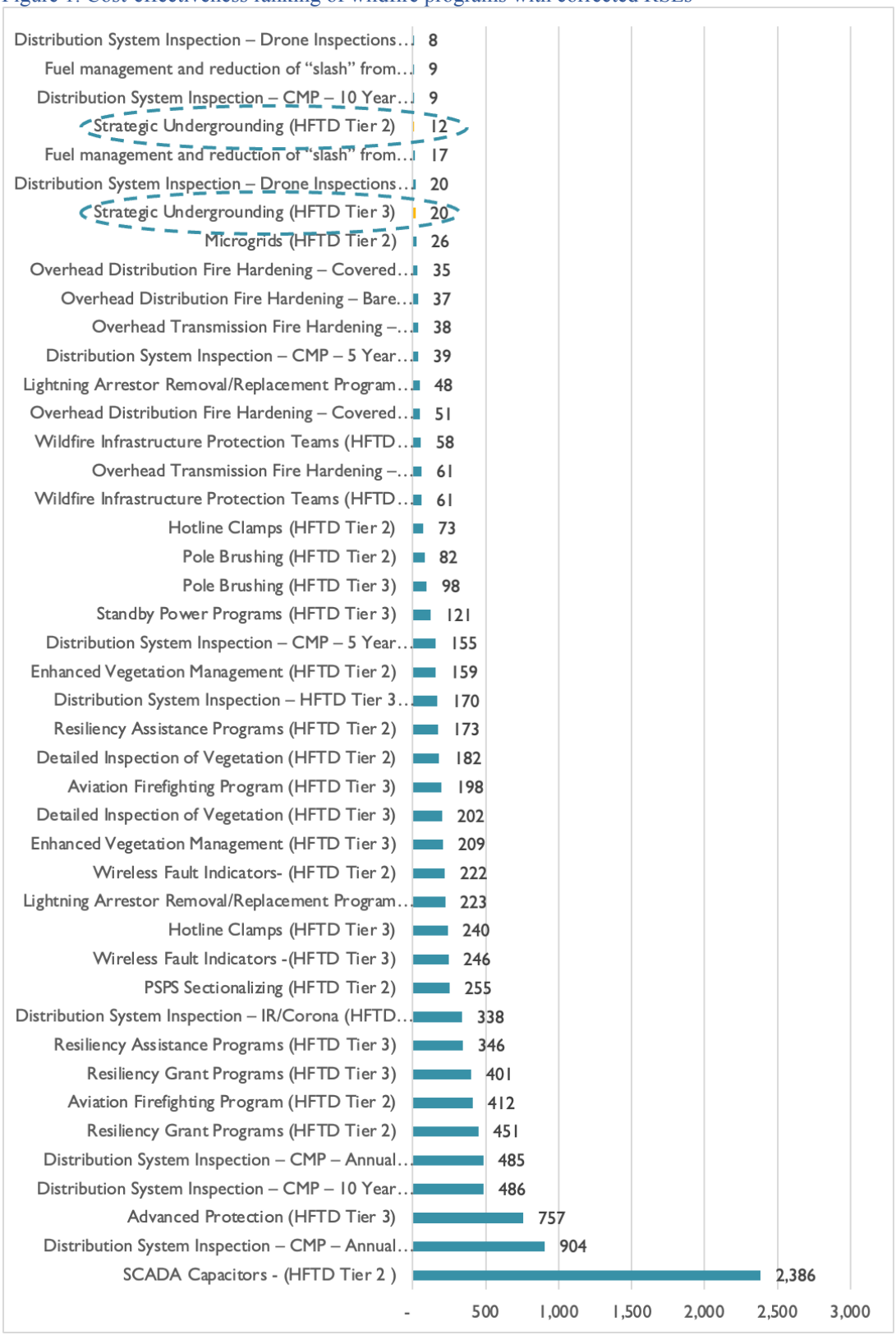
When calculated correctly, we find that the cost-effectiveness of undergrounding for mitigating wildfire risk is significantly worse than virtually all other mitigation measures.

---

[4] See Figure 2 for proposed capital expenditures. SDGE-13, p. JTW-B-8 for O&M expenditures in TY 2024. SDG&E states in TURN-15, question 4d, that "SDG&E does not forecast project-specific Post-Test Year (PTY) costs, except for those identified as PTY capital exceptions." We therefore assume flat O&M costs from the 2024 forecast in 2021 dollars. All dollar figures are presented in constant 2021 dollars to be consistent with SDG&E's testimony. A note of caution: the utility's escalation factors are meaningful, so actual costs will be much higher, around an additional 11 percent in the test year, and going up in the post test years. TURN-30, question 3, Excel attachment, contains escalation factors for wildfire programs.

[5] Since TURN's proposal reduces 12 percent less risk than SDG&E's, and we estimate San Diego's statewide wildfire risk is around 6 percent at most, this represents a .72 percent difference. TURN's proposal costs 35% or $1.2 billion less than SDG&E's.

Figure 1. Cost-effectiveness ranking of wildfire programs with corrected RSEs[6]



1

The tables below summarize TURN's and SDG&E's proposals for undergrounding and covered conductor.[7]

Table 1. Undergrounding miles and costs, TURN vs. SDG&E

	2024	2025	2026	2027	Total
	Miles - Undergrounding				
TURN	35	35	35	35	140
SDG&E	125	150	160	170	605
TURN-SDG&E	-90	-115	-125	-135	-465
	Costs - Undergrounding ($M, 2021)				
TURN	$ 82.6	$ 94.7	$ 95.5	$ 96.8	$ 370
SDG&E	$ 295.0	$ 405.8	$ 436.7	$ 470.1	$ 1,607.5
TURN-SDG&E	$ (212.4)	$ (311.1)	$ (341.2)	$ (373.3)	$ (1,238.0)

Table 2. Covered conductor miles and costs, TURN vs. SDG&E

	2024	2025	2026	2027	Total
	Miles - Covered Conductor				
TURN	100	100	100	100	400
SDG&E	60	40	40	40	140
TURN-SDG&E	40	60	60	60	260
	Costs - Covered Conductor ($M, 2021)				
TURN	$ 71.9	$ 71.9	$ 71.9	$ 71.9	$ 287.4
SDG&E	$ 59.8	$ 60.4	$ 63.3	$ 67.2	$ 250.7
TURN-SDG&E	$ 12.0	$ 11.5	$ 8.5	$ 4.7	$ 36.7

[6] Incorporates changes from TURN-4, and modifications to RSE described in Section IV. Cross functional factor (CFF) costs are included in TURN-4 alternative calculations, so we have also included those costs here to accurately compare our adjusted RSEs with TURN-4 values. This did not affect the calculation significantly.
[7] Since over 99 percent of SDG&E's undergrounding and covered conductor programs are capital expenditures, we assume all costs are capital in this testimony.

Table 3. All hardening miles and costs, TURN vs. SDG&E

	2024	2025	2026	2027	Total
	Total Miles - Hardening (UG + CC)				
TURN	135	135	135	135	540
SDG&E	185	190	200	210	745
TURN-SDG&E	-50	-55	-65	-75	-205
	Total Costs - Hardening ($M, 2021)				
TURN	$ 154.5	$ 166.5	$ 167.4	$ 168.6	$ 657.0
SDG&E	$ 354.8	$ 466.1	$ 500.1	$ 537.3	$ 1,858.3
TURN-SDG&E	$ (200.3)	$ (299.6)	$ (332.7)	$ (368.6)	$ (1,201.2)

Undergrounding represents a massive capital investment and the accompanying expansion of rate base. It is in the utility self interest to exploit wildfire fears to invest in capital intensive mitigations; it is the Commission's job to constrain utility spending to maximize risk reduction consistent with just and reasonable rates. TURN offers a more than reasonable alternative approach to hardening measures that provides significant wildfire mitigation benefits while moderating the impact on customer rates.

Section II of this testimony provides an overview of SDG&E's support for its undergrounding proposal, finding it is almost entirely lacking and not based on risk, seen in a comparison to other utility risk and spending proposals. Section III provides an overview SDG&E's wildfire risk modeling. Section IV discusses our finding regarding the primary flaws with SDG&E's RAMP RSE risk modeling: inclusion of a flawed PSPS risk calculation for the undergrounding program, lack of tranche granularity, an unreasonable assumption for the number of acres burned in a catastrophic wildfire, and not including an overhead to underground conversion factor. Section V corrects SDG&E's RSE calculation based on the issues presented in Section IV – this shows that undergrounding is one of the least cost-effective alternatives and that the costs of undergrounding exceed this mitigations' wildfire risk reduction benefits. Section VI explains why the utility should increases its forecast of covered conductor deployment, complemented by more targeted undergrounding. Finally, Section VII provides additional analysis to compare SDG&E's and TURN's proposals.

II. SDG&E's Wildfire Hardening Program is Burdensome and Unsupported

A. SDG&E Proposes Extraordinary Spending on Undergrounding but does not Adequately Support the Proposal

SDG&E proposes a multitude of programs to address wildfire risk and the impacts of Public Safety Power Shutoffs (PSPS) events. However, by far the largest capital expenditure spending category is undergrounding of electric lines – the single most expensive mitigation measure at SDG&E's disposal. The second largest expenditure is covered conductor, though SDG&E reduced its forecast for covered conductor and increased its undergrounding forecast mid-way through this proceeding. Together, these two programs comprise 82 percent of wildfire mitigation capital expenditures, 71 percent and 11 percent for undergrounding and covered conductor, respectively.[8] The costs and number of miles these costs correspond to are shown in the figures below.

[8] TY 2024 figures are provided in Appendix B of SDG&E-13-2R. Total expenditures for each year (2024-2027) provided in TURN-15, Question 4c-d (Excel attachment). Costs for post test years (PTYs) were found in SDG&E's risk workpapers for each program, which I adjusted for SDG&E's revisions in SDG&E-13-2R, Table JW-75, p. JTW-173. This table also shows the number of miles for the revised proposal.

Figure 2. Covered conductor, undergrounding, and wildfire capital expenditures ($2021, millions)

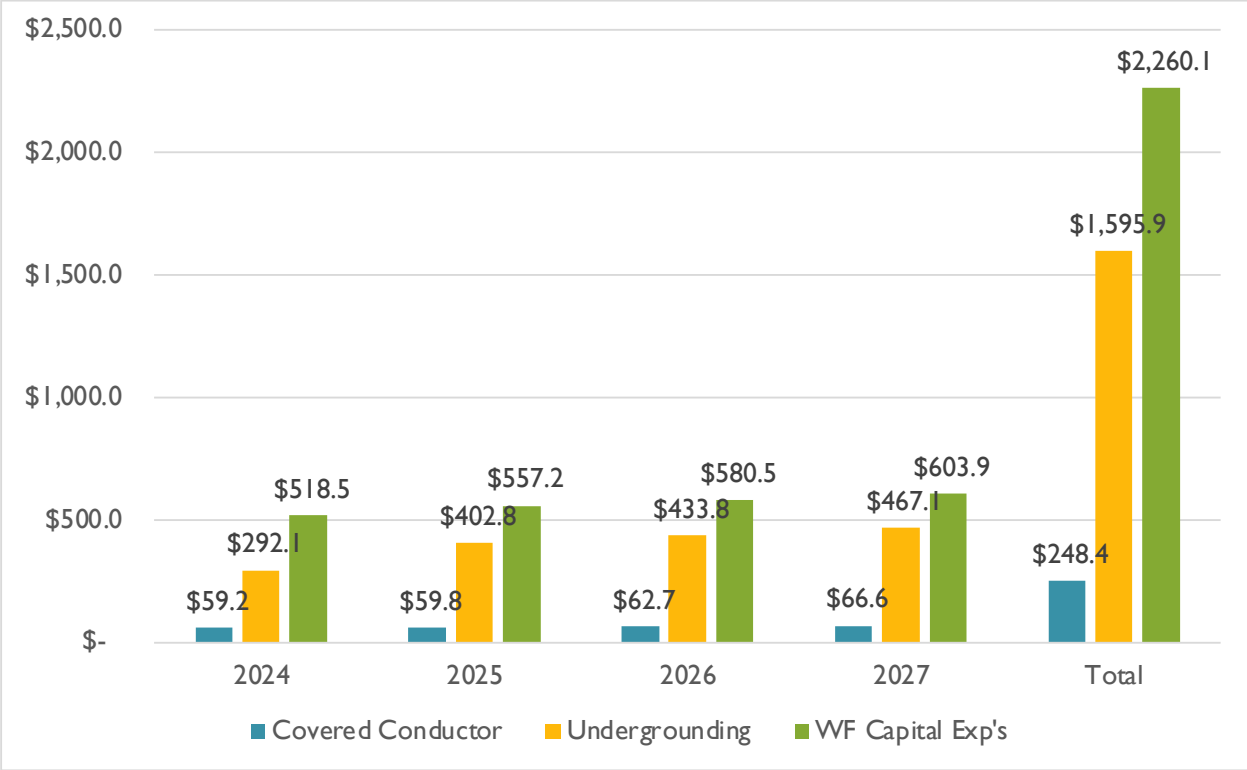
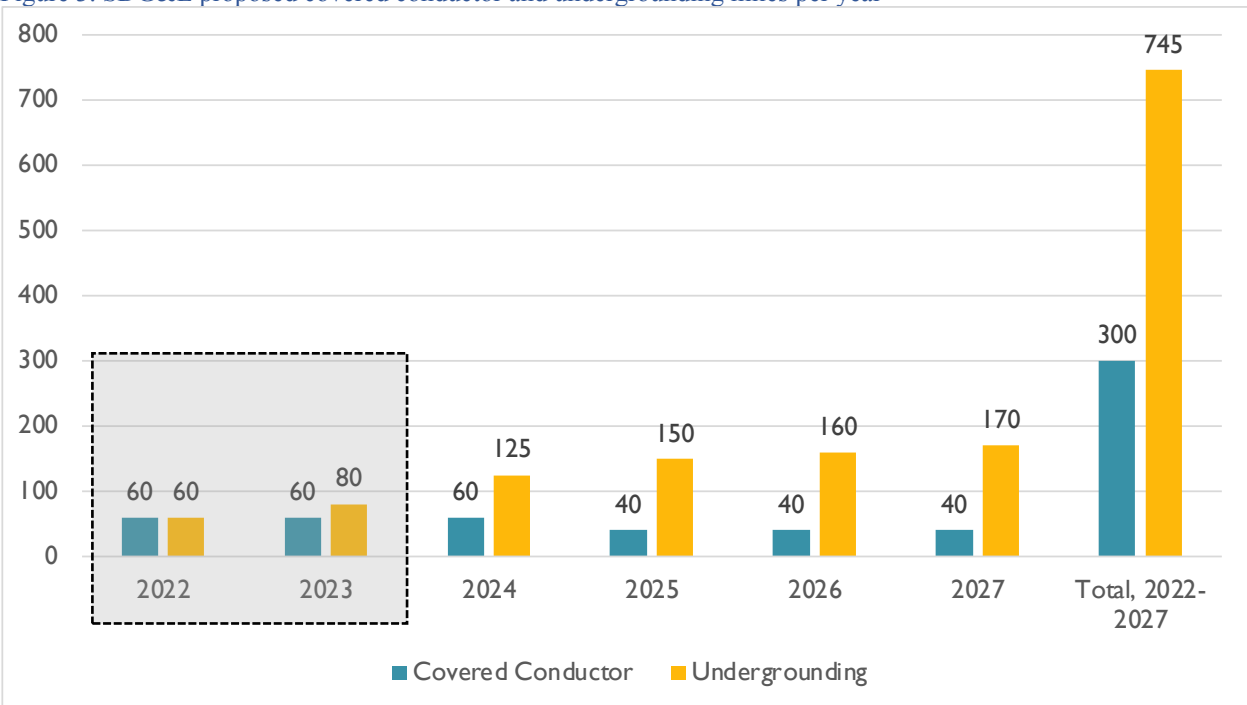


Figure 3. SDG&E proposed covered conductor and undergrounding miles per year



1
2

From 2022-2027, SDG&E proposes cumulative mileage of 300 and 745 miles for undergrounding and covered conductor, respectively. While 2022 and 2023 are not within scope of this GRC for planning purposes, from a risk reduction perspective they, along with previous risk reduction activities, are relevant to the level of risk addressed by SDG&E's proposal and should be considered by the Commission in its decision-making.[9]

SDG&E touts the high mitigation effectiveness of undergrounding for both wildfire mitigation and PSPS. It states that based on "careful analysis of the data and the cost impacts of various mitigation strategies, SDG&E selected its course because it provided the best value approach—achieving the most risk reduction possible without exponential increases in costs."[10] In one of the limited number of analytical statements in its testimony, the utility quantifies its expected risk reduction over the next ten years (though not for this rate case) – "while they come at a cost, SDG&E estimates that it can achieve an 83% reduction in risk through 2031 by implementing the measures incorporated into its WMP."[11] Yet the only figure analyzing the relationship in risks and costs in the utility's wildfire testimony has no units and is "illustrative," intended to show the "relationship between cost and risk reduction."[12]

Despite repeated discovery requests, SDG&E was not able to provide any quantitative affordability constraints used to formulate its proposal, simply affirming that its approach is a "best value approach – achieving the most risk reduction possible at the most reasonable cost to customers." These platitudes have not been supported by analysis, data, or facts.[13]

SDG&E's longer term "plan" is to underground 1,500 miles of its High Fire Threat District (HFTD) through 2032,[14] equivalent to around 43 percent of its HFTD. This is a slightly higher

---

[9] These years' forecasts are included when comparing risk reduction for TURN's vs. SDG&E's proposal.
[10] SDG&E-13, p. JTW-10.
[11] SDG&E-13, p. JTW-10.
[12] TURN-15, question 6a. The utility would not or could not share any data behind SDG&E-13, Figure JW-1, p. JTW-11.
[13] TURN-15, question 3.
[14] TURN-15, question 24e. This is in underground miles. "SDG&E estimates that the 1,500 miles of underground distribution will replace approximately 1,250 miles of overhead distribution."

percentage than proposed by PG&E in its equally egregious and unfounded proposal to underground 10,000 miles of its HFTD over the next 10 years, equivalent to 40 percent of that utility's HFTD.[15]

SDG&E does not provide expected costs through 2031 to accomplish its intended risk reduction – based on current unit costs, this will amount to nearly $4 billion (2021 dollars) which equates to between $8 and $12 billion over the life of the asset once the full revenue requirement is totaled.[16] For context, this is significantly more than the current annual revenue requirement for the entire utility, around $5 billion.[17]

B. SDG&E's Proposal Does Not Account for its Level of Risk or Previous Wildfire Mitigation Investments

1. SDG&E's Territory Represents Less Risk than Other Utilities Yet its Proposal is Less Affordable

Multiple sections of this testimony demonstrate that SDG&E's undergrounding and covered conductor proposals do not adequately incorporate cost-effectiveness and affordability. One way to view this issue is to examine the existing level of risk SDG&E's service territory. The following figures show a variety of metrics by which to assess wildfire risk in each of the utility territories: red flag warning (RFW) circuit mile days for each of the utilities;[18] the number of distribution ignitions at each utility;[19] the percent of acres burned in San Diego since 2008 (the last year available from CalFire records);[20] and the percent of damages incurred in San Diego

---

[15] 1,500 / 3,455 HFTD miles = 43% (SDG&E). 10,000 / 25,080 HFTD miles = 40% (PG&E). HFTD miles from utility 2022 WMP filings. This does not account for an overhead to underground conversion ratio, which means less overhead miles will be removed than indicated here.

[16] I expect that between inflation and revenue requirement additions (return, taxes, etc.) revenue requirement would more than double from constant 2021 dollars over the 40 year depreciation life of underground assets.

[17] See 2022 Senate Bill 695 Report from the CPUC, p. 29.

[18] 2022 Wildfire Mitigation Plan Filings (WMP Filings), Excel Table 6, for each utility. RFW circuit mile days are "calculated as the number of overhead circuit miles that were under an RFW multiplied by the number of days those circuit miles were under said RFW. For example, if 100 overhead circuit miles were under an RFW for 1 day, and 10 of those miles were under RFW for an additional day, then the total RFW OH circuit mile days would be 110."

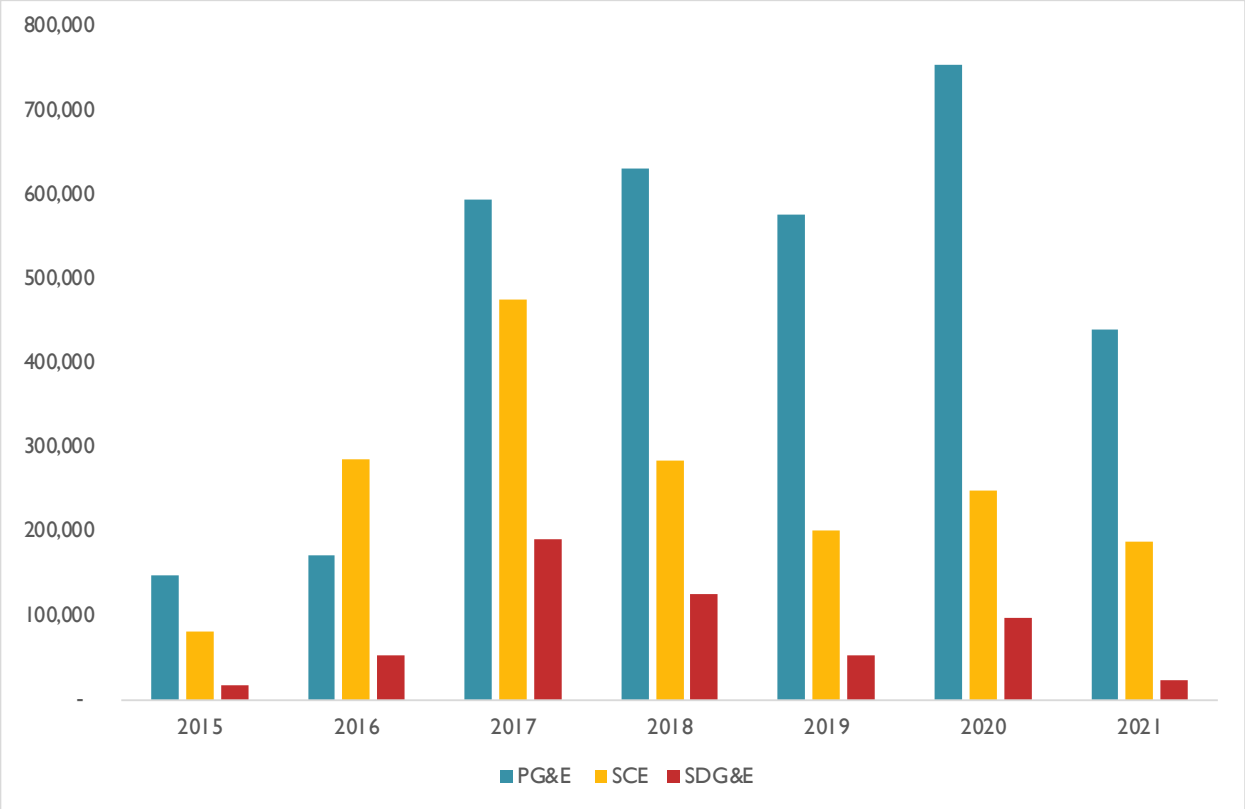
[19] WMP Filings, Excel Table 7.2.

[20] Analyzed from CalFire Redbook Data, CalFire, https://www.fire.ca.gov/our-impact/statistics.

County historically of the statewide total. Since utility wildfire risk is a portion of total statewide wildfire risk, these figures can be viewed as identifying the *maximum* potential level of risk for a wildfire caused by SDG&E.

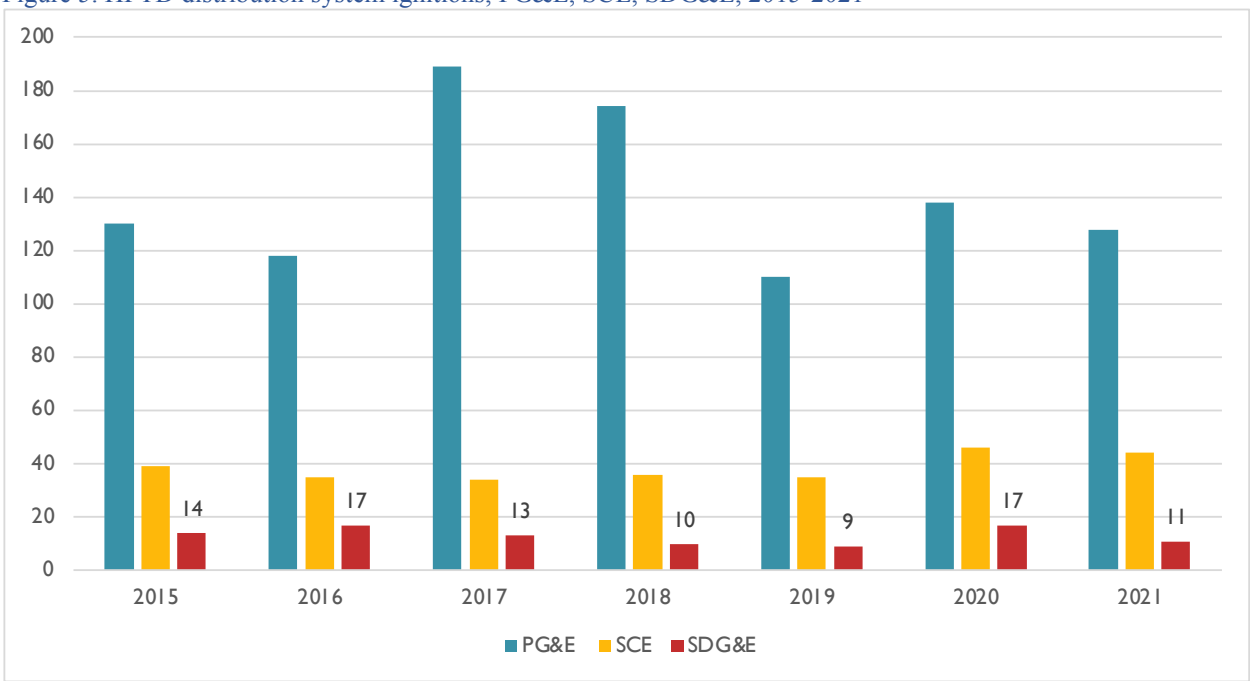
The figure below shows that risky wildfire weather (high winds on hot, dry days) comes in contact with less miles over less time for SDG&E's system than the other utilities. Red Flag Warning (RFW) circuit mile days is the number of overhead circuit miles that were under an RFW multiplied by the number of days of the RFW. Between 2015 and 2021, PG&E had between 212 percent and 1,819 percent greater number of RFW circuit mile days. –SCE had between 126 percent and 722 percent more RFW circuit mile days over the same time period.

Figure 4. Red flag warning circuit mile days: PG&E, SCE, SDG&E, 2015-2021



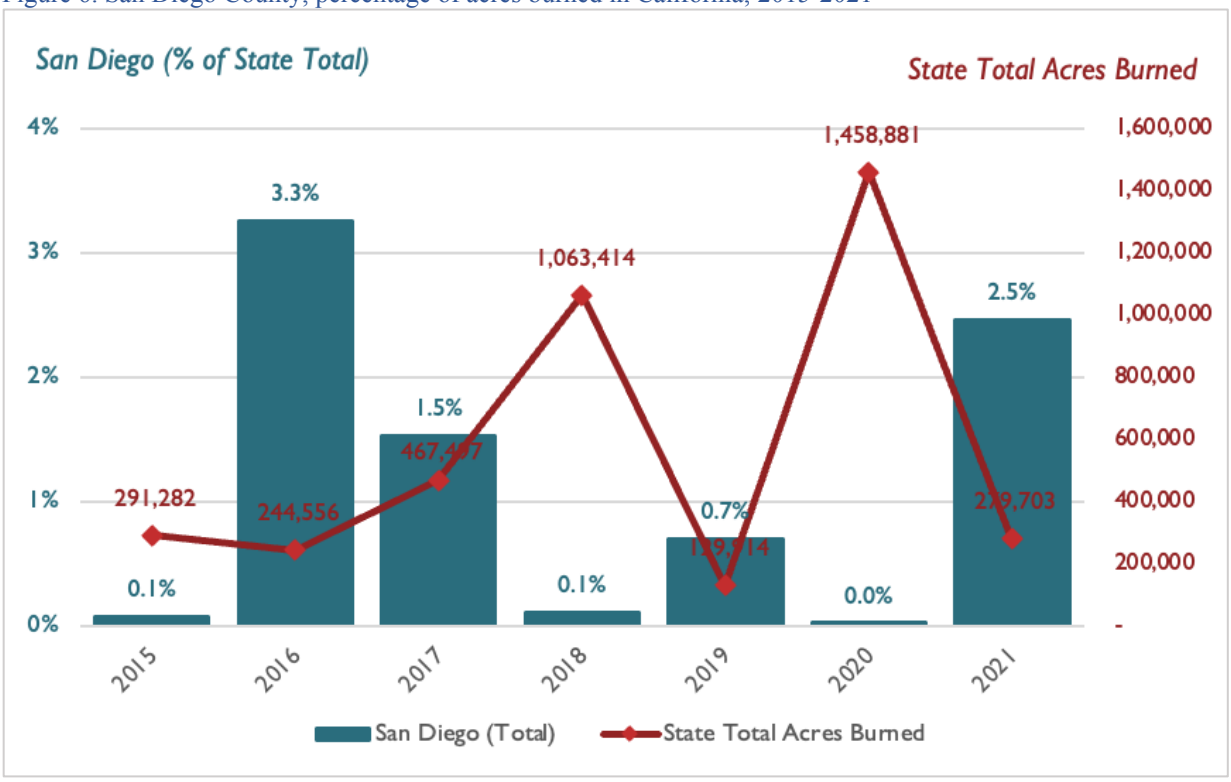
Similarly, SDG&E faces significantly fewer ignitions on its system each year than its sister utilities.

Figure 5. HFTD distribution system ignitions, PG&E, SCE, SDG&E, 2015-2021



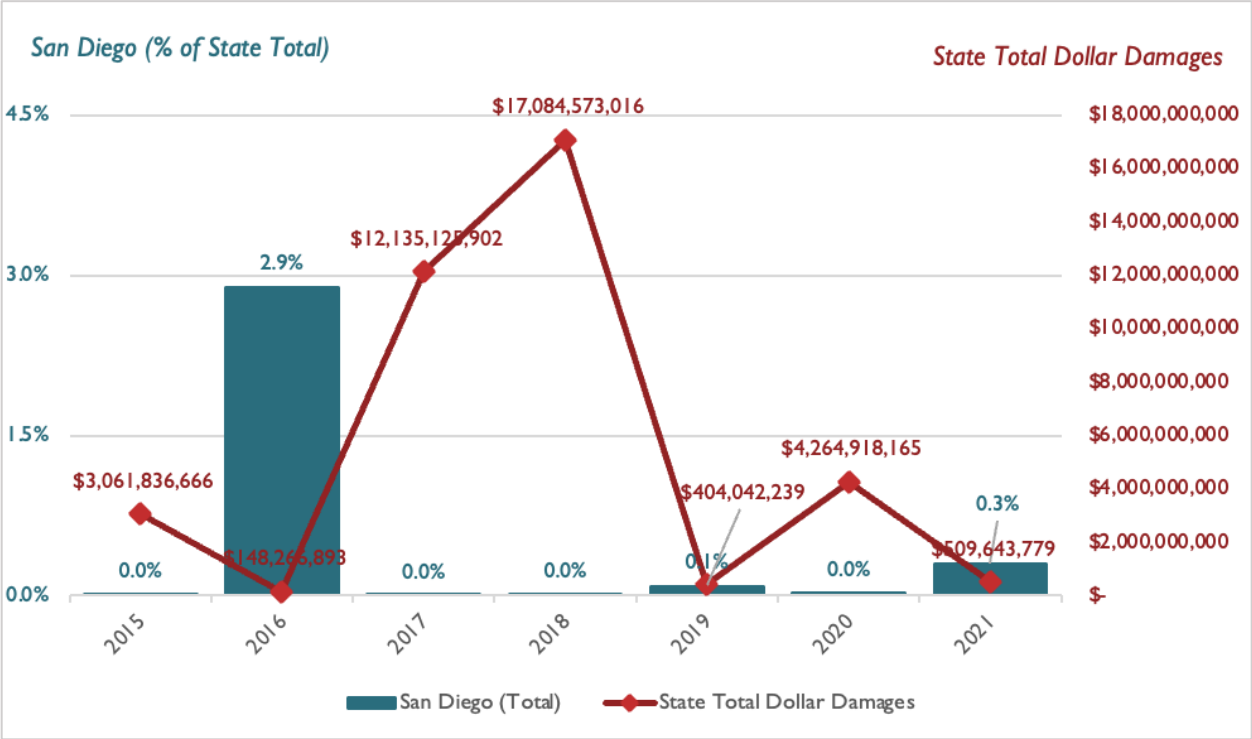
Acres burned in SDG&E's service territory, approximated here by San Diego County, was between 0 and 3.3 percent of the total acres burned across the state from 2015-2021.

Figure 6. San Diego County, percentage of acres burned in California, 2015-2021



Finally, property and other types of economic damages caused by wildfires in San Diego County were between 0 and 2.9 percent of the statewide total from 2015-2021.

Figure 7. San Diego County, percentage of wildfire damages (nominal dollars), 2015-2021

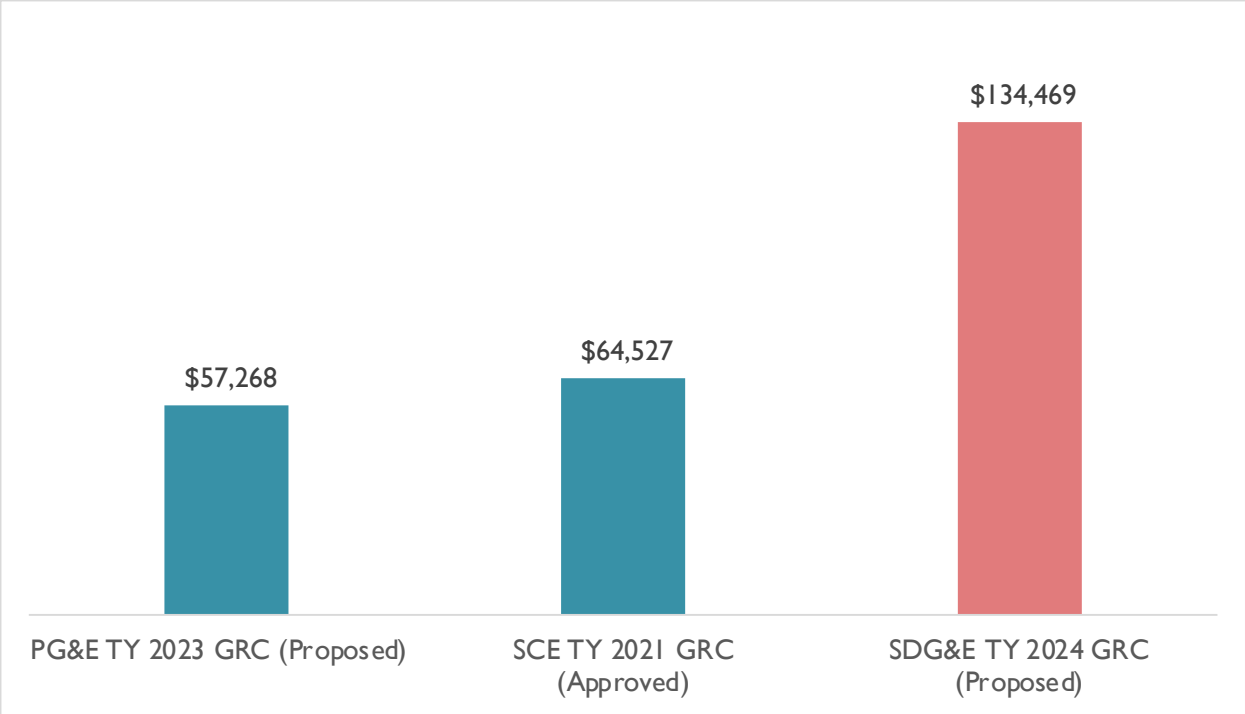


While in recent years statewide wildfire risk has ranged from approximately 0 to 3 percent in San Diego County, if we include the 2007 Witch Fire this statistic is closer to 6 percent from 2007-2021.[21] This provides a reasonable estimate for comparison of SDG&E's service territory with the rest of the state.

Despite comprising a small share of state wildfire risk, SDG&E's plan is to spend *more* on undergrounding and covered conductor than was approved for SCE and was proposed by PG&E in these utility previous rate cases on a *per mile* and *per customer basis*.

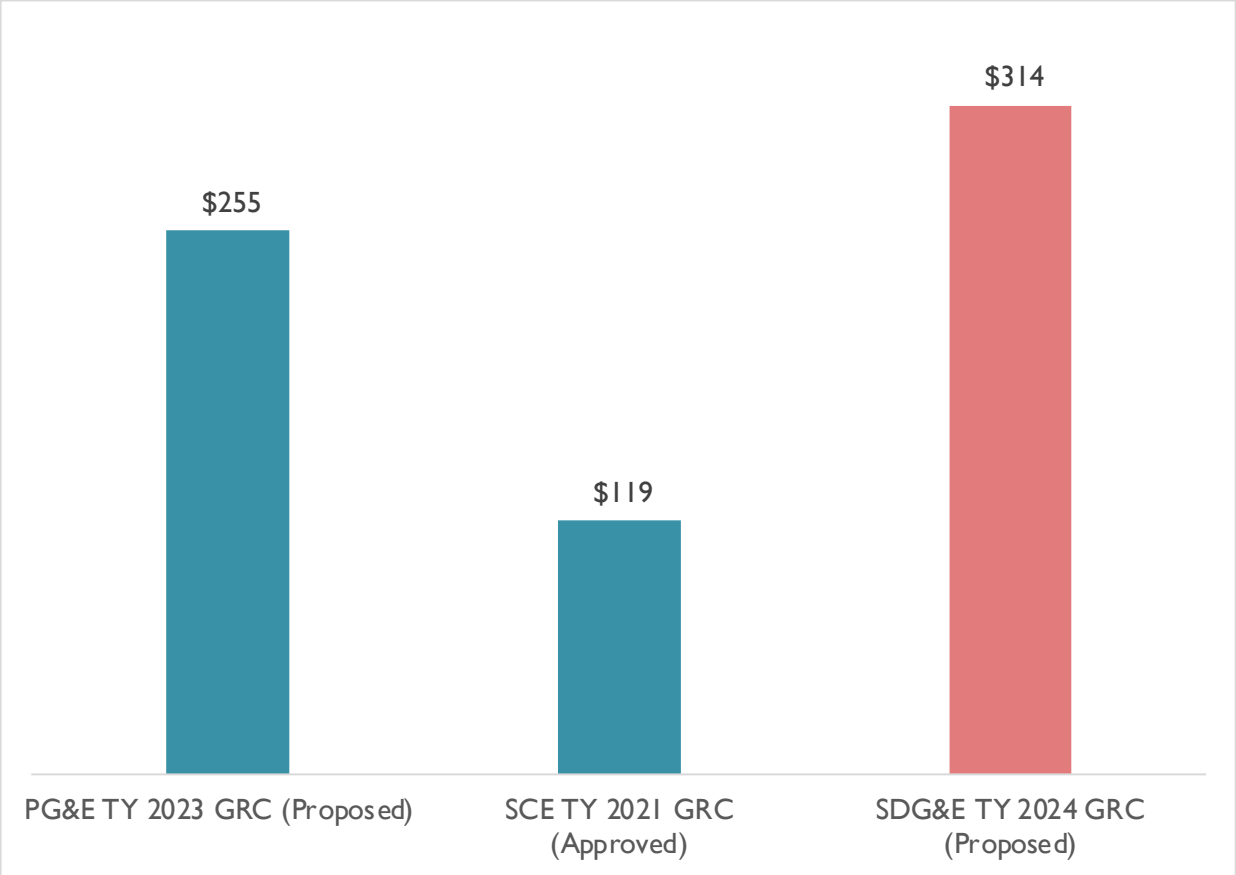
[21] The Witch Fire in 2007 was 197,990 acres of 1,520,362 that burned statewide that year. Including this in the 2008-2021 data set increases San Diego acres burned to 6 percent of the state from 2007-2021.

Figure 8. PG&E, SCE, SDG&E average annual undergrounding and covered conductor cost per HFTD overhead distribution circuit mile ($ 2021)[22]



[22] HFTD overhead distribution circuit miles from utility WMP filing Excel tables, 2022, Table 8. Cost figures from A.21-06-021, PG&E Reply Brief, Table 4-1, p. 328 (undergrounding), PG&E WP Table 4-23 summarized in A.21-06-021, Testimony of Eric Borden on Behalf of TURN (TURN-11), p. 28 (covered conductor); SCE figures from A.19-08-013, SCE-04, Vol5A, Table II-7, p. 29 (covered conductor), and Table II-18, p. 52 (undergrounding); SDG&E TY 2024 figures are provided in Appendix B of SDG&E-13-2R. Total expenditures for each year (2024-2027) provided in TURN-15, Question 4c-d (Excel attachment). Costs for post test years (PTYs) were found in SDG&E's risk workpapers for each program, which I adjusted for SDG&E's revisions in SDG&E-13-2R, Table JW-75, p. JTW-173.

Figure 9. PG&E, SCE, SDG&E average annual undergrounding and covered conductor cost per customer ($ 2021)



The charts above are not intended to suggest the other IOU spending is reasonable. The other IOU requests were similarly unbound by cost-effectiveness and affordability constraints, and TURN has advocated for reductions of both, including well beyond the final Commission approved SCE budget.[23] Despite PG&E and SCE's disregard for rate increases outpacing inflation, SDG&E's proposal still manages to be even less affordable for its customers, especially considering the spending proposed is largely unnecessary when compared to the level of risk in other utility territories.

[23] See A. 19-08-013, Prepared Testimony of Eric Borden Addressing Southern California Edison's Test Year 2021 General Rate Case Wildfire Management, Wildfire Risk, Vegetation Management, and New Service Connection Policy Issues and Cost Forecasts (TURN-02); A.21-06-021, Testimony of Eric Borden Addressing Pacific Gas and Electric Wildfire Mitigation Measures (TURN-11), June 2022.

2. SDG&E's Proposal Does Not Reflect Its Significant Investment in Wildfire Risk Mitigation.

SDG&E's proposal also does not reflect the more than decade plus that it – through its ratepayers – have invested in mitigating wildfire risk since the Witch Fire. As the utility highlights in its opening testimony,

> SDG&E has established itself as an industry leader in wildfire mitigation. These efforts have been recognized by the utility industry, California state officials, and leading credit ratings agencies. S&P Global Ratings described SDG&E's position on the forefront of wildfire innovation as follows:
>
> Over the past decade [SDG&E] has been a leader in wildfire on through the implementation of technology and system hardening. These measures reduce the probability that the company will be the cause of a catastrophic wildfire. As a direct result of the company's proactive ingenuity . . . the company has developed a strong track record of either avoiding wildfires or not being the cause of a catastrophic wildfire.[24]

SDG&E then states "in the face of a changing climate, increased drought, and the development of a year- round fire season, SDG&E cannot rest on its past achievements."[25]

Indeed, SDG&E spent $626 million on its traditional hardening program from 2012-2022. Part of this work involved replacing 14,156 poles over 700 circuit miles. SDG&E did not track the replacement of multiple other types of equipment over this time period.[26] The $626 million does not include expenditures on cameras, aviation services, drone technology, and other investments;[27] a recent article approximates these expenditures have reached $3 billion in total.[28]

SDG&E's wildfire mitigation proposal not only negates its past ratepayer funded achievements it also proposes the most aggressive and expensive approach available to it, undergrounding a significant percentage of the utility's overhead lines in its HFTD.

---

[24] SDGE-13, p. JTW-1-2:19-2.
[25] SDGE-13, p. JTW-2:3-5.
[26] TURN-4, question 1, attach TURN-SEU-004_ATTACH_Q1_Q2_Q3_Q4_5804.
[27] SDG&E, https://www.sdge.com/community-fire-safety-program.
[28] San Diego Union Tribune, *SDG&E gets a big thumbs-down from callers on potential rate increases,* March 2023, https://www.sandiegouniontribune.com/business/story/2023-03-07/callers-give-a-big-thumbs-down-to-a-potential-rate-increase-for-sdg-e.

III. Wildfire Risk Modeling Should Inform Commission Decision-Making and Help Identify a More Optimal and Affordable Scope for Wildfire Mitigation Hardening Measures

Risk modeling is not the only lens through which to understand and scope utility wildfire mitigation efforts, but it likely represents the most useful set of tools at the Commission's proposal to understand the implications of various proposals. This section addresses SDG&E's risk modeling efforts in this case, including the fact that the utility has not sufficiently incorporated affordability and an overview of wildfire risk results from the utility's most granular risk model.

A. SDG&E Has Not Sufficiently Incorporated Affordability and Cost-effectiveness Thresholds

SDG&E's proposal does not implement any affordability thresholds, and lacks reasonable cost-effectiveness criteria. Risk modeling is a tool to apply these type of criteria, and SDG&E's proposal falls short of using the tools at its disposal to craft a reasonable approach to wildfire safety investment. If anything, SDG&E's proposal *maximizes costs* to ratepayers by concentrating almost exclusively, particularly for capital expenditures, on the single most costly risk mitigation at its disposal on a per mile basis, undergrounding.

When SDG&E was asked to "explain and quantify how [it] used RSE calculations and affordability constraints to inform its GRC proposal," the utility repeated platitudes from testimony, like,

> SDG&E's GRC request is the product of careful consideration of the optimal means to safely and reliably provide electrical service to customers and reduce the risk of utility-related ignition and public safety power shutoffs—consistent with regulatory and statutory mandates—in a just and reasonable fashion.[29]

SDG&E does not address, however, how was this accomplished. Was there one single initiative deemed too large or inefficient from a risk reduction perspective? How does this comport with

[29] TURN-15, question 3.

the utilities' "underground first" strategy? My review of SDG&E's testimony, workpapers, and discovery responses has found absolutely no indication of any type of affordability constraint imposed by the utility. There is nothing to support SDG&E's proposal, other than the simplistic notion that reducing more risk, regardless of the cost, is better than the alternative. Only a monopoly utility could even consider such a spend-first approach, much less testify that it is the right one.

B. Overview of SDG&E Risk Modeling: RAMP and WiNGS

SDG&E's risk modeling is outlined in its Risk Assessment Mitigation Phase (RAMP) filing, updated for various modeling changes in the GRC.[30] The end result of the risk modeling is the risk spend efficiency (RSE) statistic, which provides the risk reduction per dollar forecast. SDG&E calculates this separately for test year and post test year. The only two risk tranches used by SDG&E for calculating the RSE of wildfire mitigations are Tier 2 and Tier 3 of the utility's HFTD. SDG&E models both wildfire risk and public safety power shutoff risk as part of its undergrounding proposal – there are several issues with the latter calculation, discussed further below.

Underlying this risk modeling is a more granular model that calculates risk at the circuit segment level called the Wildfire Next Generation System (WiNGS) model.

> As modeling efforts have improved based on stakeholder input and the availability of data, SDG&E's next generation system, WiNGS-Planning built upon the RSE methodology in RAMP and evaluates both wildfire and PSPS impacts at the sub-circuit/segment level to inform investment decisions by determining which initiatives provide the greatest benefit per dollar spent in reducing both wildfire risk and PSPS impact. The key decisions being driven from the WiNGS-Planning model are how to most efficiently and effectively apply wildfire and PSPS mitigations in the backcountry. Currently, the main mitigations being proposed in the model results are undergrounding and covered conductor, starting in 2023.[31]

---

[30] SCG-03/SDG&E-03: Chapter 2. My testimony with Courtney Lane provides an overview of this modeling and recommends a few changes to the calculation to make it more accurate. These are incorporated where applicable in this testimony.

[31] SDGE-13, p. JTW-9: 23-30.

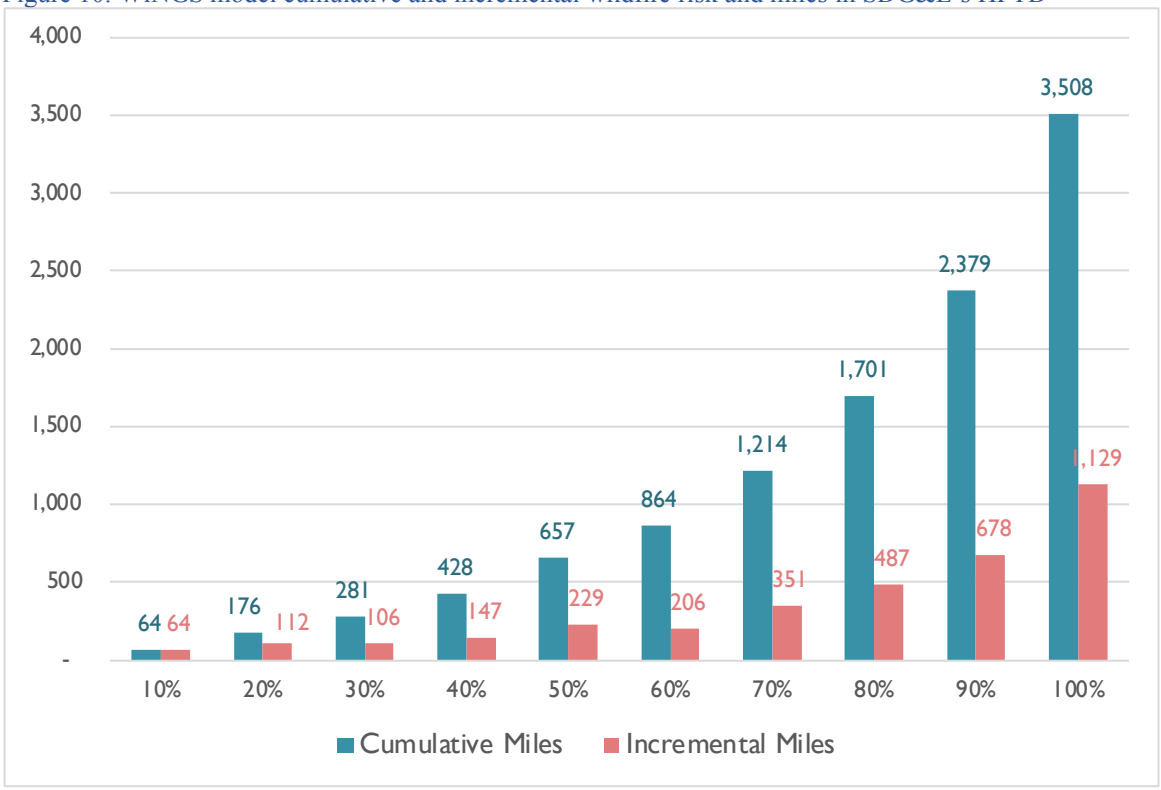
Below, I present RSE results, WiNGS results, and discuss various errors or inaccuracies in SDG&E's RSE risk modeling that forms the basis of how to develop a more optimal forecast of undergrounding and covered conductor deployment.

1. SDG&E's Wildfire Next Generation System (WiNGS) Model Results

WiNGS more granular modeling results are extremely helpful for understanding how the concentration of risk in SDG&E's territory is distributed. It also helps to develop alternative recommendations based on granular risk tranches, rather than overly broad ones such as tier 3 and tier 2 HFTD, modeled by SDG&E in its RSE analysis.

A limited number of miles in SDG&E's territory represent the highest risk miles. The figure below shows the number of cumulative and incremental miles for each 10 percent of risk in SDG&E's HFTD, when sorting HFTD circuit segments in SDG&E's WiNGS model from highest to lowest risk.

Figure 10. WiNGS model cumulative and incremental wildfire risk and miles in SDG&E's HFTD[32]

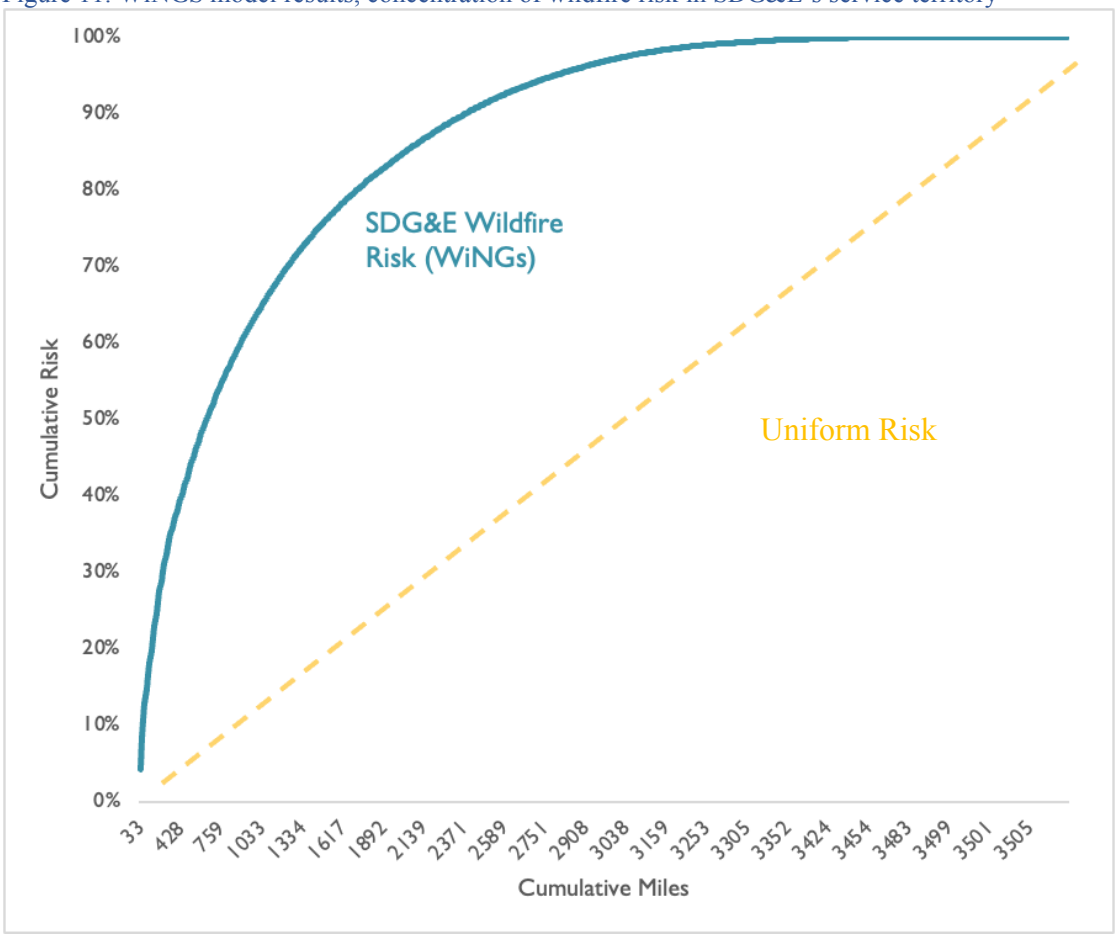


Risk in SG&E's HFTD is relatively concentrated – for example, the top 50 percent of wildfire risk is contained over 657 miles, and the bottom 50 percent over 2,840 miles.[33] This is shown graphically below, where cumulative overhead HFTD miles are plotted against cumulative risk, again when ranking circuit segments from highest to lowest risk.

[32] TURN-31, AttachQ1a_10493_10492, tab Q1a_sup_2. WiNGS data was extremely difficult and required a lengthy process to obtain from SDG&E, and ultimately was not given in the form requested through discovery. The data I was able to obtain is presented in this testimony.

[33] This does not add to 3,508 miles because the circuit segment after the 50th percentile is 11 miles long and I count this segment in the top 50 percent not the bottom 50 percent.

Figure 11. WiNGS model results, concentration of wildfire risk in SDG&E's service territory[34]



IV. Issues with SDG&E's Risk Assessment Mitigation Phase Risk Spend Efficiency Risk Modeling

There are significant flaws in SDG&E's calculation, including the fact that the undergrounding RSE is inappropriately driven mostly by PSPS risk reduction rather than wildfire risk reduction. The results are provided for only two risk tranches. Furthermore, the risk calculations for covered conductor and undergrounding are sufficiently different from one another that the cost-effectiveness of these mitigations cannot be compared directly with one another using SDG&E's

[34] *Ibid.*

RSE results.[35] I present a more accurate view of cost-effectiveness for covered conductor and undergrounding in Section VI.

There are several issues with SDG&E's RSE risk modeling and application thereof.[36] These pertain to RSE results rather than the more granular WiNGS model discussed above.[37] These are discussed in ensuing sections.

A. SDG&E's Undergrounding Risk Spend Efficiency Calculations are Inappropriately Driven by PSPS Risk Mitigation

The primary flaw in SDG&E's RSE calculation related to its strategic undergrounding program relates to the calculation of PSPS risk reduction in the benefits of the calculation.[38] First, these benefits are overstated – they significantly outweigh the benefits of undergrounding for wildfire risk reduction, as explained further below. Second, they make it difficult to compare the undergrounding program to other mitigation programs that reduce PSPS risk – undergrounding is, upon further examination but perhaps quite obviously the *least* cost-effective way of reducing PSPS risk, as seen in SDG&E's own RSE results. We discuss these problems further below.

1. SDG&E's PSPS Risk Reduction Calculation for its Undergrounding Proposal is Flawed

SDG&E calculates the risk in its service territory of wildfire and PSPS by multiplying the likelihood or probability of the risk event (LoRE) by the consequence of the risk event (CoRE),

---

[35] SDG&E seems to have assessed risk reduction for these programs on circuits with very different risk profiles, which makes the results non-comparable. Namely, the number of ignitions before hardening are 50 percent less for covered conductor than for undergrounding, so covered conductor appears significantly less cost-effective. This is clearly not evaluating these solutions on an apples to apples basis. However, we have overcome these limitations by utilizing much more granular WiNGS model data to assess cost-effectiveness, discussed below. See SDG&E Revised Excel RSE workpapers for strategic undergrounding and covered conductor.

[36] These are distinct from issues we raise in TURN-4 regarding RSE calculation methodology.

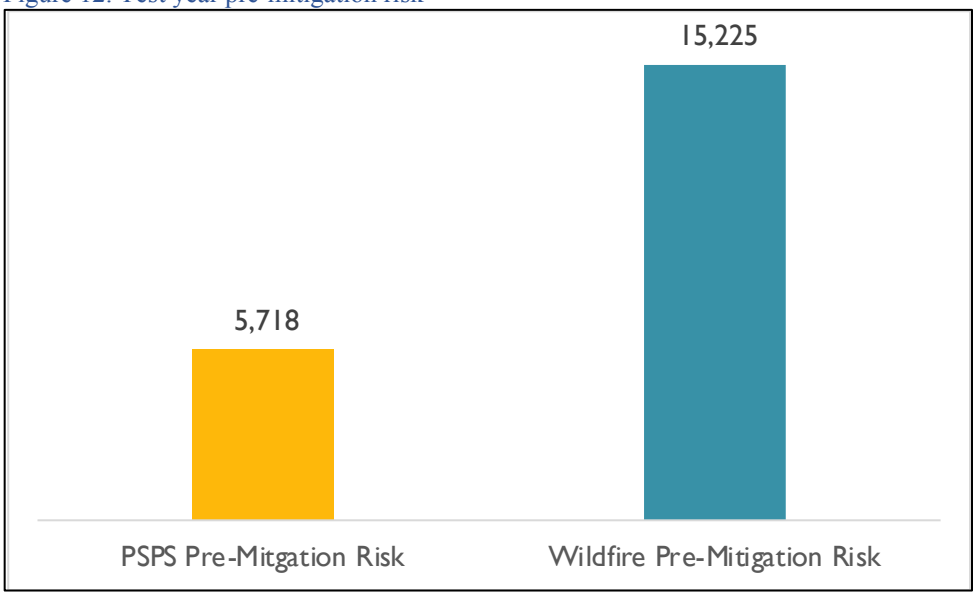
[37] That said, SDG&E (after significant delay and multiple requests) only provided the results of the WiNGS model, not the inputs.

[38] To be clear, I do not object to the inclusion PSPS risk mitigation benefits in wildfire risk modeling, but it must be modeled correctly.

before SDG&E's proposed mitigations are applied – this is called "pre-mitigation risk." LoRE, CoRE, or both can be reduced by a proposed mitigation measure, whereby SDG&E assumes a "mitigation effectiveness," or percentage of risk reduced, for the particular mitigation based on historical data, subject matter expertise, or some combination. For example, the mitigation effectiveness for undergrounding is assumed by SDG&E to be 98 percent for wildfire risk and 100 percent for PSPS risk. This is then applied to the pre-mitigation risk to calculate the amount of risk reduction that goes into the RSE calculation. The number of overhead miles or scope of the project must also be considered to correctly calculate expected risk reduction.

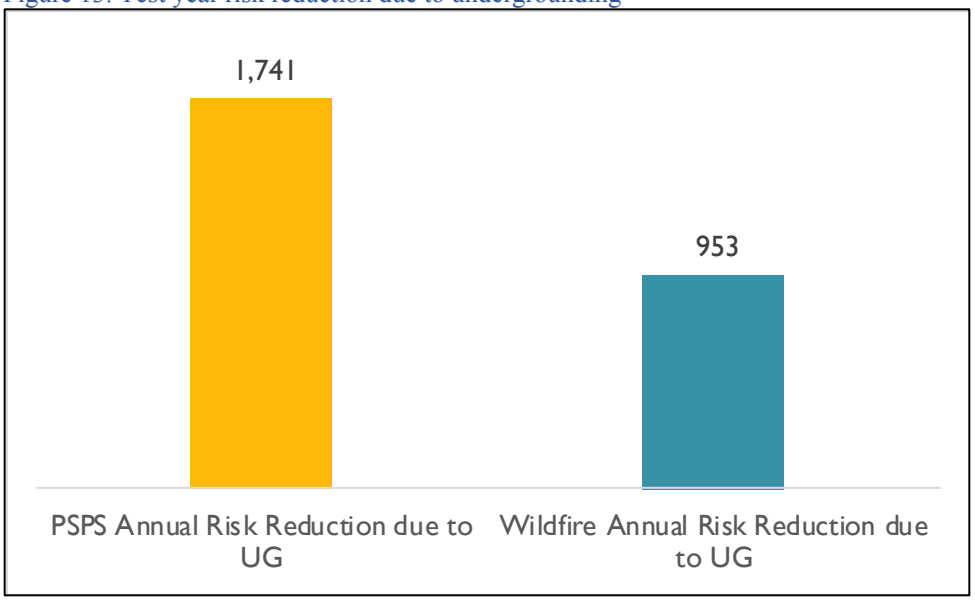
The results of SDG&E's PSPS risk reduction calculations – which are added to wildfire risk reduction to form the basis of the undergrounding RSE[39] - are flawed on their face. First, as would be expected, pre-mitigation PSPS risk is significantly less than wildfire risk, yet PSPS risk *reduction*, once undergrounding has been accomplished per SDG&E's proposal, is significantly higher than wildfire risk reduction when undergrounding the exact same miles..

Figure 12. Test year pre-mitigation risk[40]



[39] As discussed in TURN-4, the RSE statistic is calculated by subtracting risk reduction from pre-mitigation risk and dividing by the cost.
[40] SDG&E revised Excel RSE Test Year workpapers, latest "Wildfire-2R" workbook, "Strategic_Undergrounding" tab.

Figure 13. Test year risk reduction due to undergrounding[41]



In other words, according to SDG&E's calculations, the undergrounding of 125 miles of lines in the TY, equivalent to 3.6 percent of the utility HFTD overhead system, will eliminate 30 percent of PSPS risk, and 6 percent of wildfire risk. This is highly unlikely, given that PSPS events can occur across the HFTD.

The reason for the inconsistent PSPS risk reduction result appears to stem primarily from an inappropriate application of a 100 percent mitigation effectiveness factor for undergrounding to *all* expected average PSPS events on the system, rather than an approximation of the PSPS events expected to be experienced by the particular 125 miles that are undergrounded.[42] By applying a 100 percent mitigation effectiveness to the pre-mitigation likelihood of risk event (LoRE) and consequence of risk event (CoRE), the risk reduction is overstated. To better quantify the impact of undergrounding, SDG&E should have assessed the reduction to LoRE from a reasonable assumption for the pre-mitigation LoRE particular to the 125 miles it seeks to underground.

---

[41] *Ibid.*

[42] The LoRE (likelihood of risk event) is set equal to the "System PSPS average events per year" values. See Excel workpaper "1 Final TY2024 GRC RSE Workpaper - SDGE - Wildfire-2R_60933," tab "Strategic_Undergrounding," "Pre PSPS LoRE" value.

Furthermore, SDG&E should be prioritizing its program, and its spending of ratepayer dollars, based on *wildfire risk,* not PSPS risk, and it cannot do both at once. Indeed, an examination of WiNGS results for the top 30 highest PSPS risk circuits, representing around 500 overhead HFTD circuit miles, shows that PSPS risk and wildfire risk are highly uncorrelated. In other words, the highest risk circuits on a PSPS basis are not necessarily the highest risk circuits on the basis of wildfire risk.

Table 4. PSPS risk rank vs. wildfire risk rank[43]

Circuit ID	PSPS Risk Rank	Wildfire Risk Rank
CB 970	1	398
CB 441	2	454
79-1215F	3	360
CB 972	4	361
CB 442	5	455
221-1230F	6	127
79-676R	7	253
CB 1215	8	456
CB 357	9	48
CB 73	10	399
CB 235	11	400
972-8	12	89
176-1834R	13	60
CB 222	14	401
CB 396	15	457
175-24R	16	342
445-897R	17	314
442-728R	18	6
CB 356	19	458
CB 1250	20	254
222-1370R	21	14
222-1364R	22	3
448-1196F	23	459
CB 350	24	460
CB 237	25	238
393-14R	26	402

[43] TURN-31, AttachQ1a_10493_10492, tab Q1a_sup_2.

CB 217	27	461
1030-23R	28	315
CB 236	29	35
CB 971	30	54

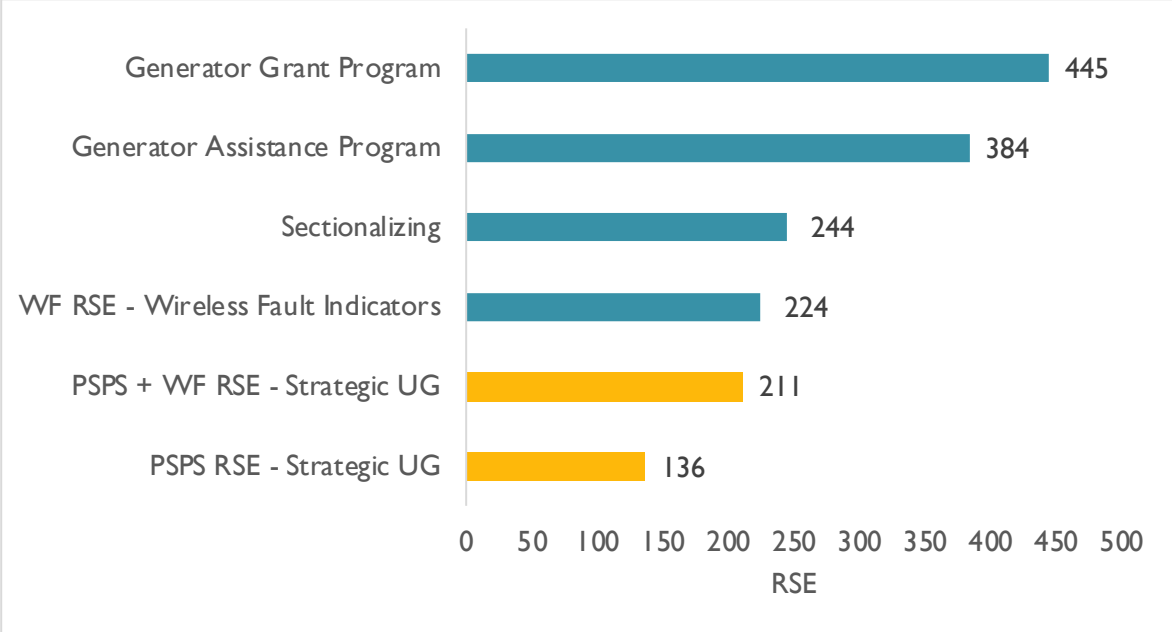
Additionally, as SDG&E acknowledges elsewhere, undergrounding will not always eliminate the PSPS risk of a circuit, even if it is underground, as the deenergization of a given circuit is dependent on switching and "upstream" circuit miles of the system which may still be overhead.[44]

2. Undergrounding is Not a Cost-effective or Necessary Mitigation for PSPS

Combining PSPS and wildfire risk reduction in the undergrounding calculation masks the fact that undergrounding is one of the least cost-effective mitigation measures to mitigate PSPS risk, even according to the utility's overly-optimistic calculations. Other measures, highlighted in the figure below, in addition to improved weather forecasting and incorporating new PSPS thresholds due to the installation of covered conductor, can significantly decrease the likelihood and consequences of PSPS and are much more cost-effective than undergrounding.

[44] As stated in TURN-31, question 1(a)(vi), "Since the PSPS risk on a segment is influenced by the maximum upstream segment PSPS probability, the score after mitigation [risk reduction] is difficult to quantify as it would only be fully realized as mitigations are implanted over time and after all OH risk has been mitigated."

Figure 14. SDG&E RSE results for PSPS risk mitigation alternatives (RSE per $ Million)[45]



3. Undergrounding Costs are Significantly Larger than PSPS Risk Reduction Benefits for Residential Ratepayers

In addition to being largely unnecessary given the availability of cost-effective alternatives (see above) widespread undergrounding is not a viable mitigation measure, particularly for residential ratepayers, due to its high cost compared with the relatively low value of avoiding a PSPS event.[46] This can be seen directly by comparing the value of lost load for the residential class using Lawrence Berkeley National Lab's Interruption Cost Estimate (ICE) calculator.[47] The values and methodology provided in the ICE calculator was recently endorsed by the

[45] As discussed in Section IV the strategic undergrounding RSEs for both PSPS and wildfire are flawed. They are presented here with SDG&E's figures for comparison purposes. Calculated from revised risk Excel workpapers and latest revision to wildfire risk calculations, supporting tabs, "1 Final TY2024 GRC RSE Workpaper - SDGE - Wildfire-2R_60933." These RSEs do not include simply better weather forecasting and isolation of circuits at the most granular level possible, likely the most cost-effective alternative. Wireless fault indicators allow for "potentially faster power restoration which could offset customer reliability impacts caused by wildfire mitigation measures" (SDGE-13, p. JTW-100). While only the wildfire RSE was calculated for this program, it would be even more cost-effective if PSPS risk reduction had been included. RSEs are presented for the program as a whole, across tranches.

[46] This is *relative to the cost of undergrounding,* not that residential ratepayers do not value reliability.

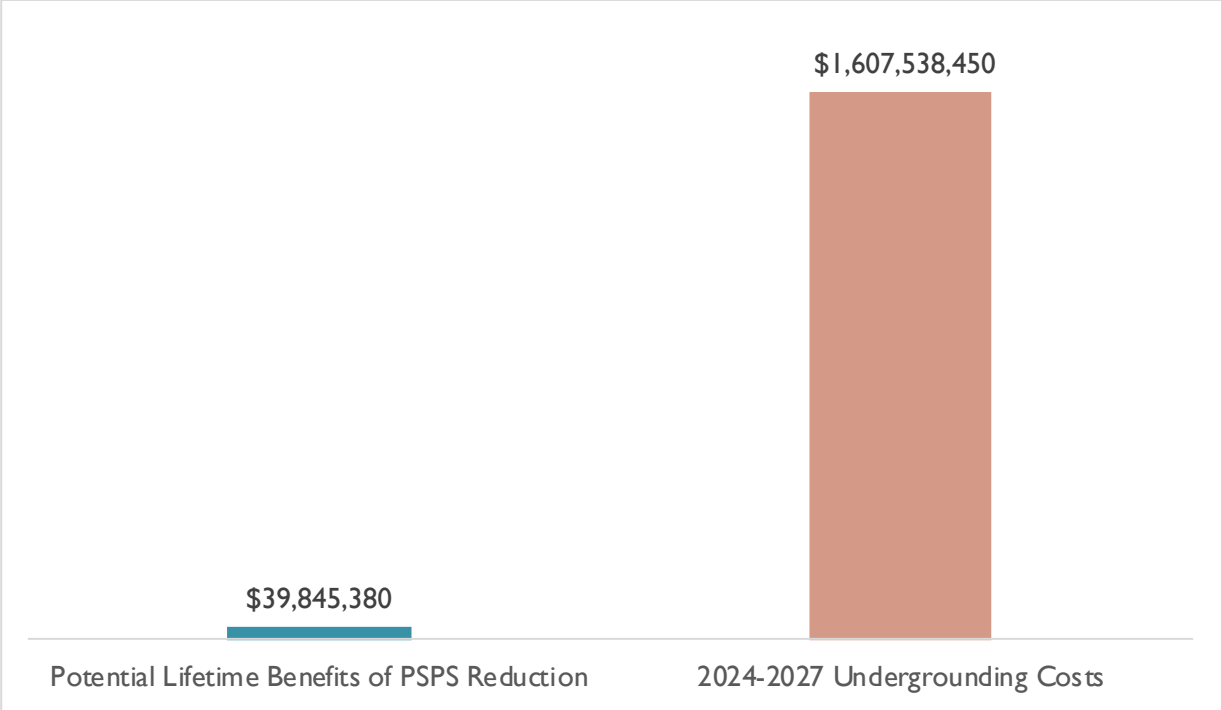
[47] See LBNL, ICE Calculator, https://icecalculator.com/documentation.

Commission for risk modeling purposes.[48] Specifically, I compare the average annual "cost" (or "risk reduction benefit," if the PSPS does not occur) that accrues to residential ratepayers for *all* PSPS events in SDG&E's territory by multiplying the annual average load affected by PSPS from 2015-2021 by the ICE calculator's estimate of the "cost per unserved kWh," for the residential class, adjusted for SDG&E territory specific inputs. The calculation includes the 40-year benefit life of undergrounding, consistent with SDG&E's assumptions.

Potential PSPS risk reduction benefits are overstated here because they are not adjusted for the number of proposed miles of undergrounding, instead, the figures incorporate the economic value of reducing the average amount of PSPS that occurred from 2017-2021 across the entire service territory. Additionally, we assume all PSPS customer outages are residential customers. Costs are understated because they do not include the full revenue requirement and are in 2021 constant dollars rather than nominal dollars.

[48] D.22-12-027, pp. 38-39.

Figure 15. Maximum economic value of PSPS risk reduction benefits for residential ratepayers compared with undergrounding costs[49]



In sum, SDG&E's RSE calculation for strategic undergrounding is flawed due to the inclusion of its PSPS risk reduction calculation. Further, considering there are multiple more cost-effective alternatives for mitigating PSPS risk, and residential ratepayers should never pay for undergrounding as a PSPS risk mitigation strategy, I recommend the Commission compare the benefits and costs of undergrounding to alternatives based on *wildfire risk and wildfire risk reduction cost-effectiveness,* not PSPS which confounds the analysis for the foregoing reasons.

B. SDG&E's Wildfire Risk Tranches are Not Sufficiently Granular

[49] LBNL ICE calculator downloaded from https://icecalculator.com/documentation, updated to include SDG&E territory specific inputs from WMP Excel table 11 (SAIDI and SAIFI including PSPS). Number of residential and non-residential customers from Energy Information Administration, https://www.eia.gov/electricity/data.php, tables 6 and 7. Load based on assumed average residential load of 500 kWh per month, converted to average load per hour, and applied to annual number of PSPS customer hours per year as reported in WMP Excel Table 11 (this also includes commercial and industrial customers so is also overstated).

SDG&E's risk tranches for wildfire – tier 2 and tier 3 – are overly broad, which is directly counter to the RAMP settlement's provisions, signed by SDG&E, that each utility should "strive to achieve as deep a level of granularity as reasonably possible" and "each element (i.e., asset or system) contained in the identified Tranche would be considered to have homogeneous risk profiles."[50] As seen above in the WiNGS model results, risk is heterogeneous across the HFTD, but SDG&E averages this risk across just two HFTD tiers, a highly simplistic representation of its system. [SDG&E should utilize its WiNGS model to a greater extent to create significantly more granular tranches and RSE results for its mitigation programs.[51].]

C. SDG&E's Risk Spend Efficiency Risk Modeling Significantly Overstates Wildfire Risk

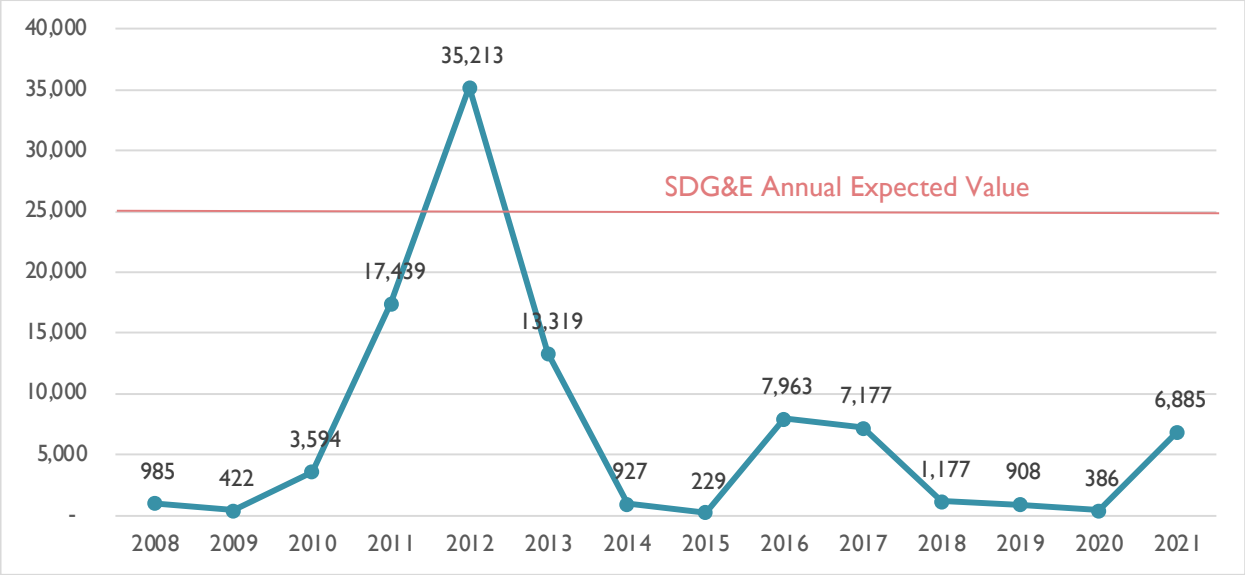
One key assumption that forms the basis of several consequences, including injuries and fatalities from wildfires, is the number of acres SDG&E expects to burn (absent mitigations) given an ignition. The assumption that SDG&E makes is that there will be a catastrophic fire once every 20 years that burns 500,000 acres,[52] an expected value of 25,000 acres per year.[53] This is also the basis for other safety implications including injuries and fatalities.

This is not a realistic modeling assumption. Indeed, it is based on a review of *statewide* fires, not those particular to SDG&E's service territory or the San Diego region.[54] Further, the expected annual number of acres burned, 25,000, is not realistic when compared with actual data for the San Diego region. Putting aside the cause of fires for the moment (the figure includes all sources), annual acres burned in San Diego county have been far less than 25,000 in all years <u>but one</u> since 2008.

---

[50] D. 18-12-014, *Settlement Agreement among multiple intervenors, including SDG&E*, Attachment A, Appendix A, p. A-11, row 14.
[51] We are relying on the utility's representations of WiNGS data as it was provided. Our use of it was limited by SDG&E's unwillingness to provide WiNGS inputs and underlying calculations.
[52] See SDG&E RSE Excel workpapers, "Risk Scoring Workpaper" tab.
[53] 1/20 * 500,000 = 25,000.
[54] TURN-31, question 6. Sources provided are for statewide fires; one of the sources is specific to PG&E.

Figure 16. Annual acres burned in San Diego County, 2008-2021, all causes[55]



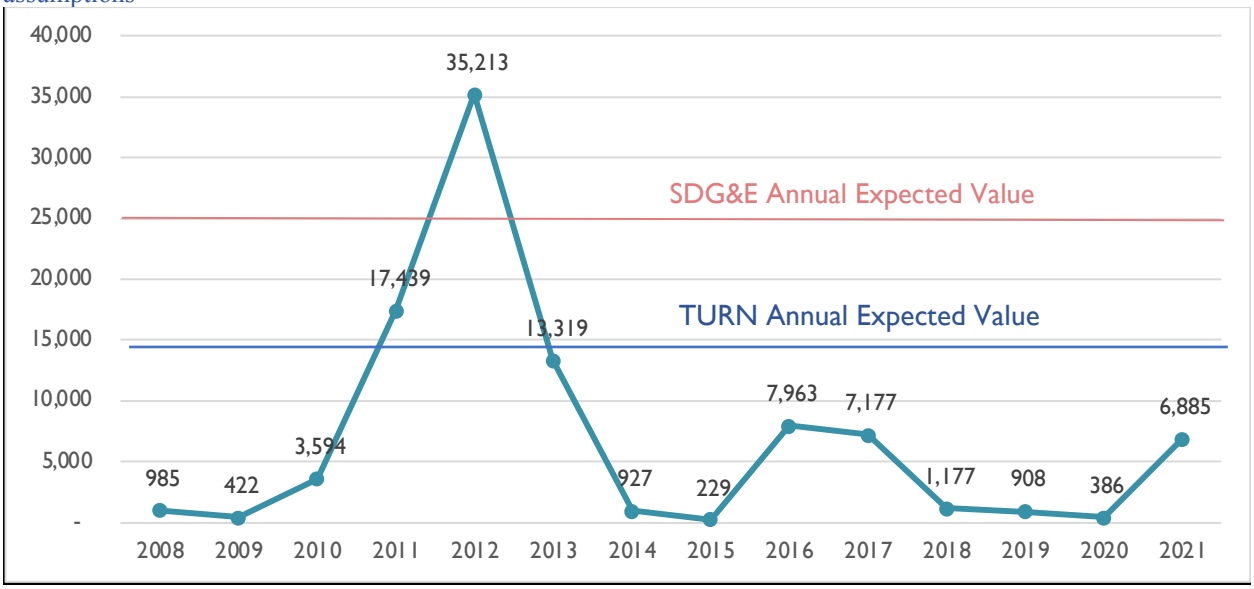
It is not as if recent years have not seen risky wildfire weather, so for SDG&E's value to be this unrepresentative of fire behavior in its service territory demonstrates that this is an unreasonable assumption.

That said, we recognize that the Witch Fire occurred in 2007 due to what was found to be imprudent and unreasonable management of its system by SDG&E.[56] This fire burned nearly 200,000 acres.[57] Therefore, using historical data there is an approximately 1/15 chance of having a 200,000 acre catastrophic fire, resulting in an annual expected value of 13,333 acres burned per year.[58] While this appears to be overly conservative based on recent data for the utility territory, particularly since 2008, "tail events" should be kept in mind for modeling purposes, particularly for modeling of wildfire risk. So we adopt this as a reasonable, but likely conservative estimate to represent both average and catastrophic wildfire years. As shown below, the number of acres

[55] Analyzed from CalFire Redbook Data, CalFire, https://www.fire.ca.gov/our-impact/statistics.
[56] D.17-11-033.
[57] 197,990 acres. See CalFire, https://www.fire.ca.gov/incidents/2007/10/21/witch-fire/.
[58] Using the 1 in 20 year criteria, this equates to a major fire of around 267,000 acres every 20 years: 267,000 * 1/20 = 13,350 annual expected value acres burned.

burned in San Diego County from all causes has been significantly less than this, even in recent years when the state saw relatively high wildfire risk.

Figure 17. Annual acres burned in San Diego County, 2008-2021, all causes, SDG&E vs. TURN acres burned assumptions[59]



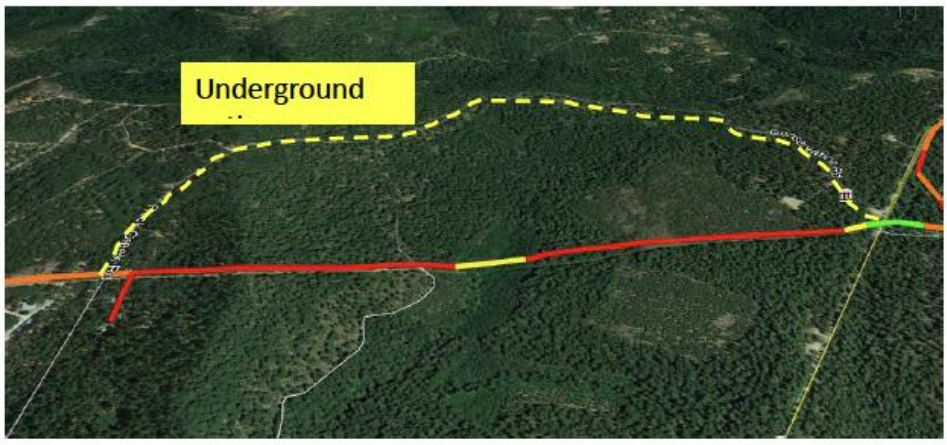
This quantitative assumption affects modified RSE calculations for strategic undergrounding and covered conductor, presented above and in Section V.

D. SDG&E's RSE Calculation Does Not Factor in Overhead to Underground Mileage Factors

One aspect of undergrounding not sufficiently illuminated in SDG&E's testimony is the fact that the unit cost for undergrounding is in dollars per underground miles, not dollars per overhead circuit mile. From a risk perspective, what is important is removal of overhead miles, not how many miles are underground. They differ because, due to challenges with topography, underground miles must go around impediments whereas an overhead line can cross creeks, canyons, and other impediments. An example of this is depicted below.

[59] Analyzed from CalFire Redbook Data, CalFire, https://www.fire.ca.gov/our-impact/statistics.

Figure 18. Underground vs. Overhead Circuit Miles[60]



This has a significant effect on unit costs, and therefore RSEs, and depends on how many more underground miles must be accomplished to replace the same circuits overhead. SDG&E assumes (though provided no data or analysis) that "for every 1 mile of OH conductor there will be 1.2 miles of UG conductor. This is a representative average based on various factors such as feasibility of constructing along the existing easement, additional routing of UG cables required and more."[61] The following shows SDG&E's unit costs assuming a 1.2 conversion ratio.

Table 5. Undergrounding unit costs with overhead to underground ratio

	$2021		$Nominal	
	Dollars per UG Mile	Dollars per OH Mile	Dollars per UG Mile	Dollars per OH Mile
2024	$ 1,938,169	$ 2,325,803	$ 2,157,764	$ 2,589,317
2025	$ 2,389,288	$ 2,867,145	$ 2,693,348	$ 3,232,017
2026	$ 2,336,496	$ 2,803,795	$ 2,677,023	$ 3,212,427
2027	$ 1,933,482	$ 2,320,178	$ 2,262,070	$ 2,714,484

SDG&E admits that it did not factor this conversion ratio into its RSE calculations.[62] This means that either a) it will cost more than modeled to achieve the same risk reduction or b) there will be

[60] A.21-06-021, TURN-154, Question 11b.
[61] TURN-15, question 15a, Excel attachment.
[62] TURN-17, question 6(a)(i). "SDG&E has not incorporated an overhead-to-underground conversion ratio into its risk analysis."

less risk reduction accomplished for the costs modeled. I present a corrected RSE calculation in Section V.

V. When Calculated Correctly, SDG&E's Risk Modeling Demonstrates that the Costs of Undergrounding are Greater than the Benefits

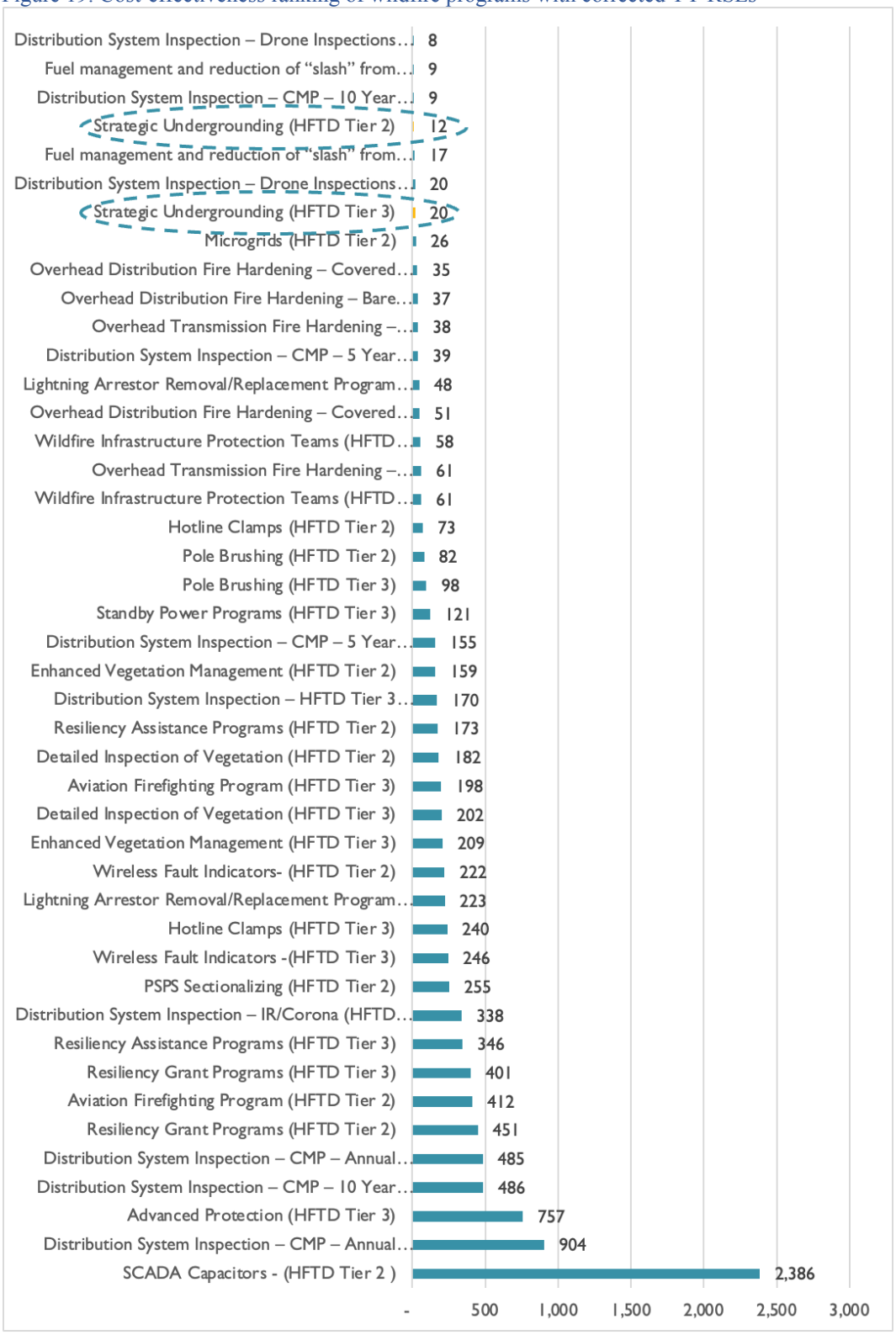
To examine the costs and risk reduction benefits of undergrounding in a more realistic light than as presented by SDG&E, we correct several flaws, discussed above, to calculate a more realistic RSE statistic:

- We remove PSPS risk reduction from the calculation due to the issues noted above, and the fact that undergrounding should be driven by reduction of wildfire risk, not PSPS;
- We reduce the annual expected acres burned in a catastrophic wildfire to a more realistic assumption;
- We incorporate the overhead to underground conversion ratio assumed by SDG&E but not included in its RSE analysis;[63]
- We adjust the discounting and inflation methodology per TURN-4. For the test year, this involves discounting benefits at the Weighted Average Cost of Capital (WACC) and inflating constant 2021 dollars to nominal 2024 dollars.

The following figure shows how the test year RSE compares with other wildfire programs once these changes are accomplished, assuming the same methodology for each mitigation from TURN-4.[64]

[63] This is accomplished by grossing up costs by 20 percent in the RSE calculation.
[64] Cross functional factor (CFF) costs are included in TURN-4 alternative calculations, so we have also included those costs here to accurately compare our adjusted RSEs with TURN-4 values. This did not affect the relative ranking of strategic undergrounding.

Figure 19. Cost-effectiveness ranking of wildfire programs with corrected TY RSEs[65]

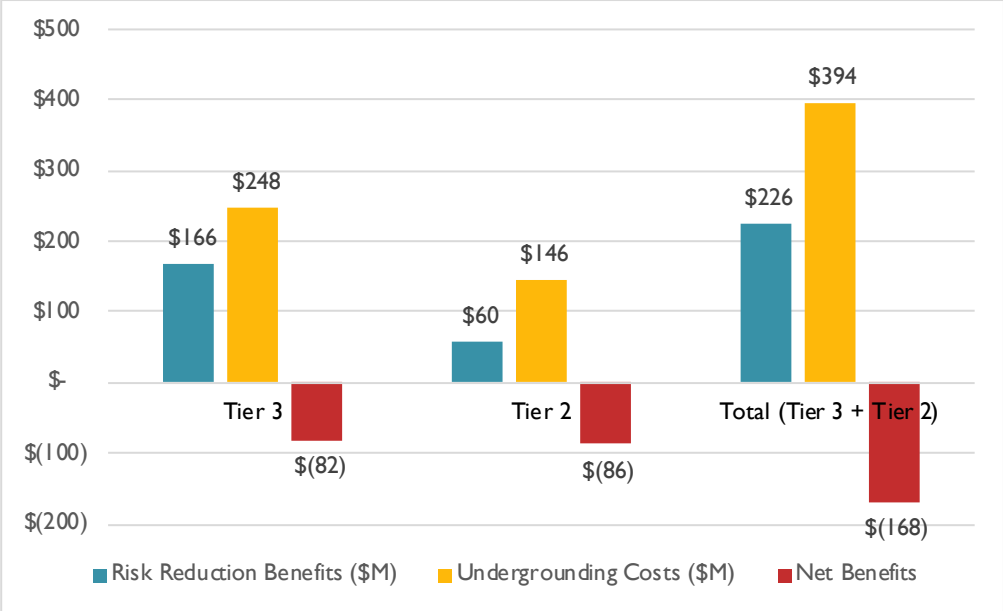


As discussed in TURN-4, the RSE statistic can be translated into a more traditional dollar-denominated benefit-cost ratio through the multi-attribute value function dollar equivalencies and algebraic transformations. This allows for a direct comparison of benefits and costs in dollar terms.

One must be careful in interpreting benefit-cost statistics – indeed, they do not consider *affordability,* only whether the modeled benefits exceed costs. Nevertheless, they can be helpful for examining modeling results in absolute, rather than relative terms, as above. Based on the modifications described above and in TURN-4 to accurately calculate the RSE for strategic undergrounding, namely removing PSPS risk reduction, reducing the number of acres burned in a catastrophic wildfire, adjusting the discount rate to WACC, and adjusting for inflation to match time periods of costs and benefits (risk reduction), costs exceed benefits for all tranches when we convert risk reduction into dollar-denominated units.[66]

[65] Incorporates changes from TURN-4, and modifications to RSE described above. Cross functional factor (CFF) costs are included in TURN-4 alternative calculations, so we have also included those costs here to accurately compare our adjusted RSEs with TURN-4 values.
[66] See TURN-4.

Figure 20. Risk reduction benefits and costs for strategic undergrounding[67]



The strategic undergrounding program for Tier 2, Tier 3, and overall has a benefit-cost ratio (BCR) of .41, .67, and .57, respectively. BCRs less than 1 have costs that are greater than benefits, and are therefore not cost-effective.

SDG&E did not update its post-test year RSE calculations so I do not present the benefits and costs of the strategic undergrounding program for those years. However, using the data currently input into the utility's calculations, the results are very similar to those shown above, even demonstrating slightly worse cost-effectiveness than the TY.[68] This is to be expected as SDG&E prioritizes highest to lowest risk circuits for undergrounding, and it will approach diminishing returns on these investments quickly (see Figure 23).

[67] Calculated with data from Revised Excel Workpapers, "Strategic_Undergrounding" tab, incorporating the changes described above.

[68] RSE may have a slight up-tick in 2027 due to lower assumed unit costs, but these costs should be approached with a degree of skepticism as I have seen no underlying evidence, analysis, or factual data to support them.

VI. Covered Conductor is a More Cost-effective Alternative to Complement Targeted Undergrounding and Other Mitigation Measures

Covered conductor provides significant risk reduction benefits – SDG&E estimates a mitigation effectiveness of about 65 percent[69] - can be deployed more quickly, and is significantly less costly than undergrounding.

As an initial matter, the Commission should recognize that SDG&E's unit cost (dollars per overhead circuit mile) for covered conductor deployment should be significantly less than what the utility has forecast. Even assuming SDG&E's higher unit costs, contrary to SCE's RSE analysis results shown above, an analysis of WiNGS model results at the circuit segment level shows that covered conductor is more cost-effective than undergrounding for every circuit where SDG&E has forecast an undergrounding project.

1. The Commission Should Adopt a Reasonable Unit Cost for Covered Conductor

SDG&E forecasts it will cost the utility around $1 million per mile to deploy covered conductor.[70] These costs are a higher than they should be. This can be seen most directly by comparing with Southern California Edison's (SCE's) actual recorded unit costs for covered conductor deployment, around $629,000 per mile in 2021.[71]

Further, SDG&E's own "traditional hardening" program, described below, is very similar to the covered conductor program, and was accomplished at a cost of $577,000 per circuit mile in 2023, increasing to over $800,000 in 2024 only because the number of miles were reduced in that year.[72] This means there are economies of scale for this program which would apply to a larger-scale covered conductor program as well – which we have proposed here.

---

[69] SDGE-13, Appendix C.
[70] TURN-15, question 11a, Excel attachment; TURN-15, question 1, Excel attachment. The attachment states "2024 Increase cost/mile due to reduced mileage target from 3 to 1."
[71] SCE WMP Filing, Excel Table 12, row 30. Subtracts stated deployment of non-WCCP CC deployment.
[72] TURN-15, question 1, Excel attachment.

> Traditional overhead hardening replaces high-risk poles and conductor types with more resilient equipment. These replacements typically include wooden poles with steel poles and small-size bare conductors with larger and stronger-rated bare conductors. Other types of equipment that may also be replaced if attached to the pole in the area targeted for hardening include but are not limited to insulators, crossarms, connectors, guys and anchors, aged and open wire secondary, capacitors, hotline clamps, fuses, switches, and lightning arresters. However, not all the above-mentioned pieces of equipment are installed at each pole location.[73]

When asked why SDG&E's costs are so different from SCE's, SDG&E stated:

> Note that SDG&E's covered conductor program and SCE's covered conductor program do have differences as explained in the Joint IOU Response to Action Statement – Covered Conductor (SDG&E's 2022 WMP Update Attachment H.) Additionally, SCE's service territory and system equipment is different from SDG&E's service territory and system equipment. The number and percentage of poles that need to be replaced to install covered conductor in SCE's service territory may not directly relate to the percentage of poles that need to be replaced to install covered conductor in SDG&E's service territory.[74]

While SDG&E acknowledges a difference between the utility programs, it fails to explain the cost differential to SCE. One difference not mentioned between the programs is that SDG&E replaces wood poles with steel poles, rather than with fire resistant wood poles like SCE. This provides no increase in risk mitigation effectiveness, yet likely represents a significant cost differential, which could not be quantified because SDG&E did not provide the necessary information.[75]

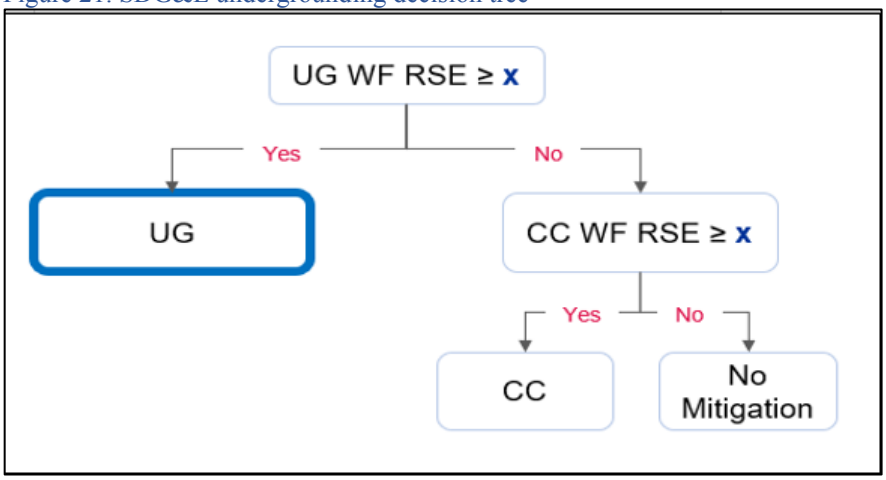
Given the disparity to SCE's covered conductor program as well as costs of SDG&E's own traditional hardening program, unit costs for covered conductor deployment should be set at no greater than $800,000 per circuit mile.[76] As stated, there appears to be economies of scale to the program, so adopting TURN's larger-scale covered conductor program will help drive down costs. Therefore, SDG&E should not be allowed to record expenditures above $800,000.

2. The WiNGS Model Does Not "Identify" Undergrounding as an Optimal Solution; it Demonstrates that Covered Conductor is More Cost-effective

[73] TURN-15, question 9a.
[74] TURN-17, question 8b.
[75] TURN-15, question 10. It is extremely surprising that a utility does not know (or is unwilling to provide) the cost to replace basic assets like poles and wires.
[76] In nominal 2024 dollars.

SDG&E implies that its WiNGS model has somehow "selected" undergrounding as the preferred option for much of the utility's expenditures, per the utility's proposal.[77] We asked numerous questions about the WiNGS model: SDG&E has not provided evidence that undergrounding is the "optimal" solution for the massive number of miles and costs that SDG&E claims. In fact, SDG&E's "decision tree" for how it assessed RSE in the WiNGS model is telling – rather than assessing which mitigation measure would be most cost-effective in the first place the utility asks *first* to see if undergrounding meets a pre-determined threshold, and then if not, looks to covered conductor, rather than assessing what mitigation measure is the most cost-effective.

Figure 21. SDG&E undergrounding decision tree[78]

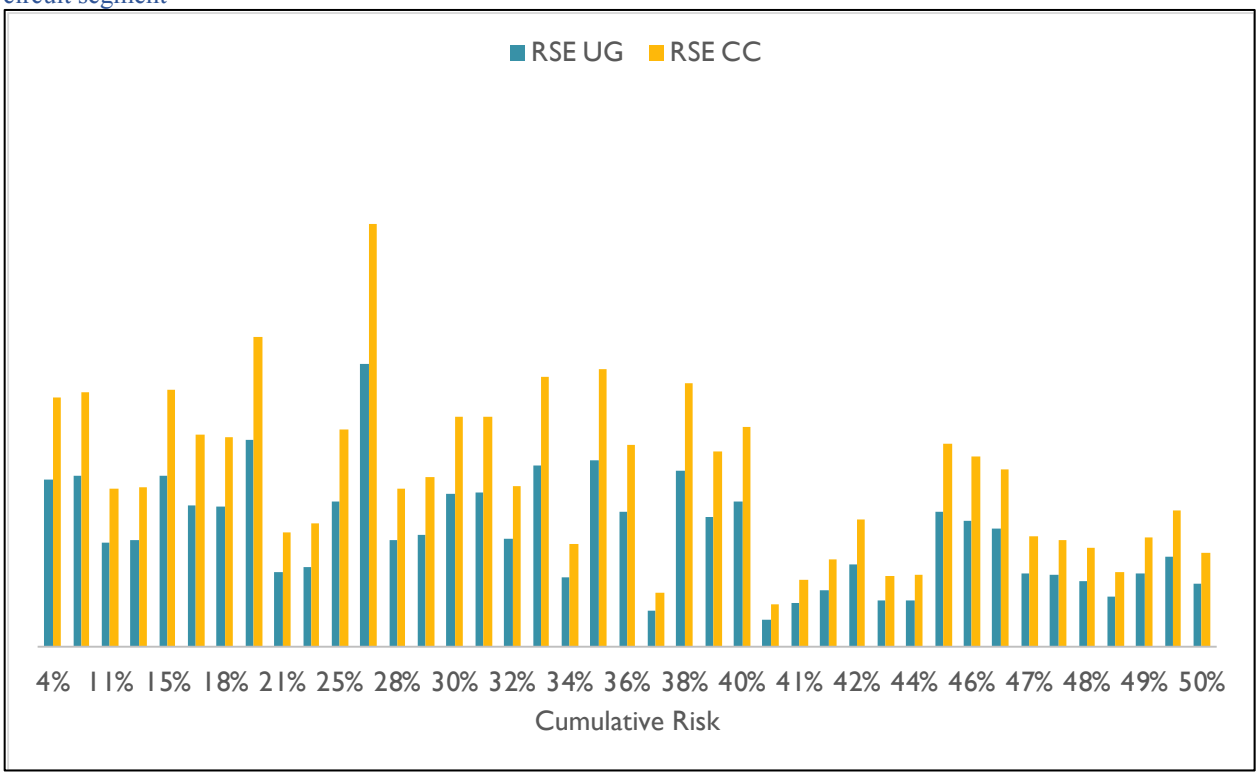


TURN's analysis, shown below, of WiNGS model risk data[79] finds that covered conductor is more cost-effective for reducing wildfire risk on every circuit where SDG&E has selected undergrounding as its preferred mitigation.

[77] See, for instance, SDGE-13, p. JTW-77:22-24. "SDG&E's Wildfire Mitigation Strategy team developed the WiNGS model to specifically tackle the issue of quantifying the impacts of and identify the optimal solutions to target both wildfire risk reduction as well as PSPS reduction."
[78] TURN-31, question 1h.
[79] Unfortunately, SDG&E's non-WiNGS RSE calculations are not sufficiently comparable for the purposes of comparing undergrounding with covered conductor. The number of ignitions before hardening are 50 percent lower for covered conductor, likely because this solution is deployed on much lower-risk circuits. While applicable to SDG&E's proposal, this approach does not allow for a comparison of cost-effectiveness for alternative proposals. Additionally, since WiNGS shows covered conductor is more cost-effective at a more granular level, the results are inconsistent.

On average, according to TURN's analysis of WiNGS model results, covered conductor is around 50 percent more cost-effective than undergrounding, even when assuming SDG&E's proposed unit cost of $1 million per mile. The figure below shows RSE results for the top 50 percent of wildfire risk where SDG&E has planned an undergrounding project.

Figure 22. RSE of undergrounding vs. covered conductor, WiNGS model analysis, sorted by highest to lowest risk circuit segment[80]

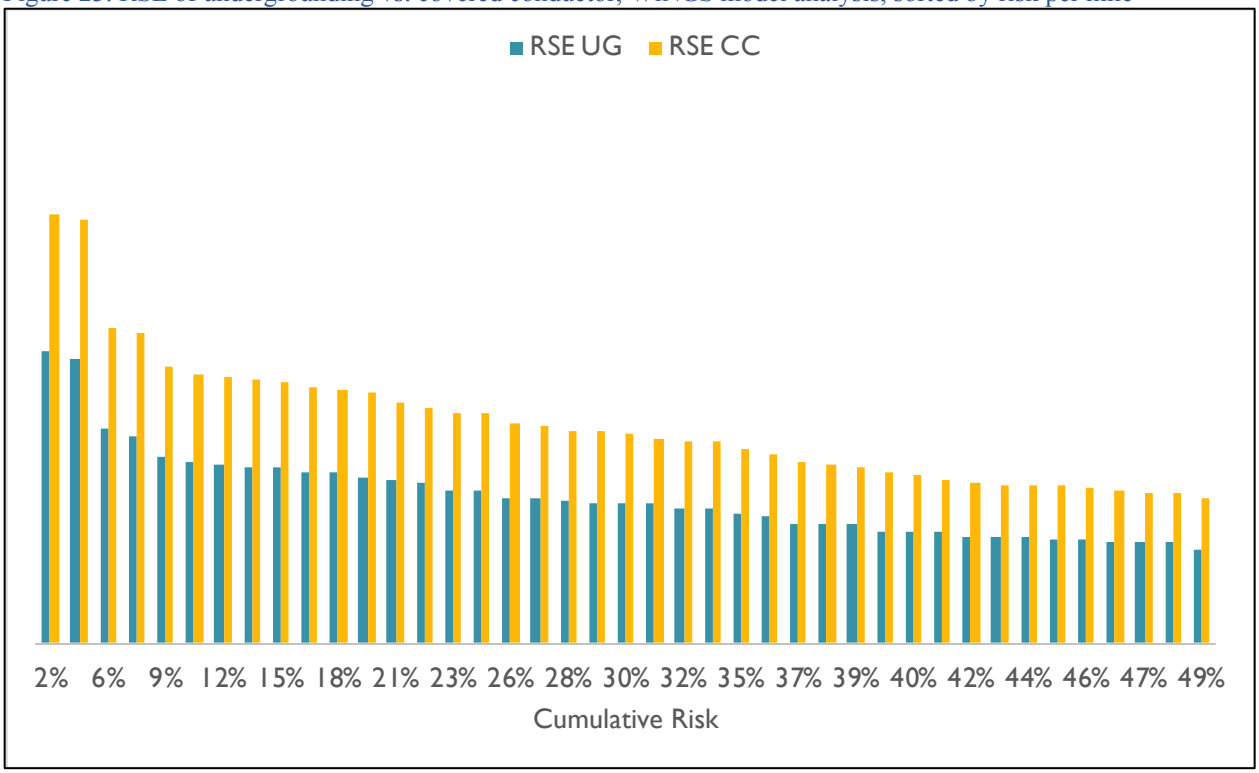


The reason risk reduction and RSEs are not uniform across risk is that circuit segments in the model have very different overhead mileages, ranging from 30 *feet* to 33 miles. Prioritizing circuits based on the highest risk per mile would ideally be the optimal strategy to reduce risk from highest to lowest priority, but may be impractical due to logistical reasons. Nevertheless,

[80] Data from TURN-31, question 1a. Since no years were provided in SDG&E's data set that corresponded to risk, I assume a weighted average (per mile) across years of costs for undergrounding from TURN-15, question 15b. Risk reduction due to undergrounding is provided in the model results. For covered conductor, I assume average unit costs from 2022-2024 provided in TURN-15, Attachment, Q1, though it seems lower unit costs would be realized if TURN's proposal for greater deployment is factored in. I assume SDG&E's mitigation effectiveness of 64.5%, SDGE-13-2R, Appendix C, Table 5.

viewing risk in this manner shows the significant disparity between covered conductor and undergrounding in terms of mitigation effectiveness for the very highest risk circuits, accounting for length.

Figure 23. RSE of undergrounding vs. covered conductor, WiNGS model analysis, sorted by risk per mile[81]



VII. TURN's Recommended Alternative Proposal for Hardening Initiatives Achieves the Majority of the Benefits at a Portion of the Costs.

The preceding sections establish that undergrounding is a significantly less cost-effective approach to wildfire mitigation compared with covered conductor along with other wildfire and

[81] Data from TURN-31, question 1a. Since no years were provided in SDG&E's data set that corresponded to risk, I assume a weighted average (per mile) across years of costs for undergrounding from TURN-15, question 15b. Risk reduction due to undergrounding is provided in the model results. For covered conductor, I assume average unit costs from 2022-2024 provided in TURN-15, Attachment, Q1, though it seems lower unit costs would be realized if TURN's proposal for greater deployment is factored in. I assume SDG&E's mitigation effectiveness of 64.5%, SDGE-13-2R, Appendix C, Table 5.

PSPS risk mitigation strategies. Furthermore, the absolute costs of SDG&E's proposal are unduly burdensome to ratepayers and have not been demonstrated to be reasonable by SDG&E.

While undergrounding is too complex, burdensome, and costly to be the broad-based solution to wildfire mitigation sought by SDG&E, it is appropriate as a strategy to mitigate risk on the very highest-risk circuit miles due to its high mitigation effectiveness.

With a keen eye towards cost-effectiveness, affordability, and absolute risk reduction, TURN believes a scaled down approach to undergrounding and a scaled up approach to covered conductor is appropriate. As we show below, this alternative achieves 78 percent of the risk reduction of SDG&E's proposal for 35 percent of the costs. However, we note that including PSPS both proposals achieve near 100 percent wildfire risk mitigation; TURN's proposal thus may incur slightly higher PSPS risk, though we expect this risk can be mitigated more cost-effectively with other programs and strategies aimed at reducing PSPS frequency and consequence.[82]

Table 6. Undergrounding miles and costs, TURN vs. SDG&E

	2024	2025	2026	2027	Total
	Miles - Covered Conductor				
TURN	100	100	100	100	400
SDG&E	60	40	40	40	140
TURN-SDG&E	40	60	60	60	260
	Costs - Covered Conductor ($M, 2021)				
TURN	$ 71.9	$ 71.9	$ 71.9	$ 71.9	$ 287.4
SDG&E	$ 59.8	$ 60.4	$ 63.3	$ 67.2	$ 250.7
TURN-SDG&E	$ 12.0	$ 11.5	$ 8.5	$ 4.7	$ 36.7

[82] These include, but are not limited to, better weather forecasting and monitoring, sectionalizing, the generator assistance program, and the generator grant program.

Table 7. Covered Conductor miles and costs, TURN vs. SDG&E

	2024	2025	2026	2027	Total
	Miles - Covered Conductor				
TURN	100	100	100	100	400
SDG&E	60	40	40	40	140
TURN-SDG&E	40	60	60	60	260
	Costs - Covered Conductor ($M, 2021)				
TURN	$ 80.0	$ 80.0	$ 80.0	$ 80.0	$ 320.0
SDG&E	$ 59.8	$ 60.4	$ 63.3	$ 67.2	$ 250.7
TURN-SDG&E	$ 20.2	$ 19.6	$ 16.7	$ 12.8	$ 69.3

Table 8. All hardening miles and costs, TURN vs. SDG&E

	2024	2025	2026	2027	Total
	Total Miles - Hardening (UG + CC)				
TURN	135	135	135	135	540
SDG&E	185	190	200	210	745
TURN-SDG&E	-50	-55	-65	-75	-205
	Total Costs - Hardening ($M, 2021)				
TURN	$ 154.5	$ 166.5	$ 167.4	$ 168.6	$ 657.0
SDG&E	$ 354.8	$ 466.1	$ 500.1	$ 537.3	$ 1,858.3
TURN-SDG&E	$ (200.3)	$ (299.6)	$ (332.7)	$ (368.6)	$ (1,201.2)

In order to compare the benefits and costs of TURN's and SDG&E's respective hardening proposals, we have evaluated the respective risk mitigations of each proposals. However, we wish to note again that these are not the only two programs SDG&E has proposed to mitigate risk. In addition to its $1.9 billion in proposed hardening programs from 2024-2027, SDG&E's programs include an additional $400 million in capital and $700 million in O&M expenditures.[83] It is therefore inaccurate to assume these are the *only* risk reducing programs, and I have not analyzed total risk reduction across all wildfire mitigation programs (nor has SDG&E, to my knowledge).

Using WiNGS data sorted from highest to lowest risk circuit segment, and assuming undergrounding is deployed before covered conductor (i.e. to higher risk circuits) from 2024-

[83] See Figure 2 and SDGE-13, p. JTW-B-8 for O&M expenditures in TY 2024. SDG&E states in TURN-15, question 4d, that "SDG&E does not forecast project-specific Post-Test Year (PTY) costs, except for those identified as PTY capital exceptions." We therefore assume flat O&M costs from the 2024 forecast.

2027, TURN's proposal provides 78 percent of the risk reduction benefits for about $1.2 billion less than SDG&E's proposal. From a statewide perspective, we show that difference of risk reduction between the proposals **is less than 1 percent.**[84] The risk reduction figures include SDG&E's 2022 and 2023 forecast deployment of undergrounding and covered conductor.

Table 9. Difference in risk reduction and cost, TURN vs. SDG&E

	Risk Reduction	Cost ($M, 2021)
TURN	44%	$ 657.0
SDG&E	56%	$ 1,858.3
TURN-SDG&E	-12%	$ (1,201.2)

TURN's proposal thus addresses the vast majority of risk as SDG&E's while saving ratepayers over $1.2 billion. This represents a more than adequate balance between safety and affordability, allowing the Commission to meet its core mandate of passing through only those costs that are just and reasonable.

[84] Since TURN's proposal reduces 12 percent less risk than SDG&E's, and we estimate San Diego's statewide wildfire risk is around 6 percent (at most), this represents a .72 percent difference.

APPENDIX B

Attachments to TURN Testimony of Eric Borden in SDG&E's 2024 GRC

CPUC Docket: A.22-05-016
Witness: Borden
Exhibit: TURN-08-Atch01

ATTACHMENTS TO THE
PREPARED TESTIMONY OF
ERIC BORDEN

ADDRESSING SAN DIEGO GAS AND ELECTRIC'S TEST YEAR 2024 WILDFIRE MITIGATION HARDENING MEASURES AND RELATED WILDFIRE RISK MODELING ISSUES

Submitted on Behalf of

THE UTILITY REFORM NETWORK

785 Market Street, Suite 1400
San Francisco, CA 94103

Telephone: (415) 929-8876
Facsimile: (415) 929-1132

March 27, 2023

Table of Contents

Data Request Number: TURN-SEU-004

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Proceeding Number: A2205015_016 2024 GRC

Publish To: The Utility Reform Network

Date Received: 9/28/2022

Date Responded:10/26/2022

1. Re. Traditional Overhead System Hardening:

a. Please provide the total spent each year 2012-2021on all traditional hardening programs (FiRM, PRiME, WiSE, etc.)

b. Please provide the total circuit miles addressed each year 2012-2021 by any traditional hardening program (FiRM, PRiME, WiSE, etc.), segregated by HFTD v. non-HFTD miles.

c. Please provide the following information for each year 2012-2021, segregated by HFTD v. non-HFTD circuit miles:

i. Total Number of wood poles replaced

ii. Total Number of steel poles installed iii. Total Number of concrete poles installed iv. Total Number of new transformers installed v. Total Number of new switches installed

SDG&E Response 1:

SDG&E objects to this request under Rule 10.1 of the Commission's Rules of Practice and Procedure to the extent it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. SDG&E specifically objects to the timeframe of the request as requesting information prior to SDG&E's Wildfire Mitigation Plan, the passage of SB 901 and AB 1054, and outside the scope of this proceeding. Due to the timeframe, providing fully responsive information is also unduly burdensome and the expense and intrusiveness of the request clearly outweighs the likelihood that the information sought will lead to the discovery of admissible evidence.

Subject to and without waiving the foregoing objection, SDG&E responds as follows:

a. See table below for costs for Traditional Hardening from 2012-2021

Year	Total Direct Costs ($)
2012	$1,830
2013	$4,283,666
2014	$16,894,518
2015	$52,896,364

SDG&E Response 1:-Continued

2016	$54,543,453
2017	$56,254,977
2018	$56,066,705
2019	$128,268,952
2020	$141,996,283
2021	$96,562,702
2022	$18,388,305
Total	$626,173,602

b. Please see attached file titled “TURN-SEU-004_ATTACH_Q1_Q2_Q3_Q4.xlsx”, tab “Q1 & Q3, TH, CC, 2012-2021"

c. Please see attached file titled “TURN-SEU-004_ATTACH_Q1_Q2_Q3_Q4.xlsx”, tab “Q1 & Q3, TH, CC, 2012-2021"

TURN-SEU-004 Question 1 & 3

HFTD/Non-HFTD	DR Question	Program	Traditional Hardening	2012	2013	2014	2015	2016	2017	2018	2019	2020	202
Non-HFTD		Traditional	total number of poles in scope	n/a	0	0	0	0	0	109	111	38	7
Non-HFTD	1.b	Traditional	circuit miles	n/a	0	0	0	0	0	4	4	1	4
Non-HFTD	1.c.i	Traditional	wood poles replaced	n/a	unk	unk	unk	unk	unk	unk	unk	36	6
Non-HFTD	1.c.ii	Traditional	steel poles installed	n/a	unk	unk	unk	unk	unk	unk	unk	36	6
Non-HFTD	1.c.iii	Traditional	concrete poles installed	n/a	0	0	0	0	0	0	0	0	0
Non-HFTD	1.c.iv	Traditional	new transformers installed	n/a	unk	unk	unk	unk	unk	unk	unk	unk	unk
Non-HFTD	1.c.v	Traditional	new switches installed	n/a	unk	unk	unk	unk	unk	unk	unk	unk	unk
HFTD		Traditional	total number of poles in scope	n/a	87	293	2138	1571	1879	1852	2270	1970	209
HFTD	1.b	Traditional	circuit miles	n/a	4	15	106	78	93	92	113	98	10
HFTD	1.c.i	Traditional	wood poles replaced	n/a	unk	unk	unk	unk	unk	unk	unk	unk	unk
HFTD	1.c.ii	Traditional	steel poles installed	n/a	unk	unk	unk	unk	unk	unk	unk	1634	164
HFTD	1.c.iii	Traditional	concrete poles installed	n/a	0	0	0	0	0	0	0	0	0
HFTD	1.c.iv	Traditional	new transformers installed	n/a	unk	unk	unk	unk	unk	unk	unk	unk	unk
HFTD	1.c.v	Traditional	new switches installed	n/a	unk	unk	unk	unk	unk	unk	unk	unk	unk
Non-HFTD		Covered Conductor	total number of poles in scope	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Non-HFTD	3.a	Covered Conductor	circuit miles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Non-HFTD	3.b	Covered Conductor	steel poles installed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Non-HFTD	3.c	Covered Conductor	transformers installed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Non-HFTD	3.d	Covered Conductor	switches installed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Non-HFTD	3.e	Covered Conductor	regulators installed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Non-HFTD	3.f	Covered Conductor	fuses installed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
HFTD		Covered Conductor	total number of poles in scope	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	34	41
HFTD	3.a	Covered Conductor	circuit miles	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	2	2
HFTD	3.b	Covered Conductor	steel poles installed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	21	39
HFTD	3.c	Covered Conductor	transformers installed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3	unk
HFTD	3.d	Covered Conductor	switches installed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12	unk
HFTD	3.e	Covered Conductor	regulators installed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	unk
HFTD	3.f	Covered Conductor	fuses installed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12	unk

n/a = not applicable as the program did not exist at that time.
unk = unknown, data is not readily available and not currently tracked and reported in this fashion.
circuit miles = are approximation based on the formula (# of total poles in scope) x (262ft average span length in HFTD) / (5,280 ft/mile).

Data Request Number: TURN-SEU-015

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/6/2023
Date Responded:01/24/2023

1. Please provide updated workpapers supporting SDG&E-13 and its revisions, including both cost and risk reduction workpapers, in Excel with all supporting workpapers and assumptions.

SDG&E Response 1:

SDG&E objects to this request under Rule 10.1 of the Commission's Rules of Practice and Procedure to the extent it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. Further, SDG&E objects to the request to the extent that it calls for the creation and production of documents that currently do not exist.

Subject to and without waiving the foregoing objection, SDG&E responds as follows:

SDG&E has provided Excel spreadsheets for workpapers and supporting files to the extent Excel spreadsheets exist, in its response to EDF-SDGE-001, which is available to parties through the Discovery Portal. The spreadsheets provided in response to EDF- SDGE-001 support the revised testimony and workpapers, submitted on August 16, 2022.

For spreadsheets supporting the second revised testimony and workpapers submitted on October 28, 2022, please see the attached files titled "TURN_SEU_015_ATTACH_Q1_192460.xlsx" and "TURN_SEU_015_ATTACH_Q1_202850.xlsx."

All other spreadsheets related to Ex. SDG&E-13 provided in response to EDF-SDGE-001 were not impacted by the second revision to testimony.

TY2024 GRC Forecast - Details

Budget Code: 19246

Estimated In Service Date: Ongoing (If this is an ongoing blanket or program, please input "ongoing")

19246 - Strategic Undergrounding Program						2022			2023			2024			2025			2026				
Line Item	Unit Description	Labor/Non-Labor	RAMP/Non-RAMP	Unit Metric	# of units	Cost per unit*	Total cost	# of units	Cost per unit*	Total cost	# of units	Cost per unit*	Total cost	# of units	Cost per unit*	Total cost	# of units	Cost per unit*	Total cost	Total Cost	Comments
1	Engineering & Design	Non-Labor	RAMP	Miles	104	$ 300,000	$ 31,200,000	163	$ 321,000	$ 52,323,000	195	$ 343,470	$ 66,976,650			$ -			$ -	$ 150,499,650	
2	Construction	Non-Labor	RAMP	Miles	65	$ 1,200,000	$ 78,000,000	80	$ 1,320,000	$ 105,600,000	125	$ 1,386,000	$ 173,250,000			$ -			$ -	$ 356,850,000	
3	Material	Non-Labor	RAMP	Miles	65	$ 120,000	$ 7,800,000	80	$ 126,000	$ 10,080,000	125	$ 132,300	$ 16,537,500			$ -			$ -	$ 34,417,500	
4	Contract Services	Non-Labor	RAMP	Miles	65	$ 92,308	$ 6,000,020	80	$ 71,250	$ 5,700,000	125	$ 58,400	$ 7,300,000			$ -			$ -	$ 19,000,020	
5	Labor	Labor	RAMP	Miles	65	$ 23,077	$ 1,500,005	80	$ 20,000	$ 1,600,000	125	$ 13,312	$ 1,664,000			$ -			$ -	$ 4,764,005	
6	Construction Provision (WiNGS)	Non-Labor	RAMP	Miles	1	$ 1,481,074	$ 1,481,074	12	$ 1,320,000	$ 15,840,000	19	$ 1,386,000	$ 26,334,000			$ -			$ -	$ 43,655,074	

*Costs should be reported in direct costs only (no overheads)

Summary															
		Labor	RAMP		$ 1,500,005		$ 1,600,000		$ 1,664,000		$ -		$ -	$ 4,764,005	
		Non-Labor	RAMP		$ 124,481,094		$ 189,543,000		$ 290,398,150		$ -		$ -	$ 604,422,244	
	Subtotal RAMP				$ 125,981,099		$ 191,143,000		$ 292,062,150		$ -		$ -	$ 609,186,249	
		Labor	Non-RAMP		$ -		$ -		$ -		$ -		$ -	$ -	
		Non-Labor	Non-RAMP		$ -		$ -		$ -		$ -		$ -	$ -	
	Subtotal Non-RAMP				$ -		$ -		$ -		$ -		$ -	$ -	
	Total Project Forecast				$ 125,981,099		$ 191,143,000		$ 292,062,150		$ -		$ -	$ 609,186,249	

ESH 2022-2024 GRC Supporting Workpaper Calculations

[***Note*: 'Costs per Mile'** includes Engineering/Design for future projects hardened in following years. ***High-level methodology*** utilized in order to align costs with monthly cash flows required for 2023-2032 10 Year **Plan** for **2022-2024** timeframe]

Traditional Hardening Cost per Unit

Category	**2022**	**2023**	**2024**	**Total**	**Comments**
Costs(Non-Labor)	$ 20,052,016	$ 1,731,151	$ 848,291	**$ 22,631,459**	
Units (Miles Hardened)	25	3	1	**29**	
Annual Costs per Mile	**$ 802,081**	**$ 577,050**	**$ 848,291**	**$ 742,474**	2023 decrease cost/mile due to reduction in costs as a result of scope shifting to Covered Conductor; 2024 Increase cost/mile due to reduced mileage target from 3 to 1
YoY Change (%)					
Costs		*-91.37%*	*-51.00%*		*Reduction in costs as a result of fire hardening 3 miles from 25 miles in 2023; while only hardening 1 mile in 2024 and beyond*
Units		*-88.00%*	*-66.67%*		*2023 reduction in miles due to scope converting over to Covered Conductor*

Category	**2022**	**2023**	**2024**	**Total**	**Comments**
Costs (Labor)	$ 1,150,474	$ 98,710	$ 43,284	**$ 1,292,468**	
Costs per unit	59	59	59	**$ 59**	Assume $59 per internal bill rate for FTE
# of hours	**19,500**	**1,673**	**734**	**$ 21,906**	**2023 & 2024** decrease in hours due to reduction in costs
YoY Change (%)					
Costs		*-91.42%*	*-56.15%*		*Reduction in costs as a result of fire hardening 3 miles from 25 miles in 2023 and beyond*

Covered Conductor Cost per Unit

Category	**2022**	**2023**	**2024**	**Total**	**Comments**
Costs (Non-Labor)	$ 73,952,225	$ 64,932,583	$ 55,554,648	**$ 194,439,456**	
Units (Miles Hardened)	60	60	60	**180**	
Annual Costs per Mile	**$ 1,232,537**	**$ 1,082,210**	**$ 925,911**	**$ 1,080,219**	**2023 decrease/mile due** to lower unit **(drives cost increase)** for miles hardened; **2024 decrease/*mile*** due to reduced preliminary engineering work from 2023
YoY Change (%)					
Costs		*-12.20%*	*-14.44%*		*Decrease in costs as a result of reduced preliminary engineering required from 2023 onwards*
Units		*0.00%*	*0.00%*		

Category	**2022**	**2023**	**2024**	**Total**	**Comments**
Costs (Labor)	$ 4,640,896	$ 4,289,870	$ 3,662,593	**$ 12,593,359**	
Costs per unit	59	59	59	**$ 59**	Assume $59 per internal bill rate for FTE
# of hours	**78,659**	**72,710**	**62,078**	**$ 213,447**	**2023 & 2024** due to decrease in costs
YoY Change (%)					
Costs		*-7.56%*	*-14.62%*		*Decrease in costs as a result of reduced engineering labor to support program in 2023 and beyond from 2022 levels*

Direct Costs

[Source: 2023-2032 10 Year Plan]

Traditional Hardening

Category	**2022**	**2023**	**2024**	**Total**
Non-Labor	$ 20,052,016	$ 1,731,151	$ 848,291	**$ 22,631,459**
Labor	$ 1,150,474	$ 98,710	$ 43,284	**$ 1,292,468**
Total Directs	**$ 21,202,491**	**$ 1,829,861**	**$ 891,576**	**$ 23,923,928**

Covered Conductor

Category	**2022**	**2023**	**2024**	**Total**
Non-Labor	$ 73,952,225	$ 64,932,583	$ 55,554,648	**$ 194,439,456**
Labor	$ 4,640,896	$ 4,289,870	$ 3,662,593	**$ 12,593,359**
Total Directs	**$ 78,593,120**	**$ 69,222,453**	**$ 59,217,241**	**$ 207,032,814**

Units

[Source: 2022-2024 Miles Hardened Targets for 2022 WMP Filing from ESH Management]

Traditional Hardening

Category	**2022**	**2023**	**2024**	**Total**
Miles Hardened	25	3	1	**29**

Covered Conductor

Category	**2022**	**2023**	**2024**	**Total**
Miles Hardened	60	60	60	**180**

Data Request Number: TURN-SEU-015

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/6/2023

Date Responded:01/24/2023

3. Please explain and quantify how SDG&E used RSE calculations and affordability constraints to inform its GRC proposal.

SDG&E Response 3:

SDG&E objects to the request on the grounds that it is vague and ambiguous, particularly as it does not specify any aspect of SDG&E's "GRC proposal" to which Question 3 pertains. SDG&E's answer is limited to its wildfire mitigation programs.

SDG&E also objects to the request to the extent it would require SDG&E to search their files for matters of public record in CPUC and OEIS regulatory proceedings (filings, testimony, transcripts, decisions, orders, etc.). This information is equally available to TURN or is available on SDG&E's website. SDG&E will not search through their files for or produce matters of public record in CPUC and FERC regulatory proceedings. Subject to the foregoing objections, SDG&E responds as follows:

With respect to certain wildfire mitigation activities, including but not limited to grid hardening investments, SDG&E utilizes RSE calculations as an input in understanding the value of performing an activity. When analyzing grid hardening activities, including covered conductor and undergrounding, SDG&E's WiNGS-Planning tool utilizes RSE as an input in recommending the most beneficial activity for that specific circuit segment. This process is described in more detail within Ex. SDGE-13-2R pages JTW-9 through JTW-11.

SDG&E's GRC request is the product of careful consideration of the optimal means to safely and reliably provide electrical service to customers and reduce the risk of utility- related ignition and public safety power shutoffs—consistent with regulatory and statutory mandates—in a just and reasonable fashion. As stated in Ex. SDG&E-01-R, "Using its risk modeling system and subject matter expertise, SDG&E selected a course of action that reasonably balances the need to mitigate the risk of utility-caused wildfire and reduce the impacts of PSPS events with the cost impact on customers. SDG&E selected its system hardening strategy because it provided the best value approach— achieving the most risk reduction possible at the most reasonable cost to customers."[1] This approach is further addressed in Ex. SDG&E-13-R at pages JTW-10-11.

[1] Ex. SDG&E-01-R at BAF-16, line 22 through BAF-17, line 1.

Question 4-Continued

c. For each category listed in the Table, please provide historical costs from 2015-2021 on an annual basis for each cost category.

SDG&E Response 4c:

SDG&E objects to this request pursuant to Rule 10.1 of the Commission's Rules of Practice and Procedure on the grounds that it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. Further, the request would require SDG&E to perform additional analyses and calculations that do not currently exist and is thus overly broad and unduly burdensome. Subject to the foregoing objections, SDG&E responds as follows:

The cost categories identified in Table JW-2 were created as part of the Wildfire Mitigation Plan filed in 2020. Costs for these categories were not required to be split into Capital and O&M costs until the 2021 Wildfire Mitigation Plan, reporting on 2020 actual costs. Therefore, capital costs from 2020 through 2027 are provided in the attached file, "TURN-SEU-015_ATTACH_Q4c-d.xlsx."

d. For each category listed in the Table, please provide forecast costs from 2025-2027 on an annual basis for each cost category. Please provide the source of these forecasts and all calculations in Excel where applicable.

SDG&E Response 4d:

SDG&E objects to this request pursuant to Rule 10.1 of the Commission's Rules of Practice and Procedure on the grounds that it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. Further, the request would require SDG&E to perform additional analyses and calculations that do not currently exist and is thus overly broad and unduly burdensome. Subject to the foregoing objections, SDG&E responds as follows:

SDG&E does not forecast project-specific Post-Test Year (PTY) costs, except for those identified as PTY capital exceptions. Please see "TURN-SEU-015_ATTACH_Q4c- d.xlsx." for cost forecast information associated with the PTY capital exceptions associated with Ex. SDG&E-13-2R.

TURN-SEU-015 Question 4c-d

Wildfire Mitigation Capital (In 000s of $)

Categories of Management	2020	2021	2022	2023	2024	2025	2026	2027
A. Risk Assessment and Mapping	1,191	1,446	2,200	2,420	2,662	2,662	2,662	2,662
B. Situational Awareness and Forecasting	2,527	1,550	7,803	800	1,864	1,864	1,864	1,864
C. Grid Design and System Hardening	329,077	312,290	343,110	405,162	471,146	509,820	533,185	556,550
D. Asset Management and Inspections	27,706	26,181	45,152	66,130	17,423	17,423	17,423	17,423
E. Grid Operations and Protocols	7,756	13,460	14,749	9,185	8,100	8,100	8,100	8,100
F. Data Governance	7,480	19,983	24,255	17,566	11,685	11,685	11,685	11,685
G. Emergency Planning and Preparedness	2,140	1,929	7,302	23,914	2,496	2,496	2,496	2,496
H. Stakeholder Cooperations and Community Engagement	4,474	5,015	6,874	3,361	3,131	3,131	3,131	3,131
Other (Resource Allocation Methodology)	1,623							
Total Capital	383,974	381,854	451,445	528,538	518,507	557,181	580,546	603,911

Data Request Number: TURN-SEU-015

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/6/2023

Date Responded:01/24/2023

6. Re Figure JW-1 on page JTW-11, please provide the Figure in Excel, including all underlying data, calculations, and assumptions in Excel.
    a. Please explain why this figure did not change when SDG&E revised its forecast and testimony in October 2022.

SDG&E Response 6a:

SDG&E objects to this request under Rule 10.1 of the Commission's Rules of Practice and Procedure to the extent it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. SDG&E objects to the request to the extent that it calls for the creation and production of documents that currently do not exist. Subject to the foregoing objections, SDG&E responds as follows:

Figure JW-1 on page JTW-11 is an illustrative figure showing the relationship between cost and risk reduction, and demonstrating SDG&E's approach to balance the two. SDG&E did not edit the figure in revised testimony because no units are provided on the figure and the illustrative relationship between cost and risk reduction did not change with the revised testimony.

9. Page JTW-109-JTW-110 states “SDG&E estimates that risk events and ignitions would be reduced by approximately 65% on circuit segments that have covered conductor installed, an improvement over the approximate 45% reduction in risk events and ignitions SDG&E has seen with its traditional hardening installations.”

a. Please explain what “traditional hardening installations” entails, including specifically a list of assets that are replaced in a “traditional hardening installation.”

SDG&E Response 9a:

Traditional overhead hardening replaces high-risk poles and conductor types with more resilient equipment. These replacements typically include wooden poles with steel poles and small-size bare conductors with larger and stronger-rated bare conductors. Other types of equipment that may also be replaced if attached to the pole in the area targeted for hardening include but are not limited to insulators, crossarms, connectors, guys and anchors, aged and open wire secondary, capacitors, hotline clamps, fuses, switches, and lightning arresters. However, not all the above-mentioned pieces of equipment are installed at each pole location.

10. Page JTW-109 states "These activities will be performed simultaneously with covered conductor installation and may include: replacing wood poles to steel; replacing wood crossarms with fiberglass; replacing insulators with new polymer insulators; replacing guys and anchors; replacing aged or open wire secondary conductor; replacing aged switches, transformers, regulators, and fuses; and replacement of a small section of underground related to riser poles." Please provide the following in Excel including all supporting workpapers, calculations, and assumptions:

a. Please provide the unit cost (dollars per overhead circuit mile in 2021 constant dollars) of each activity listed, separately.
    i. If not previously provided, please provide the unit cost in TY 2024 (dollars per overhead circuit mile in 2021 constant dollars) to replace bare conductor with covered conductor (assume no other asset replacement). If this data is not available exactly as requested, please provide the closest available proxy and explain.

SDG&E Response 10:

SDG&E objects to this request pursuant to Rule 10.1 of the Commission's Rules of Practice and Procedure on the grounds that it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. Further, the burden, expense, and intrusiveness of performing such an analysis clearly outweighs the likelihood that the information sought will lead to the discovery of admissible evidence.

Subject to the foregoing objections, SDG&E responds as follows:

SDG&E installs covered conductor installation in accordance with existing standards and associated regulatory requirements, which require that aged and/or outdated overhead distribution equipment is replaced and brought to current standards. SDG&E notes that the components of asset replacement are highly variable depending on a number of factors, including but not limited to the size of material used (i.e. #6 Cu conductor vs 4/0 Al conductor, 30' wood pole vs 70' pole, 25kVA single phase transformer vs 3-phase 150kVA bank transformers), environmental concerns and permitting requirements, and the location of the work which can drive the need for additional resources (traffic control, aerial pole set, fire watch).

Data Request Number: TURN-SEU-015

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/6/2023

Date Responded:01/24/2023

Question 10a-Continued

ii. If not previously provided, please provide the unit cost in TY 2024 (dollars per overhead circuit mile in 2021 constant dollars) to replace old bare conductor with new bare conductor (assume no other asset replacement). If this data is not available exactly as requested, please provide the closest available proxy and explain.

SDG&E Response 10ii:

SDG&E objects to this request pursuant to Rule 10.1 of the Commission's Rules of Practice and Procedure on the grounds that it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. Further, the burden, expense, and intrusiveness of performing such an analysis clearly outweighs the likelihood that the information sought will lead to the discovery of admissible evidence.

Subject to the foregoing objections, SDG&E responds as follows:

SDG&E notes that the components of asset replacement are highly variable depending on a number of factors, including but not limited to the size of material used (i.e. #6 Cu conductor vs 4/0 Al conductor, 30' wood pole vs 70' pole, 25kVA single phase transformer vs 3-phase 150kVA bank transformers), environmental concerns and permitting requirements, and the location of the work which can drive the need for additional resources (traffic control, aerial pole set, fire watch). SDG&E asset replacements are performed in accordance with existing standards and associated regulatory requirements, which require that aged and/or outdated overhead distribution equipment is replaced and brought to current standards.

Data Request Number: TURN-SEU-015

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/6/2023

Date Responded:01/24/2023

Question 10a-Continued

iii. If not previously provided, please provide the unit cost in TY 2024 (dollars per asset in 2021 constant dollars) to replace a wood pole with another wood pole (assume no other asset replacement).

SDG&E Response 10iii:

SDG&E objects to this request pursuant to Rule 10.1 of the Commission's Rules of Practice and Procedure on the grounds that it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. Further, the burden, expense, and intrusiveness of performing such an analysis clearly outweighs the likelihood that the information sought will lead to the discovery of admissible evidence.

Subject to the foregoing objections, SDG&E responds as follows:

SDG&E asset replacements are performed in accordance with existing standards and associated regulatory requirements, which require that aged and/or outdated overhead distribution equipment is replaced and brought to current standards. SDG&E notes that the components of asset replacement are highly variable depending on a number of factors, including but not limited to the size of material used (i.e. #6 Cu conductor vs 4/0 Al conductor, 30' wood pole vs 70' pole, 25kVA single phase transformer vs 3-phase 150kVA bank transformers), environmental concerns and permitting requirements, and the location of the work which can drive the need for additional resources (traffic control, aerial pole set, fire watch).

Data Request Number: TURN-SEU-015

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/6/2023

Date Responded:01/24/2023

Question 10a-Continued

iv. If not previously provided, please provide the unit cost in TY 2024 (dollars per asset in 2021 constant dollars) to replace a wood pole with a steel pole (assume no other asset replacement).

SDG&E Response 10iv:

SDG&E objects to this request pursuant to Rule 10.1 of the Commission's Rules of Practice and Procedure on the grounds that it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. Further, the burden, expense, and intrusiveness of performing such an analysis clearly outweighs the likelihood that the information sought will lead to the discovery of admissible evidence.

Subject to the foregoing objections, SDG&E responds as follows:

SDG&E asset replacements are performed in accordance with existing standards and associated regulatory requirements, which require that aged and/or outdated overhead distribution equipment is replaced and brought to current standards. SDG&E notes that the components of asset replacement are highly variable depending on a number of factors, including but not limited to the size of material used (i.e. #6 Cu conductor vs 4/0 Al conductor, 30' wood pole vs 70' pole, 25kVA single phase transformer vs 3-phase 150kVA bank transformers), environmental concerns and permitting requirements, and the location of the work which can drive the need for additional resources (traffic control, aerial pole set, fire watch).

Data Request Number: TURN-SEU-015

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/6/2023

Date Responded:01/24/2023

Question 10a-Continued

v. If not previously provided, please provide the unit cost in TY 2024 (dollars per asset in 2021 constant dollars) to replace a transformer (assume no other asset replacement).

SDG&E Response 10iv:

SDG&E objects to this request pursuant to Rule 10.1 of the Commission's Rules of Practice and Procedure on the grounds that it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. Further, the burden, expense, and intrusiveness of performing such an analysis clearly outweighs the likelihood that the information sought will lead to the discovery of admissible evidence.

Subject to the foregoing objections, SDG&E responds as follows:

SDG&E asset replacements are performed in accordance with existing standards and associated regulatory requirements, which require that aged and/or outdated overhead distribution equipment is replaced and brought to current standards. SDG&E notes that the components of asset replacement are highly variable depending on a number of factors, including but not limited to the size of material used (i.e. #6 Cu conductor vs 4/0 Al conductor, 30' wood pole vs 70' pole, 25kVA single phase transformer vs 3-phase 150kVA bank transformers), environmental concerns and permitting requirements, and the location of the work which can drive the need for additional resources (traffic control, aerial pole set, fire watch).

11. Re Table JW-41 on p. JTW-111, please provide the following in Excel, including the data shown in the table:

a. Please provide historical and forecast total costs for covered conductor from 2015-2021 and 2025-2027, annually.

SDG&E Response 11a:

For the historical costs of covered conductor, please see SDG&E's 2021 & 2022 WMP's Attachment B Table 12.

For 2025-2027 costs, please see attachment: "TURN-SEU-015_ATTACH_Q11a.xlsx."

TURN-SEU-015 Question 11a

Covered Conductor	
TY 2024 cost per mile	$ 986,954.00

Year	Miles	Projected CC costs
2025	40	$ 39,478,160.00
2026	40	$ 39,478,160.00
2027	40	$ 39,478,160.00

Data Request Number: TURN-SEU-015

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/6/2023

Date Responded:01/24/2023

Question 11-Continued

b. Please provide the number of overhead circuit miles replaced or forecast to be replaced with covered conductor in each year.

SDG&E Response 11b:

The number of overhead circuit miles forecast to be replaced with covered conductor each year are:

- 2022 - 60
- 2023 - 60
- 2024 - 60
- 2025 - 40
- 2026 - 40
- 2027 - 40

15. Page JTW-133 states “The forecast for Strategic Undergrounding for 2022, 2023, and 2024 is $125,981,000, $191,143,000, and $292,062,000, respectively.” Please provide the following in Excel:

a. Please provide the forecast costs for this activity in 2025, 2026, and 2027, respectively in constant 2021 dollars and nominal dollars.

SDG&E Response 15a:

SDG&E objects to this request under Rule 10.1 of the Commission’s Rules of Practice and Procedure to the extent it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. Further, SDG&E objects to this request pursuant to Rule 10.1 of the Commission’s Rules of Practice and Procedure on the grounds that the burden, expense, and intrusiveness of this request clearly outweigh the likelihood that the information sought will lead to the discovery of admissible evidence, and requests that SDG&E perform analyses and create documentation that does not currently exist.

Subject to and without waiving the foregoing objection, SDG&E responds as follows:

Please see the attached Excel document: “TURN-SEU-015_ATTACH_Q15a_Q15b.xlsx.”

Question 15-Continued

b. For each year from 2022-2027, respectively, please provide the number of overhead circuit miles forecast to be undergrounded corresponding to each year's costs. Please explain and provide documentation for how this estimate was derived.

SDG&E Response 15b:

Please see the attached Excel document:
"TURN-SEU-015_ATTACH_Q15a_Q15b.xlsx."

TURN-SEU-015 Question 15a

Strategic Undergrounding
Utilized TY 2024 costs to project 2025, 2026, 2027

TY 2024 Cost per mile	$ 1,933,482.00

Year	Miles	Total Cost
2025	150	$ 290,022,300.00
2026	160	$ 309,357,120.00
2027	170	$ 328,691,940.00

Data Request Number: TURN-SEU-015

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/6/2023

Date Responded:01/24/2023

Question 15-Continued

f. Please provide the number of risk units mitigated in each year and percentage of total wildfire risk, respectively, from 2022-2027. Please include all supporting workpapers and assumptions.

SDGE Response 15f:

SDG&E objects to this request on the grounds that it is vague, ambiguous, and unintelligible, particularly with respect to the phrase 'risk units mitigated' and 'percentage of total wildfire risk.' Subject to and without waiving the foregoing objection, SDG&E responds as follows:

SDG&E assumes that TURN is seeking information related to the risk mitigated by wildfire grid hardening projects. Please see the attached file titled "TURN-SEU-015_ATTACH_Q15f.xlsx." Note that risk scores are outputted from the model explicitly, but not percentage of risk. The percentage of risk can be aggregated from the risk scores as needed.

Risk Mitigated By Wildfire Grid Hardening Projects

Circuit Segment ID	Method of Hardening	Circuit mileage to be Hardened	Line Mileage to be Hardened	Mitigation Year	Wildfire Risk Score Before Hardening - in the year indicated	Wildfire Risk Score AfterHardening-in theyearindicated
1030-18R	UG	19.94	59.82	2022	0.000115	1.07E-05
1030-18R	UG	12.01	36.03	2023	0.000115	5.22E-05
1215-10R	UG	0.433309384	1.299928152	2024	0.000126	3.85E-05
1215-12R	UG	3.947670797	11.84301239	2024	0.001966	0.001190508
1215-28R	UG	1.822784189	5.468352567	2024	0.00056	0.000281104
1215-32R	UG	14.92764146	44.78292438	2024	0.003148	0
1458-454	UG	3.55	10.65	2022	9.10E-05	3.14E-05
1458-454	UG	0.165	0.495	2023	9.10E-05	8.82E-05
210-172R	UG	5.574657783	16.72397335	2024	0.000331	8.18E-05
210-9R	UG	26.04639203	78.13917609	2024	0.001731	0
211-279R	UG	15.64887023	46.94661069	2024	0.000839	0.000141221
211-280R	UG	15.93206556	47.79619668	2024	0.000926	2.13E-05
212-638R	UG	0.273416758	0.820250274	2024	0.000162	0.000153106
212-678R	UG	9.285370866	27.8561126	2024	0.001039	0.000628608
212-739R	UG	10.75542388	32.26627164	2024	0.000881	0.000492595
216-220R	UG	3.4	10.2	2022	0.000151	9.12E-05
217-983R	UG	7.033300859	21.09990258	2024	0.00073	0.000103559
220-288R	UG	2.61	7.83	2024	0.000491	0.000358667
220-294R	UG	4.73	14.19	2023	0.00135	0.00088034
220-294R	UG	17.58	52.74	2024	0.00135	0
220-298R	UG	25.83	77.49	2023	0.0025	0.000908856
221-31R	UG	6.07	18.21	2022	0.000294	0.000102357
221-37AE	UG	3.54	10.62	2022	0.000114	7.09E-05
221-37AE	UG	9.82	29.46	2023	0.000114	0
221-37AE	UG	2.28	6.84	2022	0.000114	8.62E-05
222-1364R	UG	4.93	14.79	2022	0.004951	0.004274791
222-1364R	UG	16.75288288	50.25864864	2023	0.004951	0.002653141
222-1370R	UG	5.772568817	17.31770645	2023	0.000928	0.000572293
222-1401R	UG	17.19444529	51.58333587	2023	0.001257	0.000531035
222-1433R	UG	2.002194041	6.006582123	2023	0.000598	0.000454231
222-1441R	UG	3.973342676	11.92002803	2023	0.000464	0.000225064
222-1503	UG	5.071112854	15.21333856	2023	0.002955	0.002254629
222-7R	UG	7.012940212	21.03882064	2023	0.002689	0.001463194
357-45R	UG	0.17	0.51	2022	0.00014	0.000138025
358-585R	UG	1.45	4.35	2023	7.20E-05	5.99E-05
358-682F	UG	4.02	12.06	2023	0.000637	0.000432989
358-682F	UG	7.8	23.4	2024	0.000637	0.000241159
441-23R	UG	1.695795725	5.087387175	2024	0.001845	0.001335764
441-25R	UG	4.9	14.7	2023	0.00086	0.000266813
441-279R	UG	0.621198705	1.863596115	2024	0.000265	0.00020149
441-27R	UG	2.350991225	7.052973675	2024	0.001549	0.001118541
441-30R	UG	3.227197055	9.681591165	2024	0.001447	0.000792973
442-16R	UG	5.9	17.7	2023	0.002767	0.001495559
442-721R	UG	7.54	22.62	2024	0.005657	0.003387216
445-1311R	UG	7.273440457	21.82032137	2023	0.00277	0.001302384
445-17R	UG	9.435249173	28.30574752	2023	0.000982	0.000597096
445-19R	UG	0.526581655	1.579744965	2023	0.00045	0.000433959
445-24R	UG	21.08165358	63.24496074	2023	0.001757	0.000398415
445-39R	UG	4.614298316	13.84289495	2023	0.000429	0.000274831
445-897R	UG	0.478689461	1.436068383	2023	6.20E-05	4.24E-05
73-643R	UG	12.63	37.89	2023	0.002397	0.000385164
78-26R	UG	0.884240119	2.652720357	2024	0.000589	0.000508328
78-782R	UG	1.00337089	3.01011267	2024	0.000159	7.94E-05
909-17R	UG	4.14	12.42	2023	0.000685	0.00059695
972-26R	UG	13.08	39.24	2022	0.000117	0
972-8	UG	2.45	7.35	2023	0.000803	0.000745354
CB 1458	UG	2.42	7.26	2022	3.00E-06	0
CB 210	UG	0.010405184	0.031215552	2024	2.00E-06	1.78E-06
CB 222	UG	0.043823985	0.131471955	2023	7.00E-06	5.98E-06
CB 358	UG	3.31	9.93	2022	2.00E-06	0
CB 73	UG	0.128506615	0.385519845	2023	6.00E-06	6.46E-07
CB OK1	UG	10.91	32.73	2023	0.003139	0.000811207
CB SL1	UG	2.01	6.03	2022	0.000137	8.96E-05

CB SL1	UG	9.09	27.27	2023	0.000137	0
1030-989R	UG	22.757	68.271	2026	0.000227	0
1458-565R	UG	6.364098485	19.09229546	2027	0.00011	2.23E-06
212-739R	UG	20.00391562	60.01174686	2027	0.000106	2.02E-05
215-1531R	UG	16.23961364	48.71884092	2027	0.00012	0
216-220R	UG	7.965655303	23.89696591	2026	0.000229	1.19E-05
217-835R	UG	24.06844318	72.20532954	2027	0.000143	0
220-298R	UG	20.19074496	60.57223488	2027	0.000107	5.26E-05
222-1364R	UG	24.39510223	73.18530669	2025	0.000366	0.000118578
222-1370R	UG	12.04721612	36.14164836	2026	0.000186	5.48E-05
222-1401R	UG	16.59506359	49.78519077	2026	0.000237	0.000105212
222-2013R	UG	9.329917117	27.98975135	2027	0.000105	5.22E-05
231-1635R	UG	31.33635985	94.00907955	2027	0.000112	3.01E-06
235-899R	UG	10.87548864	32.62646592	2027	0.000177	1.58E-05
237-17R	UG	14.71310985	44.13932955	2026	0.000232	2.57E-05
237-2R	UG	17.53806061	52.61418183	2025	0.000302	1.20E-05
237-30R	UG	41.98203409	125.9461023	2025	0.000633	0
357-45R	UG	10.879625	32.638875	2026	0.000242	2.54E-05
358-585R	UG	8.470943182	25.41282955	2027	0.000109	2.67E-06
448-11R	UG	32.86194318	98.58582954	2026	0.000239	0
449-13R	UG	14.0181553	42.0544659	2027	0.000152	7.26E-06
524-69R	UG	35.81349242	107.4404773	2025	0.000603	1.68E-05
788-34R	UG	7.236465909	21.70939773	2027	0.000135	5.78E-06
79-808R	UG	11.88886364	35.66659092	2026	0.000186	1.02E-05
79-679R	UG	7.869670455	23.60901137	2027	0.000108	0
908-2038R	UG	16.59145833	49.77437499	2026	0.000243	1.89E-05
1021-25R	CC	0.12	0.36	2024	2.60E-05	2.55E-05
1030-989R	CC	1.12	3.36	2023	0.000382	0.000358646
1215-12R	CC	0.12	0.36	2024	0.001966	0.001937712
157-11R	CC	0.06	0.18	2022	3.00E-06	1.88E-06
157-204R	CC	7.17	21.51	2024	0.000135	6.09E-05
157-207R	CC	0.06	0.18	2022	5.00E-06	4.86E-06
157-75R	CC	4.43	13.29	2022	0.000464	0.000266733
157-81R	CC	4.65	13.95	2022	0.000405	0.000339427
157-84R	CC	0.21	0.63	2024	0.001798	0.001782102
157-84R	CC	2.87	8.61	2022	0.001798	0.001580726
157-87R	CC	1.63	4.89	2023	0.000621	0.000590639
157-87R	CC	4.05	12.15	2022	0.000621	0.000545564
176-197F	CC	0.05	0.15	2024	4.80E-05	4.78E-05
176-200F	CC	0.06	0.18	2024	3.00E-06	2.84E-06
176-26R	CC	0.03	0.09	2024	7.70E-05	7.68E-05
176-36R	CC	0.2	0.6	2024	4.90E-05	4.78E-05
176-36R	CC	2.48	7.44	2023	4.90E-05	3.47E-05
176-38R	CC	0.08	0.24	2024	2.40E-05	2.37E-05
176-41R	CC	0.09	0.27	2024	1.80E-05	1.78E-05
176-58R	CC	0.02	0.06	2023	0.000162	0.000161755
176-58R	CC	4.59	13.77	2022	0.000162	0.000105753
212-628R	CC	0.85	2.55	2024	3.70E-05	2.14E-05
212-630R	CC	0.35	1.05	2024	0.000119	0.000107494
212-632R	CC	2.39	7.17	2024	0.000243	0.000194522
212-632R	CC	4.39	13.17	2023	0.000243	0.000153954
212-650R	CC	5.95	17.85	2024	0.000304	0.00021896
212-650R	CC	1.74	5.22	2023	0.000304	0.000279131
212-650R	CC	2.99	8.97	2022	0.000304	0.000261266
212-652R	CC	2.76	8.28	2024	0.000124	8.72E-05
212-652R	CC	1.09	3.27	2023	0.000124	0.000109451
212-739R	CC	0.1	0.3	2024	0.000881	0.000876667
214-647R	CC	5.44	16.32	2024	0.000163	7.00E-05
215-38R	CC	0.05	0.15	2024	0.000109	0.000108162
217-837R	CC	0.02	0.06	2024	5.30E-05	5.29E-05
220-288R	CC	2.21	6.63	2023	0.000491	0.000356538
221-782R	CC	0.03	0.09	2024	0.000244	0.000241782
222-1401R	CC	0.11	0.33	2023	0.001257	0.001251427
230-133AE	CC	0.07	0.21	2024	4.00E-05	3.98E-05
233-123R	CC	0.03	0.09	2024	1.30E-05	1.30E-05
236-10R	CC	0.04	0.12	2024	6.90E-05	6.89E-05
236-38R	CC	0.05	0.15	2024	5.80E-05	5.78E-05
237-30R	CC	1.3	3.9	2022	0.002161	0.002072126
240-1028R	CC	0.1	0.3	2024	1.30E-05	1.28E-05
240-1095R	CC	0.05	0.15	2024	1.70E-05	1.69E-05

240-1148	CC	0.04	0.12	2024	4.00E-06	3.95E-06
350-2192R	CC	0.06	0.18	2024	4.10E-05	4.09E-05
350-2196R	CC	18.34	55.02	2024	0.000396	0.000180874
350-2201R	CC	0.09	0.27	2024	9.20E-05	9.14E-05
350-41R	CC	0.05	0.15	2024	2.50E-05	2.49E-05
442-721R	CC	0.07	0.21	2024	0.005657	0.005631713
442-721R	CC	0.36	1.08	2023	0.005657	0.005526954
444-43R	CC	5.61	16.83	2024	0.000531	0.00037609
445-1311R	CC	1.99	5.97	2024	0.00277	0.002288156
445-17R	CC	3.38	10.14	2023	0.000982	0.000816538
445-17R	CC	0.97	2.91	2022	0.000982	0.000934515
445-19R	CC	1.6	4.8	2024	0.00045	0.000391511
445-19R	CC	3.89	11.67	2023	0.00045	0.000307799
445-24R	CC	1.7	5.1	2024	0.001757	0.001625534
445-39R	CC	0.39	1.17	2023	0.000429	0.000413364
445-39R	CC	1.75	5.25	2022	0.000429	0.000358836
445-894R	CC	2.28	6.84	2024	0.000377	0.000343774
445-894R	CC	8.16	24.48	2023	0.000377	0.000258085
448-11R	CC	2.49	7.47	2024	0.003785	0.003392797
448-11R	CC	7.28	21.84	2023	0.003785	0.002638317
448-11R	CC	1.79	5.37	2022	0.003785	0.003503055
448-13R	CC	2	6	2023	0.000395	0.000301949
448-13R	CC	3.62	10.86	2022	0.000395	0.000226578
448-19R	CC	8.2	24.6	2023	0.001577	0.000471752
448-19R	CC	3.35	10.05	2022	0.001577	0.001125466
448-23R	CC	0.06	0.18	2024	0.000853	0.000846248
448-23R	CC	7.44	22.32	2022	0.000853	1.58E-05
448-33R	CC	5.98	17.94	2023	0.000573	0.000240971
448-33R	CC	3.02	9.06	2022	0.000573	0.00040532
448-37	CC	0.47	1.41	2023	0.000271	0.000216099
448-37	CC	3.36	10.08	2022	0.000271	0
448-9R	CC	1.08	3.24	2024	0.000606	0.000568665
448-9R	CC	7.35	22.05	2023	0.000606	0.000351916
448-9R	CC	1.73	5.19	2022	0.000606	0.000546195
449-6R	CC	0.13	0.39	2024	0.000626	0.000617549
520-1045R	CC	0.06	0.18	2024	5.30E-05	5.25E-05
520-1048	CC	0.07	0.21	2024	0.000217	0.000216307
520-10R	CC	0.02	0.06	2024	7.00E-06	6.97E-06
520-1489R	CC	6.46	19.38	2024	0.000205	0.000124933
520-22R	CC	0.07	0.21	2024	2.30E-05	2.29E-05
520-26R	CC	0.06	0.18	2024	4.70E-05	4.67E-05
520-35R	CC	0.09	0.27	2024	8.20E-05	8.10E-05
520-45	CC	2.91	8.73	2024	8.40E-05	5.60E-05
521-14R	CC	0.22	0.66	2024	2.50E-05	2.46E-05
521-18R	CC	0.04	0.12	2024	3.20E-05	3.19E-05
521-32R	CC	0.1	0.3	2024	5.20E-05	5.15E-05
78-26R	CC	1.37	4.11	2022	0.000589	0.000439013
79-785	CC	1.67	5.01	2023	0.000214	0.000178721
907-1702R	CC	0.05	0.15	2024	4.10E-05	4.06E-05
909-17R	CC	0.06	0.18	2024	0.000685	0.000683469
971-1973R	CC	0.07	0.21	2024	9.30E-05	9.23E-05
971-26R	CC	0.06	0.18	2024	0.000186	0.000185487
971-379R	CC	0.1	0.3	2024	0.000152	0.000151082
972-8	CC	0.05	0.15	2024	0.000803	0.000801588
972-8	CC	2.75	8.25	2023	0.000803	0.000725354
974-23R	CC	0.15	0.45	2024	0.000114	0.000112756
974-35R	CC	1.57	4.71	2024	0.000178	0.000139401
CB 444	CC	0.07	0.21	2024	7.00E-06	6.13E-06
CB 971	CC	0.19	0.57	2024	9.70E-05	9.39E-05
1233-252R	CC	22.23901515	66.71704545	2025	7.60E-05	0
157-81R	CC	6.179483421	18.53845026	2025	0.00011	8.67E-05
260-358R	CC	11.62310606	34.86931818	2026	4.70E-05	0
444-43R	CC	13.85297161	41.55891483	2026	5.30E-05	1.59E-05
445-17R	CC	6.114077309	18.34223193	2027	9.00E-06	0
445-19R	CC	5.331424496	15.99427349	2027	2.80E-05	1.53E-05
448-23R	CC	0.225706041	0.677118123	2027	3.40E-05	3.30E-05
448-9R	CC	7.265865773	21.79759732	2026	5.30E-05	3.13E-05
73-678R	CC	5.495827466	16.4874824	2027	6.00E-05	3.55E-05
RB1-19R	CC	6.280113636	18.84034091	2027	2.50E-05	1.45E-12

Data Request Number: TURN-SEU-015

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/6/2023

Date Responded:01/24/2023

Question 24-Continued

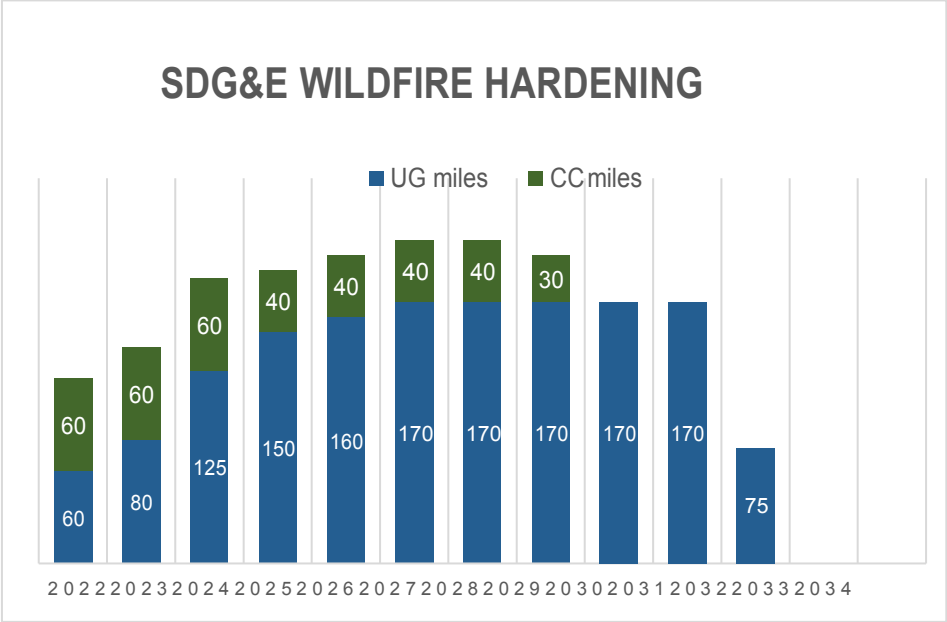
e. The segments scoped for undergrounding sum to around 500 overhead miles. Please explain what time period this is over (e.g. 2024-2027). Please provide the number of miles for this mitigation per year, and explain why it does not match SDG&E's GRC forecast, if applicable. Please include whether these are "underground" or "overhead" circuit miles.

SDG&E Response 24e:

SDG&E objects to the request on the grounds that it is vague and ambiguous. Specifically, SDG&E is unable to identify or correlate the "around 500 miles" TURN is referring to. SDG&E's forecasted wildfire-mitigation related hardening projects are described in the Revised Direct Testimony of Jonathan Woldemariam and are available to TURN on SDG&E's website. Subject to the foregoing objections, SDG&E responds as follows:

Scoped mileages described in data requests may be in various stages of design or construction and are subject to change based on a variety of factors. The target miles for the entire portfolio can be found below.

Figure: Undergrounding and Covered Conductor Hardening Targets 2022-2032



Data Request Number: TURN-SEU-017

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 1/12/2023

Date Responded: 1/27/2023

6. Re Excel workpaper "1Final TY2024 GRC RSE Workpaper - SDGE - Wildfire_53773", tab "Strategic_Undergounding," please provide the following:

a. Regarding cells Q15:Q18 please explain whether these represent underground or overhead circuit miles.

i. Please explain how SDG&E has incorporated an overhead to underground conversion ratio into its risk analysis. If it did not, please explain why not.

SDG&E Response 6ai:

SDG&E objects to this request under Rule 10.1 of the Commission's Rules of Practice and Procedure to the extent it seeks the production of information that is neither relevant to the subject matter involved in the pending proceeding nor is likely reasonably calculated to lead to the discovery of admissible evidence. SDG&E also objects to this request on the grounds that it is vague and ambiguous, specifically with regard to the phrase "mitigation." Further, SDG&E objects to this request to the extent it imposes upon SDG&E an obligation to generate or create records that do not exist, or which have not been generated or created in its regular course of business. This purported obligation exceeds the requirements provided by the CPUC's Discovery Custom and Practice Guidelines and California Code of Civil Procedure Section 2031.230 (proper response stating inability to comply with discovery request includes a statement that "the particular item or category [of records] has never existed"). *See also* A.05-04-020, *In the Matter of the Joint Application of Verizon Communications Inc. and MCI, Inc.*, Administrative Law Judge's Ruling Addressing Motion of Qwest to Compel Responses, Aug. 5, 2005, at 7 (in relation to motion to compel emphasized that "Verizon is not required to create new documents responsive to the data request") (also available at 2005 WL 1866062); A.05- 02-027, *In the Matter of the Joint Application of SBC Communications Inc. and AT&T Corp.*, Administrative Law Judge's Ruling Regarding ORA's Second Motion to Compel, June 8, 2005, at 23 (in ruling on motion to compel stressed that SBC Communications "shall not be required to produce new studies specifically in response to this DR") (also available at 2005 WL 1660395).

Subject to the foregoing objections, SDG&E responds as follows:

These represent underground circuit miles. SDG&E has not incorporated an overhead-to- underground conversion ratio into its risk analysis. SDG&E will continue to review different methodologies to further enhance the accuracy of the projected risk reduction.

Question 8-Continued

b. Total Significant Fire Incidents per Year (row 60)

SDG&E Response 8b:

Please refer to the following attachment with supporting documentation, formulas, and an explanation of how those values are calculated:

- TURN_SEU_017_Question_8_Risk_Scoring_Workpaper_Table_2023_01_23.xlsx

SDGE

Row Number	Name	Incident Type	Metric	Assumed Value	Source	Explanation
59			Expected total fire size	500,000	SME Input, based on Wildfire Activity Statistics	Subject Matter Expert assumption to estimate the potential maximum footprint (acres) of a catastrophic wildfire in SDG&E service territory. The assumption is 500,000 acres.
60			Total Significant Fire Incidents per Year	0.05	SME, internal data	Subject Matter Expert conservative assumption to estimate the frequency of a catastrophic wildfire in SDG&E service territory. The assumption is 1 in 20 years
61			Total Serious Injuries and Fatalities (SIFs) per significant fire incident	12.6	SME, internal data	See Tab "Supporting Data" starting on row 6
62			% Tier 2	35.79%	calculated from Technosylva simulations, ratios based on cAcrAve	See Tab "Supporting Data" starting on row 18
63			% Tier 3	62.65%	calculated from Technosylva simulations, ratios based on cAcrAve	See Tab "Supporting Data" starting on row 18
64			% Non-HFTD	1.56%	calculated from Technosylva simulations, ratios based on cAcrAve	See Tab "Supporting Data" starting on row 18
68			Total safety index per year	1.88	Calculation	See Tab "Supporting Data" starting on row 33
69			$ per acre	$1,766	SME assumption	Subject Matter Expert conservative assumption to estimate the financial amount of suppression and restoration activities. See "TURN_SEU_017_Question_8_Suppression_Cost_2023_01_23.xlsx" for details on how this value is calculated
70			$ per structure damaged	$1,000,000	SME assumption	See Tab "Supporting Data" starting on row 48
71			Structures per acre	0.00875	SME assumption	Average value of structures destroyed per acre burned. See "TURN_SEU_017_Question_8_RedbookDatasetPreProcessing_2023_01_23.xlsx" for details on how this ratio is calculated
73	Wildfire LoRE	Tier 3	Total Incidents per Year	6.2	See Masters Inputs – 2017 – 2021 ignition data, SME inputs	Not asked in Data Request, left here for reference only as this value is used to calculate others
74		Tier 2	Total Incidents per Year	5.8	See Masters Inputs – 2017 – 2021 ignition data, SME inputs	Not asked in Data Request, left here for reference only as this value is used to calculate others
75		Non-HFTD	Total incidents per year	7.2	See Masters Inputs – 2017 – 2021 ignition data, SME inputs	Not asked in Data Request, left here for reference only as this value is used to calculate others
76	PSPS LoRE	Tier 3 and Tier 2	Total incidents per year	4	Internal reliability data	Subject Matter Expert conservative assumption to estimate the annual expected number of PSPS de-energization events in SDG&E service territory.
87	Safety	PSPS	Total safety incidents per year	0.018	SME, internal data	See Tab "Supporting Data" starting on row 71
97	Financial	PSPS	Tier3, $MUSD per incident (repair cost, destruction of property)	12.92	SME, internal data	See Tab "Supporting Data" starting on row 87 The name of this variable is incorrect. The correct name for this variable is: Tier3, $MUSD per PSPS de-energization event
98			Tier2, $MUSD per incident (repair cost, destruction of property)	5.54	SME, internal data	See Tab "Supporting Data" starting on row 87 The name of this variable is incorrect. The correct name for this variable is: Tier2, $MUSD per PSPS de-energization event
99	Reliability	HFTD	Reliability index per incident, tier 3	0.0039	SME based on internal reliability data	See Tab "Supporting Data" starting on row 103
100			Reliability index per incident, tier 2	0.0024	SME based on internal reliability data	See Tab "Supporting Data" starting on row 103
101		Non-HFTD	Reliability index per incident	0.0001	SME based on internal reliability data	See Tab "Supporting Data" starting on row 103
102		PSPS	Tier 3, SAIDI Minutes per year	37.62	SME, internal data	See Tab "Supporting Data" starting on row 131
103			Tier 3, SAIFI Outages per year	0.02	SME, internal data	See Tab "Supporting Data" starting on row 131
104			Tier 3, Reliability Index per incident	0.025	Calculation	See Tab "Supporting Data" starting on row 131
105			Tier 2, SAIDI Minutes per year	16.12	SME, internal data	See Tab "Supporting Data" starting on row 131
106			Tier 2, SAIFI Outages per year	0.01	SME, internal data	See Tab "Supporting Data" starting on row 131
107			Tier 2, Reliability Index per incident	0.011	Calculation	See Tab "Supporting Data" starting on row 131

Data Request Number: TURN-SEU-030

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 2/8/2023

Date Responded: 2/23/2023

3. Please provide the escalation rate, according to Sempra's proposal, that should be utilized for each year and cost category listed in the attached spreadsheet ("TURN Attachment 1_Escalation factors).

SoCalGas Response 3:

SoCalGas assumes Sempra as used in this request is referring to SoCalGas.

Please see the separately attached excel file "TURN-SEU-030_Q3_SoCalGas.xlsx".

Note: in the template provided for SoCalGas, columns E-H and columns I-L were both labeled "Capital Cost Escalation Relative to 2021". SoCalGas updated the label on columns I-L to read "O&M Cost Escalation Relative to 2021" to reflect the data provided.

TURN-SEU-030_Q3 SCG RSE IDs and Control/Mitigation Names

			Capital Cost Escalation Relative to 2021				O&M Cost Escalation Relative to 2021			
Type	**ID**	**Control/Mitigation Name**	2024	2025	2026	2027	2024	2025	2026	2027
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C01-T01	Cathodic Protection - Capital	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C01-T02	Cathodic Protection - Capital	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C02-T01	Cathodic Protection - Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C02-T02	Cathodic Protection - Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C03-T01	Leak Repair	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C03-T02	Leak Repair	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C04-T01	Leak Survey & Patrol	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C04-T02	Leak Survey & Patrol	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C05-T01	Pipeline Relocation/Replacement - Capital	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C05-T02	Pipeline Relocation/Replacement - Capital	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C06-T01	Shallow/Exposed Pipe Remediations	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C06-T02	Shallow/Exposed Pipe Remediations	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C07-T01	Pipeline Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C07-T02	Pipeline Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C08-T01	Right of Way	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C08-T02	Right of Way	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C09-T01	Class Location (Hydrotest) - Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C09-T02	Class Location (Hydrotest) - Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C10	Compressor Stations - Capital	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C11	Compressor Station - Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C12-T01	Measurement & Regulation - Capital	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C12-T02	Measurement & Regulation - Capital	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C13-T01	Measurement & Regulation Station - Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C13-T02	Measurement & Regulation Station - Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C14	Odorization	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C15	Security and Auxiliary Equipment	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C20	Facility Integrity Management Program (FIMP) - Transmission	0.9874	0.9786	0.9954	1.0177	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C21-T01	Integrity Assessments & Remediation	0.9874	0.9786	0.9954	1.0177	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C21-T02	Integrity Assessments & Remediation	0.9874	0.9786	0.9954	1.0177	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C22-T02.4	Pipeline Safety Enhancement Plan - Pipeline Replacement (Phase 1B, GRC base)	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C22-T03.2	Pipeline Safety Enhancement Plan - Pipeline Replacement (Phase 2A, GRC base)	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C22-T03.4	Pipeline Safety Enhancement Plan - Hydrotesting (Phase 2A, GRC base)	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C22-T04.3	Pipeline Safety Enhancement Plan - Valve Enhancement (GRC base)	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C22-T04.4	Pipeline Safety Enhancement Plan - Valve Enhancement (GRC base)	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-C23-T1	Blythe Compressor Station Modernization	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-M01-T01	Gas Transmission Safety Rule - MAOP Reconfirmation	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-M01-T02	Gas Transmission Safety Rule - MAOP Reconfirmation	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-1-New-FIMP-Dist	NEW - Facility Integrity Management Program (FIMP) - Distribution	0.9874	0.9786	0.9954	1.0177	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C01	Cathodic Protection Base Activities	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C04	Meter & Regulator (M&R) Station and Electronic Pressure Monitors (EPM) Inspection and Mainten	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C05	Regulator Station Installation & Replacement	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C07	EPM Installations & Replacements	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C08/C17	Leak Survey	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C09	Pipeline Monitoring (Bridge & Span)	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C10	Pipeline Monitoring (Pipeline Patrol, Bridge& Span Inspections, UnstableEarth Inspection)	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C12	Valve Inspection & Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C13	Valve Installs and Replacements	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C14	Cathodic Protection- Install / Replace Impressed Current Systems	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C16	Service Replacements- Leakage, Abnormal Op. Conditions, CP Related	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	SCG-RISK-3-C19-T1	Main Replacements- Leakage, Abnormal Op. Conditions, CP Related	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	Ventura ARE	Ventura ARE	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the High Pressure System (Excluding Dig-in)	Ventura Principal	Ventura Principal	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-M2	Automate Third Party Excavation Incident Reporting	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C12	Damage Prevention Analyst Program	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C16-T01/T02/T	Public Awareness	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C14	Locating Equipment (HP)	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C04	Locate & Mark Activities (HP)	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C06	Locate and Mark Annual Refresher Training and Competency Program (HP)	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C26	Pipeline Patrol and Pipeline Markers	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C32	Ticket Risk Assessment, and evaluating City permit data	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C15-T01/T02/T	Public Awareness	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C03	Locate and Mark Activities (MP)	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C05	Locate and Mark Annual Refresher Training and Competency Program (MP)	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C11	Damage Prevention Analyst Program	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-C13	Locating Equipment (MP)	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Excavation Damage (Dig-In) on the Gas System	SCG-RISK-2-M1	Automate Third Party Excavation Incident Reporting	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C01	Cathodic Protection Base Activities	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C02	Cathodic Protection- CP10 Activities	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C20	DIMP: Distribution Riser Inspection Project (DRIP)	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C21-T2	DIMP: DREAMS- Bare Steel Replacement Program (BSRP)	0.9874	0.9786	0.9954	1.0177	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C21-T1	DIMP: DREAMS- Vintage Integrity Plastic Plan (VIPP)	0.9874	0.9786	0.9954	1.0177	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C22	DIMP: Gas Infrastructure Protection Project (GIPP)- Medium Pressure and High pressure	0.9874	0.9786	0.9954	1.0177	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C23	DIMP: Sewer Lateral Inspection Project (SLIP)	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C07	EPM Replacements & Installs	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C25	Field Employee Skills Training	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C08/C17	Leak Survey and Main & Service Leak Repair	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C19 T2	Main Replacements- Leakage, Abnormal Op. Conditions, CP Related	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C19 T3	Main Replacements- Leakage, Abnormal Op. Conditions, CP Related	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C16	Service Replacements- Leakage, Abnormal Op. Conditions, CP Related	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C04 T2	Meter and Regulator (M&R) Station Maintenance + Electronic Pressure Monitor (EPM) Maintenan	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C06	Meter Set Assembly (MSA) Inspection and Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C30	MSA Inspection Program	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C28	Quality Assurance Program	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C05	Regulator Station Replacements/Installs	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C18	Residential Meter Protection	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C32	Safety Related Field Orders	0.9874	0.9786	0.9954	1.0177	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C12	Valve Inspections and Maintenance	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C13	Valve Installs and Replacements	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Medium Pressure System (Excluding Dig-in)	SCG-RISK-3-C33	Natural Gas Appliance Testing	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Storage System (Excluding Dig-in)	SCG-RISK-4-C01	Integrity Demonstration, Verification, and Monitoring Practices	0.9874	0.9786	0.9954	1.0177	1.0732	1.0995	1.1255	1.1530
Incident Related to the Storage System (Excluding Dig-in)	SCG-RISK-4-C05 - T1	Storage Field Maintenance - Aboveground Facilities	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Storage System (Excluding Dig-in)	SCG-RISK-4-C05 - T2	Storage Field Maintenance - Aboveground Piping	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Storage System (Excluding Dig-in)	SCG-RISK-4-C05 - T3	Storage Field Maintenance - Underground Components	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Related to the Storage System (Excluding Dig-in)	SCG-RISK-4-C06	Compressor Overhauls	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Storage System (Excluding Dig-in)	SCG-RISK-4-C07	Upgrade to Purification Equipment	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Storage System (Excluding Dig-in)	HR Prin	HR Prin	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Storage System (Excluding Dig-in)	SCG-RISK-4-C02	Well Abandonment and Replacement	0.9874	0.9786	0.9954	1.0177	N/A	N/A	N/A	N/A
Incident Related to the Storage System (Excluding Dig-in)	SCG-RISK-4-M1	Facility Integrity Management Program (FIMP)	0.9874	0.9786	0.9954	1.0177	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-M04	Creation of a Safety Video Library	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-C02	Drug and Alcohol Testing Programs	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-C04	Employee Safety Training and Awareness Programs	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-C03	Employee Wellness Programs	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-M06	Industrial Hygiene Program Expansion	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-M02	Industrial Hygiene Program Refresh	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-C07	Near Miss, Stop the Job and Jobsite Safety Programs	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-M03	Proactive Monitoring and Indoor Air Quality and Chemicals of Concern	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-C05	Safe Driving Programs	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-C08	Safety Culture Programs	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-C09	Utilizing Industry Best Practices and Benchmarking	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-M07	Workplace Violence Prevention Program Enhancements	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving an Employee	SCG-RISK-5-C10	Workplace Violence Prevention Programs	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving a Contractor	SCG-RISK-7-C01	Contractor Safety Oversight	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving a Contractor	SCG-RISK-7-C02	Third-Party Administration Tools	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530
Incident Involving a Contractor	SCG-RISK-7-C03	Contractor Engagement	N/A	N/A	N/A	N/A	1.0732	1.0995	1.1255	1.1530

Data Request Number: TURN-SEU-031

Proceeding Name: A2205015_016 - SoCalGas and SDGE 2024 GRC

Publish To: The Utility Reform Network

Date Received: 2/9/2023

Date Responded: 2/24/2023

1. Regarding SDG&E's supplemental response to TURN-15, question 24a, Excel attachments Supplemental 1 and 2:
    a. In Excel, please add the following information for all rows (circuit segments) in each spreadsheet in additional columns:
        i. Year of mitigation (e.g. 2022, 2023, 2024, etc.);
        ii. Overhead circuit miles for each segment.
        iii. Wildfire risk score (if same as "wildfire risk rank" please state this);
        iv. PSPS risk score (please explain if incorporated into wildfire risk score or rank);
        v. Wildfire risk score after hardening;
        vi. PSPS risk score after hardening.

SDG&E Response 1a:

SDG&E objects to the request on the grounds that it calls for SDG&E to create new analysis, records, or studies that do not currently exist. Subject to and without waiving the foregoing objections, SDG&E responds as follows:

i. The WiNGS-Planning model outputs referenced as Supplemental 1 and 2 from TURN- 15, Q24a, are total portfolio outputs from versions of the model and the model does not provide a yearly plan. The output from the model is prioritized, desktop scoping and feasibility study is performed which includes geography, prior hardening, loading, standards, land/environmental, operational improvements, easement constraints, reliability improvements, and construction cost savings to create a plan for the scoped work to meet annual mileage targets. Please see attached file titled "TURN-SEU- 031_ATTACH_Q1a.xlsx", tab "Q1a_2022-2027" for currently proposed work scope for years 2022-2027.

ii. See the separately attached file titled "TURN-SEU-031_ATTACH_Q1a.xlsx", tabs Q1a_sup_1, and Q1a_sup_2.

iii. The column labeled "wildfire risk rank", included in "TURN-SEU- 015_ATTACH_Q24a_Supplemental_1.xlsx" and "TURN-SEU- 015_ATTACH_Q24a_Supplemental_2.xlsx" is the wildfire risk score.

iv. See the separately attached file titled "TURN-SEU-031_ATTACH_Q1a.xlsx", tabs Q1a_sup_1, and Q1a_sup_2.

PSPS risk score is not an element incorporated within WF risk score and is a separate risk metric.

Note: Where PSPS risk scores are 0, factors contributing to that may include expected risk being 0 and/or risk being accounted for and captured in an upstream circuit-segment within the same circuit.

SDG&E Response 1a-Continued:

v. See the separately attached file titled "TURN-SEU-031_ATTACH_Q1a.xlsx", tabs Q1a_sup_1, and Q1a_sup_2.

Note: For the updated column for the Supplemental 1 file specifically, the post-mitigation WF risk score tied to segments designated with a 'UG/CC' mitigation selection are not readily available metrics in the output of the model and require additional manual analysis to derive that risk score. For this reporting for those particular cases, the value has been set to 'n/a', indicating value is not readily available from the model output tied to the associated version of the model.

vi. The model output for WiNGS 1.0 and WiNGS 2.0 tied to Supplemental 1 and 2 are models at a snapshot in time of the associated PSPS risk. Since the PSPS risk on a segment is influenced by the maximum upstream segment PSPS probability, the score after mitigation is difficult to quantify as it would only be fully realized as mitigations are implanted over time and after all OH risk has been mitigated. WiNGS 1.0 and WiNGS
2.0 were not set up to feedback in the yearly scoped work to evaluate the PSPS risk overtime as they are static excel models. SDG&E continues to implement improvements to these capabilities in its newest version of WiNGS, which is cloud based.

TURN-SEU-031 Question 1a Sup 1

segment	oh_hftd_miles	base_wf_risk_score	base_psps_risk_score	mitigation_recommended	post_mit_wf_risk_score
442-721R	15.66	0.005657	0	UG ALL	0
222-1364R	30.08	0.004951	0.000329694	UG ALL	0
448-11R	24.03	0.003785	1.7748E-05	UG ALL	0
1215-32R	11.32	0.003148	0	UG ALL	0
CB OK1	12.26	0.003139	0	UG ALL	0
222-1503	17.83	0.002955	0	UG ALL	0
445-1311R	11.44	0.00277	0	UG ALL	0
442-16R	10.7	0.002767	0	UG ALL	0
222-7R	12.82	0.002689	0	UG ALL	0
220-298R	33.82	0.0025	0	UG ALL	0
73-643R	12.54	0.002397	0	UG ALL	0
237-30R	31.61	0.002161	9.11351E-06	UG ALL	0
79-673R	10.34	0.002051	0	UG ALL	0
1215-12R	8.34	0.001966	0	UG ALL	0
441-23R	5.12	0.001845	0	UG ALL	0
157-84R	23.75	0.001798	0	UG ALL	0
445-24R	22.72	0.001757	0	UG ALL	0
210-9R	15.59	0.001731	6.48453E-06	UG ALL	0
448-19R	11.7	0.001577	0	UG ALL	0
441-27R	7.05	0.001549	0	UG ALL	0
441-30R	5.95	0.001447	0	UG ALL	0
220-294R	11.33	0.00135	0.000148698	UG ALL	0
222-1401R	24.81	0.001257	0	UG ALL	0
212-734R	19.21	0.00117	0	UG / CC	n/a
442-29R	8.61	0.001167	0	UG / CC	n/a
212-678R	19.59	0.001039	0	UG / CC	n/a
445-17R	20.06	0.000982	0	UG / CC	n/a
73-678R	30.95	0.000954	0	CC ALL	0.000357
222-1370R	12.55	0.000928	0.000344608	UG / CC	n/a
211-280R	13.59	0.000926	4.75376E-06	UG / CC	n/a
214-1122R	17.97	0.000907	0.000178898	UG / CC	n/a
212-739R	20.33	0.000881	0	UG / CC	n/a
79-679R	6.13	0.00087	0.000163667	UG / CC	n/a
441-25R	5.92	0.00086	0	UG / CC	n/a
448-23R	7.58	0.000853	1.43501E-05	UG / CC	n/a
211-279R	15.68	0.000839	0	UG / CC	n/a
972-8	28.44	0.000803	0.000416187	CC ALL	0.000298
449-13R	13.81	0.000766	0	UG / CC	n/a
79-799R	6.41	0.000736	2.00103E-05	UG / CC	n/a
217-983R	6.83	0.00073	2.58668E-05	UG / CC	n/a
909-17R	26.84	0.000685	0	CC ALL	0.000257
358-682F	10.46	0.000637	0.000221735	UG / CC	n/a
449-6R	9.63	0.000626	0	UG / CC	n/a
157-87R	33.34	0.000621	0	CC ALL	0.000214
448-9R	17.53	0.000606	0	CC ALL	0.000213
222-1433R	6.94	0.000598	0	UG / CC	n/a
78-26R	5.38	0.000589	0	UG / CC	n/a
237-2R	14.72	0.000582	6.11879E-05	UG / CC	n/a
448-33R	10.32	0.000573	0.000149201	UG / CC	n/a
524-69R	30.8	0.000571	0.000103146	CC ALL	0.000216
1215-28R	3.05	0.00056	0	UG / CC	n/a
79-660R	7.3	0.000556	0	UG / CC	n/a
444-43R	19.23	0.000531	0	CC ALL	0.000183
220-288R	8.07	0.000491	0	UG / CC	n/a
222-1441R	6.43	0.000464	0	UG / CC	n/a
157-75R	10.42	0.000464	0	UG / CC	n/a
215-1531R	14.66	0.000462	0	CC ALL	0.00017

445-19R	12.31	0.00045	0	CC ALL	0.000163
442-14R	2.35	0.000437	0	UG / CC	n/a
445-39R	10.7	0.000429	0.000199619	UG / CC	n/a
79-685R	3.8	0.000405	2.33034E-05	UG / CC	n/a
157-81R	28.72	0.000405	5.09072E-05	CC ALL	0.000147
79-668R	7.52	0.000399	0	UG / CC	n/a
350-2196R	33.76	0.000396	0	CC ALL	0.000141
448-13R	8.49	0.000395	0	UG / CC	n/a
1030-989R	18.32	0.000382	1.61605E-05	CC ALL	0.000138
1458-565R	5.52	0.000381	0	UG / CC	n/a
445-894R	25.87	0.000377	0	CC ALL	0.000133
908-2038R	14.56	0.000352	0	CC ALL	0.000126
73-683R	9.97	0.000343	0	CC ALL	0.000122
182-2240F	15.98	0.000335	0	CC ALL	0.000123
210-172R	6.17	0.000331	0	UG / CC	n/a
1233-252R	26.74	0.000323	0	No Mitigation	0.000323
212-650R	21.27	0.000304	0	CC ALL	0.000109
221-31R	7.76	0.000294	0	CC ALL	0.000091
237-1761R	7.45	0.000287	0	UG / CC	n/a
214-583R	5.88	0.000286	0.000137036	UG / CC	n/a
357-1299R	2.56	0.000274	1.58597E-06	UG / CC	n/a
448-37	2.32	0.000271	0	UG / CC	n/a
CB PE1	5.01	0.000269	0	UG / CC	n/a
441-279R	2.16	0.000265	0	UG / CC	n/a
237-17R	15.91	0.000254	0	CC ALL	0.000096
75-1744R	4.28	0.000251	0	UG / CC	n/a
221-782R	3.3	0.000244	1.39122E-05	UG / CC	n/a
212-632R	11.98	0.000243	0	CC ALL	0.000088
79-658R	9.31	0.000235	0	CC ALL	0.00008
973-626R	10.76	0.000225	3.6165E-06	CC ALL	0.000083
520-1048	21.91	0.000217	0	No Mitigation	0.000217
79-785	10.13	0.000214	0.000105047	CC ALL	0.000068
CB 202	11.72	0.000211	9.16514E-06	CC ALL	0.000079
520-1489R	16.54	0.000205	4.67505E-05	CC ALL	0.000071
221-344R	10.52	0.000201	0	CC ALL	0.000068
CB 236	7.44	0.0002	0.000284946	CC ALL	0.000075
CB 240	26.25	0.000197	0	No Mitigation	0.000197
235-899R	10.53	0.000189	0	CC ALL	0.000071
971-26R	21.75	0.000186	0	No Mitigation	0.000186
972-32R	15.25	0.000185	0	No Mitigation	0.000185
974-35R	7.24	0.000178	4.04199E-05	CC ALL	0.000064
214-647R	9.53	0.000163	0	CC ALL	0.000059
176-58R	13.22	0.000162	0	CC ALL	0.000058
212-638R	4.15	0.000162	9.19113E-06	UG / CC	n/a
907-1716R	13.09	0.000161	0	No Mitigation	0.000161
351-819R	10.73	0.00016	0	No Mitigation	0.00016
357-2049F	5.65	0.000159	0	CC ALL	0.00006
78-782R	1.67	0.000159	0	UG / CC	n/a
971-379R	16.56	0.000152	0	No Mitigation	0.000152
216-220R	7.16	0.000151	0	CC ALL	0.000057
239-15R	17.01	0.000147	0.000118821	No Mitigation	0.000147
357-45R	10.04	0.00014	0	No Mitigation	0.00014
597-595	16.56	0.000139	0.000152771	No Mitigation	0.000139
CB SL1	4.84	0.000137	0	CC ALL	0.000051
157-204R	13.06	0.000135	0	CC ALL	0.000047
79-714R	4.52	0.000131	0	CC ALL	0.000045
356-19R	19.53	0.000127	0	No Mitigation	0.000127
1215-10R	0.52	0.000126	0	UG / CC	n/a
212-652R	9.29	0.000124	0	CC ALL	0.000044
221-23R	5.88	0.000124	0	CC ALL	0.000043
1250-24R	7.63	0.000124	0	CC ALL	0.000047

1243-45R	9.74	0.000121	6.92366E-05	CC ALL	0.000044
212-630R	3.62	0.000119	0	CC ALL	0.000044
972-26R	2.86	0.000117	0	UG / CC	n/a
1030-987	3.03	0.000117	0	UG / CC	n/a
211-312R	17.24	0.000115	0	No Mitigation	0.000115
1030-18R	18.33	0.000115	0	No Mitigation	0.000115
974-23R	13.75	0.000114	0	No Mitigation	0.000114
221-37AE	7.8	0.000114	0	CC ALL	0.000037
1030-20R	14.37	0.000113	0	No Mitigation	0.000113
908-1368R	19.23	0.00011	0	No Mitigation	0.00011
215-38R	6.5	0.000109	0.000129691	CC ALL	0.000039
240-1097R	12.94	0.000108	0	No Mitigation	0.000108
450-18	9.89	0.000102	0	No Mitigation	0.000102
1030-42R	13.96	0.000101	0	No Mitigation	0.000101
235-897R	4.37	0.000099	0	CC ALL	0.000038
CB 351	8.39	0.000099	5.3545E-05	No Mitigation	0.000099
CB 971	5.97	0.000097	0.000272398	CC ALL	0.000035
1458-519	6.62	0.000094	0	CC ALL	0.000034
78-35	1.54	0.000093	0	UG / CC	n/a
971-1973R	9.49	0.000093	0	No Mitigation	0.000093
350-2201R	13.98	0.000092	9.73029E-06	No Mitigation	0.000092
973-630R	4.84	0.000092	0	CC ALL	0.000034
1458-454	4.52	0.000091	0.000140649	CC ALL	0.000034
1039-13	13.39	0.000089	0.000125154	No Mitigation	0.000089
78-404R	3.86	0.000089	0	CC ALL	0.00003
CB RA1	9.09	0.000085	0.000128809	No Mitigation	0.000085
520-45	8.74	0.000084	0	CC ALL	0.000028
520-35R	7.55	0.000082	0	No Mitigation	0.000082
971-29R	3.43	0.000079	0	CC ALL	0.000029
470-47R	23.02	0.000079	0	No Mitigation	0.000079
176-26R	9.8	0.000077	0	No Mitigation	0.000077
1166-18R	8.55	0.000076	0	No Mitigation	0.000076
1166-342R	11.76	0.000074	0	No Mitigation	0.000074
973-649R	7.57	0.000074	0	No Mitigation	0.000074
358-585R	7.17	0.000072	3.32192E-05	No Mitigation	0.000072
908-1172R	8.93	0.000072	0	No Mitigation	0.000072
CB JU1	2.53	0.000071	0	CC ALL	0.000027
237-1765R	7.34	0.00007	8.20259E-05	No Mitigation	0.00007
236-10R	20.24	0.000069	0	No Mitigation	0.000069
449-16R	1.99	0.000068	0	CC ALL	0.000024
221-788	3.62	0.000066	0	CC ALL	0.000024
231-655R	27.34	0.000065	0	No Mitigation	0.000065
440-13R	0.38	0.000063	0	UG / CC	n/a
445-897R	1.26	0.000062	0.000379846	UG / CC	n/a
217-972R	8.58	0.000061	0	No Mitigation	0.000061
CB 214	10.91	0.00006	0.000184261	No Mitigation	0.00006
1234-3R	14.36	0.00006	0	No Mitigation	0.00006
1021-67AE	10.15	0.000059	0	No Mitigation	0.000059
RB1-19R	6.22	0.000059	0	No Mitigation	0.000059
217-835R	17.87	0.000058	0	No Mitigation	0.000058
236-38R	13.58	0.000058	0	No Mitigation	0.000058
CB 970	6.23	0.000057	0.000761477	No Mitigation	0.000057
79-676R	3.23	0.000056	0.000514539	CC ALL	0.000018
67-34R	19.87	0.000056	0	No Mitigation	0.000056
788-34R	6.47	0.000056	0	No Mitigation	0.000056
217-48AE	14	0.000055	0	No Mitigation	0.000055
RB1-30R	9.84	0.000055	0	No Mitigation	0.000055
214-17AE	6.79	0.000054	0	No Mitigation	0.000054
599-19R	26.44	0.000054	0	No Mitigation	0.000054
217-837R	11.57	0.000053	0	No Mitigation	0.000053
CTL1-3R	3.99	0.000053	0	CC ALL	0.000019

520-1045R	6.45	0.000053	0	No Mitigation	0.000053
521-32R	9.58	0.000052	0	No Mitigation	0.000052
233-86F	16.79	0.000051	0	No Mitigation	0.000051
176-36R	8.47	0.000049	0	No Mitigation	0.000049
176-197F	13.05	0.000048	0	No Mitigation	0.000048
221-35	0.64	0.000048	0	UG / CC	n/a
249-24R	12.43	0.000048	0	No Mitigation	0.000048
442-28	0.98	0.000047	0	UG / CC	n/a
520-26R	10.19	0.000047	0	No Mitigation	0.000047
CB 1250	2.54	0.000045	0.000347602	CC ALL	0.000017
214-536R	2.55	0.000045	0	CC ALL	0.000015
175-64R	10.38	0.000044	0	No Mitigation	0.000044
221-6R	5.56	0.000042	0	No Mitigation	0.000042
1001-1820	5.81	0.000041	8.80153E-05	No Mitigation	0.000041
907-1702R	4.78	0.000041	0	No Mitigation	0.000041
CB 1235	19.2	0.000041	0	No Mitigation	0.000041
350-2192R	30.28	0.000041	0	No Mitigation	0.000041
CB 1101	3.07	0.00004	0.000105408	CC ALL	0.000015
230-133AE	18.12	0.00004	0	No Mitigation	0.00004
283-55R	7.59	0.000039	0	No Mitigation	0.000039
353-914R	5.18	0.000039	0	No Mitigation	0.000039
231-42	13.2	0.000039	0	No Mitigation	0.000039
217-41AE	11.58	0.000038	0	No Mitigation	0.000038
CB 246	7.7	0.000038	4.99936E-05	No Mitigation	0.000038
214-613R	4.33	0.000038	0	No Mitigation	0.000038
354-38R	14.8	0.000037	0	No Mitigation	0.000037
67-24R	12.63	0.000037	0	No Mitigation	0.000037
212-628R	2.02	0.000037	0	CC ALL	0.000013
CB 1021	5.64	0.000035	0	No Mitigation	0.000035
CB RA3	2.28	0.000035	0.000112805	CC ALL	0.000013
353-904R	4.92	0.000034	0	No Mitigation	0.000034
1023-46AE	18.55	0.000033	0	No Mitigation	0.000033
521-18R	22.12	0.000032	0	No Mitigation	0.000032
350-2188R	20.2	0.000031	0	No Mitigation	0.000031
449-19R	1.58	0.000031	0	CC ALL	0.000012
444-9R	10.03	0.000031	1.04002E-05	No Mitigation	0.000031
175-90R	11.06	0.00003	0	No Mitigation	0.00003
908-1236R	4.75	0.00003	0	No Mitigation	0.00003
CB 300	16.9	0.000029	2.50084E-05	No Mitigation	0.000029
1022-17F	4.15	0.000029	4.83057E-05	No Mitigation	0.000029
972-942R	7.15	0.000029	0	No Mitigation	0.000029
236-1535R	6.86	0.000028	0.000133656	No Mitigation	0.000028
221-675R	5.57	0.000028	0	No Mitigation	0.000028
1030-23R	10.4	0.000027	0.000295597	No Mitigation	0.000027
454-48	3.14	0.000027	0	No Mitigation	0.000027
CB 233	15.6	0.000027	0	No Mitigation	0.000027
1233-259R	5.25	0.000027	0	No Mitigation	0.000027
522-38R	12.97	0.000027	0	No Mitigation	0.000027
452-38AE	4.1	0.000026	0	No Mitigation	0.000026
233-41R	9.74	0.000026	0	No Mitigation	0.000026
TM1-10R	2.93	0.000026	1.18561E-05	No Mitigation	0.000026
1021-25R	6.85	0.000026	0	No Mitigation	0.000026
1166-15R	4.34	0.000026	0	No Mitigation	0.000026
536-150R	3.3	0.000026	0	No Mitigation	0.000026
907-1562AE	2.99	0.000025	0	No Mitigation	0.000025
521-14R	13.37	0.000025	4.60491E-05	No Mitigation	0.000025
350-41R	15.18	0.000025	0	No Mitigation	0.000025
CB 1023	5.74	0.000024	0	No Mitigation	0.000024
1100-1172R	2.32	0.000024	3.58996E-06	No Mitigation	0.000024
CB 234	11.97	0.000024	0	No Mitigation	0.000024
176-38R	6.02	0.000024	0	No Mitigation	0.000024

524-46R	11.74	0.000024	0	No Mitigation	0.000024
357-750R	7.22	0.000024	0	No Mitigation	0.000024
908-1201R	10.51	0.000024	0	No Mitigation	0.000024
75-996R	9.37	0.000024	2.53823E-05	No Mitigation	0.000024
920-813R	5.61	0.000023	0	No Mitigation	0.000023
175-94R	9.19	0.000023	0	No Mitigation	0.000023
1030-1728R	2.1	0.000023	0	No Mitigation	0.000023
520-22R	14.67	0.000023	0	No Mitigation	0.000023
908-1372R	3.54	0.000022	0	No Mitigation	0.000022
CB 231	7.79	0.000022	9.10026E-05	No Mitigation	0.000022
209-623AE	15.55	0.000021	0	No Mitigation	0.000021
357-50R	9.06	0.000021	0	No Mitigation	0.000021
352-27R	11.68	0.000021	0	No Mitigation	0.000021
246-34R	9.56	0.000021	0	No Mitigation	0.000021
520-18R	7.43	0.00002	0	No Mitigation	0.00002
239-89R	7.57	0.00002	0.000205316	No Mitigation	0.00002
908-2040R	4.58	0.00002	0	No Mitigation	0.00002
67-45R	9.66	0.000019	0	No Mitigation	0.000019
908-1370R	5.47	0.000019	0	No Mitigation	0.000019
470-40AE	5.63	0.000019	0	No Mitigation	0.000019
CB 355	6.68	0.000018	0.000208672	No Mitigation	0.000018
176-41R	6.8	0.000018	0	No Mitigation	0.000018
239-2144R	4.93	0.000017	0	No Mitigation	0.000017
1023-48	15.1	0.000017	0	No Mitigation	0.000017
240-1095R	9.69	0.000017	0	No Mitigation	0.000017
1250-671R	1.3	0.000017	0	No Mitigation	0.000017
521-700R	10.62	0.000017	0	No Mitigation	0.000017
1105-1479	3.49	0.000016	3.35712E-07	No Mitigation	0.000016
CB 357	2.94	0.000016	0.000438982	No Mitigation	0.000016
214-4R	3.65	0.000015	0	No Mitigation	0.000015
353-901F	2.12	0.000015	0	No Mitigation	0.000015
185-51F	6.63	0.000015	0	No Mitigation	0.000015
CB 599	8.6	0.000015	0	No Mitigation	0.000015
396-699R	12.97	0.000015	0	No Mitigation	0.000015
1458-28	0.9	0.000015	0	CC ALL	0.000005
67-37R	7.7	0.000014	0	No Mitigation	0.000014
CB 536	2.64	0.000014	5.25288E-05	No Mitigation	0.000014
204-32R	16.3	0.000014	0	No Mitigation	0.000014
1138-6R	13.56	0.000014	0	No Mitigation	0.000014
230-127AE	9.44	0.000014	0	No Mitigation	0.000014
442-38R	2.54	0.000014	0	No Mitigation	0.000014
355-41R	4.78	0.000014	0	No Mitigation	0.000014
502-718F	1.36	0.000014	0	CC ALL	0.000004
CB 232	5.22	0.000014	0	No Mitigation	0.000014
221-38AE	1.47	0.000013	0.00010958	No Mitigation	0.000013
240-1028R	5.81	0.000013	0	No Mitigation	0.000013
CB MOR1	2.91	0.000013	0	No Mitigation	0.000013
233-123R	13.04	0.000013	0	No Mitigation	0.000013
339-480R	8.86	0.000013	0	No Mitigation	0.000013
91-7F	4.87	0.000013	0	No Mitigation	0.000013
1021-855	2.91	0.000013	0	No Mitigation	0.000013
411-30R	17.96	0.000012	0	No Mitigation	0.000012
CB FB1	3.83	0.000012	0	No Mitigation	0.000012
356-30AE	14.97	0.000012	0	No Mitigation	0.000012
CB 440	0.08	0.000012	9.70228E-06	UG / CC	n/a
215-1544R	2.74	0.000012	0	No Mitigation	0.000012
524-27R	11.46	0.000011	0	No Mitigation	0.000011
CB 522	4.62	0.000011	0.000139054	No Mitigation	0.000011
521-27R	7.81	0.000011	0	No Mitigation	0.000011
CB RC1	2.6	0.000011	0	No Mitigation	0.000011
230-1586R	7.03	0.00001	0.000118014	No Mitigation	0.00001

351-871R	4.09	0.00001	0	No Mitigation	0.00001
234-48R	5.27	0.00001	0	No Mitigation	0.00001
CB 542	2.35	0.00001	0.000151651	No Mitigation	0.00001
356-16R	4.43	0.00001	0	No Mitigation	0.00001
1250-8R	3.61	0.000009	0	No Mitigation	0.000009
1094-35F	5.22	0.000009	0	No Mitigation	0.000009
1090-74F	8.77	0.000009	0	No Mitigation	0.000009
357-1147R	0.75	0.000009	1.25854E-06	No Mitigation	0.000009
1022-24R	3.47	0.000009	0	No Mitigation	0.000009
205-36	4.39	0.000009	0	No Mitigation	0.000009
353-900F	0.9	0.000009	0	No Mitigation	0.000009
471-36F	1.02	0.000009	7.34179E-05	No Mitigation	0.000009
175-24R	3.96	0.000009	0.000397688	No Mitigation	0.000009
307-234R	4.01	0.000008	0	No Mitigation	0.000008
283-71F	4.74	0.000008	0	No Mitigation	0.000008
354-24AE	3.51	0.000008	0	No Mitigation	0.000008
CB 1161	1.21	0.000008	8.66825E-05	No Mitigation	0.000008
524-50R	9.45	0.000008	0	No Mitigation	0.000008
75-32R	9.01	0.000008	0	No Mitigation	0.000008
444-15R	6.79	0.000008	0	No Mitigation	0.000008
524-22R	9.57	0.000008	0	No Mitigation	0.000008
859-42R	7.19	0.000007	0	No Mitigation	0.000007
CB 534	1.72	0.000007	3.72758E-05	No Mitigation	0.000007
CB 444	0.56	0.000007	0.000156761	CC ALL	0.000002
CB 204	16.07	0.000007	4.53193E-05	No Mitigation	0.000007
1023-91R	3.7	0.000007	0	No Mitigation	0.000007
520-10R	4.74	0.000007	0	No Mitigation	0.000007
CB 1215	0.05	0.000007	0.000477178	UG / CC	n/a
260-174R	11.43	0.000007	0	No Mitigation	0.000007
CB 222	0.25	0.000007	0.00040671	CC ALL	0.000002
DV1-3R	5.98	0.000007	0	No Mitigation	0.000007
CB 1090	4.63	0.000007	4.77334E-05	No Mitigation	0.000007
75-1589R	8.08	0.000007	0	No Mitigation	0.000007
240-1044	3.19	0.000007	2.55623E-05	No Mitigation	0.000007
1001-1822	1.62	0.000006	0	No Mitigation	0.000006
233-81F	4	0.000006	0	No Mitigation	0.000006
CB 1234	5.06	0.000006	0.000260647	No Mitigation	0.000006
353-593F	2.05	0.000006	0	No Mitigation	0.000006
CB 237	0.46	0.000006	0.000314176	No Mitigation	0.000006
1021-879R	3.06	0.000006	0	No Mitigation	0.000006
CB 73	0.12	0.000006	0.000427273	UG / CC	n/a
281-28R	0.76	0.000006	5.46605E-05	No Mitigation	0.000006
728-689AE	2.09	0.000006	0	No Mitigation	0.000006
411-14R	6.97	0.000006	0	No Mitigation	0.000006
791-419F	2.4	0.000006	0.000123634	No Mitigation	0.000006
281-28R	0	0.000005	5.46605E-05	No Mitigation	0.000005
353-902F	0.61	0.000005	0	No Mitigation	0.000005
157-207R	2.08	0.000005	0	No Mitigation	0.000005
CB 247	0.81	0.000005	3.05433E-05	No Mitigation	0.000005
358-33	0.42	0.000005	0	No Mitigation	0.000005
534-581R	1.16	0.000005	0	No Mitigation	0.000005
247-46	4.52	0.000005	0	No Mitigation	0.000005
1242-127	3.93	0.000005	0	No Mitigation	0.000005
CB 249	2.88	0.000005	6.58749E-05	No Mitigation	0.000005
521-29R	3.57	0.000005	0	No Mitigation	0.000005
CB 1243	5.39	0.000005	1.80416E-05	No Mitigation	0.000005
840-308F	0.99	0.000005	3.12219E-06	No Mitigation	0.000005
355-6R	1.25	0.000004	0	No Mitigation	0.000004
CB RA2	1.68	0.000004	4.34117E-05	No Mitigation	0.000004
240-1148	3.31	0.000004	0	No Mitigation	0.000004
702-30	0	0.000004	0	No Mitigation	0.000004

908-30	1.34	0.000004	0	No Mitigation	0.000004
307-1684R	0	0.000004	0	No Mitigation	0.000004
75-41	2.52	0.000004	0	No Mitigation	0.000004
1021-883R	0.68	0.000003	0	No Mitigation	0.000003
CB FB2	3.69	0.000003	0	No Mitigation	0.000003
CB 1458	0.58	0.000003	0	No Mitigation	0.000003
157-11R	0.16	0.000003	0	CC ALL	0.000001
1090-73F	6.34	0.000003	0	No Mitigation	0.000003
CB 523	3.31	0.000003	9.76627E-05	No Mitigation	0.000003
CB 235	0.52	0.000003	0.000422004	No Mitigation	0.000003
305-32R	0	0.000003	0	No Mitigation	0.000003
230-1606R	2.52	0.000003	5.87925E-05	No Mitigation	0.000003
CB 305	0	0.000003	0	No Mitigation	0.000003
1023-89	3.84	0.000003	0	No Mitigation	0.000003
1201-282F	2.13	0.000003	7.75731E-05	No Mitigation	0.000003
523-31AE	2.72	0.000003	0	No Mitigation	0.000003
1001-1140R	0	0.000003	0	No Mitigation	0.000003
CB 576	0.37	0.000003	0.000196318	No Mitigation	0.000003
305-35R	0	0.000003	0	No Mitigation	0.000003
CB 920	3.11	0.000003	0	No Mitigation	0.000003
353-594F	1.38	0.000003	0	No Mitigation	0.000003
CB 212	0.15	0.000003	0.00024891	CC ALL	0.000001
387-15	3.18	0.000003	7.3436E-05	No Mitigation	0.000003
183-440AE	1.71	0.000003	0	No Mitigation	0.000003
176-200F	1.15	0.000003	0	No Mitigation	0.000003
1001-1130R	0	0.000003	0	No Mitigation	0.000003
CB 200	6.69	0.000003	0.000109711	No Mitigation	0.000003
920-735AE	1.65	0.000003	0.000103076	No Mitigation	0.000003
CB 788	0.9	0.000002	0.00019626	No Mitigation	0.000002
CB 358	0.45	0.000002	0.000190028	No Mitigation	0.000002
CB 242	1.39	0.000002	0	No Mitigation	0.000002
CB 1138	2.58	0.000002	0.000234949	No Mitigation	0.000002
586-3	0	0.000002	0	No Mitigation	0.000002
315-485AE	1.72	0.000002	0	No Mitigation	0.000002
CB 470	2	0.000002	0.000163742	No Mitigation	0.000002
CB 210	0.08	0.000002	0.000108871	CC ALL	0.000001
252-129AE	4.14	0.000002	0	No Mitigation	0.000002
230-371AE	1.31	0.000002	0	No Mitigation	0.000002
CB 292	1.57	0.000002	4.14744E-05	No Mitigation	0.000002
307-234R	0	0.000002	0	No Mitigation	0.000002
CB 260	1.6	0.000002	5.31891E-05	No Mitigation	0.000002
921-800F	1.1	0.000002	8.48092E-05	No Mitigation	0.000002
500-1531	1.2	0.000002	4.34289E-05	No Mitigation	0.000002
CB 1106	1.28	0.000002	0.000151369	No Mitigation	0.000002
CB 327	0.9	0.000002	1.05685E-05	No Mitigation	0.000002
492-343R	0	0.000002	0	No Mitigation	0.000002
75-1734	2.03	0.000002	0	No Mitigation	0.000002
1105-1483	0.33	0.000002	1.73033E-05	No Mitigation	0.000002
CB 443	1.64	0.000002	9.27482E-06	No Mitigation	0.000002
1243-38R	0.35	0.000002	0	No Mitigation	0.000002
230-181	1.45	0.000002	0	No Mitigation	0.000002
CB 535	0.46	0.000002	0.000150524	No Mitigation	0.000002
CB 975	0.17	0.000002	0.0002558	No Mitigation	0.000002
198-37R	4.02	0.000002	2.07933E-05	No Mitigation	0.000002
CB 442	0.02	0.000002	0.000604772	UG / CC	n/a
393-14R	1.82	0.000002	0.000303586	No Mitigation	0.000002
702-27R	0	0.000002	0	No Mitigation	0.000002
307-1538F	2.12	0.000002	0	No Mitigation	0.000002
CB 244	0.81	0.000002	8.60181E-05	No Mitigation	0.000002
1021-92	0.39	0.000002	0	No Mitigation	0.000002
CB 441	0	0.000001	0.000729045	UG / CC	n/a

338-6R	1.13	0.000001	0	No Mitigation	0.000001
288-18	0	0.000001	0	No Mitigation	0.000001
CB 980	2.6	0.000001	4.3693E-05	No Mitigation	0.000001
1094-7	0.85	0.000001	0	No Mitigation	0.000001
242-773F	2.31	0.000001	0.000132687	No Mitigation	0.000001
859-13F	0	0.000001	0	No Mitigation	0.000001
CB 449	0.04	0.000001	0.000134561	CC ALL	0
182-356R	0.69	0.000001	0	No Mitigation	0.000001
522-34	1.64	0.000001	0	No Mitigation	0.000001
CB 776	2.64	0.000001	0	No Mitigation	0.000001
183-439AE	1	0.000001	0	No Mitigation	0.000001
200-613AE	2.36	0.000001	0	No Mitigation	0.000001
CB 275	0	0.000001	0	No Mitigation	0.000001
CB 203	3.21	0.000001	6.4396E-05	No Mitigation	0.000001
411-47R	2.84	0.000001	5.3785E-05	No Mitigation	0.000001
CB 907	1.24	0.000001	0.000209357	No Mitigation	0.000001
522-36	1.33	0.000001	0	No Mitigation	0.000001
206-1105	0.63	0.000001	0	No Mitigation	0.000001
401-39R	0	0.000001	0	No Mitigation	0.000001
1001-1820	0	0.000001	8.80153E-05	No Mitigation	0.000001
CB 330	2.26	0.000001	0.000163276	No Mitigation	0.000001
CB 1100	0.38	0.000001	0	No Mitigation	0.000001
230-1008R	0.76	0.000001	3.77914E-05	No Mitigation	0.000001
968-476F	1.85	0.000001	0	No Mitigation	0.000001
CB 280	1.4	0.000001	0.000167247	No Mitigation	0.000001
CB 492	0	0.000001	0	No Mitigation	0.000001
1001-1140R	0.41	0.000001	0	No Mitigation	0.000001
CB 91	0.95	0.000001	5.54945E-05	No Mitigation	0.000001
1458-455F	0.18	0.000001	0	No Mitigation	0.000001
307-1492R	0	0.000001	0	No Mitigation	0.000001
504-36R	1.61	0.000001	0	No Mitigation	0.000001
501-786	1.05	0.000001	3.10421E-05	No Mitigation	0.000001
CB 461	1.52	0.000001	0.000158447	No Mitigation	0.000001
311-43	1.88	0.000001	2.83402E-05	No Mitigation	0.000001
463-1136F	1.41	0.000001	3.35712E-07	No Mitigation	0.000001
CB 973	0.12	0.000001	0.000244517	No Mitigation	0.000001
454-49	0	0.000001	0	No Mitigation	0.000001
CB 68	0	0.000001	0	No Mitigation	0.000001
CB 114	0	0.000001	0	No Mitigation	0.000001
CB 448	0.09	0.000001	0	No Mitigation	0.000001
1118-1F	0.82	0.000001	0	No Mitigation	0.000001
CB 1299	2.99	0.000001	5.33122E-06	No Mitigation	0.000001
770-259R	1.44	0.000001	0	No Mitigation	0.000001
CB FM3	0	0.000001	0	No Mitigation	0.000001
835-11F	1.05	0.000001	0	No Mitigation	0.000001
CB 311	1.59	0.000001	0	No Mitigation	0.000001
CB 511	0	0.000001	0	No Mitigation	0.000001
1022-26R	0.29	0	0	No Mitigation	0
CB 306	0	0	0	No Mitigation	0
CB 307	0	0	0	No Mitigation	0
594-1379F	0.57	0	2.23808E-07	No Mitigation	0
296-68F	0.9	0	0	No Mitigation	0
450-50R	0.2	0	0	No Mitigation	0
CB 1085	0	0	0	No Mitigation	0
CB 380	0	0	0	No Mitigation	0
1006-829F	0.43	0	6.71424E-08	No Mitigation	0
973-530AE	0.03	0	0	No Mitigation	0
197-1150F	1.39	0	0	No Mitigation	0
177-955	0.39	0	0	No Mitigation	0
CB 59	0	0	0	No Mitigation	0
CB 972	0.07	0	0.000613776	No Mitigation	0

591-1129R	0.42	0	0	No Mitigation	0
CB 329	1.32	0	4.01068E-05	No Mitigation	0
1090-70F	0.45	0	0	No Mitigation	0
CB 368	0	0	0	No Mitigation	0
308-563AE	0.38	0	1.5374E-05	No Mitigation	0
971-353R	0.07	0	0	No Mitigation	0
CB 215	0.18	0	6.48455E-05	No Mitigation	0
CB NVS1	0.4	0	0	No Mitigation	0
CB CTL1	0.03	0	0	No Mitigation	0
350-2182R	0.4	0	0	No Mitigation	0
CB 589	0	0	0	No Mitigation	0
CB 1242	0.46	0	0	No Mitigation	0
CB 221	0.02	0	0	No Mitigation	0
247-48	0.67	0	0	No Mitigation	0
855-46AE	0.24	0	0	No Mitigation	0
CB 1245	0.49	0	3.95315E-05	No Mitigation	0
859-42R	0	0	0	No Mitigation	0
168-702F	0	0	0	No Mitigation	0
CB 568	0.99	0	4.47616E-08	No Mitigation	0
362-47F	0	0	0	No Mitigation	0
CB 1448	0	0	0	No Mitigation	0
299-814AE	0	0	0	No Mitigation	0
CB 851	0	0	0	No Mitigation	0
CB 339	0.23	0	0	No Mitigation	0
CB 908	0.26	0	0	No Mitigation	0
CB 211	0.01	0	7.47156E-05	No Mitigation	0
CB 145	0	0	0	No Mitigation	0
CB 352	0.12	0	3.74982E-05	No Mitigation	0
CB 835	0.4	0	0.000140059	No Mitigation	0
454-49	0.09	0	0	No Mitigation	0
276-158R	0	0	0	No Mitigation	0
799-29AE	0.46	0	0	No Mitigation	0
CB 1166	0.09	0	4.97663E-05	No Mitigation	0
1073-872	0.68	0	3.80473E-07	No Mitigation	0
CB SSC1	0.5	0	1.57302E-05	No Mitigation	0
CB 220	0.01	0	0.000213286	No Mitigation	0
CB 445	0.02	0	0	No Mitigation	0
357-2047	0.03	0	1.13284E-06	No Mitigation	0
CB 350	0.14	0	0.000319762	No Mitigation	0
493-407	0	0	0	No Mitigation	0
CB 1160	0.04	0	4.48964E-05	No Mitigation	0
355-65R	0.05	0	0	No Mitigation	0
1173-71	0	0	0	No Mitigation	0
CB 120	0	0	0	No Mitigation	0
CB 596	0	0	0	No Mitigation	0
CB 540	0.09	0	5.87846E-05	No Mitigation	0
CB 78	0.02	0	6.26596E-05	No Mitigation	0
CB 216	0.04	0	0	No Mitigation	0
280-382AE	0	0	0	No Mitigation	0
CB 456	0	0	0	No Mitigation	0
703-46AE	0	0	0	No Mitigation	0
589-64	0	0	0	No Mitigation	0
146-27	0	0	0	No Mitigation	0
907-1602	0.1	0	0	No Mitigation	0
223-526R	0.29	0	0	No Mitigation	0
312-28R	0.32	0	5.00206E-05	No Mitigation	0
CB 280	0	0	0.000167247	No Mitigation	0
CB FM1	0	0	0	No Mitigation	0
920-735AE	0	0	0.000103076	No Mitigation	0
277-43	0	0	0	No Mitigation	0
114-48	0	0	0	No Mitigation	0

CB 64	0	0	0	No Mitigation	0
CB 79	0.13	0	0	No Mitigation	0
CB RB1	0.02	0	8.02711E-05	No Mitigation	0
178-968AE	0.22	0	0	No Mitigation	0
493-24	0	0	0	No Mitigation	0
CB 185	0.09	0	0.000158355	No Mitigation	0
CB 217	0.04	0	0.000300463	No Mitigation	0
308-563AE	0	0	1.5374E-05	No Mitigation	0
1073-874	0.2	0	2.87916E-05	No Mitigation	0
283-80F	0.03	0	0	No Mitigation	0
CB 65	0	0	0	No Mitigation	0
CB MNR3	0	0	0	No Mitigation	0
CB 852	0	0	0	No Mitigation	0
835-10F	0.18	0	0	No Mitigation	0
232-40AE	0.06	0	5.65705E-06	No Mitigation	0
CB 67	0.04	0	0.000208048	No Mitigation	0
1001-1232F	0	0	0	No Mitigation	0
703-279R	0	0	0	No Mitigation	0
CB 338	0.05	0	0	No Mitigation	0
339-478R	0.05	0	0	No Mitigation	0
1001-1231	0	0	2.29328E-07	No Mitigation	0
197-1155F	0.17	0	5.91758E-06	No Mitigation	0
CB 857	0	0	0	No Mitigation	0
CB 241	0.02	0	0	No Mitigation	0
308-486AE	0	0	0	No Mitigation	0
CB HC3	0	0	0	No Mitigation	0
393-14R	0	0	0.000303586	No Mitigation	0
493-39	0	0	0	No Mitigation	0
139-245AE	0	0	0	No Mitigation	0
209-782	0.06	0	0	No Mitigation	0
452-717	0	0	0	No Mitigation	0
203-21R	0.1	0	0	No Mitigation	0
146-275R	0	0	0	No Mitigation	0
140-496	0	0	0	No Mitigation	0
277-459F	0	0	0	No Mitigation	0
835-35F	0.08	0	0	No Mitigation	0
CB 569	0.12	0	0	No Mitigation	0
490-23	0	0	0	No Mitigation	0
CB 354	0.03	0	0.000144707	No Mitigation	0
243-14R	0.03	0	0	No Mitigation	0
CB 396	0.06	0	0.000398388	No Mitigation	0
CB DV1	0.04	0	0	No Mitigation	0
504-36R	0	0	0	No Mitigation	0
280-24AE	0	0	0	No Mitigation	0
1001-1231	0.03	0	2.29328E-07	No Mitigation	0
907-1604	0.02	0	0	No Mitigation	0
CB 981	0.05	0	5.53325E-05	No Mitigation	0
CB 315	0.1	0	0.000137915	No Mitigation	0
CB 239	0.04	0	0	No Mitigation	0
178-982	0.15	0	0	No Mitigation	0
CB 356	0.02	0	0.000348971	No Mitigation	0
CB 196	0.1	0	7.25782E-05	No Mitigation	0
1079-9	0.13	0	4.38401E-05	No Mitigation	0
CB 1030	0.03	0	0	No Mitigation	0
CB 283	0.01	0	0.000173851	No Mitigation	0
CB FM2	0	0	0	No Mitigation	0
CB CCB1	0	0	0	No Mitigation	0
CB 1233	0.02	0	0.000118343	No Mitigation	0
CB 521	0.02	0	0.000137936	No Mitigation	0
308-485AE	0.04	0	3.12819E-05	No Mitigation	0
362-40F	0	0	0	No Mitigation	0

CB 520	0.01	0	0.00014666	No Mitigation	0
1081-38AE	0	0	0	No Mitigation	0
150-506	0	0	0	No Mitigation	0
CB 116	0	0	0	No Mitigation	0
CB 63	0	0	0	No Mitigation	0
CB AD1	0	0	0	No Mitigation	0
CB 66	0	0	0	No Mitigation	0
66-1213R	0	0	0	No Mitigation	0
CB BN2	0	0	0	No Mitigation	0
63-797R	0	0	0	No Mitigation	0
150-434AE	0	0	0	No Mitigation	0
CB DM2	0	0	0	No Mitigation	0
63-35AE	0	0	0	No Mitigation	0
CB 69	0	0	0	No Mitigation	0
583-318F	0	0	0	No Mitigation	0

TURN-SEU-031 Question 1a Sup 2

segment	oh_hftd_miles	base_wf_risk_score	base_psps_risk_score	mitigation_recommended	post_mit_wf_risk_score
237-30R	32.811742	0.000633	1.49876E-06	UG ALL	0.000012
524-69R	30.7	0.000603	1.69629E-05	UG ALL	0.000009
222-1364R	30.072159	0.000366	5.42197E-05	UG ALL	0.000012
971-383R	25.892235	0.000318	0	UG ALL	0.000006
237-2R	15.218371	0.000302	1.00626E-05	UG ALL	0.000006
442-728R	16.090341	0.000263	6.18067E-05	UG ALL	0.000006
908-2038R	14.991477	0.000243	0	UG ALL	0.000005
357-45R	10.12803	0.000242	0	UG ALL	0.000004
448-11R	27.128409	0.000239	2.91874E-06	UG ALL	0.000009
222-1401R	24.869697	0.000237	0	UG ALL	0.000011
237-17R	13.789015	0.000232	0	UG ALL	0.000004
216-220R	7.001136	0.000229	0	UG ALL	0.000004
1030-989R	18.520644	0.000227	2.65767E-06	UG ALL	0.000004
222-1370R	14.235417	0.000186	5.66725E-05	UG ALL	0.000005
79-808R	10.48447	0.000186	2.92788E-06	UG ALL	0.000004
235-899R	9.95	0.000177	0	UG ALL	0.000003
449-13R	12.267803	0.000152	0	UG ALL	0.000002
215-1534R	7.009091	0.000146	0	UG ALL	0.000002
217-835R	17.965341	0.000143	0	UG ALL	0.000003
788-34R	6.3	0.000135	0	UG ALL	0.000002
215-1531R	7.714962	0.00012	0	UG ALL	0.000002
231-1635R	26.835417	0.000112	0	UG ALL	0.000002
157-81R	29.176326	0.00011	8.37192E-06	CC ALL	0.000088
1458-565R	5.413258	0.00011	0	UG ALL	0.000002
358-585R	7.236174	0.000109	5.46305E-06	UG ALL	0.000002
79-679R	6.345833	0.000108	2.69158E-05	UG ALL	0.000003
220-298R	33.079356	0.000107	0	UG ALL	0.000006
212-739R	20.582955	0.000106	0	UG ALL	0.000003
222-2013R	15.472348	0.000105	0	UG ALL	0.000005
358-682F	10.635985	0.000104	3.64654E-05	UG ALL	0.000005
157-189R	24.900947	0.000104	0	CC ALL	0.000055
214-1122R	18.613636	0.000102	2.94206E-05	UG ALL	0.000005
909-805R	18.04053	0.000101	1.24136E-05	UG ALL	0.000006
1458-519	6.439205	0.000101	0	UG ALL	0.000002
CB 236	6.620644	0.000097	4.68608E-05	UG ALL	0.000002
441-27R	7.060795	0.000097	0	UG ALL	0.000002
CB RA1	11.025947	0.000094	2.11832E-05	UG ALL	0.000002
214-1135R	11.15928	0.000092	0	UG ALL	0.000001
217-837R	11.974242	0.000091	0	UG ALL	0.000002
1021-1748F	15.60625	0.000089	2.2999E-05	UG ALL	0.000001
449-6R	10.078977	0.000085	0	UG ALL	0.000001
237-1761R	7.636553	0.00008	0	UG ALL	0.000002
521-700R	10.876136	0.000079	0	UG ALL	0.000001
73-643R	12.905492	0.000079	0	UG ALL	0.000005
78-26R	5.591098	0.000078	0	UG ALL	0.000003
445-1311R	11.900947	0.000078	0	UG ALL	0.000004
448-19R	11.81875	0.000077	0	UG ALL	0.000004
CB 357	4.075	0.000076	7.21927E-05	UG ALL	0.000001
1233-252R	22.239015	0.000076	0	CC ALL	0.000027
520-22R	14.071212	0.000073	0	UG ALL	0.000001
1215-12R	8.133712	0.000072	0	UG ALL	0.000002
237-1765R	7.45303	0.000072	1.34895E-05	UG ALL	0.000001
215-38R	7.173485	0.00007	2.13283E-05	UG ALL	0.000001
157-75R	10.703409	0.000069	0	UG ALL	0.000004
CB 971	4.205303	0.000069	4.47972E-05	UG ALL	0.000001
441-23R	5.178977	0.000068	0	UG ALL	0.000002
221-782R	3.369318	0.000068	2.28793E-06	UG ALL	0.000001
182-2240F	12.007197	0.000066	0	UG ALL	0.000001

1243-45R	7.262121	0.000066	1.13863E-05	UG ALL	0.000001
176-1834R	12.845833	0.000065	6.78564E-05	UG ALL	0.000001
157-257R	21.112311	0.000065	1.30011E-06	CC ALL	0.000041
1250-677R	7.764015	0.000063	0	UG ALL	0.000001
357-2049F	5.79375	0.000061	0	UG ALL	0.000001
73-678R	13.483523	0.00006	0	UG ALL	0.000002
73-683R	10.291477	0.000059	0	UG ALL	0.000002
222-1441R	6.546023	0.000059	0	UG ALL	0.000002
236-10R	20.408712	0.000058	0	No Mitigation	0.000058
972-32R	11.748106	0.000058	0	UG ALL	0.000001
239-15R	18.770076	0.000057	1.95406E-05	No Mitigation	0.000057
357-50R	9.433333	0.000056	0	UG ALL	0.000001
357-1299R	2.723295	0.000056	2.60821E-07	UG ALL	0.000001
283-55R	7.273295	0.000054	0	UG ALL	0.000001
356-19R	19.849242	0.000053	0	No Mitigation	0.000053
973-626R	10.995265	0.000053	5.94751E-07	UG ALL	0.000001
444-43R	19.814583	0.000053	0	CC ALL	0.00003
448-9R	17.715909	0.000053	0	CC ALL	0.000033
909-17R	10.594697	0.000053	0	UG ALL	0.000003
521-18R	22.367424	0.000053	0	No Mitigation	0.000053
1166-18R	7.792424	0.000052	0	UG ALL	0.000001
1166-15R	4.391288	0.000052	0	UG ALL	0.000001
970-1341R	4.214583	0.000051	0	UG ALL	0.000001
67-34R	18.401705	0.000049	0	No Mitigation	0.000049
974-35R	8.921591	0.000049	6.64725E-06	UG ALL	0.000001
521-27R	7.740152	0.000049	0	UG ALL	0.000001
CB 202	11.382197	0.000048	1.50725E-06	UG ALL	0.000001
221-344R	10.450947	0.000047	0	UG ALL	0.000001
260-358R	11.623106	0.000047	0	CC ALL	0.000016
441-30R	5.713826	0.000047	0	UG ALL	0.000002
521-32R	9.613636	0.000046	0	UG ALL	0.000001
972-8	15.918158	0.000046	6.84439E-05	UG ALL	0.000003
908-1172R	9.250568	0.000045	0	UG ALL	0.000001
470-47R	23.132765	0.000044	0	No Mitigation	0.000044
597-595	17.169129	0.000042	2.51238E-05	No Mitigation	0.000042
231-42	12.977083	0.000042	0	No Mitigation	0.000042
CB 355	6.824242	0.000041	3.43171E-05	UG ALL	0.000001
357-750R	7.376705	0.000041	0	UG ALL	0.000001
442-16R	10.756439	0.000041	0	UG ALL	0.000001
RB1-427R	9.432576	0.000041	0	UG ALL	0.000001
350-2192R	29.828977	0.000041	0	No Mitigation	0.000041
1039-13	13.217045	0.00004	2.05822E-05	UG ALL	0.000001
157-273R	12.60947	0.00004	0	CC ALL	0.000029
907-1716R	10.700379	0.000039	0	UG ALL	0.000001
971-29R	3.334091	0.000039	0	UG ALL	0.000001
445-39R	10.899053	0.000039	3.28283E-05	UG ALL	0.000001
222-1523R	12.588447	0.000038	0	UG ALL	0.000002
230-127AE	10.096591	0.000038	0	UG ALL	0.000001
222-2063R	4.798295	0.000038	0	UG ALL	0.000001
520-35R	14.267803	0.000037	0	No Mitigation	0.000037
212-1177R	12.22197	0.000037	3.15426E-06	CC ALL	0.000026
79-799R	6.658523	0.000036	3.29079E-06	UG ALL	0.000001
355-41R	4.930303	0.000036	0	UG ALL	0.000001
971-388R	17.431629	0.000035	0	No Mitigation	0.000035
212-734R	19.308523	0.000035	0	No Mitigation	0.000035
79-668R	8.060038	0.000034	0	UG ALL	0.000001
448-23R	7.889583	0.000034	2.35994E-06	CC ALL	0.000032
445-1325	16.322159	0.000034	0	CC ALL	0.000021
524-27R	11.806818	0.000033	0	No Mitigation	0.000033
356-30AE	14.907197	0.000033	0	No Mitigation	0.000033
CB 1235	17.769318	0.000033	0	No Mitigation	0.000033
973-630R	3.35322	0.000032	0	UG ALL	0.000001

211-312R	17.646591	0.000032	0	No Mitigation	0.000032
411-30R	17.889583	0.000032	0	No Mitigation	0.000032
CB 231	7.858523	0.000032	1.49658E-05	UG ALL	0
351-819R	10.514962	0.000031	0	No Mitigation	0.000031
236-38R	13.735795	0.000031	0	No Mitigation	0.000031
73-23R	7.753788	0.000031	0	CC ALL	0.000019
1030-18R	13.714394	0.00003	0	No Mitigation	0.00003
221-1230F	3.910606	0.00003	9.51429E-05	UG ALL	0.000001
CB 300	17.420076	0.00003	4.11275E-06	No Mitigation	0.00003
79-660R	7.455492	0.00003	0	UG ALL	0
1030-42R	14.458144	0.000029	0	No Mitigation	0.000029
353-904R	6.836932	0.000029	0	UG ALL	0
79-785	10.925	0.000028	1.72755E-05	No Mitigation	0.000028
356-16R	4.521402	0.000028	0	UG ALL	0
908-1236R	4.860606	0.000028	0	UG ALL	0
445-19R	11.797159	0.000028	0	CC ALL	0.00002
445-894R	25.535227	0.000028	0	No Mitigation	0.000028
67-24R	12.154167	0.000028	0	No Mitigation	0.000028
971-1973R	9.174053	0.000027	0	No Mitigation	0.000027
73-1130	10.881439	0.000027	0	CC ALL	0.00002
217-48AE	14.414962	0.000027	0	No Mitigation	0.000027
1458-454	3.214962	0.000027	2.31304E-05	UG ALL	0
78-404R	4.062311	0.000026	0	UG ALL	0.000001
599-19R	25.889205	0.000026	0	No Mitigation	0.000026
CB 233	15.928409	0.000026	0	No Mitigation	0.000026
212-773R	10.782008	0.000025	0	CC ALL	0.000015
CB 351	6.615341	0.000025	8.80572E-06	UG ALL	0
CB 1234	16.876326	0.000025	4.28647E-05	No Mitigation	0.000025
DV1-3R	6.047538	0.000025	0	UG ALL	0
RB1-19R	6.280114	0.000025	0	CC ALL	0.000009
524-46R	11.416856	0.000025	0	No Mitigation	0.000025
521-14R	12.02178	0.000025	7.573E-06	No Mitigation	0.000025
1022-17F	4.099621	0.000025	7.9441E-06	UG ALL	0
212-638R	4.307765	0.000025	1.51153E-06	UG ALL	0.000001
350-41R	14.687879	0.000024	0	No Mitigation	0.000024
908-1372R	3.576705	0.000024	0	UG ALL	0
445-24R	23.499811	0.000024	0	CC ALL	0.000016
235-897R	4.23	0.000024	0	UG ALL	0
1030-20R	14.488068	0.000024	0	No Mitigation	0.000024
230-133AE	18.868561	0.000023	0	No Mitigation	0.000023
350-2188R	20.470076	0.000023	0	No Mitigation	0.000023
450-18	8.656629	0.000023	0	No Mitigation	0.000023
79-658R	9.636742	0.000023	0	No Mitigation	0.000023
974-23R	14.04697	0.000023	0	No Mitigation	0.000023
222-1503	2.362311	0.000023	0	UG ALL	0.000001
352-27R	11.439773	0.000022	0	No Mitigation	0.000022
CB PE1	4.964205	0.000022	0	UG ALL	0.000001
CTL1-3R	3.970455	0.000022	0	UG ALL	0
448-33R	10.557008	0.000022	2.45368E-05	CC ALL	0.000019
217-41AE	11.942803	0.000022	0	No Mitigation	0.000022
176-197F	13.25928	0.000022	0	No Mitigation	0.000022
1030-1823	3.115341	0.000022	0	UG ALL	0
1021-25R	6.475	0.000021	0	No Mitigation	0.000021
1023-46AE	17.370833	0.000021	0	No Mitigation	0.000021
222-1433R	6.090152	0.000021	0	UG ALL	0.000001
442-14R	2.47822	0.000021	0	UG ALL	0
176-161R	10.027841	0.000021	0	No Mitigation	0.000021
339-480R	8.969508	0.000021	0	No Mitigation	0.000021
CB 234	12.030871	0.000021	0	No Mitigation	0.000021
78-35R	1.550189	0.000021	0	UG ALL	0
67-45R	9.439583	0.000021	0	No Mitigation	0.000021
79-685R	3.804356	0.000021	3.83236E-06	UG ALL	0.000001

520-1489R	16.868371	0.000021	7.68834E-06	No Mitigation	0.000021
354-38R	16.922917	0.00002	0	No Mitigation	0.00002
353-914R	5.223485	0.00002	0	UG ALL	0
524-50R	9.77197	0.00002	0	No Mitigation	0.00002
249-24R	12.524432	0.00002	0	No Mitigation	0.00002
CB 908	10.428977	0.000019	0	No Mitigation	0.000019
350-2201R	13.601705	0.000019	1.60019E-06	No Mitigation	0.000019
1022-322R	3.429924	0.000019	0	UG ALL	0
78-782R	1.696212	0.000019	0	UG ALL	0.000001
240-1097R	12.898864	0.000019	0	No Mitigation	0.000019
522-38R	13.368182	0.000019	0	No Mitigation	0.000019
908-1368R	17.869318	0.000019	0	No Mitigation	0.000019
217-972R	8.571023	0.000018	0	No Mitigation	0.000018
1215-28R	2.980303	0.000018	0	UG ALL	0.000001
975-22R	1.697159	0.000018	0	UG ALL	0
520-1045R	8.327462	0.000018	0	No Mitigation	0.000018
1215-32R	11.820455	0.000018	0	UG ALL	0.000003
TM1-10R	2.930303	0.000018	1.94978E-06	UG ALL	0
209-623AE	14.991856	0.000018	0	No Mitigation	0.000018
176-36R	8.647727	0.000018	0	No Mitigation	0.000018
1023-48	14.6875	0.000018	0	No Mitigation	0.000018
214-647R	9.62197	0.000018	0	CC ALL	0.000007
212-886R	9.263636	0.000017	0	No Mitigation	0.000017
1090-639R	4.367803	0.000017	2.47447E-05	CC ALL	0.000008
221-35	0.697538	0.000017	0	UG ALL	0
175-64R	10.054924	0.000016	0	No Mitigation	0.000016
351-871R	4.157386	0.000016	0	CC ALL	0.000006
350-2196R	33.479545	0.000016	0	No Mitigation	0.000016
973-649R	7.833712	0.000016	0	No Mitigation	0.000016
212-650R	14.581629	0.000016	0	No Mitigation	0.000016
221-824	2.775379	0.000016	0	UG ALL	0
441-25R	5.976515	0.000016	0	UG ALL	0.000001
1166-342R	10.961364	0.000016	0	No Mitigation	0.000016
175-90R	11.1875	0.000016	0	No Mitigation	0.000016
239-2144R	5.067992	0.000016	0	No Mitigation	0.000016
233-123R	13.2	0.000016	0	No Mitigation	0.000016
233-86F	16.690341	0.000015	0	No Mitigation	0.000015
908-1370R	5.611553	0.000015	0	No Mitigation	0.000015
1105-1479	3.401326	0.000015	5.52094E-08	CC ALL	0.000005
1233-259R	4.967045	0.000015	0	No Mitigation	0.000015
448-13R	8.598485	0.000014	0	No Mitigation	0.000014
449-16R	1.993371	0.000014	0	UG ALL	0
907-1562AE	3.191098	0.000014	0	UG ALL	0
CB 246	7.086364	0.000014	8.22168E-06	No Mitigation	0.000014
75-32R	5.832765	0.000014	0	No Mitigation	0.000014
971-371R	2.313068	0.000014	0	UG ALL	0
520-10R	4.659659	0.000014	0	No Mitigation	0.000014
444-9R	10.407008	0.000013	1.71037E-06	No Mitigation	0.000013
907-1702R	4.741098	0.000013	0	No Mitigation	0.000013
1090-73F	8.832008	0.000013	0	No Mitigation	0.000013
283-71F	4.667424	0.000013	0	No Mitigation	0.000013
230-1586R	7.347348	0.000013	1.9408E-05	No Mitigation	0.000013
1021-855	2.811553	0.000013	0	UG ALL	0
67-37R	7.508712	0.000013	0	No Mitigation	0.000013
91-7F	5.018371	0.000013	0	No Mitigation	0.000013
240-2004R	16.375758	0.000012	2.91349E-06	No Mitigation	0.000012
920-1342R	6.010795	0.000012	0	No Mitigation	0.000012
79-714R	5.026894	0.000012	0	No Mitigation	0.000012
972-942R	7.231629	0.000012	0	No Mitigation	0.000012
221-23R	5.802462	0.000012	0	No Mitigation	0.000012
1021-1760R	2.607576	0.000012	0	UG ALL	0
CB 237	0.659091	0.000012	5.16678E-05	UG ALL	0

520-45	9.145833	0.000012	0	No Mitigation	0.000012
1242-127	3.994508	0.000011	0	No Mitigation	0.000011
1138-6R	13.503788	0.000011	0	No Mitigation	0.000011
521-1819R	3.487121	0.000011	0	UG ALL	0
CB 240	5.295644	0.000011	0	No Mitigation	0.000011
520-1509R	13.596023	0.000011	0	No Mitigation	0.000011
470-40AE	5.655114	0.000011	0	No Mitigation	0.000011
1030-1728R	2.098674	0.000011	0	UG ALL	0
157-204R	12.995833	0.00001	0	No Mitigation	0.00001
355-6R	1.365341	0.00001	0	UG ALL	0
1090-74F	8.697538	0.00001	0	No Mitigation	0.00001
212-652R	9.353598	0.00001	0	No Mitigation	0.00001
233-41R	9.488826	0.00001	0	No Mitigation	0.00001
411-14R	6.775	0.00001	0	No Mitigation	0.00001
79-676R	3.164015	0.00001	8.46183E-05	No Mitigation	0.00001
221-37AE	4.855682	0.00001	0	No Mitigation	0.00001
CB 1250	2.624621	0.00001	5.71647E-05	CC ALL	0.000003
449-19R	1.597727	0.00001	0	UG ALL	0
CB 1101	3.040341	0.00001	1.73348E-05	No Mitigation	0.00001
452-38AE	4.20322	0.00001	0	No Mitigation	0.00001
220-294R	11.589205	0.00001	2.44541E-05	UG ALL	0.000002
215-1544R	2.668371	0.000009	0	CC ALL	0.000003
221-6R	5.57822	0.000009	0	No Mitigation	0.000009
449-683R	1.76572	0.000009	4.1223E-07	UG ALL	0
520-1527R	10.074242	0.000009	7.65861E-06	No Mitigation	0.000009
221-675R	5.929356	0.000009	0	No Mitigation	0.000009
220-288R	7.02	0.000009	0	No Mitigation	0.000009
CB 204	16.186174	0.000009	7.45297E-06	No Mitigation	0.000009
176-41R	6.854167	0.000009	0	No Mitigation	0.000009
445-17R	4.133144	0.000009	0	UG ALL	0
234-48R	5.324053	0.000009	0	No Mitigation	0.000009
246-34R	9.382955	0.000009	0	No Mitigation	0.000009
221-788	3.420455	0.000009	0	No Mitigation	0.000009
972-1582R	10.900379	0.000009	0	No Mitigation	0.000009
1250-671R	1.358333	0.000008	0	UG ALL	0
396-699R	12.704545	0.000008	0	No Mitigation	0.000008
CB MOR1	3.101136	0.000008	0	No Mitigation	0.000008
214-17AE	6.787311	0.000008	0	No Mitigation	0.000008
1250-27R	1.422917	0.000008	0	UG ALL	0
CB FB1	4.259659	0.000008	0	No Mitigation	0.000008
1458-28	0.897917	0.000008	0	UG ALL	0
CB 599	9.291667	0.000008	0	No Mitigation	0.000008
157-207R	2.075379	0.000008	0	CC ALL	0.000003
212-743R	3.908902	0.000008	0	No Mitigation	0.000008
1100-1172R	2.394318	0.000008	5.90386E-07	No Mitigation	0.000008
75-996R	9.014773	0.000008	4.17425E-06	No Mitigation	0.000008
502-718F	1.270265	0.000008	0	UG ALL	0
307-234R	4.297727	0.000008	0	No Mitigation	0.000008
CB FB2	3.93428	0.000007	0	No Mitigation	0.000007
441-279R	2.158902	0.000007	0	UG ALL	0
239-89R	8.935227	0.000007	3.37653E-05	No Mitigation	0.000007
211-279R	15.743182	0.000007	0	UG ALL	0.000001
CB JU1	2.574053	0.000007	0	No Mitigation	0.000007
175-2024R	7.526515	0.000007	0	No Mitigation	0.000007
CB 232	4.930871	0.000007	0	No Mitigation	0.000007
CB RC1	2.786932	0.000007	0	No Mitigation	0.000007
CB 523	4.002841	0.000007	1.60611E-05	No Mitigation	0.000007
536-150R	3.593371	0.000007	0	No Mitigation	0.000007
212-888R	6.820833	0.000007	0	No Mitigation	0.000007
524-1782	6.037879	0.000007	0	No Mitigation	0.000007
CB 534	2.402652	0.000006	6.13019E-06	No Mitigation	0.000006
CB 536	3.066477	0.000006	8.63861E-06	No Mitigation	0.000006

204-32R	16.249621	0.000006	0	No Mitigation	0.000006
236-1535	6.667235	0.000006	2.19804E-05	No Mitigation	0.000006
387-15	3.207008	0.000006	1.20769E-05	No Mitigation	0.000006
CB 928	3.238068	0.000006	2.89655E-05	No Mitigation	0.000006
CB OK1	12.2	0.000006	0	No Mitigation	0.000006
214-4R	3.734091	0.000006	0	No Mitigation	0.000006
CB 975	0.478598	0.000006	4.20675E-05	UG ALL	0
445-897R	1.257386	0.000005	6.24674E-05	UG ALL	0
1030-23R	8.073106	0.000005	4.86123E-05	No Mitigation	0.000005
859-42R	7.263447	0.000005	0	No Mitigation	0.000005
908-2040	4.541667	0.000005	0	No Mitigation	0.000005
CB 1243	5.539773	0.000005	2.96702E-06	No Mitigation	0.000005
442-29R	2.014015	0.000005	0	No Mitigation	0.000005
908-30	1.618561	0.000005	0	UG ALL	0
353-901F	2.233333	0.000005	0	No Mitigation	0.000005
1023-89	3.669697	0.000005	0	No Mitigation	0.000005
454-48F	2.967803	0.000005	0	No Mitigation	0.000005
520-1525R	7.461174	0.000005	0	No Mitigation	0.000005
523-31AE	2.786742	0.000005	0	No Mitigation	0.000005
CB 522	4.513447	0.000004	2.2868E-05	No Mitigation	0.000004
358-33	0.424053	0.000004	0	UG ALL	0
240-1095R	9.736553	0.000004	0	No Mitigation	0.000004
444-15R	6.941856	0.000004	0	No Mitigation	0.000004
1021-883R	0.682386	0.000004	0	UG ALL	0
CB 1023	3.602652	0.000004	0	No Mitigation	0.000004
217-983R	6.84	0.000004	4.25392E-06	No Mitigation	0.000004
CB RA3	3.086553	0.000004	1.85513E-05	No Mitigation	0.000004
442-28R	1.017424	0.000004	0	CC ALL	0.000002
CB 1106	1.284848	0.000004	2.48934E-05	No Mitigation	0.000004
233-81F	4.071402	0.000004	0	No Mitigation	0.000004
791-419F	2.638636	0.000004	2.03322E-05	No Mitigation	0.000004
185-51F	6.713636	0.000004	0	No Mitigation	0.000004
CB 249	3.239583	0.000004	1.08334E-05	No Mitigation	0.000004
354-24AE	3.559848	0.000004	0	No Mitigation	0.000004
221-38AE	1.566667	0.000004	1.80209E-05	UG ALL	0
198-37R	4.144318	0.000003	3.41955E-06	No Mitigation	0.000003
175-24R	4.072917	0.000003	6.54016E-05	No Mitigation	0.000003
442-46R	0.62178	0.000003	0	UG ALL	0
CB 248	4.492992	0.000003	9.53305E-08	No Mitigation	0.000003
CB 1090	4.854167	0.000003	7.84998E-06	No Mitigation	0.000003
534-581R	1.107197	0.000003	0	No Mitigation	0.000003
928-19	2.085795	0.000003	0	No Mitigation	0.000003
176-164R	6.125	0.000003	0	No Mitigation	0.000003
1001-1820F	5.866477	0.000003	1.44745E-05	No Mitigation	0.000003
247-46	4.683902	0.000003	0	No Mitigation	0.000003
182-2252R	3.163447	0.000003	0	No Mitigation	0.000003
240-1028R	4.764583	0.000003	0	No Mitigation	0.000003
206-1817	4.390909	0.000003	0	No Mitigation	0.000003
230-181	2.671212	0.000003	0	No Mitigation	0.000003
1094-35F	4.830303	0.000003	0	No Mitigation	0.000003
230-1606R	2.559659	0.000003	9.6687E-06	No Mitigation	0.000003
212-880R	1.720644	0.000003	0	No Mitigation	0.000003
357-1147R	0.75	0.000003	2.06973E-07	UG ALL	0
CB 972	0.319886	0.000002	0.000100938	UG ALL	0
315-485AE	1.732197	0.000002	0	No Mitigation	0.000002
1250-8R	2.871212	0.000002	0	No Mitigation	0.000002
522-34	1.328409	0.000002	0	No Mitigation	0.000002
175-94R	1.936932	0.000002	0	No Mitigation	0.000002
1023-200R	3.767992	0.000002	0	No Mitigation	0.000002
75-41	2.522159	0.000002	0	No Mitigation	0.000002
CB 542	2.110606	0.000002	2.49398E-05	No Mitigation	0.000002
CB 230	0.639583	0.000002	0	CC ALL	0.000001

CB 444	0.407576	0.000002	2.57801E-05	UG ALL	0
840-308F	1.141098	0.000002	5.13459E-07	No Mitigation	0.000002
921-800F	1.104735	0.000002	1.39473E-05	No Mitigation	0.000002
CB 788	0.904545	0.000002	3.2276E-05	No Mitigation	0.000002
411-47R	2.920455	0.000002	8.84519E-06	No Mitigation	0.000002
CB 524	2.669129	0.000002	9.50819E-06	No Mitigation	0.000002
CB 540	1.026136	0.000002	9.6674E-06	No Mitigation	0.000002
1021-92	0.393939	0.000002	0	UG ALL	0
338-6R	0.904545	0.000002	0	No Mitigation	0.000002
1090-1734	2.367235	0.000002	0	No Mitigation	0.000002
CB 200	3.166098	0.000002	1.80424E-05	No Mitigation	0.000002
281-28R	0.763636	0.000002	8.98918E-06	No Mitigation	0.000002
1090-636R	8.529924	0.000002	0	No Mitigation	0.000002
240-1148	3.328409	0.000002	0	No Mitigation	0.000002
CB 907	1.2125	0.000002	3.44297E-05	No Mitigation	0.000002
CB 292	0.970833	0.000002	6.82066E-06	No Mitigation	0.000002
353-900F	0.919318	0.000002	0	No Mitigation	0.000002
200-613AE	1.937121	0.000002	0	No Mitigation	0.000002
176-200F	1.146212	0.000002	0	No Mitigation	0.000002
907-2820R	2.432955	0.000002	0	No Mitigation	0.000002
CB 260	1.577841	0.000002	8.7472E-06	No Mitigation	0.000002
440-13R	0.441288	0.000002	0	CC ALL	0.000001
471-36F	1.075189	0.000002	1.20739E-05	No Mitigation	0.000002
CB 247	1.328788	0.000002	5.02299E-06	No Mitigation	0.000002
CB 203	3.264394	0.000002	1.05902E-05	No Mitigation	0.000002
CB 327	0.914015	0.000002	1.73803E-06	No Mitigation	0.000002
79-1215F	0.187121	0.000002	0.000117574	UG ALL	0
CB 331	2.902841	0.000002	7.41992E-06	No Mitigation	0.000002
230-371AE	1.288068	0.000002	0	No Mitigation	0.000002
CB 222	0.525568	0.000001	6.68854E-05	UG ALL	0
1118-1F	0.735417	0.000001	0	No Mitigation	0.000001
230-1008R	0.884091	0.000001	6.21497E-06	No Mitigation	0.000001
442-509R	3.876136	0.000001	0	No Mitigation	0.000001
1243-38R	0.346212	0.000001	0	CC ALL	0
221-43AE	0.780114	0.000001	0	UG ALL	0
210-9R	15.957386	0.000001	1.06641E-06	No Mitigation	0.000001
252-129AE	4.250568	0.000001	0	No Mitigation	0.000001
972-26R	3.264583	0.000001	0	UG ALL	0.000001
353-593F	2.146212	0.000001	0	No Mitigation	0.000001
307-1538F	2.118939	0.000001	0	No Mitigation	0.000001
CB 235	0.157765	0.000001	6.94006E-05	UG ALL	0
242-773F	2.413068	0.000001	2.1821E-05	No Mitigation	0.000001
CB 470	1.894318	0.000001	2.69281E-05	No Mitigation	0.000001
CB 329	2.635606	0.000001	6.59576E-06	No Mitigation	0.000001
CB 1299	2.969318	0.000001	8.76743E-07	No Mitigation	0.000001
CB 215	0.138826	0.000001	1.06642E-05	UG ALL	0
442-525	2.657765	0.000001	0	No Mitigation	0.000001
CB 576	0.769318	0.000001	3.22855E-05	No Mitigation	0.000001
211-280R	13.5	0.000001	7.81779E-07	No Mitigation	0.000001
504-36R	1.760417	0.000001	0	No Mitigation	0.000001
CB 91	2.103977	0.000001	9.12632E-06	No Mitigation	0.000001
CB 242	2.470833	0.000001	0	No Mitigation	0.000001
920-735AE	1.688636	0.000001	1.69514E-05	No Mitigation	0.000001
183-440AE	1.752083	0.000001	0	No Mitigation	0.000001
CB 980	1.856818	0.000001	7.18551E-06	No Mitigation	0.000001
393-14R	1.618371	0.000001	4.99261E-05	No Mitigation	0.000001
240-1044	2.107955	0.000001	4.20384E-06	No Mitigation	0.000001
CB 216	0.085985	0.000001	0	UG ALL	0
1105-1483	0.330492	0.000001	2.84561E-06	UG ALL	0
311-43	1.941477	0.000001	4.66068E-06	No Mitigation	0.000001
1201-282F	1.65947	0.000001	1.27573E-05	No Mitigation	0.000001
CB RA2	2.925379	0.000001	7.13926E-06	No Mitigation	0.000001

CB 443	1.550568	0.000001	1.52529E-06	No Mitigation	0.000001
CB 73	0.063068	0.000001	7.02671E-05	UG ALL	0
591-1594R	0.417424	0.000001	1.77471E-06	No Mitigation	0.000001
353-594F	1.257576	0.000001	0	No Mitigation	0.000001
CB 1458	0.563636	0.000001	0	No Mitigation	0.000001
311-1163	1.519697	0.000001	0	No Mitigation	0.000001
339-478R	0.286364	0.000001	0	No Mitigation	0.000001
CB 1138	2.600947	0.000001	3.86384E-05	No Mitigation	0.000001
CB 776	2.858902	0.000001	0	No Mitigation	0.000001
CB 330	1.942614	0.000001	2.68516E-05	No Mitigation	0.000001
CB 244	0.763826	0.000001	1.41461E-05	No Mitigation	0.000001
1022-26R	0.320833	0.000001	0	No Mitigation	0.000001
CB 358	0.503977	0.000001	3.1251E-05	No Mitigation	0.000001
214-583R	5.68	0.000001	2.25362E-05	No Mitigation	0.000001
CB 339	0.24375	0.000001	0	No Mitigation	0.000001
454-1814	0.094129	0.000001	0	UG ALL	0
CB 1166	0.137879	0.000001	8.18431E-06	CC ALL	0
182-2254R	0.889583	0.000001	8.96966E-08	No Mitigation	0.000001
501-786	1.054924	0.000001	5.10502E-06	No Mitigation	0.000001
240-2006R	1.088258	0.000001	0	No Mitigation	0.000001
CB 970	0.030303	0.000001	0.000125228	UG ALL	0
183-439AE	0.998864	0.000001	0	No Mitigation	0.000001
197-1150F	1.391288	0.000001	0	No Mitigation	0.000001
CB 280	1.442235	0	2.75046E-05	No Mitigation	0
968-476F	2.275758	0	0	No Mitigation	0
CB 449	0.054356	0	2.21292E-05	UG ALL	0
971-381R	0.067992	0	0	UG ALL	0
1006-829F	0.464962	0	1.10419E-08	No Mitigation	0
594-1379F	0.566856	0	3.68063E-08	No Mitigation	0
CB 974	0.069697	0	1.55102E-05	UG ALL	0
1001-1817F	1.562689	0	0	No Mitigation	0
210-172R	6.314583	0	0	No Mitigation	0
CB 461	2.345455	0	2.60574E-05	No Mitigation	0
500-1531	0.85303	0	7.14208E-06	No Mitigation	0
CB 981	0.814394	0	9.09968E-06	No Mitigation	0
214-613R	4.24	0	0	No Mitigation	0
206-1105	0.627273	0	0	No Mitigation	0
CB 157	0.033523	0	0	UG ALL	0
835-11F	1.054545	0	0	No Mitigation	0
CB 973	0.060417	0	4.0212E-05	UG ALL	0
CB 499	0.961932	0	1.82118E-06	No Mitigation	0
350-2182R	0.348295	0	0	No Mitigation	0
177-955	0.385795	0	0	No Mitigation	0
770-259R	1.455682	0	0	No Mitigation	0
CB CTL1	0.073485	0	0	UG ALL	0
CB 1161	0.381818	0	1.42553E-05	No Mitigation	0
445-1318	0.185227	0	0	No Mitigation	0
CB 568	1.052083	0	7.36125E-09	No Mitigation	0
353-902F	0.635417	0	0	No Mitigation	0
1001-1814AE	0.414773	0	0	No Mitigation	0
1094-7	0.882955	0	0	No Mitigation	0
CB SL1	4.919508	0	0	No Mitigation	0
1073-872F	0.524621	0	6.25706E-08	No Mitigation	0
CB 1245	0.508333	0	6.50115E-06	No Mitigation	0
450-50R	0.2	0	0	No Mitigation	0
CB 535	0.311742	0	2.47544E-05	No Mitigation	0
463-1136F	0.549811	0	5.52094E-08	No Mitigation	0
799-504R	0.443939	0	4.87969E-06	No Mitigation	0
CB 212	0.239015	0	4.09344E-05	No Mitigation	0
1161-388	0.230492	0	0	No Mitigation	0
CB 835	0.396591	0	2.30333E-05	No Mitigation	0
214-536R	2.46495	0	0	No Mitigation	0

907-1602	0.103977	0	0	No Mitigation	0
CB 440	0.029167	0	1.59559E-06	UG ALL	0
315-1151	0.502273	0	0	No Mitigation	0
CB 176	0.298295	0	0	No Mitigation	0
308-563AE	0.375947	0	2.52832E-06	No Mitigation	0
CB 442	0.021212	0	9.94576E-05	UG ALL	0
CB 356	0.016856	0	5.739E-05	UG ALL	0
197-1155F	0.22178	0	9.73173E-07	No Mitigation	0
223-526R	0.291856	0	0	No Mitigation	0
CB 217	0.035985	0	4.94126E-05	No Mitigation	0
1215-10R	0.515341	0	0	No Mitigation	0
CB 210	0.053788	0	1.79044E-05	No Mitigation	0
448-1196F	0.026136	0	5.41632E-05	UG ALL	0
855-46AE	0.235606	0	0	No Mitigation	0
CB 67	0.043939	0	3.42144E-05	No Mitigation	0
247-48	0.448106	0	0	No Mitigation	0
CB 352	0.125947	0	6.16675E-06	No Mitigation	0
CB 78	0.036174	0	1.03047E-05	No Mitigation	0
CB 338	0.0375	0	0	UG ALL	0
1073-887F	0.056818	0	0	No Mitigation	0
445-1315	0.038068	0	0	No Mitigation	0
CB 350	0.138068	0	5.25864E-05	No Mitigation	0
1079-9	0.169886	0	7.20971E-06	No Mitigation	0
973-530AE	0.03428	0	0	No Mitigation	0
203-21R	0.089015	0	0	No Mitigation	0
CB 283	0.006061	0	2.85906E-05	UG ALL	0
CB 353	0.043939	0	4.19588E-05	No Mitigation	0
CB 569	0.144318	0	0	No Mitigation	0
CB 211	0.010606	0	1.22873E-05	No Mitigation	0
1030-1767	0.027652	0	9.72245E-06	UG ALL	0
243-14R	0.027652	0	0	No Mitigation	0
CB 315	0.097159	0	2.26807E-05	No Mitigation	0
1073-874F	0.057955	0	4.73492E-06	No Mitigation	0
1001-1231	0.030114	0	3.7714E-08	No Mitigation	0
308-485AE	0.026136	0	5.14446E-06	No Mitigation	0
CB 196	0.097159	0	1.19358E-05	No Mitigation	0
CB 220	0.011932	0	3.50759E-05	No Mitigation	0
CB 239	0.039773	0	0	No Mitigation	0
CB 396	0.025	0	6.55167E-05	No Mitigation	0
CB 1215	0.05303	0	7.84741E-05	No Mitigation	0
CB 441	0.02	0	0.000119895	No Mitigation	0
CB 185	0.092424	0	2.60422E-05	No Mitigation	0
307-1492R	0	0	0	No Mitigation	0
1001-1130R	0	0	0	No Mitigation	0
1001-1140R	0	0	0	No Mitigation	0
305-32R	0	0	0	No Mitigation	0
450-88R	0	0	0	No Mitigation	0
454-47R	0	0	0	No Mitigation	0
355-65R	0.071591	0	0	No Mitigation	0
185-40AE	0	0	0	No Mitigation	0
185-52F	0	0	0	No Mitigation	0
305-35R	0	0	0	No Mitigation	0
476-885R	0	0	0	No Mitigation	0
486-61R	0	0	0	No Mitigation	0
66-1213R	0	0	0	No Mitigation	0
522-36	1.451136	0	0	No Mitigation	0
1458-455F	0.241288	0	0	No Mitigation	0
CB SSC1	0.865152	0	2.58691E-06	No Mitigation	0
CB 521	0.21572	0	2.26843E-05	No Mitigation	0
CB 1100	0.170265	0	0	No Mitigation	0
296-68F	0.592235	0	0	No Mitigation	0
1090-70F	0.429356	0	0	No Mitigation	0

1458-1062	0.102841	0	0	No Mitigation	0
312-28R	0.323864	0	8.22612E-06	No Mitigation	0
CB NVS1	0.401326	0	0	No Mitigation	0
178-968AE	0.21875	0	0	No Mitigation	0
232-40AE	0.060038	0	9.30329E-07	No Mitigation	0
178-982	0.148674	0	0	No Mitigation	0
CB 214	0.040909	0	3.03026E-05	No Mitigation	0
835-10F	0.184091	0	0	No Mitigation	0
1073-886F	0.083902	0	0	No Mitigation	0
CB RB1	0.026705	0	1.3201E-05	UG ALL	0
835-35F	0.076705	0	0	No Mitigation	0
1001-1818F	0.069129	0	0	No Mitigation	0
CB 909	0.097917	0	3.69376E-06	No Mitigation	0
283-80F	0.03447	0	0	No Mitigation	0
CB 1160	0.010606	0	7.38343E-06	No Mitigation	0
CB 533	0.010606	0	4.38738E-06	No Mitigation	0
205-1550	0.05928	0	0	No Mitigation	0
CB 354	0.057008	0	2.37977E-05	No Mitigation	0
CB 520	0.005871	0	2.41189E-05	UG ALL	0
907-1604	0.01572	0	0	UG ALL	0
CB 1233	0.011364	0	1.9462E-05	UG ALL	0

Question 1 - Continued

h. Please explain how the model or SDG&E decides whether each circuit segment should be mitigated with undergrounding or covered conductor. Please provide all supporting calculations for each circuit segment mitigated with either undergrounding or covered conductor.

SDG&E Response 1h:

SDG&E objects to the request on request to the extent it would require SDG&E to search through documents previously produced in this proceeding. SDG&E's WiNGS models are discussed extensively in its WMP submissions. Such documents are already in TURN's possession, or available on SDG&E's website. Subject to and without waiving the foregoing objects, SDG&E responds as follows:

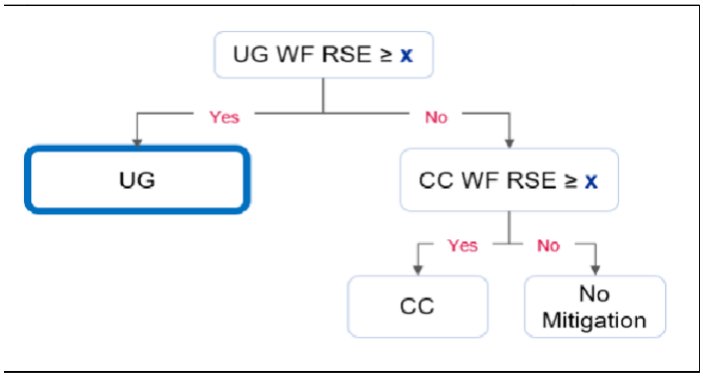
The primary aim of WiNGS-Planning is ultimately to enable SDG&E to reduce the wildfire risk associated with electrical infrastructure down to SDG&E's wildfire risk target goals in a manner that recognizes and promotes cost efficiencies. SDG&E employs the WiNGS-Planning model to aid in the prioritization of its undergrounding and covered conductor projects across its service territory. The way this is performed and prioritized by the model is based on two factors: (1) the long-term risk reduction target aimed for within its service territory, and (2) the circuit-segment specific cost-effectiveness metric known as the risk spend efficiency (RSE) for the two evaluated mitigations.

WiNGS-Planning incorporates SDG&E's overall wildfire mitigation goal by prioritizing RSEs for undergrounding and covered conductor projects at the circuit-segment level.
The way mitigations are assigned to segments is based on the RSE methodology utilized in RAMP. See RAMP section (SDGE RAMP-C Risk Quantification Framework and Risk Spend Efficiency).[1] The model uses RSE thresholds to determine if a segment meets the required threshold for undergrounding, if not, assessment for covered conductor is done, if the threshold for covered conductor is not met, no mitigation is recommended. The image below is the decision tree that helps inform what mitigation should be selected.

[1] As described in the Risk Assessment Mitigation Phase (RAMP), Risk Spend Efficiencies (RSEs) are numerical values that attempt to portray changes in risk scores per dollar spent. For more information on RSEs see SDGE RAMP- C Risk Quantification Framework and Risk Spend Efficiency, page C-26, dated May 17,2021.

SDG&E Response 1h-Continued:

Based on the model outputs, SDG&E utilizes a decision tree, which reviews the segment- specific covered conductor and undergrounding RSE to effectively recommend circuit- segment mitigations across the scope of all the circuits-segments considered within the WiNGS-Planning model. During this process, SDG&E also considers additional factors outside the model, such as feasibility and environmental constraints, in addition to subject matter expertise to finalize the recommended mitigation. TURN is already in possession of the calculated outputs of the WiNGS model, as provided in this and prior data request responses.



6. Re the Excel workbook "1 Final TY2024 GRC RSE Workpaper - SDGE – Wildfire", tab "Risk Scoring Workpaper," shows expected total fire size of 500,000. However, the data provided in TURN-4, Attach 10b_AC_5804, shows the highest number of acres burned under Technosylva models was 33,000 acres:
    a. How does SDG&E justify the 500,000 acre per significant fire assumption? Please explain and provide all sources and supporting documentation.

SDG&E Response 6a:

SDG&E Subject Matter Experts conservatively estimate that the frequency of a catastrophic Wildfire in SDG&E's service territory is around 1 in 20 years. Based on the analysis performed on historical wildfire records (2000-2020) to determine the fire size and financial consequences of wildfire events, it was concluded that 500,000 acres represent a potential maximum footprint (acres) of a catastrophic wildfire.

References:

[1] https://hub-calfire-forestry.hub.arcgis.com/datasets/fire-perimeters/explore

[1] https://www.fire.ca.gov/media/t1rdhizr/top20_destruction.pdf.

[1] https://www.fire.ca.gov/media/4jandlhh/top20_acres.pdf

[1] https://www.fire.ca.gov/media/iy1gpp2s/2019_redbook_final.pdf.

[1] https://www.iii.org/fact-statistic/facts-statistics-wildfires.

[1] https://wildfiretoday.com/2021/04/06/a-list-of-some-of-the-fires-attributed-to-pge- powerline-equipment/

Question 6 – Continued

i. Please indicate if and how this value can be derived from values in TURN-4, Attach 10b_AC_5804. Please provide the workbook with formulas to do so. If not, please explain why not.

SDG&E Response 6ai:

The value of 500,000 acres cannot be reproduced using Technosylva expected acres burned because Technosylva simulates ignitions with a fixed 8-hour duration.

BUSINESS

SDG&E Gets A Big Thumbs-Down From Callers on Potential Rate Increase

In its General Rate Case filed with the California Public Utilities Commission, SDG&E requests increasing electric rates 5.3 percent and natural gas rates 17.5 percent starting in 2024 and going through 2027. (Rob Nikolewski/The San Diego Union- Tribune)

If approved by the CPUC, monthly electric bills for typical residential customers would increase $8.45 per month and natural gas bills would go up $9.16, starting next year.

https://www.sandiegouniontribune.com/business/story/2023-03-07/callers-give-a-big-thumbs-down-to-a-potential-rate-increase-for-sdg-e

BY ROB NIKOLEWSKI MARCH 7, 2023 10:48 AM PT

San Diego Gas & Electric's request to increase electric and natural gas rates next year and through 2027 received a decidedly negative reception from customers who called into a virtual hearing Monday night hosted by the California Utilities Commission.

SDG&E proposal would result in an $8.45 increase per month in the electricity bill of a typical residential customer using 400 kilowatt-hours, up 5.3 percent compared to 2023. Natural gas rates would rise 17.5 percent, translating to $9.16 more per month for residential customers using 24 therms in a given month. A therm refers to one unit of natural gas.

It's up to the utilities commission, the CPUC , to decide whether to accept, reject or modify the requested increases.

Monday night's meeting was one of four hearings the CPUC has scheduled to receive public input for what's called a General Rate Case. Every four years, the state's investor- owned utilities file requests to the commission, estimating what each utility believes it will cost to maintain and upgrade its power system.

SDG&E's proposed increases come on the heels of a surge in the commodity price in natural gas that increased some customers' gas bills by 100 percent or more early this year.

The commodity, or wholesale, price of natural gas for Southern California has fallen back to more normal levels in March, but judging by some of the calls Monday night, the financial pain and anger are still fresh.

"I'm facing $300 bills in a home that's constantly in the 50s" for room temperature, said one woman from Carlsbad. "I use less than average kilowatt-hours per hour per household. I cannot afford to live without shaking in the cold."

Brian Naugton recently moved to San Diego and said, "We have our oven open to let the heat out after we ate dinner, sitting in front of an electric heater, covered in cats, to generate warmth because our power bill last month was $615."

The major investments that SDG&E has listed in its application include:

programs to reduce wildfire risk. Since the deadly Witch Creek, Guejito and Rice fires of 2007, SDG&E has already spent about $3 billion on safety measures such as replacing wood poles with fire-resistant steel poles, undergrounding power lines and establishing a network of more than 220 weather stations.
decarbonization efforts, such as installing utility-scale battery storage projects and electric vehicle charging infrastructure that align with state and local climate action plans. Seeking to reduce greenhouse gas emissions, California policymakers have set a goal to derive 100 percent of the state's electricity from carbon-free sources by 2045, if not sooner.
improvements to electricity transmission and distribution, including pipeline replacements, and bolstering cybersecurity and upgrading the ability to protect customer data

"We believe our rate request strikes the right balance between making strategic investments to benefit customers and mitigate rate impacts," said Jamie York, SDG&E's director of General Rate Case and

revenue requirements. “California has established aggressive greenhouse gas goals that call for massive increases in the use of clean electricity. Our rate request is geared for preparing the grid for the clean energy future that so many of us aspire toward.”
CPUC administrative law judge Manisha Lakhanpal has been assigned to SDG&E’s rate request and presided over Monday’s virtual hearing. She was accompanied by commissioner Darcie Houck.

The meeting heard 65 customers over the course of three hours, with all but seven callers opposing the rate increase.

Many referenced last week’s 2022 earnings call by Sempra, the Fortune 500 energy company that is the parent company of SDG&E. Sempra reported adjusted earnings of

“I am sleeping in long underwear and sweats because I don’t turn on my heater,” said Paula Brant, a retiree living in Poway. “The house is frigidly cold. In the summertime, I can’t afford to turn on air because I can’t afford the bill. And the profits that SDG&E made is obscene.”

Others pointed to data compiled by the U.S. Bureau of Labor Statistics showed that in January the average electricity price in San Diego came to 47.5 cents per kilowatt-hour, more than any other metropolitan area. Urban Hawaii came in second, at 44.6 cents.

“We are the highest rate in the continental U.S., more than 67 percent than the national average,” said Chelsea Logan, a condominium owner in Oceanside who said she is considering moving back in with her parents because of rising costs. “But we do not get 67 percent or more in terms of service.”

Another virtual hearing is scheduled for March 15.

Two in-person forums will be held March 23 at the Sherman Heights Community Center at 2258 Island Ave. There will be one session at 2 p.m. and a second at 6 p.m.

The process of completing a General Rate Case is a long one that involves multiple hearings and thousands of pages of documents, legal briefs and testimony from interested parties. Lakhanpal is expected to issue a proposed decision on SDG&E’s request early next year, with the CPUC’s five commissioners eventually making a final decision by majority vote.

CPUC public forums on SDG&E’s proposed rate increase

Virtual meeting March 15, 1 p.m. Webcast: adminmonitor.com/ca/cpuc Phone number: 800-857-1917
Passcode: 1767567#

In-person meeting March 23
First session starts at 2 p.m. Second session starts at 6 p.m.
Sherman Heights Community Center Multipurpose Room on second floor 2258 Island Ave.
San Diego, CA 92102

Rob Nikolewski

https://www.sandiegouniontribune.com/business/story/2023-03-07/callers-give-a-big-thumbs-down-to-a-potential-rate-increase-for-sdg-e

Eric Borden, Principal Associate

Synapse Energy Economics I 485 Massachusetts Avenue, Suite 3 I Cambridge, MA 02139 I 617-453-7042
eborden@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics, Inc., Cambridge, MA. *Principal Associate,* May 2022 – Present

- Sponsors expert testimony and performs analyses related to utility electric vehicle incentives and policy, wildfire mitigation strategies and costs, risk modeling, rate design, cost allocation, and revenue requirement issues in General Rate Cases and Multi-year Rate Plans.
- Conducts research and analysis related to the cost-effectiveness of distributed energy resources and Integrated Resource Plans.
- Examines utility performance incentives and provides expertise on ratemaking issues.

The Utility Reform Network (TURN), San Francisco, CA, *Energy Policy Expert,* February 2015 - May 2022

- Prepared testimony, conducted analyses, drafted comments, and represented TURN in various proceedings at the California Public Utilities Commission (CPUC) related to general rate cases, wildfire-related safety applications, electric vehicle charging infrastructure, utility procurement, rate design, and demand response.

4 Thought Energy LLC, Chicago, IL. *Senior Energy Analyst*, June 2013 – January 2015

- Created financial models to forecast profits of potential site installations
- Researched state and regional public policy frameworks governing CHP
- Conducted analyses over electricity and natural gas price trends
- Developed presentations and marketing materials for investor meetings

International Renewable Energy Agency (IRENA) Bonn, Germany. *Consultant,* February 2014 – October 2014

- Hired to write a report on worldwide electricity sector battery storage, including primary applications for renewable energy integration, market developments, trends, and case studies
- Conduct research, review literature, interview key industry players, develop case study material
- Travel to Bonn, company sites, and research facilities
- Written report will be sent to policymakers in 167 IRENA member countries

Alexander von Humboldt Foundation (hosted by DIW Berlin), Berlin, Germany. *German Chancellor Fellow*, July 2012 – November 2013

- Research Project: "Energy Storage Technology and the Large-Scale Integration of Renewable Energy"
- Investigated the role of energy storage in Germany for renewable integration through literature review, interviews with German energy experts, and analysis comparing public policy support in Germany and the U.S. for storage technologies
- Invited to hold a presentation at the International Renewable Energy Storage Conference and Exhibition (IRES 2013)
- Discussions with German businesses and governmental ministries; special visit to European Union and NATO headquarters in Brussels
- Attended energy conferences and workshops in Berlin

The Kenrich Group, LLC, Chicago, IL. *Senior Consultant*, June 2008 – July 2009

- Consulted for multiple energy utilities in legal disputes with the Department of Energy (DOE)
- Performed detailed research and quantitative/qualitative analysis to analyze financial impact related to construction of coal-fired power plants, liquid natural gas facilities, and other types of construction
- Contributed to final reports and presentations submitted in arbitration, settlement, or court of law presenting KRG's expert opinion

Charles River Associates, Chicago, IL. *Associate - Intellectual Property*, July 2006 – May 2008

- Developed complex financial models including discounted cash flow, lost profit, and regression analyses to support expert reports within the context of intellectual property and financial litigation in multiple industries
- Created valuation models and supporting materials to value business entities
- Contributed to final reports and presentations submitted in arbitration, settlement, or court of law presenting CRA's expert opinion

EDUCATION

University of Texas, LBJ School of Public Affairs, Austin, Texas

Master of Public Affairs, specialization in Natural Resources and the Environment, 2012

Washington University, St. Louis, MO

B.S.B.A. Finance, Entrepreneurship, 2006

PUBLICATIONS

Battery Storage for Renewables: Market Status and Technology Outlook, International Renewable Energy Agency (IRENA), co-author with Ruud Kempener, 2015.

Germany's Energiewende, chapter 15 in Global Sustainable Communities Design Handbook, ed. Dr. Woodrow Clark, Elsevier Press, 2014.

Expert Views on the Role of Energy Storage for the German Energiewende, DIW Berlin and BMU "Stores" project, 2014.

Policy efforts for the development of storage technologies in the U.S. and Germany, DIW Discussion Paper, 2013.

Electric Vehicles and Public Charging Infrastructure: Impediments and Opportunities for Success in the United States, The University of Texas at Austin, 2012.

Clean Energy Technology and Public Policy, LBJ Journal of Public Affairs, editor and contributor, 2011.

TESTIMONY

Public Utilities Commission of Maine (Docket No. 2022-00152): Direct Testimony of Melissa Whited and Eric Borden regarding Central Maine Power Company's request for rate design increase and changes. On behalf of the Maine Office of the Public Advocate. December 2, 2022.

A.21-06-021: Prepared Testimony Addressing Pacific Gas and Electric's Test Year 2023 General Rate Case – Wildfire Mitigation and New Customer Connections Cost Requests. June 13, 2022.

A.21-09-008: Prepared Testimony Addressing the Reasonableness of Pacific Gas and Electric 2020 Vegetation Management Balancing Account Overspend. May 25. 2022.

A.21-06-022: Prepared Testimony Addressing Pacific Gas and Electric's Framework for Substation Microgrid Solutions. March 30, 2022.

A.21-10-010: Prepared Testimony Addressing Pacific Gas and Electric's Electric Vehicle Charge 2 Proposal. March 2, 2022.

A.20-09-019: Prepared Testimony Addressing Pacific Gas and Electric's Wildfire Mitigation Memorandum Accounts. April 14, 2021.

A.19-08-013: Prepared Testimony Addressing Southern California Edison's Test Year 2021 Track 2 General Rate Case Memorandum Account Request – Wildfire Expenditures. September 4, 2020.

A.20-03-004: Joint Testimony with Eduyng Castano (SCE) Addressing Data Collection and Evaluation of the New Homes Battery Storage Pilot Program. September 1, 2020.

A.19-10-012: Prepared Testimony Addressing San Diego Gas and Electric's Power Your Drive 2 Electric Vehicle Charging Infrastructure Proposal. May 18, 2020.

A.19-08-013: Prepared Testimony Addressing Southern California Edison's General Rate Case Wildfire Management, Wildfire Risk, Vegetation Management, and New Service Connection Policy Issues and Cost Forecasts. May 5, 2020.

A.18-12-009: Prepared Testimony Addressing Pacific Gas and Electric's Enhanced Vegetation Management and System Hardening Wildfire Mitigation Expenditures. July 26, 2019.

A.18-09-002: Direct Testimony Addressing SCE's Grid Safety and Reliability Program Infrastructure Proposal. April 23, 2019.

A.18-06-015: Rebuttal Testimony Addressing SCE's Charge Ready 2 EV Infrastructure Proposal. December 21, 2018.

A.18-06-015: Direct Testimony Addressing SCE's Charge Ready 2 EV Infrastructure Proposal. November 20, 2018.

A.17-12-011: Direct Testimony Regarding Potential Effects of More "Cost Based" TOU Rates and Seasonal Differentiation of Tiered Rates. October 26, 2018.

A.18-02-016 et al.: Prepared Testimony Addressing Issues Pertaining to AB 2868 (Energy Storage). August 10, 2018.

A.17-12-002 et al.: Prepared Testimony Addressing the Proposal of SCE for Energy Storage Procurement. April 9, 2018.

A.17-01-020: Direct Testimony Addressing the Proposal of PG&E for a Fast Charging Infrastructure Program. July 25, 2017.

R.12-06-013: Direct Testimony Evaluating Hardship due to TOU Rates on Vulnerable Populations in Hot climate Zones. April 19, 2017.

A.15-09-001: Direct Testimony Addressing the Proposal of PG&E for Electric Distribution and New Business Expenditures. April 29, 2016.

A.15-02-009: Rebuttal Testimony Regarding PG&E's A.15-02-009 for EV Infrastructure and Education Program. December 21, 2015.

A.15-02-009: Direct Testimony Regarding PG&E's EV Infrastructure and Education Program. November 20, 2015.

A.14-11-003: Direct Testimony Addressing the Treatment of Solar Distributed Generation for Estimating Distribution System Capacity/Expansion Expenditures. May 15, 2015.

A.14-04-014/R.13-11-007: Testimony Regarding SDG&E's Application for Authority to Build Electric Vehicle Charging Infrastructure. April 13, 2015.

Resume updated January 2023