STATE OF RHODE ISLAND

PUBLIC UTILITIES COMMISSION

IN RE:	**RHODE ISLAND ENERGY'S FY 2024 GAS INFRASTRUCTURE SAFETY, AND RELIABILITY PLAN**	)))	**DOCKET NO. 22-54-NG**

DIRECT TESTIMONY

OF

ROD WALKER

February 14, 2023

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND PLACE OF EMPLOYMENT.

A. My name is Rod Walker. I am employed by Rod Walker & Associates Consultancy, Inc. (RWA), a management consulting and technical advisory firm.

Q. ON WHOSE BEHALF ARE YOU TESIFYING IN THIS MATTER?

A. I am testifying on behalf of the Rhode Island Division of Public Utilities and Carriers (the "Division").

Q. WHAT DOES YOUR POSITION WITH RWA ENTAIL?

A. RWA is a technical advisory and management consulting firm. As CEO and President of RWA, I am responsible for the overall development, direction, supervision, and preparation of technical advisory and management consulting projects for our clients, including involvement in capital replacement program reviews, system modeling and planning reviews, project engineering, planning and design reviews, construction management, organizational assessments, due diligence reviews, strategic planning, regulatory compliance and providing expert witness testimony.

Q. WOULD YOU PLEASE OUTLINE YOUR EDUCATIONAL BACKGROUND?

A. I graduated from Clemson University in Clemson, South Carolina in 1985 with a Bachelor of Science Degree in Civil Engineering.

Q. PLEASE BRIEFLY DESCRIBE YOUR EXPERIENCE WITH NATURAL GAS UTILITIES.

A. I have worked in the natural gas industry since 1985 (37 years). In the first seventeen years of my career, I worked in engineering, operations and management roles at the Atlanta Gas Light Company (now Southern Company Gas), and as Utilities Director for the City of Hartwell, Georgia and the City of Toccoa, Georgia. Through my work in the gas industry, I gained significant experience in the areas of natural gas utility operations, management, design engineering, system reliability analysis, as well as the design and construction of hundreds of natural gas infrastructure projects (pipelines, regulator stations, and tap stations). My industry work has also focused on system reliability and safety, system improvements for future expansion and replacement of aging infrastructure.

After my seventeen years of working in the gas industry, I worked for several national energy consulting firms, R. W. Beck/SAIC, Halcrow, Black & Veatch as well as RWA, a gas industry consulting firm I started in 2015. In the role of a gas industry consultant, I have continued working with domestic and international utilities, state jurisdictions in the areas of capital planning, replacement programs evaluations, due diligence, organizational assessments, strategic planning, regulatory compliance, expert witness, and engineering the design and construction of various infrastructure projects.

Currently, I serve as an advisor to the State of Arkansas Attorney General's Office, the DC Office of People's Counsel, the Delaware Division of Public Advocate, the California Energy Commission, the California Utility Reform Network, the New Jersey Division of Rate Counsel, and the Massachusetts Attorney General's Office in addition to the Rhode

Island Division of Public Utilities and Carriers on natural gas industry issues. I have written numerous white papers and articles on subjects affecting the natural gas utility industry.

Q. HAVE YOU PREVIOUSLY TESTIFIED AS AN EXPERT BEFORE THE RHODE ISLAND PUBLIC UTILITIES COMMISSION?

A. Yes. I testified before the Rhode Island Public Utilities Commission ("Commission") in 2019, 2020, 2021, and 2022 concerning the FY 2020, 2021, 2022, and 2023 Gas ISR Plans of The Narragansett Electric Company d/b/a National Grid ("National Grid" or the "Company").

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to provide the Commission with my findings and recommendations on behalf of the Division regarding the Narragansett Electric Company d/b/a Rhode Island Energy's ("RIE" or the "Company") Gas Infrastructure, Safety, and Reliability Plan for FY 2024 Proposal (the "Plan" or "ISR") that was provided to the Division on October 21, 2022, the finalized ISR filed with the Commission on December 22, 2022, and the Company's supplemental ISR filing that the Company filed with the Commission on January 27, 2023. My testimony will discuss the following: (i) The overall condition of the Company's infrastructure, (ii) Leak trends on the Company's

distribution system and the efficacy of the replacement programs to reduce leaks, and (iii) the relationship between methane emission reduction and proactive pipe replacement.

III. SUMMARY OF FINDINGS AND RECOMMENDATIONS

Q. CAN YOU PLEASE SUMMARIZE YOUR FINDINGS?

A. Following my review of the facts of this proceeding, the Company's discovery responses, ISR and System Integrity Report ("SIR"), and associated data; my findings are as follows:

1. The Rhode Island natural gas distribution system continues to be one of the oldest in the United States and includes one of the largest collections (top 2% of all utilities) of leak prone and deteriorating infrastructure which, in some instances, was installed over 100 years ago.

2. The Company has steadily removed leak prone pipe ("LPP") from its system and has seen somewhat proportional reductions in leaks over the same period. Leaks on the Company's system have declined over the past 5 years by 6.4% according to the SIR; however in 2021, leaks increased across almost all metrics including an overall increase in the workable leak backlog (+21.3%), main leak rate (+6.6%), cast iron main break rate (+76%), steel main corrosion leak rate (+39.2%), and service leak rate (+72.3%).

3. There are discrepancies between the Company's DOT reports and the SIR reports over the past several years. The delta in total leak repairs between the two data sets is less than one percent for most years which continues a trend of data issues that has plagued the Company's ISR filings for years

Q. CAN YOU PLEASE SUMMARIZE YOUR RECOMMENDATIONS TO THE COMMISSION?

A. Given the above findings, my recommendations to the Commission are as follows:

1. That the Company monitor its uptick in leaks and that any continued future trend in this direction be closely scrutinized.

2. That the Company continues to re-evaluate the effectiveness of its replacement programs to ensure the riskiest leak prone aging mains and services are being replaced so the metrics around leak rates (and especially hazardous, Grade 1 leaks), trend downward.

3. That the ongoing discrepancies found in data presented by the Company during this proceeding and in previous years concerning quantities of leak prone infrastructure and leaks be continually addressed to ensure that the Company maintains sufficient knowledge of its system to perform integrity management functions as required by regulations.

4. There is a relationship between methane emission reductions and removing LPP. The Company, therefore, should continue to make investments in removing LPP in the pending and future gas ISR programs.

IV. ANALYSIS

Q. WHAT IS LEAK-PRONE PIPE?

A. Throughout the history of natural gas utilities, various materials have been used to transport gas from production sites through to the final point of end use. Over time, the metallurgical processes, operational procedures, and polymer production processes related to the manufacture and installation of gas piping materials have changed and improved. As real-world data has been collected over the decades, there are certain materials that the industry as a whole and specifically Pipeline Hazardous Materials Safety Administration (PHMSA), the federal agency charged with oversight of safety of the natural gas distribution systems across the country, have identified as being more leak-prone than others. These materials, collectively referred to as "leak-prone", are more likely to experience corrosion, cracking, or other conditions that could lead to a leak and create a safety hazard to customers and the general public.

These materials are generally considered to include:

- Cast iron – Cast iron is prone to cracking and separation at joints.
- Ductile iron – Obsolete material that is susceptible to corrosion.
- Bare steel – Steel that is not coated is prone to accelerated corrosion in soil.
- Unprotected steel – Steel that is not cathodically protected is at risk of accelerated material loss due to electrolytic degradation.

- Bare & Unprotected steel – Steel that is neither coated nor cathodically protected is at exceptional risk from corrosion.
- Copper – Copper is particularly reactive electrically and often experiences accelerated corrosion.
- Other – there are other materials that are unique to certain systems that may have elevated risk of leaking such as certain vintage plastics. These risks, while important to monitor, are typically secondary to the metal materials described above.

Q. WHAT LEAK-PRONE MATERIALS HAVE BEEN/ARE PRESENT IN THE COMPANY'S DISTRIBUTION SYSTEM?

A. The Rhode Island natural gas distribution system continues to be one of the oldest in the United States and includes one of the largest collections (top 2% of all utilities) of leak-prone and deteriorating infrastructure which, in some instances, was installed over 100 years ago. The Company has cast iron, ductile iron, unprotected steel and bare/unprotected steel main piping in its inventory as of the most recent reporting.[1] Of these materials, cast iron and the bare & unprotected steel represent the largest risk to the system. The quantities of these materials are summarized in the table below. The table also contains the percentages that each material makes up of the total distribution system.

[1] 2021 PHMSA Report and the 2021 System Integrity Report.

LPP Material	Miles of Main	% of System
Unprotected Steel	139	4%
Bare/Unprotected Steel	158	5%
Cast Iron	632	20%
Ductile Iron	13	0.4%
Total LPP	942	29.4%

Further, the Company also has a large number of leak-prone services –approximately 45,000 steel services in use in the Company's system that are not cathodically protected. This represents approximately 23% of all services in the system. Of those 45,000 unprotected steel services, approximately 38,000 are also bare (uncoated) steel which represents approximately 19% of all services in the distribution system. Additionally, there are a negligible amount of copper and cast iron services remaining.

Q. WHAT HAS THE HISTORICAL TREND BEEN IN REDUCING THIS INVENTORY OF LEAK-PRONE PIPE?

A. Over the past 5 years, the quantity of leak-prone main in the system has declined steadily at a pace of about 49 miles per year (on average). This decline represents a year-over-year change of approximately -4.6% per year over the same period. The Company estimates that, at the current 65-mile rate of abandonment, the leak-prone main and associated leak prone services in the system will be replaced in 14 years (2036).

Q. WHY IS IT IMPORTANT TO EVALUATE LEAK TRENDS FOR A GAS UTILITY SUCH AS RIE?

A. Leak reduction is a key indicator that a replacement program is effectively removing the riskiest, most leak-prone aging infrastructure—which, in turn, increases the safety of the gas service being provided to the gas utility's customers and reduces the risk of a gas incident.

Q. HOW DID YOU CONDUCT YOUR ANALYSIS OF THE COMPANY'S LEAK PERFORMANCE?

A. I performed a review of the most recent infrastructure metrics that the Company is required to report annually to the Pipeline and Hazardous Materials Safety Administration ("PHMSA") as well as the similar metrics supplied in the System Integrity Report ("SIR") as part of this proceeding. I assessed the following metrics in regard to the Company's distribution pipeline assets: (i) the current and trending total leak rates; (ii) the total and trending hazardous leaks; and (iii) performed a cause analysis of leaks on the Company's system.

Q. WHAT WERE THE RESULTS OF YOUR ANALYSIS OF THE CURRENT AND TRENDING LEAK RATES ON THE COMPANY'S SYSTEM?

A. Total leak repairs ("leaks") in the most recent year occurred approximately 55% on main and approximately on 45% on services according to the SIR.[2] This is the most recent distribution in what appears to be a trend of decreasing main leak rates and relatively stagnant service leak rates.

[2] *See* SIR, pgs. 24 and 45.

On the scale of a 5-year trend,[3] total leaks on the distribution system have declined. However, in the last reporting year, total leaks repaired rose by approximately 21% according to the SIR (+245 leaks).[4] This increase was driven heavily by leaks on services. The largest increase in leaks in the last reporting year by cause were leaks from corrosion – mostly on services, but there was also an increase in corrosion leaks on mains. Overall, hazardous leaks due to corrosion and equipment failure have dropped over the same 5-year period by significant percentages (although did rise in 2021 as with total leaks). Regardless of change in volume year over year, leaks caused by corrosion and cast iron joint failures continue to be the leading cause by a large margin.

This recent increase is supported by the findings of the 2021 SIR[5] which concludes that there was an overall increase in the workable leak backlog (+21.3%), main leak rate (+6.6%), cast iron main break rate (+76%), steel main corrosion leak rate (+39.2%), and service leak rate (+72.3%).

These increases described above are concerning, especially the degree of increase with each and should be addressed by the Company to understand the reason(s) for the significant uptick in these rates. I continue to be concerned about the large number of aging leak prone services, a good portion of which are over 80-100 years old, that are the closest asset to customers and the general public and will continue to pose significant risk until addressed.

[3] 2017-2021.

[4] *See* SIR, pg. 15.

Q. WHAT WERE THE RESULTS OF YOUR TREND ANALYSIS REGARDNG HAZARDOUS LEAKS?

A. There is a significant increase in the number of hazardous leaks reported by the Company in 2021 after several years of decreasing hazardous leaks. As reported in the SIR, Grade 1/Type 1 hazardous leaks have increased to 581 which represents a 38% increase over the year prior.[6]

Corrosion continues to be the leading cause of hazardous leaks, accounting for 45% of all hazardous leaks in the most recent year – more than double the next most common cause of hazardous leaks. This highlights how critical it is to remove LPP (and cast iron in particular) from the system.

Q. DID YOU ASSESS ANY OTHER LEAK CRITERIA IN YOUR ANALYSIS? IF SO, WHAT WERE THE RESULTS OF THOSE ANALYSES?

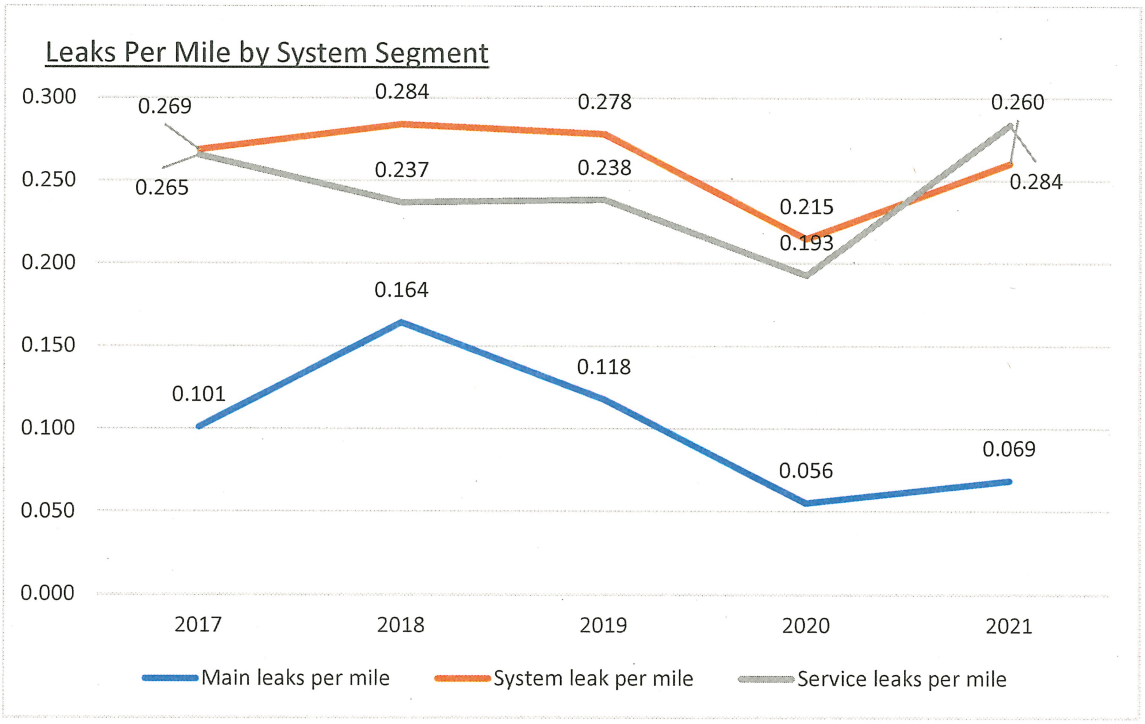
A. Yes, I analyzed the year-end leak inventory and also leaks on a per-mile basis to account for the changing system size over time. Regarding the year-end leak inventory, this has recently increased by approximately 21% in the most recent reporting year to 188 leaks held for repair.[7] This may be due to a larger number of small leaks being discovered due to the leak survey cycle or other factors related to the general increase in leaks. There are an additional 2,917 leaks in the Company's Grade 3 leak backlog which is also an

[6] *See* SIR, pg. 15.

[7] *See* SIR, pg. 16.

increase from the previous year and continues the Company's trend of increasing its Grade 3/Type 3 backlog since 2018.[8]

Regarding the leaks-per-mile metric, this metric takes the total leaks repaired on the system in a year and divides it by the total miles of piping in the system[9] to achieve a ratio which was then tracked over a 5-year period to show the trend. As the figure below demonstrates, total system leaks per mile have seen a slight uptick in the most recent reporting year.



[8] *See* SIR, pg. 17.

[9] Miles of piping was calculated using the formula: [miles of main + ((number of services * average length) /5280)].

This uptick follows the leaks per mile of services closely and not the main leaks per mile. This indicates that leaks on services are a majority driver of total leak metrics. This is supported by total leak numbers as discussed above.

Q. HOW CAN ONE DETERMINE THE EFFICACY OF A UTILITY'S REPLACEMENT PROGRAM AT REDUCING LEAKS?

A. The efficacy of a program can by estimated by comparing the rates of removal of the targets of the replacement program (*i.e.,* cast iron or bare steel pipe) to the rates of leaks that occur on the system.

Q. WHAT ARE THESE RATES FOR THE COMPANY, AND WHAT IS THE RESULT OF YOUR ANALYSIS OF THESE RATES?

A. Looking at the last 5 years, the Company has removed LPP such as bare steel, unprotected steel, cast iron, copper, and ductile iron from its system. This has resulted in the removal rates shown in the table below[10]:

Year	LPP Main (miles)	LPP Main (%)	YoY Change (#)	YoY Change (%)
2017	1140	36%	-46	-4%
2018	1100	34%	-40	-4%
2019	1052	33%	-48	-4%
2020	989	31%	-63	-6%
2021	942	29%	-47	-5%
Avg.	*1045*	*33%*	*-49*	*-4.6%*

[10] The PHMSA reports and System Integrity Report align on these metrics.

Comparably, leak rates have seen similar declines as shown in the tables below. The two tables are provided as there are minor discrepancies in historic reports:

PHMSA			
Year	Total Leaks - All Causes	YoY % Change	YoY # Change
2017	1526	-	-
2018	1615	6%	89
2019	1522	-6%	-93
2020	1182	-22%	-340
2021	1435	21%	253
5-year	*-91*	*-6.0%*	

System Integrity Report			
Year	Total Leaks - All Causes	YoY % Change	YoY # Change
2017	1523	-	-
2018	1466	-4%	-57
2019	1522	4%	56
2020	1181	-22%	-341
2021	1426	21%	245
5-year	*-97*	*-6.4%*	

From this data, one can compare the two sets of data which appear to be somewhat similar in this case. While there is a steady decline in leak-prone pipe, year-over-year change in leak rates appears to be inconsistent and fluctuating. However, when looking at a 5-year trend, there is a 17.3% reduction in leak-prone pipe and over the same period, a 6.0% reduction in leaks according to PHMSA and a 6.4% reduction in leaks according to the SIR.

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THE EFFECTIVENESS OF THE REPLACMENT PROGRAM TO REDUCE LEAKS.

A. Comparing the changes in LPP and leaks indicates there is somewhat of an improvement in leaks resulting from replacement efforts across the 5-year period.

This past year's increases in leaks – and in particular, leaks caused by corrosion, however, is concerning. If there is not a reversal of this trend in future years, then there

may be further a concern about the efficacy of the program to select and remove the riskiest, most leak-prone pipe in a way that mitigates the risk of the system.

Q. WHAT IS LOST AND UNACCOUNTED FOR GAS?

A. Lost gas (LAUF) is, essentially, the difference between gas produced/purchased and gas delivered to customers (with appropriate adjustments). The remnant gas that cannot be accounted for is reported as a percentage of total gas produced/purchased and is generally an indicator of effective leak management, accurate measuring, and general management of the gas in the system.

Q. DESCRIBE THE COMPANY'S HISTORICAL AND CURRENT LOST GAS PERCENTAGES AND YOUR INTERPRETATION OF THEM.

A. Over the past 5 years, the Company has seen a somewhat high and rising LAUF percentage that has increase from 2.2% in 2017 up to 2.7% in 2021 with a high in 2020 of 2.9%.[11] This exceeds the industry average of 2.19% for 2021[12] and the typical target LAUF percentage of 1% that is used industrywide as a best practice.

It is important to note that the Company estimates the volume of gas lost to leaks and considers this gas lost to leaks to be accounted for and therefore it does not include it in its reported LAUF percentage. This means that the 2.7% lost and unaccounted for percentage in 2021 was in addition to gas lost due to leaks. The Company estimates that

[11] *See* SIR, pg. 52.

[12] 2021 PHMSA Distribution Report.

it lost approximately 280,239 Mcf of its gas to leaks[13] in 2021. The total reported volume of lost and unaccounted for gas could be another 0.25%-0.5% (or more) higher if it were to include gas lost to leaks.

Many other utilities do include gas lost to leaks in their LAUF. The Company's lost gas percentage, then, may be higher than it should be when benchmarked against the industry average.

Q. HOW CAN LEAKS BE USED TO CALCULATE METHANE EMISSIONS?

A. There is a direct relationship between leaks and direct methane emissions. While the size and duration of a methane leak does vary, an average can be used to estimate the amount of methane emission the Company produces in a given year.

Q. DOES THE COMPANY ESTIMATE EMISSIONS?

A. In response to discovery, the Company provided its estimates of emissions per year as shown in the table below.[14] These estimates were calculated using the EPA's guidance provided in 40 CFR Part 98 Subpart W.

[13] *See* Company response to Division 1-4.

[14] *See* Company response to Division 1-2 (a).

Year	Emissions (Mcf)	Change (Mcf)	Change (%)
2012	373,157	-	-
2013	360,764	-12,393	-3.3%
2014	349,053	-11,711	-3.2%
2015	334,078	-14,975	-4.3%
2016	323,068	-11,010	-3.3%
2017	312,314	-10,754	-3.3%
2018	302,482	-9,832	-3.1%
2019	302,734	252	0.1%
2020	291,105	-11,629	-3.8%
2021	280,239	-10,866	-3.7%
2022[15]	269,421	-10,818	-3.5%
2023[16]	248,261	-17697	-6.7%
2024	228,892	-19369	-7.8%

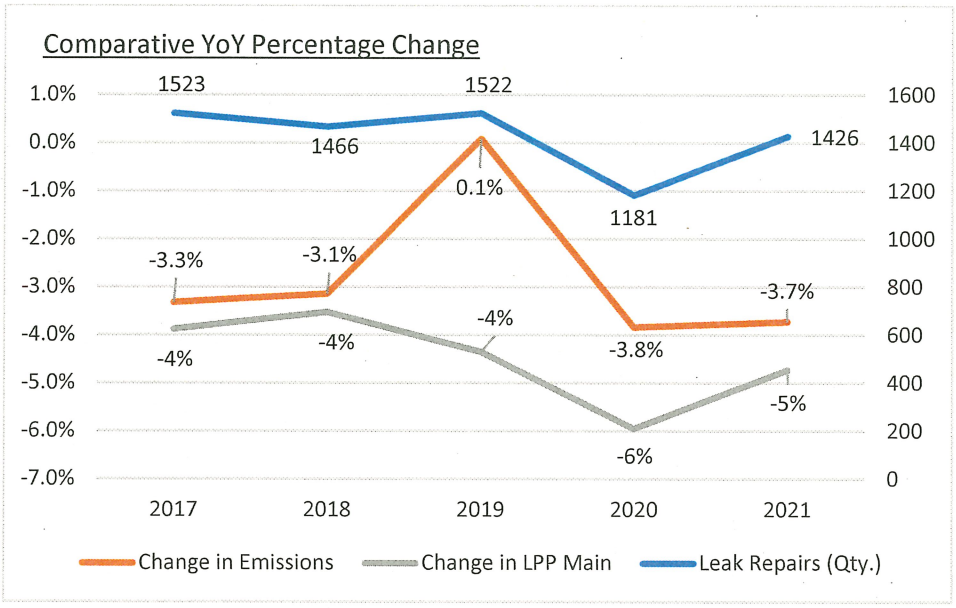
Q. WHAT IS YOUR ANALYSIS OF THE COMPANY'S METHANE EMISSIONS DATA?

A. To understand the relationship between leaks, methane emissions, and leak-prone pipe, I plotted the change in emissions and LPP main expressed as a percentage over the last 5 years as well as total leaks.[17] The figure demonstrates there is a correlation between leak-prone pipe removal, total leaks and emissions reductions.

[15] 2022 data projected using the average of the last 5 years of non-anomalous historical data.

[16] 2023 and 2024 are projections made by the Company in response to Division 1-2 (c) & (d).

[17] While the total leak repairs differ between the SIR and PHMSA, the trend line similar in profile. This figure contains total leak repairs from the SIR.



Q. WHAT DO YOU CONCLUDE FROM YOUR ANALYSIS?

A. Given the relationship between methane emission reduction and the removal of LPP, I conclude the Company should continue to make investments in removing LPP as part of its FY 2024 Gas ISR Plan and future gas ISR programs.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.