STATE OF ILLINOIS
ILLINOIS COMMERCE COMMISSION

The Peoples Gas Light and Coke Company	)	26-0065
Proposed general increase in rates and revisions to service classifications, riders and terms and conditions of service. (Tariffs filed January 5, 2026)	)	
	)	(cons.)
North Shore Gas Company	)	26-0066
Proposed general increase in rates and revisions to service classifications, riders and terms and conditions of service. (Tariffs filed January 5, 2026)	)	

REBUTTAL TESTIMONY OF JOE VON FISCHER CORRECTED AND SUPPLEMENTAL

ON BEHALF OF

ENVIRONMENTAL DEFENSE FUND

July 10, 2026

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I. Background and Exhibits

Q: Please list the exhibits you are sponsoring with this rebuttal testimony.

A: I am sponsoring the following documents:

- EDF Exhibit 2.01: PGL Data Request Response EDF-PGL 1.04_Attach01.
- EDF Exhibit 2.02: PGL Data Request Response EDF-PGL 1.04_Attach02.
- EDF Exhibit 2.03: Data Exhibits 1 through 8.
- EDF Exhibit 2.04: Peoples Gas Light and Coke Company System Modernization Program, Annual Report on Pilot Program for Incorporation of Advanced Leak Detection and Quantification Technology into System Modernization Program (Feb. 1, 2021 (Public Version) (filed in ICC Dkt. No. 16-0376).
- EDF Exhibit 2.05: Selected PGL Data Request Responses
- EDF Exhibit 2.06: Recommended Annual Data Reporting Specification

II. Structure of This Document

Q: How is your rebuttal testimony organized?

A: I present my testimony in the following sections:

- Summary of testimony
- Results of analysis of leak and asset data
- Synthesis of PGL's stated use of AMLD
- PGL's lack of transparency about data and PRP prioritization
- Rebuttal to NSG-PGL testimony
- My recommendations and conclusions

III. Summary of Testimony

Q: Please summarize your rebuttal testimony.

A: First, PGL has a significant inventory of leak-prone pipe (LPP), which is the focus of their pipeline retirement project (PRP). For legacy reasons, this LPP is disproportionately present in neighborhoods with greater percent people of color (%POC), creating a structural inequity with environmental justice (EJ) implications. Although the greater abundance of LPP has been recognized in PGL testimony, my analysis reveals several concerning EJ patterns that, to my knowledge, have not been identified previously. When comparing neighborhoods with higher %POC to those with lower %POC, the higher %POC neighborhoods experience:

- 30% higher per capita abundance of LPP
- 40% more leaks per capita
- 43% more leaks per mile of main.
- 79% more leaks per mile of LPP

This last result is perhaps the most concerning: there are nearly twice as many leaks per mile of LPP in neighborhoods with higher %POC. Although a complete pipeline retirement should eventually eliminate this discrepancy, there remains a current inequity that PGL has a responsibility to address in the PRP.

Second, PGL has presented an ambiguous case for its use of Advanced Methane Leak Detection (AMLD) technology to help characterize its system performance. AMLD is a powerful tool for finding natural gas leaks and estimating their size, and ratepayers are paying for its deployment. There is a responsibility here for PGL to make better use of this program to deliver the full value of AMLD to customers who are being asked to pay for it.

Third, the current level of reporting about system performance, maintenance, and decision-making methods for the PRP are inadequate. Given the system's structural inequities, this lack of transparency prevents stakeholders from determining whether the system is being managed effectively. Customers also deserve access to this information so they can understand what the data reveal. Compounding these issues, there is significant erosion in the federally mandated reporting structures (e.g., EPA GHG reporting) that PGL points to as the regulatory compulsion for their current reporting. Enhanced reporting required by the ICC would maintain transparency despite that erosion and would be consistent with Illinois policy.

Q: What are your recommendations?

A: In light of these factors, I make six recommendations to the ICC.

First, PGL should generate a published and fully transparent prioritization algorithm[1] that combines pipeline material (i.e., leak-prone miles), pipeline performance (recently-measured leak frequency per mile of LPP with emphasis on emission rates), and

[1] In particular, I am aware of the need for transparency for algorithms, as the Commission determined at page 159 of its Order in ICC Docket 24-0081 (an investigation into PGL's System Modernization Program, which was the predecessor to PGL's PRP) (Feb. 20, 2025): "Closed proprietary analytical processes deny the Commission and intervening parties the benefits of full examinations and proposals based on such analyses. Equally critical, restricted access to significant portions of a proprietary analysis undermines the credibility, weight, and usefulness of the conclusions. The Commission has experience with the use of proprietary information and has effective protective mechanisms in place. These mechanisms are accepted by parties and have been successful in protecting sensitive information, while enabling full examination of the proprietary information. The Commission expects parties using proprietary tools in Commission proceedings to utilize those protective mechanisms."

an EJ burden metric, which is consistent with Illinois' EJ policy directives and the ICC's authority to weigh equity.

Second, PGL should establish measurable, chronological targets for pipeline replacements/retirements and leak reductions that reduce the inequitable EJ burdens so the ICC can audit progress.

Third, PGL should pair replacement/retirement with more frequent AMLD leak surveying in the EJ neighborhoods. This is an immediate, lower-cost equity step that can reduce the odor-call burden on EJ communities.

Fourth, PGL should annually release comprehensive and geographically specific data on its pipeline leaks and its pipeline replacement/retirement activities.

Fifth, the ICC should conduct annual analyses of the reported data so that any deterioration in PGL performance can be caught and corrected.

Finally, I acknowledge NSG-PGL's rebuttal that currently-existing statutory provisions for alternative ratemaking treatment may not be sufficient to support a framework that aligns gas distribution utility financial interests with decarbonization efforts; I therefore recommend that stakeholders investigate what recommendations might be made to the Illinois General Assembly to establish a framework so that gas distribution utility financial incentives are aligned with the companies' compliance with state GHG emissions goals. Without an incentive structure, compliance with GHG emissions goals is at risk of non-achievement. In addition to incentivizing utility actions consistent with the State's climate goals, a consistent regulatory framework at the state level would insulate the state's climate goals from policy swings at the federal level, and it could include inducements not available or achievable at the federal level. An ideal legal framework would define the emissions quantification methods and scope, which would ideally derive strongly from direct measurements of system performance and less on standard emissions factors. Several financial structures should be considered, particularly the use of capital expenditures to support methane emissions quantification programs and for encouraging the Company to be more data-driven in its operations.

IV. Results of Analysis of Leak and Asset Data

Q: Please provide an overview of your analysis of the leak and asset data, including any caveats.

A: I conducted an analysis of the PGL pipeline infrastructure and leaks to identify if customers are experiencing an equitable system. This analysis is motivated, in part, by the adage "you can't manage what you don't measure". In previous testimony, PGL indicated that they recognized that there is more leak-prone pipe (LPP) in neighborhoods with a greater percent people of color (%POC), yet they asserted without a statistical analysis that there is not a concern about equity. This response suggested to me that environmental justice concerns could be more rigorously evaluated within PGL, and that public disclosure of asset and leak data could encourage more equitable management of the system.

The analysis I present here is not comprehensive. It was conducted within the time frame allowed by the procedural schedule in this rate case, and I therefore recommend it should be developed and vetted more fully by NSG-PGL, EDF and other stakeholders in the near future. I also welcome feedback or corrections accordingly. In my analysis, I used simple but robust statistical models to examine the relationship between the distribution system features and EJ predictors. A rigorous and scientifically statistical analysis would take months to develop, reconsider, stress-test, and then characterize in written text. The timescale of this proceeding did not permit that, and so I present here results that I would describe as preliminary for academic purposes, but which are carefully reasoned and based on my experience, are very likely to reflect true patterns in the data that I was given. I believe the weakest part of the data analysis lies in the magnitude of statistical significance that is reported. This is a large dataset, and so there is a lot of statistical "power" which can lead to inflated p-values of significance. Also, the data are spatial and my model did not correct for spatial autocorrelations. That said, it is my intuition based on years of study and practice in this field that even after correcting for things like spatial dependence, most of the concerning patterns that I present here would remain statistically significant.

My analysis focuses on the abundance of LPP and belowground leaks and how variation in those features are predicted by EJ metrics. Based on my previous work, the EJ metrics that I selected include percent people of color, percent low-income, percent of residents that are renters, age of the housing, percent of residents with limited English, and the population density. The pipeline data were spatially aggregated into parcels known as "census block groups". These spatial units were developed by the US Census Bureau and are designed to contain relatively homogeneous neighborhood groups of around 1500 people (range 600 to 3000), and between 240-1200 housing units. The block group is the finest spatial unit that contains the needed EJ data, which is collected by the American Community Survey. So the individual data points for analysis came down to features of each of these block groups. Each block group would have certain EJ values associated with it, as well as aggregated information about the pipeline and leaks. There were more than a thousand block groups in the analysis.

I conducted the analyses in the open-source statistical software R. To enable others to replicate my work, I have included the R markdown files that I used in my workpapers, as well as pdf versions of those files for easier viewing. I tried to make the statistical results files readable, and they contain even more detail than my testimony does.

Q: What documents did PGL provide that you reviewed for this analysis?

A: This analysis is derived from two discovery documents provided by PGL. EDF Exhibit 2.01 (EDF 1.01 Attach01) contains the leak information, and EDF Exhibit 2.02 (EDF 1.04 Attach02) contains the pipeline location information. These files are included among my exhibits.

Q: What other data sources did you rely on?

A: Beyond the leak records and the distribution-main map produced in discovery, I relied on several publicly available outside data sources.

I obtained the demographic characteristics of each neighborhood from the U.S. Census Bureau's American Community Survey.[2] These block-group estimates (e.g., share of residents who are people of color and the share who are low-income) are the neighborhood characteristics I tested in the environmental-justice analysis.

[2] American Community Survey, U.S. Census Bureau. https://www.census.gov/programs-surveys/acs

I used the Census Bureau's TIGER/Line boundary files for the geography of the neighborhoods.[3] I assigned each leak to the census block group that contains it, and I used the municipal boundaries to define the service area I analyzed.

I converted the leak street addresses into map coordinates using two geocoding services: the U.S. Census Bureau geocoder[4] for most addresses, and the Esri ArcGIS geocoder[5] for those the Census service could not resolve.

I drew the City of Chicago's community-area boundaries from the City's open data portal.[6] The community area is the coarse spatial unit I used to test whether the findings depend on the scale of analysis.

Q: How did you clean and integrate the data?

A: I prepared the data in two steps, and I documented each step in its own exhibit so that another analyst can follow and reproduce the work. Each of these exhibits shows the actual computer code I ran together with its output.

The first step was cleaning the leak records the Companies produced in discovery, which I describe in EDF Exhibit 2.03 Data Exhibit 2. I standardized the field names and category labels, parsed the leak dates from the three different formats in which they were stored, corrected stylistic differences in data-entry (e.g., capitalization vs lower case), and removed one duplicate record. I then classified each belowground leak by its pipe material

[3] TIGER/Line Shapefiles, U.S. Census Bureau. https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-line-file.html
[4] Census Geocoder, U.S. Census Bureau. https://geocoding.geo.census.gov/geocoder/
[5] ArcGIS World Geocoding Service, Esri. https://developers.arcgis.com/rest/geocode/
[6] Boundaries – Community Areas, Chicago Data Portal. https://data.cityofchicago.org/Facilities-Geographic-Boundaries/Boundaries-Community-Areas/igwz-8jzy

and limited the analysis to leaks caused by the condition of the pipe, setting aside leaks from outside causes such as excavation damage. The meaning of every field I used, and the reason for each cleaning and exclusion rule, is set out in the data dictionary, which is EDF Exhibit 2.03 Data Exhibit 1.

The second step was integrating the cleaned leak records with the outside data to build a single analysis dataset, which I describe in EDF Exhibit 2.03 Data Exhibit 3. I geocoded each leak address to a map coordinate and assigned it to the census block group and municipality that contain it. I attached American Community Survey demographic characteristics to each block group, and I defined the analysis area as the block groups in the neighborhoods the Companies actually serve. I also extracted the miles of distribution main, by pipe material, from the Company's gas-main map, and I georeferenced that map so that I could extract the embedded data on pipe mileage within each block group.

The result is one block-group dataset that brings together leak counts, repair and discovery information, distribution-main mileage, and neighborhood demographics. EDF Exhibit 2.03 Data Exhibit 4 summarizes that dataset, and EDF Exhibit 2.03 Data Exhibit 8 records the software versions and settings I used.

Q: What do the summary statistics show?

A: The data the Companies produced are of two kinds: a record of individual gas leaks, and a map of the buried distribution mains. EDF Exhibit 2.03 Data Exhibit 4 summarizes both, and EDF Exhibit 2.03 Data Exhibit 5 checks my figures against the Companies' own. I describe the key features below.

The Companies produced three sets of leak records: belowground leaks on the buried distribution system, aboveground leaks at customers' meters and risers, and a backlog of currently open leaks. The aboveground leaks are by far the most numerous, and about 69 percent of them are indoor. Table 1 shows the leaks I carried into the analysis, by type and by utility, after I removed leaks from outside causes such as excavation damage.

Table 1. Leak records by type and utility.

Leak type	**Peoples Gas**	**North Shore Gas**	**Total**
Belowground (buried pipe)	1,389	384	1,773
Aboveground (meter and riser)	23,519	2,947	26,466
Open backlog	1,890	5	1,895

Because aboveground leaks occur at customer premises rather than on the buried infrastructure that is the focus of the Companies' PRP, I focus the rest of my analysis on the belowground leaks.

Of the 1,773 belowground leaks, 924 are on distribution mains, 746 are on service lines, and 103 are on valves. Table 2 groups the leaks that are on identifiable pipe by material. Half of these leaks are on leak-prone pipe, and among the leaks on distribution mains, 83 percent are on leak-prone pipe. This is the cast and ductile iron pipe that the Companies are required to retire.

Table 2. Belowground leaks by pipe material.

Pipe material	Leaks
Leak-prone metal (cast iron, ductile iron, bare steel, copper)	830
Leak-prone plastic (clear, cellulose butyrate)	16
Modern or protected steel	444
Non-leak-prone plastic (high- and medium-density polyethylene)	387

The Companies grade each leak by severity. Grade 1 leaks are the most hazardous and call for immediate repair, Grade 3 leaks are the least hazardous, and the Grade 2 categories fall in between and are scheduled for later repair. Table 3 shows the belowground analysis leaks by grade. About one third are Grade 1, just over half are Grade 2S, and the Grade 2 and Grade 3 leaks make up the remainder.

Table 3. Belowground leaks by severity grade.

Severity grade	Leaks	Percent
Grade 1	589	33.2
Grade 2	115	6.5
Grade 2S	982	55.4
Grade 3	87	4.9

The grade determines how quickly a leak is repaired. Table 4 reports repair time in days for each grade. The data reveal that PGL has an excellent rate of repairs for its most hazardous leaks. Grade 1 leaks are repaired at once: their median repair time is zero days, and ninety percent are closed within two days. The lower-severity leaks stay open much longer, with median repair times of three to five weeks and a long upper tail, so that the slowest tenth stay open for about a year or more. These extended repair times are typical in the industry, and consistent with regulatory requirements that I am aware of. Repair times are strongly right-skewed, so the mean sits well above the median and the value one standard deviation below the mean falls below zero; the 10th and 90th percentiles describe the spread within the observed range. Because the most hazardous leaks are repaired immediately everywhere, the environmental-justice question about repair time concerns the non-urgent leaks.

Table 4. Belowground repair time in days, by severity grade. The -1 SD and +1 SD columns are the mean minus and plus one standard deviation, near the 16th and 84th percentiles for a normal distribution. Table 4 includes only leaks with valid open and close dates.

Grade	**Leaks**	**Mean**	**Median**	**-1 SD**	**+1 SD**	**10th pctile**	**90th pctile**
Grade 1	561	4	0	-15	23	0	2
Grade 2	114	110	23	-75	296	1	359
Grade 2S	980	167	36	-60	394	2	554
Grade 3	85	168	35	-57	392	2	560

The records also note how each leak was found. Table 5 groups the belowground leaks by discovery method. A majority, about 61 percent, were reported by customers rather than found by the Companies' own leak surveys, which located 24 percent. In my experience, these fractions of leak discovery by customer odor call are typical for the industry, but I will note that this places the majority of the burden of leak discovery on the customer. How a leak is found matters for environmental justice, because customers may differ, for a variety of reasons, in their ability and likelihood of noticing and calling in a gas odor. I return to this later in my testimony when I address leak-level analysis.

Table 5. Belowground leaks by discovery method.

Discovery method	**Leaks**	**Percent**
Customer report	1,072	60.5%
Leak survey	425	24.0%
Shop	160	9.0%
Not recorded	116	6.5%

The second kind of data is the gas-main map. From it I measured about 4,700 miles of distribution main in the Peoples Gas service area, of which about 1,100 miles are leak-prone cast and ductile iron. Table 6 gives the breakdown by material. In EDF Exhibit 2.03 Data Exhibit 5 I show that these figures match the Company's own filed figures within a few percent, which confirms that I correctly extracted data from the pdf map.

Table 6. Distribution-main miles by material (Peoples Gas, City of Chicago).

Material class	**Miles**
Cast and ductile iron (leak-prone)	1,132
Low-pressure plastic and steel	393
Medium-pressure plastic and steel	3,137
All mains	4,662

I carry out the environmental-justice analysis at the level of the census block group, which is a small neighborhood unit, using demographic characteristics from the American Community Survey. The analysis covers the 3,038 block groups in the neighborhoods the Companies serve.

One feature of the data affects the sample sizes in the analyses that follow. I have leak records and demographics for the block groups of both Peoples Gas and North Shore Gas, but I have distribution-main mileage only for Peoples Gas, because the gas-main map that the Companies produced covers the City of Chicago alone. As Table 7 shows, my analyses of leaks per resident use all 3,038 block groups, while my analyses of leaks per mile of pipe are limited to the 1,860 block groups in the Peoples Gas territory that have mileage data.

Table 7. Block groups in the analysis, by utility and gas-main mileage coverage.

Utility	Block groups	With gas-main mileage
Peoples Gas	1,981	1,860
North Shore Gas	1,057	0
Total	3,038	1,860

Finally, I characterize the neighborhoods themselves using the demographic predictors from the American Community Survey that are used in the environmental-justice models. In Table 8 displays the statistical range of values for each predictor across the 3,038 modeled block groups: the mean, the median, the values one standard deviation below and above the mean, and the 10th and 90th percentiles. For a normally distributed predictor the -1 SD and +1 SD values fall near the 16th and 84th percentiles. Several predictors are right-skewed, for example percent limited-English and population density, so their -1 SD value can lie below the observed range, and I show the 10th and 90th percentiles for comparison.

Table 8. Environmental justice predictors across the modeled block groups. The -1 SD and +1 SD columns are the mean minus and plus one standard deviation, near the 16th and 84th percentiles for a normal distribution.

Predictor	**Mean**	**Median**	**-1 SD**	**+1 SD**	**10th pctile**	**90th pctile**
% people of color	60.3	61.1	29.2	91.4	17.4	99.7
% low-income	29.6	25.5	8.6	50.6	5.8	60.9
% renter	41.4	41.7	14.7	68.2	4.6	77.4
Housing age (years)	66	68	47	84	37	84
% limited-English	7.2	2.9	-3.0	17.4	0.0	21.3
Population density, per sq mi	15,431	10,895	-1,329	32,192	2,383	31,493

In the environmental-justice models, I do not use these percentages directly. I standardize each predictor by subtracting its mean and dividing by its standard deviation, so that every block group is expressed in standard-deviation units relative to the Chicago metropolitan area as a whole. A block group at +1 SD in percent people of color is a neighborhood with substantially more residents of color than the regional average, and one at -1 SD has substantially fewer. When I describe results for communities that are more or less people of color, or more or less low-income, I mean the +1 SD and -1 SD values in Table 8. Standardizing puts every predictor on a common scale and makes each comparison relative to the region rather than to an absolute percentage, so the raw percentages themselves do not enter the models.

Q: What did your environmental justice analysis reveal?

A: In brief, my analysis asked whether leak burden is associated with neighborhood environmental-justice indicators for the buried distribution system in the Peoples Gas and

North Shore Gas service areas. I want to be clear at the outset about the shape of the result because it is what gives the finding its weight. I ran a series of separate comparisons, and the large majority of them came back "null", with no association between the EJ predictors and the system metrics. However, a specific and coherent subset did not come back null. Of the five environmental-justice indicators I tested, only one, the percent people of color, is consistently associated with more leaks. The others, including income, are largely null. Throughout these analyses, I standardized each indicator relative to the metro area (z-score standardization), so a comparison of one standard deviation below the regional average against one standard deviation above it describes a neighborhood well below the regional average against one well above. For the share of residents of color, that is roughly 29 percent people of color compared with 91 percent. Population density is a control, not an environmental-justice indicator. I describe each step below.

I fit four multivariable models. Each one adjusts for all six z-scored indicators at the same time, so that each association is estimated holding the others constant. Thus, despite correlation among these EJ predictors, the model identifies how variation in the system leaks are uniquely related to each predictor. The first analysis asks whether residents of higher-indicator neighborhoods bear more belowground leaks per capita (both utilities, n=3,038). The second asks whether there are more leaks for a given length of distribution main (Peoples Gas, n=1,860). The third asks whether the leak-prone cast and ductile-iron main fails more often where it is present, which is a measure of pipe condition (n=1,306). The fourth asks whether more of a neighborhood's mains are leak-prone in the first place, which is a measure of pipe spatial distribution (n=1,860).

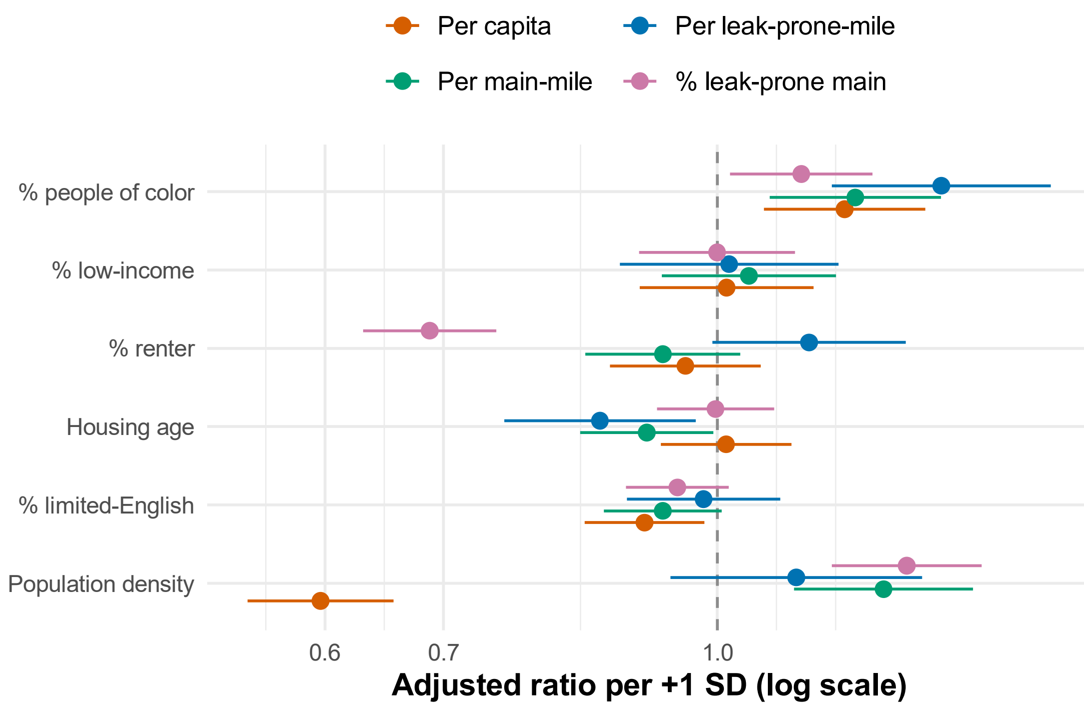

Figure 1: Adjusted association per +1 SD with 95 percent confidence intervals, by indicator and model. A value of 1 (dashed line) means no association. The share of residents of color is above 1 in all four models; the other indicators scatter around 1.

Across these four models there are five environmental-justice indicators, so twenty predictor-by-outcome cells (Figure 1). Most of them are null as is indicated when the adjusted ratio is not different from 1.0. Percent low-income is essentially null in all four (ratios of 1.00 to 1.04, none significant). Percent renter is null in three of the four, and the one value that reaches significance points the other way, toward less leak-prone main, not more: in the spatial distribution model the renter coefficient is 0.69, meaning neighborhoods with more renters have less leak-prone main, not more. Housing age is null in three of four, with its two significant values both below 1. Percent limited-English is null in three of four, and its one significant value is also below 1. So among these four indicators (% low-income, % renter, housing age, and % limited English), the few coefficients that reach significance are small and point toward fewer leaks, not more.

The share of residents of color is the exception. It is above 1 and statistically significant in all four models. I illustrate the magnitude of these effects in the bar graphs of Figure 2. In each bar chart I compare a neighborhood one standard deviation below the regional average to one standard deviation above it, a span of two standard deviations[7].

[7] The percent changes shown next to the arrow are equivalent to the per-standard-deviation ratios described above compounded twice. So for example, an adjusted ratio of 1.27 means a 27 percent increase per standard deviation, and this becomes about 62 percent difference across the span of -1SD to +1SD, because the effect multiplies rather than adds.

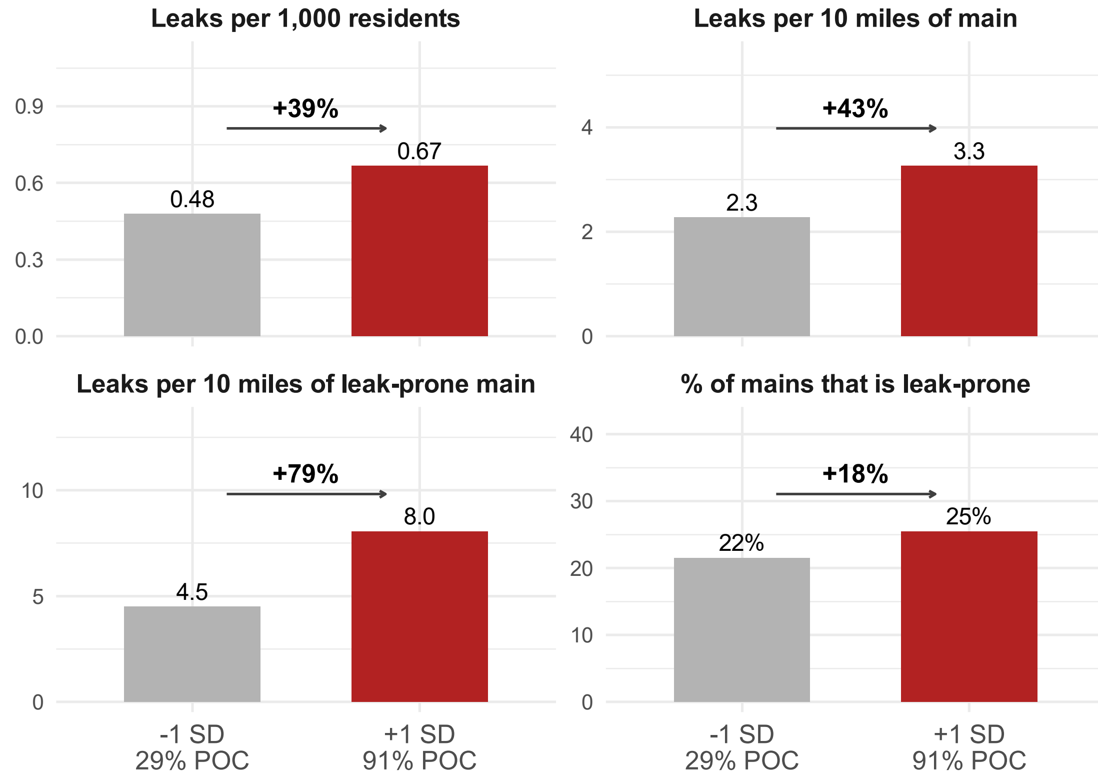

Figure 2: Predicted response at one standard deviation below versus above the mean share of residents of color, with the other indicators held at their means. The arrow gives the percent increase. As leaks per resident and per mile both rise, the leak-prone main is more abundant and leaks more often.

The association with the share of residents of color is highly coherent across the models. Adjusting for income, rental status, housing age, language, and density, neighborhoods with more residents of color have about 18 percent more belowground leaks per resident per standard deviation (rate ratio 1.18), and about 20 percent more leaks for a given length of main (1.20). In some ways, these results are consistent with PGL's acknowledgement that there are more leak-prone pipes where there are more people of color. My analysis shows that this larger share of the mains in these neighborhoods is leak-prone cast and ductile iron to begin with (odds ratio 1.12). But a surprising result also emerges: the leak-prone main that is present fails more often with higher percent people of color, and this is the strongest single association in the set (rate ratio 1.34 per mile of such main).

The remaining questions concern not how many leaks occur, but how they are found and how quickly they are fixed. These are leak-level questions, so I fit them to individual belowground leaks, with standard errors clustered on the block group, using the same adjusted indicator set.

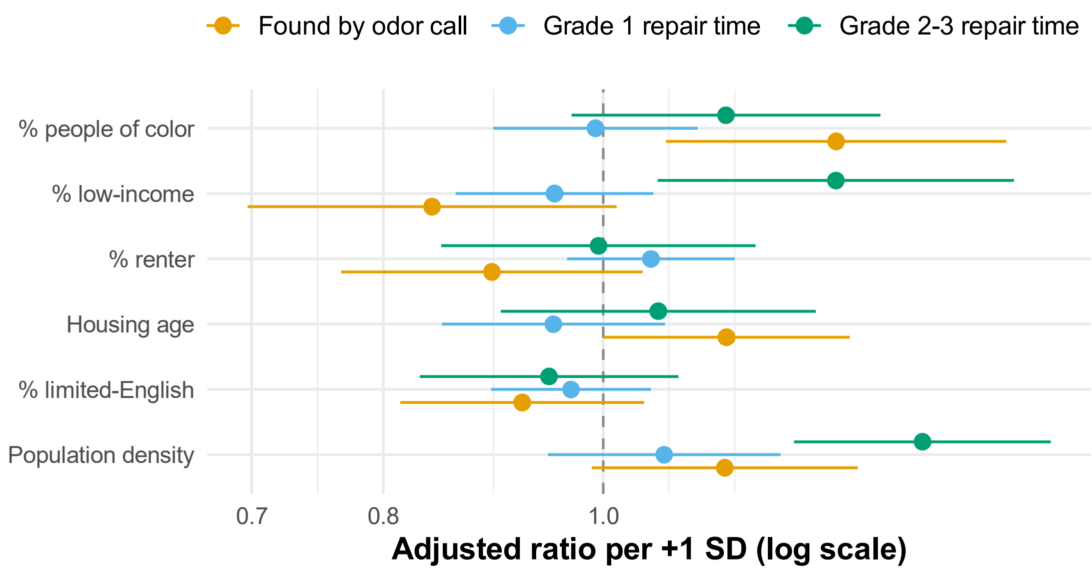

Figure 3: Adjusted association per +1 SD with 95 percent confidence intervals, clustered on the block group, for three leak-level outcomes. Odor discovery is an odds ratio; the repair models are repair time ratios. A value of 1 means no association.

Here again, most results show no association, but the strongest result is how leaks are found. In neighborhoods with a higher share of residents of color, a leak is more likely to be discovered by a customer odor call than by a proactive leak survey (odds ratio 1.27 per standard deviation). More reliance on a resident smelling gas and calling it in means relatively less proactive detection by the utility. No other indicator is significant for discovery except housing age, which is small.

Repair time gives a clean, commendable negative result. PGL is doing a great job assuring the most hazardous grade 1 leaks are repaired immediately everywhere, with a median of zero days, and no indicator is associated with any delay. For the less urgent grade 2 and grade 3 leaks, the one significant predictor is income, not race: repair takes about 27 percent longer per standard deviation in neighborhoods with more low-income residents. Income, which was not a significant predictor in every other model, surfaces here, on the timeline of non-urgent repairs. The race coefficient for these repairs is not significant.

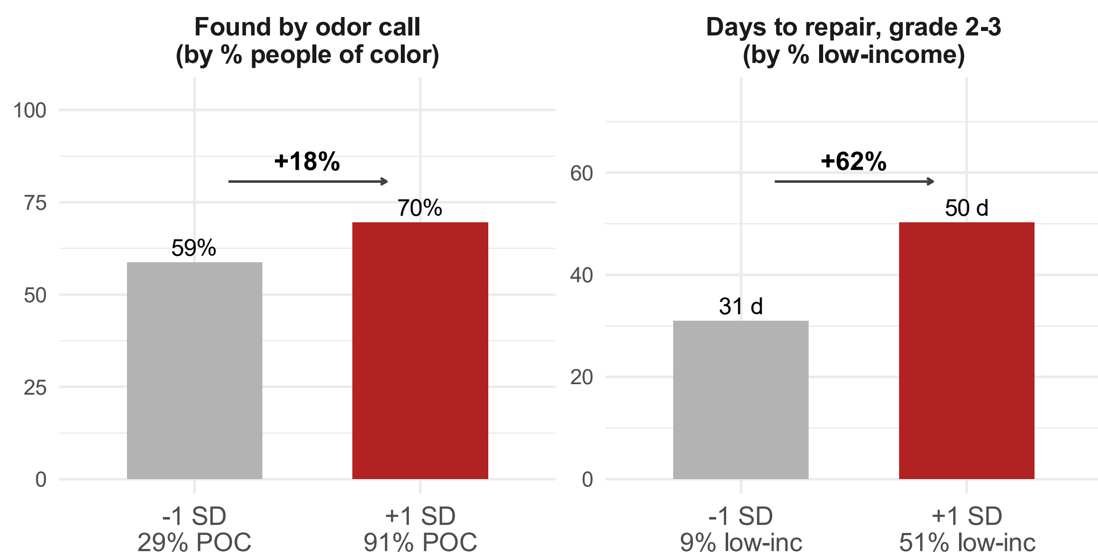

Figure 4: Left: probability a belowground leak is found by a customer odor call, by share of residents of color. Right: days to repair a grade 2-3 leak, by percent low-income. Each is the prediction at -1 SD versus +1 SD, with the other indicators at their means.

Q: What do these results indicate should be done in future analyses?

A: These are deliberately simple analyses, conducted within the discovery-and-rebuttal timeframe, and I offer them to show that specific patterns are present in the data, not as a complete accounting of them. A fuller analysis would account for the spatial dependence among neighboring areas, treat leak types and pipe materials jointly, and use the full set of demographic indicators, none of which a simple model attempts. A community cannot assess whether it is being treated fairly without access to the data that would allow the assessment. I therefore recommend that these leak data be released on a regular, annual basis, so that this work can be done thoroughly and independently, outside the time constraints of a single proceeding.

Q: How do these results compare with PGL's assertion that there is not an EJ pattern?

A: The Company concluded in its testimony that leak risk shows no environmental justice pattern in its system. In direct testimony, when asked whether connection to the remaining cast-iron and ductile-iron main under 36 inches is "correlated with household income," Eldringhoff and Dickson answered "No," and stated that a map of the percentage of residents in poverty "confirms that the location of high-risk CI/DI pipe is not correlated to household income" (NSG-PGL Ex. 3.0, at 23). I want to be precise about what that conclusion rests on. It rests on a visual reading of a single map drawn at the community-area scale. The Company presented no statistical test. A map read by eye can show that two things look unrelated, but it cannot establish that they are unrelated, because the absence of a correlation is a quantitative claim, and a quantitative claim requires a quantitative test. No map can return a p-value. The claim is therefore both unsupported, because no test was presented, and incorrect, because the test, once run, refutes it.

I ran the test the Company did not. EDF Exhibit 2.03 Data Exhibit 7 fits the relationship between belowground leak burden and neighborhood demographics directly, using the Company's own geocoded leak records, with belowground leaks per resident as the outcome. I fit the same model at three nested scales: the census block group, the census tract, and the community area, which is the scale of the Company's map. The result is that at every scale, including the Company's own community-area scale, both household income and the share of residents of color are significantly associated with leak burden.

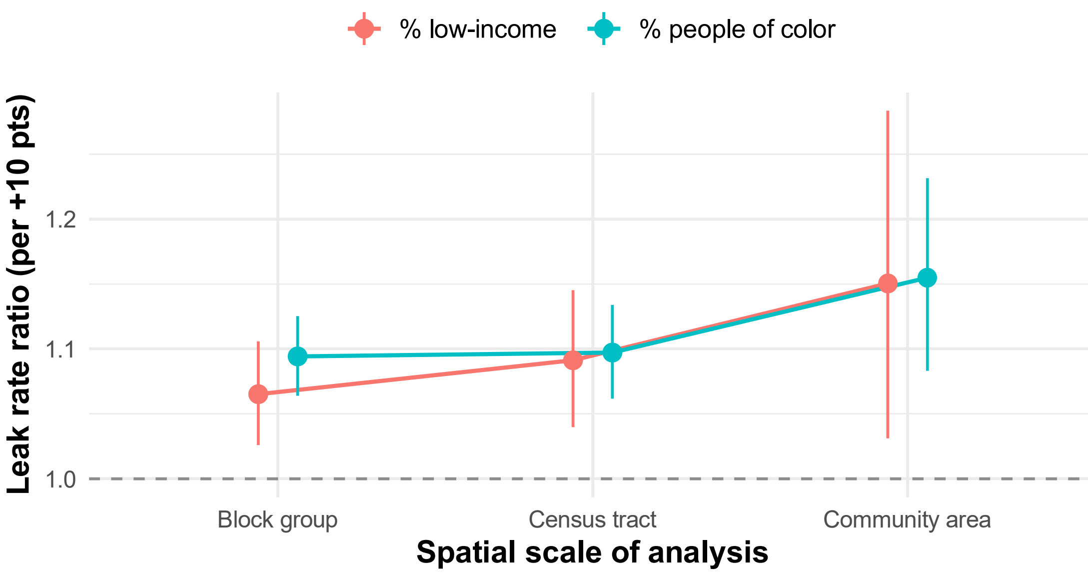

Figure 5: Estimated belowground leak rate ratio per +10 percentage points (95 percent confidence interval), by indicator and spatial scale. A ratio of 1 (dashed line) means no association. The estimate is about the same at every scale, including the community-area scale the Company used; the confidence interval widens at coarser scales because there are fewer data points.

In this simple analysis, one indicator at a time in the same fashion that was suggested in Company testimony; the rate ratio per ten-percentage-point increase is essentially constant across scales. For the share of residents of color, it is 1.09 at the block group (95 percent CI 1.06 to 1.13), 1.10 at the tract (1.06 to 1.13), and 1.15 at the community area (1.08 to 1.23, p<.001). For the low-income share it is 1.07 at the block group (1.03 to 1.11), 1.09 at the tract (1.04 to 1.15), and 1.15 at the community area (1.03

to 1.28, p=0.012). The community-area test is the direct answer to the Company's claim. Tested at the Company's own scale, the leak burden is significantly higher in lower-income neighborhoods. The "not correlated to income" conclusion is therefore incorrect when a statistical test is run.

There is a reasonable hypothesis for why the Company's map appeared to show no pattern, and it is the same concern I raised in my direct testimony: the community area is a large unit, and a single average for a large unit can hide variation inside of it. If a community area is internally mixed, painting it one color averages the rich and poor blocks together, and the relationship between income and leaks can be washed out before it ever reaches the map. In plain terms, a single community area can run from very low-income to very high-income blocks and reporting only its average discards that spread. I measured how much of this internal variation the community-area scale averages away.

Across the 77 Chicago community areas, 51 percent of the block-group variation in the low-income share, and 20 percent of the variation in the share of residents of color, lies within community areas rather than between them. The mean within-area range is 55 percentage points for income and 40 for race. Income is far more internally mixed than race, which is why the coarse scale weakens the income signal more than the race signal. The map below illustrates this directly for four adjacent South Side community areas; each painted its single average next to the much wider range of its own block groups.

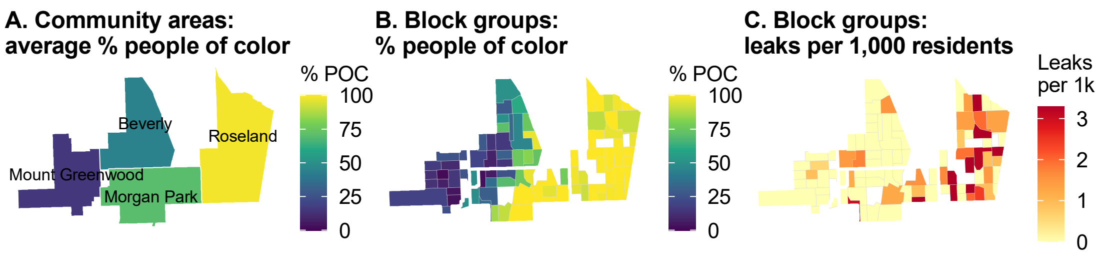

Figure 6: Four adjacent South Side community areas. Panel A paints each community area with its single population-weighted average; panels B and C show the block groups within. A community area that is one flat color in A spans much of the range in B, and its leak burden in C varies block to block.

So, scale-masking is a genuine concern, and it explains why a community-area map can understate the income gradient. It does not, however, rescue the Company's conclusion, because even at that coarse scale the income association remains statistically present ($p=0.012$), and the race association is strong at every scale.

I do not rest this conclusion on the smaller p-values at the finest scale. That precision partly reflects the larger number of units at the block-group scale and the fact that neighboring areas are not statistically independent of one another. What I rely on instead is the consistency of the estimate. The simple rate ratio is about the same whether I analyze block groups, tracts, or community areas, which is the signature of a real relationship rather than an artifact of one particular geography.

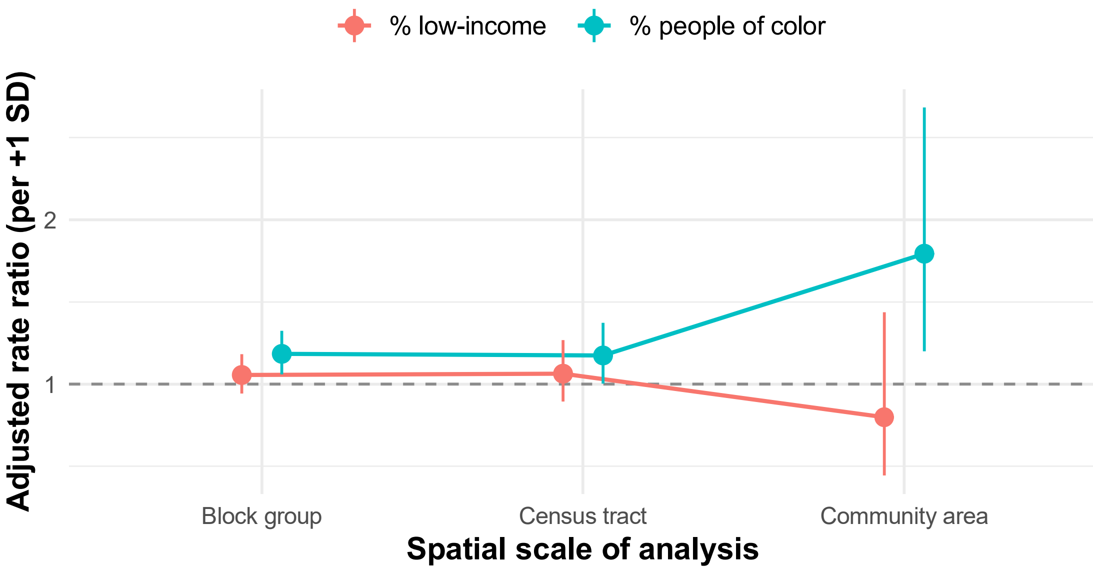

Figure 7: Adjusted rate ratio per +1 SD (95 percent confidence interval), by indicator and scale, from the model with all six indicators entered together. The association is carried by the share of residents of color, which stays above 1 and significant at every scale; the low-income share is near 1 once adjusted.

When all six indicators are entered together, so that each is estimated holding the others constant, the disparity is carried by the share of residents of color, which stays positive and significant at every scale (p=0.003 at the block group, 0.045 at the tract, 0.004 at the community area). The low-income share does not survive this adjustment at any scale (p=0.34, 0.49, 0.45). This does not contradict the simple result. It explains it. The simple income correlation reflects variance that income shares with race and population density, and race is the independent, scale-robust signal underneath it.

In rebuttal, the Company noted that my own earlier survey[8] did not find a statistically significant within-Chicago relationship between leak density and the environmental-justice predictors, and that is true. I said so plainly. It is worth explaining why, because the reason is the limits of that survey, not the absence of a pattern. Across 13 U.S. metropolitan areas my previous work found leak density on average 37 percent higher in census tracts with a majority people-of-color population. Within Chicago specifically, it covered 1,153 road-miles and 402 leak indications across 115 census tracts. That is a relatively small sample of the city, and the survey was conducted nearly a decade ago.

The data the Company produced in this case are different in kind. They are the complete geocoded record of the utility's own recorded leaks across roughly 1,830 Chicago block groups, far larger, more precise, and at the finer scale I recommended. The complete data the Company itself produced reveal within Chicago the pattern that my limited survey could not detect there. The contrast does not undercut my finding; it is the reason the within-Chicago test now succeeds.

The Company also responded that its PRP will replace/retire all cast-iron and ductile-iron pipe under 36 inches system-wide by 2035, so ten years from now these patterns should be erased (Ex. 17.0, at 192 to 193). But the presence of these patterns today, in my opinion, is concerning and deserving a remedy on a shorter timescale.

[8] Weller et al. (2022) Env.Sci.Tech. https://pubs.acs.org/doi/full/10.1021/acs.est.2c00097

V. Synthesis of PGL's Stated Use of AMLD

Q: Please summarize Peoples Gas's stated position on its use of AMLD.

A. Advanced Methane Leak Detection, or AMLD, is a vehicle-mounted methane sensing technology that does two distinct things. First, it helps to find and locate natural gas leaks. Second, it estimates how much methane is being emitted. These are separate capabilities, and the distinction is central to my testimony, because Peoples Gas customers are being asked to pay for the whole tool, but NSG-PGL use only the second of these two capabilities.

Peoples Gas began deploying AMLD vehicles in 2017 to survey its highest-risk neighborhoods and to quantify the methane being emitted there (NSG-PGL Ex. 3.6, at 48). At that time, the Company used the emissions measurements to set priorities. When two neighborhoods have similar risk scores, the one with higher measured methane emissions is scheduled for construction first. The Company's central claim that methane emissions fell by at least 95 percent in upgraded areas rests entirely on before-and-after AMLD surveys (Ex. 3.6, at 67). The Company states that AMLD gives it insight into both the quantity and the general location of methane emissions, and that it has used AMLD to make construction-planning decisions (EDF Ex. 2.04, at 4). On that same page, the Company commits to continue using AMLD going forward as part of the modernization program, and it is ending the AMLD pilot one year early. In this case, the proposed AMLD cost is $250,000 for the 2027 test year (EDF Ex. 2.05 – DRR EDF 2.01), and ratepayers are being asked to fund it.

There is a surprising amount of conflicting messaging in how the Company characterizes its relationship with AMLD. I see tension in three areas. First, the Company treats methane emissions and AMLD as both a priority and not a priority. It prioritizes neighborhoods by measured emissions, resting its headline 95 percent reduction claim on AMLD, and it commits to keep using AMLD. At the same time, it is reassessing its methane goal, it says it does not use AMLD for compliance surveys, and it describes AMLD as used "in the past." A discovery response from NSG-PGL states that "Neither PGL nor NSG use AMLD for compliance related surveys. AMLD was used in the past to help prioritize neighborhoods under the SMP" (EDF Exhibit 2.05 – DRR EDF 1.01(g). And the Company's Corporate Responsibility Report states that it is "reassessing our previous, standalone goal related to methane emissions from natural gas distribution" (EDF Exhibit 2.05 – DRR 2.09 Attach01). Second, the Company says AMLD will be used going forward yet also describes it in the past tense, so the future commitment is ambiguous. Third, the Company pays for the whole tool but uses only one of its two capabilities, the emissions-quantification side, and not the capability to find leaks that the periodic walking and instrument survey does not catch. That second capability is something ratepayers are paying for and not receiving.

In rebuttal (NSG-PGL Ex. 17.0, Section XIII, at 188 to 192), the Company responds to my suggestions. It states that "Peoples Gas does not use AMLD for leak detection or operational surveying; rather, it voluntarily deploys AMLD to measure and track methane emissions before and after construction," and that "PGL intends to continue deploying AMLD in this manner for PRP projects, and thus there is no dispute between PGL and EDF on the value of AMLD for this purpose." The Company declines my recommendation to use AMLD leak data to reorder retirement priorities. It offers four reasons: the federal

DIMP rule already requires it to promptly repair the most hazardous Grade 1 and Grade 2 leaks anywhere on the system, using field observations and the JANA risk model; the Commission's retirement directive is a comprehensive mandate to retire about 1,020 miles of cast-iron and ductile-iron main by 2035, driven by system-level planning rather than by chasing the largest individual leaks; AMLD leak-size estimates are probabilistic and have lower precision than field measurements, and I myself acknowledge that leak detection is probabilistic, because "you don't find every leak every time"; and reorganizing the program around AMLD would jeopardize the 2035 deadline. The Company frames my position as "emissions-first" against its own "safety-first" risk-based approach.

One point follows the record itself, and it sets up what comes next. The 95 percent reduction claim requires regular before-and-after emissions monitoring, so the Company has to keep running AMLD on these areas regardless of how it characterizes the program's status.

Q. What prior statements have PGL made in supporting your recommendations about better use of AMLD technology?

A. Below are excerpts drawn from public testimony and discovery.

At EDF Exhibit 2.05 – DRR to EDF 2.02, PGL states that AMLD is useful in targeting retirements: *"PGL contends that through a pilot together with CUB, AMLD was utilized and evaluated for usefulness. The AMLD pilot effectively demonstrated the ability to evaluate methane emissions between pre-construction and post-construction of gas infrastructure upgrade. AMLD will serve as another tool to aid PGL in targeting the* *retirement of the riskiest CI/DI main less than 36 inches in diameter first, as stated under the current Commission-ordered retirement directive."*

At NSG-PGL Exhibit 3.6, page 48, NSG-PGL explains how AMLD can help it prioritize neighborhoods with a higher amount of methane emissions, consistent with my recommendations in my Direct Testimony (EDF Exhibit 1.0): *"The third step in the Neighborhood prioritization process is to review methane emissions data. In 2017, the company started using advanced methane leak detection (AMLD) vehicles to conduct mobile surveys of neighborhoods with the highest risk scores. The data collected in the surveys allows Peoples Gas to quantify the amount of methane being emitted within the neighborhood. If two neighborhoods have similar risk scores, a neighborhood with a higher amount of methane emissions based on the survey data collected will be prioritized for construction first."* Page 67: *"This concept has been proven on PGL's own system: in areas where the system has been upgraded, methane emissions have decreased by at least 95% based on a before-and-after methane survey using AMLD vehicle technology."*

At EDF Exhibit 2.04 at page 4 (PGL System Modernization Program Annual Report on Pilot Program for Incorporation of Advanced Leak Detection and Quantification Technology into System Modernization Program, Public Version), PGL again explains how AMLD can help reduce methane emissions quicker and prioritize neighborhoods with greater emissions: *"Peoples Gas has found the advanced leak detection and quantification technology and equipment easy to use and that it provides insight into both the quantity and general location of methane emissions. This technology has enabled Peoples Gas to use data to make construction planning decisions, which can help reduce methane* *emissions quicker when those planning decisions are incorporated into the SMP. Peoples Gas' first priority when planning construction is safety, but we can overlay additional information gained from the advanced leak detection and quantification technology to prioritize neighborhoods with greater emissions."*

At EDF Exhibit 2.04 at page 4, PGL committed to using AMLD to use methane emissions data to prioritize neighborhood work: *"Peoples Gas is now committing to use this technology going forward as part of the SMP. Therefore, Peoples Gas seeks to terminate the Pilot Program one year early, since it is no longer necessary to study the technology for possible incorporation into the SMP. Peoples Gas will continue to leverage the methane emission data to prioritize neighborhood work as was done in the Pilot Program."*

Q. How could Peoples Gas use AMLD more effectively to deliver the value that ratepayers are paying for, and what do you recommend?

A. The Company has framed my recommendation as a choice between an "emissions-first" approach and its own "safety-first" one, and that framing is wider than my actual recommendations. So let me grant the Company its premises first. I am not asking Peoples Gas to restructure its retirement program around individual leak sizes, and I am not asking it to abandon a risk-based, safety-first ranking. I accept that the Company faces a firm 2035 deadline to retire all of this cast-iron and ductile-iron pipe, I accept that the DIMP rule is currently in effect, I accept that the JANA risk model is currently being used by the Company, and I accept that AMLD flow estimates are probabilistic. My recommendation is narrower and is not contradicted by any of the Company's assertions. My assertion is that the Company is asking its customers to pay for a tool with two capabilities, and it is using only one of the capabilities. Customers are paying for both capabilities, and they should get both capabilities.

Regarding AMLD capabilities: it finds leaks, and it quantifies emissions. The Company uses only the quantification side. It runs before-and-after surveys to measure emissions, and that is the basis of its 95 percent claim. But the same vehicle, on the same pass, also detects and locates leaks that the periodic walking and instrument survey does not catch. The more you look for leaks, the more you find. The Company is already paying for the equipment to find them and is simply not collecting or acting on that information.

The Company's objections do not defeat my claims. The claim that AMLD flow estimates are imprecise is about leak size, which is beside the point, because locating a leak for repair does not require an exact flow number. You repair a leak because it is there, not because you have measured it at some level of precision. The claim that detection is probabilistic is also not a reason to decline the tool. That "you don't find every leak every time" is an argument for looking more often, not an argument to stop looking. The natural response to probabilistic detection is to run the survey on a regular cycle so that leaks missed on one pass are caught on the next. And the Company has previously committed to using AMLD emissions data as a tiebreaker among similar-risk neighborhoods, so using current AMLD data to keep prioritization up to date extends something the Company itself already committed to. AMLD does not replace JANA; it feeds JANA better information.

There is an efficiency point that I think is decisive. Because the 95 percent claim requires ongoing before-and-after monitoring, the Company must keep running AMLD on these project areas regardless. The vehicle is already on the street. Capturing the leak-location data at the same time is close to free. And finding more leaks sooner serves the very safety-first goal the Company emphasizes, because a leak found is a leak that can be graded and repaired. Leak detection is not in tension with the Company's DIMP and safety obligations. It directly advances them.

Q: With that framing, what are your recommendations?

A: With that framing, my recommendations are these.

1. If the Company is dissatisfied with its AMLD provider, it should shop around. There are more providers now than in 2016, and the technology has improved.
2. AMLD is very good at finding leaks. If the Company is already paying for AMLD, it should obtain and use the leak-location information to improve leak discovery, which means dispatching field technicians to the AMLD leak indications. Most AMLD providers can advise the Company on incorporating AMLD as an additional tool in the leak-survey process.
3. The system's leak behavior changes over time, and new information can shift priorities. An AMLD survey, covering both leak detection and emissions quantification, should be run annually on all project areas, and the results should be used to update prioritization with the best and most recent information.
4. Doing AMLD well across the project areas may cost more than $250,000, and the Company should accordingly be allowed to increase its AMLD budget within reason.
5. The results of the AMLD surveys should be included in the Company's annual reporting.

VI. Analysis of pipeline replacement data

Q. What additional data did the Company produce in this proceeding, and what did you do with it?

A. In response to data request EDF 1.04, the Company produced the geographic locations of its distribution-pipe replacement work for 2025 and for 2026 through May 5 (EDF 1.04 SUPP Attach01). Once produced, I was able to see where replacement is happening, rather than only how much. My earlier testimony established that the Company's leak-prone main and its leaks are concentrated in higher-burden neighborhoods, but without the replacement data I had no way to test whether the replacement program reaches those neighborhoods. These located data make that test possible. I focused on gas mains. Because service-line replacement generally follows the main work, it is not separately modeled here.

From these data I identified the retired leak-prone main, the cast-iron and ductile-iron pipe the Company is required to retire. That is 1,172 segments, about 14.6 miles in total, of which 11.0 miles were retired in 2025 and 3.7 miles in 2026 through May 5, 2026. Every segment carried coordinates. The 1,172 segments fall under 294 distinct replacement projects, so the work is organized into project areas rather than scattered. I placed each segment into a census block group by a point-in-polygon match. I then analyzed the result for the same six environmental-justice indicators I used in my direct testimony, and I also asked the question in reverse: what factors describe where the Company chose to replace leak prone pipe.

One descriptive point about the activity is worth noting so that it is not misread. The Company removed more main than it installed in this period, about 16 miles against

7. That does not indicate a loss of distribution capacity. The Company is retiring low-pressure main and installing medium-pressure main, which operates at higher pressure and carries more gas per mile, so fewer miles of new main can serve the same or greater load. I note this so that the gap between the removal and installation mileage is not read as a reduction in service.

Q. Is the retirement of leak-prone main reaching the neighborhoods that bear more of that pipe and more of the leaks?

A. By rate, it is reaching them evenly. No environmental-justice indicator is significantly associated with the retirement rate, whether that rate is measured as the share of a neighborhood's leak-prone stock that was retired or as retirements per mile of leak-prone main. Per mile of leak-prone pipe, retirement is occurring at about the same rate across neighborhoods, regardless of demographics. Of the 1,306 Chicago block groups that have leak-prone main, 208 saw some retirement, and about 1.34 percent of the leak-prone stock in those block groups was retired over the period. The absence of a pattern holds in both 2025 and 2026.

Q. What describes where the Company chose to replace?

A. Reversing the question, where the Company replaced leak prone pipe is predicted by risk-based factors and by no demographic indicator. The amount of leak-prone main a block group has predicts it (odds 1.49 per standard deviation, $p<.001$), and so does the number of cast-iron and ductile-iron main leaks it has had (odds 1.59 per standard deviation, $p<.001$). The leak rate, though, the number of those leaks per mile of leak-prone main, does not predict it. That means the Company is replacing where the leak-prone pipe and the total number of leaks are concentrated, but within that pipe it is not preferentially going first to the segments that fail most often per mile. To put a number on it, 40 percent of the replacement went to block groups with no recorded cast or ductile-iron main leaks at all, which is what a comprehensive retire-everything program looks like, not one that prioritizes the leakiest pipe. No demographic indicator predicts the locations. I should be candid: on this evidence, the Company's replacements are occurring where the leak-prone pipe and the leaks are, not by the demographics of the neighborhood, and this is not a finding that the program is being run inequitably. The one qualification I would add is that the program tracks how much leak-prone pipe a neighborhood has rather than how leaky that pipe is, which is consistent with my direct recommendation that leak and emissions data be used to prioritize the leakiest pipe first.

Q. What do these two findings mean for the equity of the replacement program?

A. They have to be read together with my earlier findings: environmental justice neighborhoods have more leak-prone pipe and more leaks per mile. Because retirement tracks the stock of leak-prone pipe and the leaks, and those are greater in the higher burden neighborhoods, more retirement occurs there in absolute terms. That is the right direction.

But the rate per mile is equal across neighborhoods. So the program is reducing the pre-existing disparity proportionally rather than closing it faster where the burden is greatest. The consequence of this approach is that an equal rate applied to an unequal starting point leaves the gap in place. Because every neighborhood's leak-prone stock is being drawn down at about the same rate, the neighborhoods that started with more leak-prone pipe and more leaks still have more of both at the end of each year. The existing gap, in leak-prone pipe and in leaks, persists through the years of the retirement program. It shrinks for everyone, but it does not narrow between neighborhoods. I also looked at the leak-prone main that has not yet been replaced. It sits in block groups that have less of it and far fewer leaks, and that are demographically similar to the rest, so the queue is ordered by risk and is not skewed against the more-burdened neighborhoods.

Q. What do you recommend in light of this analysis?

A. This is an early and small slice of data, about 14.6 miles over roughly 15 months. The power to detect a modest equity effect is therefore limited, and importantly the results do not suggest a strong hidden one. One year of located data cannot settle the question of how equitably the replacement program is being conducted over the longer term either way.

That limitation is itself the recommendation. The value of these located data is that they can be analyzed in exactly this way every year: to confirm that replacement/retirement remains risk-based, and to catch any drift, as the program scales toward retiring all such pipe by 2035. The Company produced these data once, in discovery in this case. I recommend that going forward, the Company release these data on a regular annual basis so that the equity of the program can be checked as it proceeds, rather than reconstructed after the fact. Producing them each year would let the Commission and the public verify that the program stays on a risk-based footing and watch whether the underlying disparity finally begins to close. That is a concrete and low-cost step, and this analysis is a working demonstration of what it would yield.

VII. PGL's Lack of Transparency About Data and PRP Prioritization

Q. Please explain your concerns regarding PGL's transparency about its data and PRP prioritization.

A. The Company's current reporting of system performance, maintenance, and its decision-making methods for the PRP are incomplete. My data requests in this proceeding surfaced patterns that all stakeholders should be able to see. Given the structural inequity that my analysis found in the system, this lack of transparency means that stakeholders cannot confirm that the system is being managed fairly or optimally. The customers who pay for this work deserve to see what the data shows. The federally mandated reporting structures that the Company points to as the compulsion for its current reporting, such as EPA greenhouse-gas reporting, are eroding. Reporting required by the Commission would maintain transparency despite that erosion and would be consistent with Illinois policy.

I am aware that in the prior NSG-PGL rate case in 2023, the Commission ordered the Companies to "annually report leaks by Grade, cause, and facility type (i.e., material type, age, and type of infrastructure)." Order at 65, ICC Dkt. Nos. 23-0068/23-0069 (Cons.) (Nov. 16, 2023). The Commission found that such reporting "will improve transparency, measure the effects of, and gauge performance and leak results from the Companies' investments." *Id.* My recommendation builds directly on that framework and further improves transparency around leaks and system performance.

VIII. Rebuttal to NSG-PGL testimony

Q: Do you have any additional rebuttals to specific points raised in PGL's testimony?

A: NSG-PGL witnesses Eldringhoff and Dickson (NSG-PGL Exhibit 17.0 at 194) state that my observation in my direct testimony "ignores that PGL does not make that claim [that PGL's data point 'does not address leak rates or trends in areas where it has not yet retired leak prone pipe.'], and amounts to a complaint that PGL has not yet retired all of its CI/DI pipe." To the contrary, I was not ignoring that PGL was not making that claim; I was expressly pointing it out as a gap in PGL's direct testimony. Further, it is not a complaint that PGL has not yet retired all of its CI/DI pipe; it is advocating PGL to better measure and manage its leak prone pipe between now and when its leak prone pipe is fully retired.

IX. Recommendation and Conclusion

Q. What are your recommendations?

A. I make six recommendations.

First, I recommend that the Company publish a fully transparent prioritization algorithm. This algorithm should combine pipeline material (the leak-prone miles in a given area), pipeline performance (recently measured leak frequency per mile of leak-prone pipe, with emphasis on emission rates), and an environmental-justice burden metric. This approach is consistent with Illinois' environmental-justice policy directives and with the Commission's authority to weigh equity in its decisions. Publishing the algorithm lets stakeholders see how priorities are set, rather than having to infer them from outcomes.

Second, the Company should establish measurable, chronological targets for pipeline replacements/retirements and leak reductions, set so that they reduce the inequitable environmental justice burdens my analysis identified. Targets that are measurable and scheduled give the Commission a basis on which to audit progress over time.

Third, the Company should pair replacement/retirement with more frequent AMLD leak surveying in the environmental-justice neighborhoods. This is a lower-cost, immediate equity step that reduces the odor-call burden those communities now bear, which matters because my analysis found that leaks in higher-people-of-color neighborhoods are more often discovered by a customer odor call than by a proactive survey. I do not restate my full set of AMLD recommendations here, including provider selection, dispatching field technicians to AMLD leak indications, and annual surveys for both detection and quantification, because I set those out in my separate AMLD testimony section, and I refer the reader to that section.

Fourth, the Company should annually release comprehensive, geographically specific data on its pipeline leaks and on its replacement and retirement activities. This recommendation matters because the current state of the system is the result of decades of management decisions, and geographically specific leak and replacement/retirement data are the evidence by which stakeholders can judge what they care about. Those concerns are safety and reliability, that is, whether system integrity is in fact improving in return for this large expenditure; equity, that is, the absence of concerning patterns in who bears the leaks and who receives replacement/retirement first; and sustainability, including greenhouse-gas emissions. The reporting should build on the Commission's 2023 order (leaks by grade, cause, material, age, and infrastructure type) and add, for each leak, its geographic location, the dates it was discovered and repaired, and the method by which it was detected. For replacement and retirement, the reporting should include the pipe identifier, location, category, material, length, and diameter, together with the results of the AMLD surveys. This is a low-burden request. The Company's own rebuttal states that many of these data elements are already captured in its internal systems for purposes of DIMP and UMRI compliance, so the recommendation is to compile and publish data the Company already records, no special cost recovery is needed, and modern data tools reduce the effort required per record to comply. The request is also well within precedent and appropriate to this venue. Comparable state-mandated reporting already exists in New Jersey, Massachusetts, California, and Washington, D.C., as I describe in my direct testimony, and the Commission itself ordered annual leak reporting in the 2023 rate case. A rate case is therefore a proper venue, and this is an incremental evolution of an existing requirement rather than a new and burdensome one. The Company states that it is not opposed to transparency, and this recommendation is consistent with that stance. As federal reporting weakens, it is appropriate for the Commission to step in so that this transparency continues.

Fifth, the Commission should conduct annual analyses of the reported data, so that any drift in the Company's performance can be caught and corrected. The analysis I present here and in the attached exhibits is one example of how such analyses could be conducted, and I offer it as a starting point that Commission staff, data scientists, and stakeholders can refine over time.

Sixth, I recommend that stakeholders collaborate on recommendations that can be made to the legislature to establish a framework that aligns local distribution company financial incentives with the state's greenhouse-gas emissions goals. I offer this as a forward-looking and modest step. Without an incentive structure, those emissions goals are at risk of non-achievement, and at present there is no accountability mechanism for them at the Commission level. Such regulation would insulate the state's climate goals from swings in federal policy. An appropriate framework would define the emissions quantification methods and their scope, drawing more on direct measurement of system performance than on standard emission factors, and would consider recognized protocols such as OGMP or Veritas and the question of direct versus induced emissions. Financial structures worth considering include using capital expenditure to support methane quantification programs and to make the Company's operations more data driven. The full framework may develop through the legislature or a dedicated proceeding, such as the Future of Gas docket, but the Commission's and Stakeholders' role now is to identify the need and to establish accountability for meeting state climate goals. The Commission, in coordination with the Illinois EPA, is well suited to manage that accountability.

Q: Do you have recommended data reporting specifications?

A: Yes. I incorporate with my testimony the document I have prepared and titled "Recommended Annual Data Reporting: Files and Fields" and included here as EDF Exhibit 2.06.

Q: Does this conclude your testimony?

A: Yes.