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August 31, 2023

Via Electronic Filing

OREGON PUBLIC UTILITY COMMISSION ATTENTION: FILING CENTER PO BOX: 1088 SALEM OR 97308-1088

RE: <u>Docket No. UE 421</u> – In the Matter of PACIFICORP, dba PACIFIC POWER, 2022 Power Cost Adjustment Mechanism.

Attached for filing are the following exhibits: Joint Staff Opening Testimony Exhibit 100-104 Dlouhy_Jent_Kim_Pileggi and Exhibit 200-201 Stevens.

/ Kay Barnes Oregon Public Utility Commission (971) 375-5079 Kay.barnes@puc.oregon.gov



PUBLIC UTILITY COMMISSION OF OREGON

STAFF EXHIBIT 100

Opening Testimony

August 31, 2023

Q. Please state your name, occupation, and business address. A. My name is Curtis Dlouhy, Ph.D. I am an Economist employed in the Utility Strategy and Integration Division of the Oregon Public Utility Commission (OPUC). My business address is 201 High Street SE, Suite 100, Salem, Oregon 97301. Q. Please describe your educational background and work experience. A. My witness qualifications statement is found in Exhibit Staff/101. Q. Please state your name, occupation, and business address. A. My name is Julie Jent. I am a Senior Utility Analyst employed in the Energy Costs Section of the Rates, Safety, and Utility Performance (RSUP) Program of the OPUC. My business address is 201 High Street SE, Suite 100, Salem, Oregon 97301. Q. Please describe your educational background and work experience. A. My witness qualifications statement is found in Exhibit Staff/102. Q. Please state your name, occupation, and business address. A. My name is Anna Kim. I am the Energy Costs Section Manager employed in the RSUP Program of the OPUC. My business address is 201 High Street SE, Suite 100, Salem, Oregon 97301. Q. Please describe your educational background and work experience. A. My witness qualifications statement is found in Exhibit Staff/103.

Q. Please state your name, occupation, and business address.

- A. My name is Rose Pileggi. I am a Senior Utility Analyst employed in the Energy
 Costs Section of the RSUP Program of the OPUC. My business address is
 201 High Street SE, Suite 100, Salem, Oregon 97301.
- Q. Please describe your educational background and work experience.
- A. My witness qualifications statement is found in Exhibit <u>Staff/104</u>.

Q. What is the purpose of your testimony?

- A. The purpose of our testimony is to provide an overview of the Company's
 Power Cost Adjustment Mechanism (PCAM) filing and an overview of Staff's analysis to date.
- Q. Did you prepare any exhibits for this docket?
- A. Yes. We prepared Exhibit <u>Staff/101</u>, Exhibit <u>Staff/102</u>, Exhibit <u>Staff/103</u>, and Exhibit <u>Staff/104</u>.

Q. How is your testimony organized?

A. Our testimony provides an overview of the 2022 PCAM filing and discusses
 Staff's analysis of PacifiCorp's request to amortize more than \$130 million of
 excess Net Variable Power Costs incurred during 2022.

1		OVERVIEW OF 2022 PCAM FILING
2	Q.	What is the PCAM?
3	A.	The PCAM is a true-up proceeding for net variable power costs (NVPC) that
4		compares PacifiCorp's actual NVPC incurred in operations against the
5		forecast NVPC set in rates annually in PacifiCorp's Transition Adjustment
6		Mechanism (TAM) proceeding. The PCAM is the mechanism by which
7		PacifiCorp recovers or refunds the difference between actual power costs
8		and forecast power costs after applying a deadband, sharing mechanism,
9		earnings test, and amortization cap.
10	Q .	Where was the 2022 NVPC forecast identified?
11	A.	The forecast for power costs in the 2022 calendar year was adopted in the
12		2022 TAM through Order No. 21-379 in Docket No. UE 390.
13	Q.	Please outline major activities in the procedural history of this docket.
14	A.	The Company filed the PCAM on May 15, 2023.
15		On August 3, 2023, in lieu of a settlement conference, the Company
16		provided a workshop on workpapers and other data that had been filed by
17		the Company.
18		On August 18, 2023, the Company provided a workshop at Staff's
19		request that covered basic coal operations and major coal market factors
20		that affected the Company in 2022.

Q. Please provide an overview of Staff's testimony.

A. In Opening Testimony, Staff provides context to the ongoing review of costs associated with the PCAM and provides analysis of rate impacts from the PCAM.

Q. What issues are addressed in Staff's testimony?

A. In Staff/100, we provide an overview of the filing and some of our analysis to date. In Staff/200, witness Bret Stevens addresses the rate impact of the PCAM on Oregon customers.

Q. Please summarize PacifiCorp's 2022 PCAM filing.

A. In the 2022 PCAM, the Company seeks to recover the difference between actual net power costs incurred and the base costs established in the 2022 TAM filing in UE 390. Actual PCAM costs on an Oregon basis are \$163.3 million more than in the 2022 TAM. The Company seeks to recover \$131.1 million of these costs amortized over two years.¹

Q. What is the total impact of the PCAM?

- A. In the 2022 PCAM, the Company seeks to recover \$131.1 million on an Oregon-allocated basis for the 2022 PCAM. This number was calculated by applying the deadband, sharing band, and earnings test to the power cost variance (PCV).² The Company proposes amortizing these costs over two years starting January 1, 2024, with an impact of \$69 million a year.³
 - ¹ PAC/100, Painter/2.
 - ² PAC/100, Painter/2.
 - ³ PAC/100, Painter/4.

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Q. Did Staff review PacifiCorp earnings for 2022?

A. Yes. In Staff's review of PacifiCorp's Results of Operations, PacifiCorp's Type 1 return on equity earnings for 2022 was 2.84 percent. This is well below PacifiCorp's authorized return on equity of 9.5 percent. Therefore, there is no reduction in the amount of power costs that is recoverable by PacifiCorp with respect to an earnings test.

Q. What is the effect of the increase on Oregon customers?

A. The proposed amortization would result in a roughly four percent increase in rates in 2024 and 2025 above 2023 levels. The impact varies by customer type and will be addressed further in Staff/200.⁴ These rates will go into effect on January 1, 2024, at the same time as rates from the 2024 TAM, which will have an additional impact on customer rates.

Q. Please list changes by individual cost categories since last year's filing.

- A. On a company-wide basis, compared to the 2022 TAM, coal fuel expenses decreased by \$66 million, natural gas expenses increased by \$307 million, purchased power expenses increased by \$65 million, and the cost associated with reduced wholesale sales revenue increased by \$322 million.
 In total, Company-wide NVPC were \$667 million higher than the 2022 TAM forecast.⁵
 - PAC/100, Painter/12.
 PAC/100, Painter/12.
 - ⁵ PAC/100, Painter/12.

1	Q. What are the major factors the Company cites that have contributed to
2	this increase?
3	A. The Company references the following factors that have increased costs
4	beyond what was forecasted:
5	Extreme weather events, such as heat waves and the ongoing drought in
6	the summer months;
7	The war in Ukraine;
8	 Decreased coal generation due to coal supply shortages; and
9	An increase in natural gas generation to compensate for reduced coal
10	generation.
11	Despite higher fuel prices, increased natural gas generation was less
12	expensive than additional market purchases. The Company attributes the
13	difference in forecast and actual market sales due to modeling of market
14	depth and the increase in market purchase costs due to heat waves. ⁶
15	Q. Does Staff have additional questions related to PAC's operations?
16	A. Yes. Based on events in 2022 referenced by the Company, Staff
17	understands why the Company might choose to dispatch less coal and more
18	natural gas, and that market purchases and sales were less favorable
19	overall than forecast. However, we have questions about the Company's
20	decisions regarding which coal plants were dispatched and which gas plant
21	were dispatched. It is unclear to Staff why the Company chose to increase

⁶ PAC/100, Painter/13-17.

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generation at some facilities and decrease generation at others. Staff also questions why the Company attributes the difference in wholesale revenues to modeling assumptions rather than having less energy to sell due to reduced generation of lower cost coal units. Staff plans to investigate these topics further and wishes to continue meeting with PAC to understand these topics better.

Q. Please describe Staff's experience investigating the impact of coal markets and coal availability on PacifiCorp's power costs.

A. The coal market is complex. Interactions of various factors in the market, and how the Company responds to these interactions on a unit-by-unit basis, impact the Company's NVPC. In Staff's experience, the current discovery process is not an adequate vehicle for Staff and parties to gather sufficient information about the complex interactions of the coal market and the Company's actions in order to validate or contest the Company's forecast of coal-related costs. The workshop held by the Company on August 18 was particularly helpful in understanding the challenges the Company faced with coal markets in 2022.

Q. Why does Staff find it important to have more information on the coal market and coal generation?

A. Staff believes that the coal market is less stable now than in the past and the
 market has experienced several shocks recently. As the energy economy
 shifts toward generation that requires lower carbon intensity, the future for coal
 is less certain even when the Company is still relying on a steady supply of

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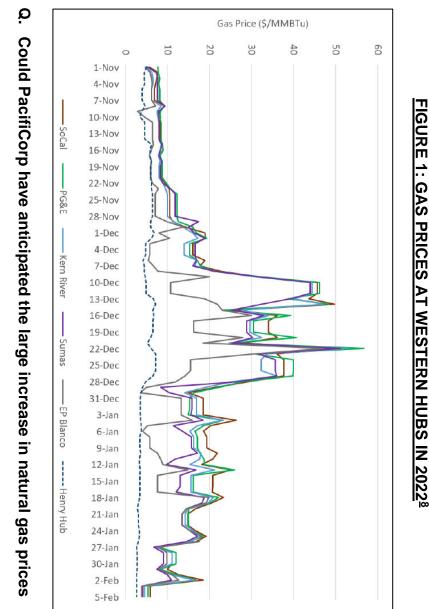
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coal to meet load. Staff believes it is important to understand the impacts of coal market changes on the Company's complex system. Each facility may be facing different impacts and it is difficult to understand these decisions without more information about the interactive effects.

Q. Please describe Staff's understanding of the natural gas market in 2022.

A. Staff is aware that gas prices have stayed above \$5/MMBtu since mid-2021, but in late 2022, prices sustained at even higher than normal seasonal levels. Next-day natural gas prices for Western hubs reached a maximum value of about \$57/MMBtu in December 2022. In addition, next-day and future bilateral power prices experienced price spikes during December 2022 between \$400/MWh and \$500/MWh. As a result of this, CAISO electricity prices increased fivefold, at an average price of more than \$250/MWh. See Figure 1 below for a sampling of gas prices at different Western hubs in 2022.⁷

⁷ <u>2022-Fourth-Quarter-Report-on-Market-Issues-and-Performance-Mar-16-2023.pdf (caiso.com).</u>



in 2022?

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10 ശ ω ດ ~ S 4 ≥ increase in its total natural gas costs appear to be from a change in Staff does not believe so. As previously stated, natural gas expenses cyclical pattern that mirrors the heating season. For PacifiCorp, much of the in storage or gas swaps. As seen in Figure 2, natural gas prices follow a would have impacted physical gas bought in the market but not necessarily gas than average monthly prices during the heating season of each year, this increased by \$307 million. While the Company could have predicted higher

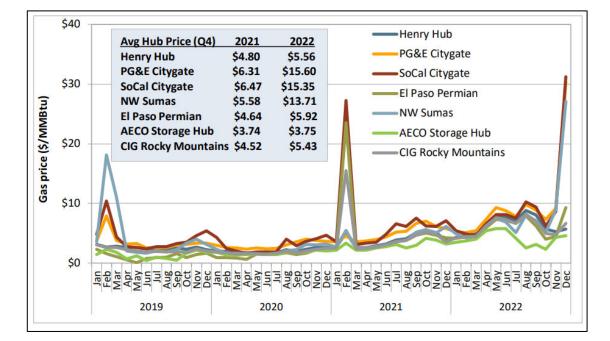
ω See Gas Conditions and CAISO Markets Report published on February 6, 2023 and prepared by Market Analysis.

1 2 expectation for natural gas at the generating facilities that PacifiCorp either

owns or contracts rather than Gas physicals, swaps, or storage.

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Q. Has Staff proposed any adjustments?

A. Not at this time, but Staff's investigation into the over \$130 million in excess
 NVPC is ongoing. Staff may have adjustments as its investigation evolves.

Q. Does Staff have recommendations for the Commission at this time?

A. No. Staff continues to research the above topics and related impacts to better understand the Company's system and decision processes.

Q. Does this conclude your testimony?

A. Yes.

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PUBLIC UTILITY COMMISSION OF OREGON

STAFF EXHIBIT 101

Witness Qualifications Statement

August 31, 2023 WITNESS QUALIFICATION STATEMENT

NAME:	Curtis Dlouhy
EMPLOYER:	Public Utility Commission of Oregon
TITLE:	Economist, Strategy and Integration Division
ADDRESS:	201 High St. SE, Ste. 100 Salem, OR 97301-3612
EDUCATION:	PhD, Economics University of Oregon, Eugene, OR
	Master of Science, Economics University of Oregon, Eugene, OR
	Bachelor of Arts, Economics & Math Nebraska Wesleyan University, Lincoln, NE
EXPERIENCE:	I have been employed by the Oregon Public Utility Commission (OPUC) in the Strategy and Integration Division since April 2022 and had previously worked in the Rates, Finance, and Audit Division since June 2020. My responsibilities include providing research, analysis, and recommendations on a range of regulatory issues. I have provided analysis and expert testimony in various contested cases including UG 388, UG 389, UG 390, UE 374, UE 390, UE 391, UE 394, UG 433, UG 435, UE 399, UE 400, UE 402, UE 416 (Ongoing), and UE 420 (Ongoing).
	Prior to working for the Commission, I was employed by the University of Oregon as a graduate employee where I taught classes in Intermediate Microeconomics, Industrial Organization, and Antitrust Economics. My PhD dissertation won an award from the Transportation and Public Utility Working Group and covered topics in fossil fuel markets ranging from coal mine closure, dispatchable electricity choices under carbon taxes and coal transport via railroad. While completing my PhD, I provided economic analysis for the Graduate Teaching Fellows Federation as a member of its contract bargaining team.

PUBLIC UTILITY COMMISSION OF OREGON

STAFF EXHIBIT 102

Exhibits in Support Of Opening Testimony

August 31, 2023 WITNESS QUALIFICATIONS STATEMENT

NAME:	Julie Jent
EMPLOYER:	Public Utility Commission of Oregon
TITLE:	Senior Utility Analyst Rates, Safety and Utility Performance Program
ADDRESS:	201 High Street SE. Suite 100 Salem, OR. 97301
EDUCATION:	I have a Bachelor of Science from Berea College in Political Science where I concentrated on economics and the regions of Eastern Europe and Southeastern Asia. I also hold a Masters of Integral Economic Development Policy specializing in the public sector and econometrics.
EXPERIENCE:	I have been employed as a Junior Financial Analyst by the Oregon Public Utility Commission since June 2021 in the Telecommunications and Water division. I transitioned to the Rates, Safety and Utility Performance Division in July of 2022 within the Energy Costs section. Within this division, I currently perform a range of financial analysis duties related to natural gas, electric, and water utilities, with a focus on operations and maintenance. In addition, I assist with Purchased Gas Adjustments, Annual Power Cost filings, and General Rate Cases. Past rate cases include UG 435 and UE 399. I was previously employed as an adjunct professor of Econometrics at the Catholic University of American and as an Analyst in the Office of Management and Budget (OMB) within the Executive Office of the President (EOP), where I worked as part of a team on education funding. Prior to EOP, I was an Economic Consultant for the U.S. Conference of Catholic Bishops.

PUBLIC UTILITY COMMISSION OF OREGON

STAFF EXHIBIT 103

Exhibits in Support Of Opening Testimony

August 31, 2023

WITNESS QUALIFICATION STATEMENT

NAME:	Anna Kim
EMPLOYER:	Public Utility Commission of Oregon
TITLE:	Energy Costs Section Manager Rates, Safety and Utility Performance Program
ADDRESS:	201 High Street SE. Suite 100 Salem, OR. 97301
EDUCATION:	Master of Science, Economics Portland State University, Portland, OR
	Master of Environmental Studies, The Evergreen State College, Olympia, WA
	Bachelor of Arts, Economics University of California, Berkeley, CA
EXPERIENCE:	I have been employed by the Oregon Public Utility Commission (OPUC) since July 2018 originally in the Energy Resources and Planning Division principally as the Staff liaison with the Energy Trust and then as Energy Costs Section Manager starting May 2023. My responsibilities include analyzing, working with Staff assigned, leading and managing energy cost dockets.
	Prior to working for the Commission, I worked for Seattle City Light as a power resource planner developing integrated resource plans. I also worked for five years as an evaluation consultant which involved evaluating energy efficiency and demand response pilots and programs and market research.

PUBLIC UTILITY COMMISSION OF OREGON

STAFF EXHIBIT 104

Exhibits in Support Of Opening Testimony

August 31, 2023

WITNESS QUALIFICATIONS STATEMENT

NAME:	Rose T. Pileggi
EMPLOYER:	Public Utility Commission of Oregon
TITLE:	Senior Utility Analyst Energy Costs Section
ADDRESS:	201 High Street SE. Suite 100 Salem, OR. 97301
EDUCATION:	In 2013, I received a Bachelor of Science in Business Administration from Thomas Edison State University. In 2017, I received a Master of Science in Finance from the University of Portland.
EXPERIENCE:	I have been employed by the Commission since July of 2022 analyzing finance, power cost, rate case and affiliated interest dockets.
	From July 2021 through June 2022, I worked as an Analyst for the Oregon Judicial Department. Duties included data analysis, ensuring compliance with pertinent statutes and rules to ensure that data was being handled in accordance with requirements and recommending process improvements.
	From 2017 to 2021, I worked as an Investment Analyst, Portfolio Manager, and Systems Manager for Northwest Capital Management. My work included analysis of the markets and investments, the management and rebalancing of portfolios, creating reports as required by the SEC, as well as managing software integrations for

operational and reporting purposes.

CASE: UE 421 WITNESS: Bret Stevens

PUBLIC UTILITY COMMISSION OF OREGON

STAFF EXHIBIT 200

Opening Testimony Rate Impact

August 31, 2023

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Q. Please state your name, occupation, and business address.

 A. My name is Bret Stevens. I am a Senior Economist employed in the Rates and Telecommunications Section of the Rates, Safety and Utility Performance
 Program of the Public Utility Commission of Oregon (OPUC). My business address is 201 High Street SE, Suite 100, Salem, Oregon 97301.

Q. Please describe your educational background and work experience.

A. My witness qualification statement is found in Exhibit Staff/201.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to discuss the single issue of the PCAM rate impact. I also discuss the rate impact of the PCAM in combination with PAC's currently forecasted 2024 power costs in UE 420.

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ISSUE 1. RATE IMPACT

Q. What is the overall amount that PacifiCorp (PAC) is proposing to collect in this filing?

A. PAC is proposing to amortize roughly \$137 million related 2022 PCAM eligible costs over two years.¹ Of this \$137 million, \$6.8 million is attributable to interest accrued during the amortization period.

$\ensuremath{\mathsf{Q}}\xspace.$ How does PAC propose to spread the above costs across the

customer classes?

PAC proposes to spread these costs by generation revenue. PAC's proposed rate spread is given below in Table 1.²

Schedule	Generation Rate Spread	Schedule 206 Revenues	Change in Total Rates
Schedule 4	37.4%	\$25,738,077	3.5%
Schedule 23	7.0%	\$4,850,546	3.2%
Schedule 28	12.4%	\$8,557,799	4.1%
Schedule 30	7.7%	\$5,335,797	4.5%
Schedule 41	1.4%	\$943,060	3.4%
Schedule 48	33.9%	\$23,367,180	5.2%

Table 1. PacifiCorp's Proposed Rate Spread³

¹ See workpaper entitled, "2022 OR PCAM_Exhibit 101_with amortization.xlsx".

² Smaller schedules are omitted in Table 1 for visual clarity.

³ PAC/203, Ridenour/1.

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Q. Both UE 420 and UE 421 have the same rate effective date. What is the combined rate impact of these two filings?

A. The combined impact of these filings assuming both a 1-Year and 2-Year PCAM amortization period is given below in Table 2.⁴ The impact of UE 420 is relatively higher than the impact of UE 421. However, the combination of these filings sums to a sizable increase to all customers on January 1, 2024. Staff is concerned about the size of this increase, particularly given the fact that PAC has indicated that the 2023 PCAM may also include a sizable increase to rates next year.⁵

Schedule	1-Year PCAM Amortization	2-Year PCAM Amortization
Schedule 4	13.3%	10.0%
Schedule 23	12.3%	9.3%
Schedule 28	15.9%	12.0%
Schedule 30	17.0%	13.1%
Schedule 41	13.2%	10.0%
Schedule 48	16.0%	15.0%

 Table 2. Combined TAM and PCAM Rate Impact

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Staff notes that the number presented in Table 2 are based on the

forecast from PAC's Reply Testimony. PAC will submit a final update in

⁴ To calculate these impacts, Staff updated the revenue target in the "OR CY2024 Blocking TAM eff 1-1-2024.xlsx" workpaper submitted in UE 420 with the updated NVPC change provided in UE 420, PAC/402, Mitchell/1. Staff then used these updated proposed base revenues in the "OR CY2024 Blocking 2022PCAM eff 1-1-2024.xlsx" workpaper provided in UE 421. ⁵ UE 420, PAC/400, Mitchell/15-16.

1 November. As such, the figures presented in Table 2 are not final and subject 2 to change. 3 Q. How does PacifiCorp's proposed two-year amortization length 4 compare to previous PCAM cases? A. In the 2021 PCAM, UE 404, the amortization window was set to four years.⁶ 5 6 Besides UE 404, no amount has been amortized through the PCAM for the last 7 ten years. 8 Q. Does Staff agree with PAC's proposal to amortize the \$131 million of 9 PCAM eligible costs for two years? 10 A. Staff is agreeable to this amortization period, but also recognizes the trade-offs 11 with a longer amortization period. As I discussed earlier in this testimony, the 12 combination of the rate impact between the Transition Adjustment Mechanism 13 (TAM), in UE 420, and this filing will be substantial. A longer amortization 14 period can help reduce the per year increase at the cost of a higher overall 15 interest payment. 16 However, there is a concern that future years would have increases 17 themselves that customers would pay in addition to an amortization of a 18 previous increase. In other words, the increases would be compounded into 19 an even bigger increase. There can be significant year-to-year variation in how 20 much the TAM differs from actual NVPCs. If actual power costs in the next few 21 years end up being higher than forecasted, customers may be more burdened

⁶ Order No. 22-469, Page 2.

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by extending the amortization window. Therefore, Staff supports a shorter amortization period.

Q. How does the length of the amortization period affect both the total amount of interest paid by rate payers and the rate impact?

A. Staff has compared PAC's proposed 2-year amortization period to both a 3year and 4-year amortization period. The results of this analysis is shown in Table 3.⁷

⁷ For this analysis, Staff forecasted the Modified Blended Treasury rate from 2024-2027. Forecasted rates were calculated by utilizing the Forward Curve Analysis in Bloomberg to forecast future rates. Forecasted rates were calculated in the same manner as actual MBT rates, with the exception that instead of the historical constant maturity treasury rates, Staff used a forecasted rate from a dollar swap forward corrected for the historical spread on the dollar swap spot and constant maturity treasury curves.

	2-Year Amortization	3-Year Amortization	4-Year Amortization
Total Amortized	\$138,094,146	\$141,915,160	\$145,349,402
Yearly Amortization	\$69,047,073	\$47,305,053	\$36,337,351
Total Interest Paid	\$7,003,835	\$10,824,849	\$14,259,091
Schedule 4 Change	3.45%	2.36%	1.81%
Schedule 23 Change	3.20%	2.19%	1.68%
Schedule 28 Change	4.15%	2.84%	2.18%
Schedule 30 Change	4.52%	3.09%	2.37%
Schedule 41 Change	3.44%	2.35%	1.81%
Schedule 48 Change	5.18%	3.54%	2.72%

Table 3. Comparison of Multi-Year Amortization Periods

Each year the amortization period is extended, the amount of total interest paid by ratepayers increases by roughly \$3.5 million. This means that when doubling the length of the amortization period, ratepayers will pay roughly double the amount of interest. In return, the 2024 rate impact falls by roughly 50 percent. When extending the amortization period by only one year, the 2024 rate impact falls by roughly 30 percent, while the total amount of interest paid increases by roughly 50 percent.

Q. What would be the impact of shortening PAC's proposed amortization length to one year?

A. The effect of amortizing these costs over one year is shown below in Table 4. In this scenario, both the total amount of interest paid and the risk to compounding amortizations is minimized. However, the rate impacts are substantial. This impact is magnified by the potential increase in UE 420, as seen in Table 1.

Total Amortized	\$134,474,032	
Total Interest Paid	\$3,383,721	
Schedule 4 Change	6.73%	
Schedule 23 Change	6.23%	
Schedule 28 Change	8.08%	
Schedule 30 Change	8.80%	
Schedule 41 Change	6.70%	
Schedule 48 Change	10.09%	

Table 4. 1-Year Amortization

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Q. What is Staff's preferred amortization period?

 A. Staff's preference is for PAC's proposed 2-year amortization period because it is a reasonable balance between mitigating price impacts while not accruing an untenable amount of interest. Staff may also be agreeable to 3-

4 5 6 year amortization period. However, Staff is also concerned about aggregate rate impact of multiple upward PCAM adjustments being amortized simultaneously. Staff's position may change after review of other parties' testimonies and analysis.

Q. Does this conclude your testimony?

A. Yes.

CASE: UE 421 WITNESS: Bret Stevens

PUBLIC UTILITY COMMISSION OF OREGON

STAFF EXHIBIT 201

Witness Qualifications Statement

August 31, 2023

WITNESS QUALIFICATIONS STATEMENT

NAME:	Bret Stevens
EMPLOYER:	Public Utility Commission of Oregon
TITLE:	Senior Economist Rates, Safety, and Utility Performance
ADDRESS:	201 High Street SE. Suite 100 Salem, OR. 97301
EDUCATION:	Ph.D., Agricultural & Resource Economics University of California, Davis
	M.S., Agricultural & Resource Economics University of California, Davis
	B.A., Economics/Environmental Studies Western Washington University
EXPERIENCE:	I have been employed at the Public Utility Commission of Oregon since September of 2022. My primary responsibilities revolve around providing research and analysis on rate spread and rate design. I have been a staff witness in UE 407, UE 410, UE 412, and UE 414, and UE 416. Prior to working for the Commission, I was employed by the University of California, Davis as a graduate student researcher, associate instructor, and teaching assistant. I taught courses on econometrics, finance, and microeconomics.