REDACTED
Rocky Mountain Power
Docket No. 17-035-40
Witness: Rick A. Vail

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF UTAH

ROCKY MOUNTAIN POWER

REDACTED
Surrebuttal Testimony of Rick A. Vail

May 2018

Q. Are you the same Rick A. Vail who previously provided testimony in this case on behalf of Rocky Mountain Power ("Company"), a division of PacifiCorp?

A. Yes.

PURPOSE AND SUMMARY OF SURREBUTTAL TESTIMONY

Q. What is the purpose of your surrebuttal testimony in this proceeding?

A. My testimony further supports the Company's voluntary request for approval of a resource decision to construct the Aeolus-to-Bridger/Anticline transmission line and network upgrades ("Transmission Projects"). Specifically, my testimony responds to the April 17, 2018, testimonies filed by Utah Division of Public Utilities ("DPU") witnesses Dr. Joni S. Zenger and Mr. Daniel Peaco, Office of Consumer Services ("OCS") witness Mr. Philip Hayet, and the Utah Association of Energy Users ("UAE") and the Utah Industrial Energy Consumers ("UIEC") witness Mr. Bradley G. Mullins.

Q. Please summarize your testimony.

A. Many—if not most—of the parties' concerns in this case are based on a misunderstanding or mischaracterization of the Company's testimony to date, particularly regarding the Company's transmission studies, services, and processes. In my surrebuttal testimony, I first discuss the continued and immediate need for the Transmission Projects. The transmission system in eastern Wyoming is currently constrained, with generation capacity behind the TOT 4A cut-plane exceeding transmission capacity. The Aeolus-to-Bridger/Anticline transmission line has been part of the Company's long-term transmission plan since 2007 and provides substantial immediate benefits with or without the Wind Projects (Ekola Flats, TB Flats I and II, and Cedar Springs). The advantage of building the Transmission Projects along with

the Wind Projects is the economic benefits to customers that will be realized over the life of the projects.

Second, I demonstrate that the Transmission Projects' risks have decreased over the course of this case. Project costs are now more certain, and final contracting and construction is on-schedule; the Company has made substantial progress scoping, developing, and preparing the projects to submit the next round of permit applications necessary for construction and operation. Based on its extensive experience developing comparable transmission resources, the Company is confident that it can deliver the Transmission Projects on-time and at the cost estimates included in my testimony.

Third, the Company did not mismanage its generator interconnection queue or attempt to use its generator interconnection queue to bias the outcome of the 2017R Request for Proposals ("RFP"), as certain parties assert. The Company's treatment of all projects in its generator interconnection queue, whether bidders or not, was consistent with the terms and conditions of its Open Access Transmission Tariff ("OATT").

Fourth, the detailed technical analysis of the Transmission Projects continues to improve and demonstrate that the Company can reliably interconnect the Wind Projects while increasing the transfer capability across Wyoming.

Finally, the Company's estimated third-party transmission revenues included in the economic analysis are reasonable and consistent with the ratemaking methodologies used by the Federal Energy Regulatory Commission ("FERC").

REMOVAL OF UINTA

Q. As discussed by Company witness Ms. Cindy A. Crane, the Company has removed Uinta from the list of projects for which the Company is seeking approval. Does this change affect the network upgrades?

A. Yes. Exhibit RMP___(RAV-1SR) shows the updated 230-kV network upgrades. The following upgrades will no longer be needed with the removal of the Uinta project:

- Construct a new three (3) breaker 230-kV ring bus.
- Inclusion of the project into Naughton RAS.
- Construct a 230-kV single circuit transmission line beginning approximately one mile outside of the Ben Lomond substation to replace the Ben Lomond–Naughton 230-kV #1 circuit which resides on the north side of the 7-mile long lattice tower double circuit with the Ben Lomond–Birch Creek 230-kV line.
- Reconductor 2.35 miles of 795 ACSR 138-kV line between Railroad and Croydon with 1222 ACCC high temperature conductor. The portion of the line to reconductor is on one side of a double-circuit tower.

Q. How do these changes to the network upgrades affect the cost of the Transmission Projects?

A. The costs are reduced by $33.33 million, from $110.65 million to $77.32 million.

TRANSMISSION PROJECTS ARE NEEDED AND WILL PROVIDE IMMEDIATE BENEFITS TO CUSTOMERS

Q. The parties assert that the Company did not claim that it had a need for the Aeolus-to-Bridger/Anticline transmission line until late in this proceeding and has not established any independent need for the line. (***See, e.g.,*** **Peaco Supplemental Rebuttal and Surrebuttal, lines 193–205.) Is this a fair characterization of the Company's testimony?**

A. No. The parties ignore the fact that the Company's direct and rebuttal testimonies thoroughly described the need for the Aeolus-to-Bridger/Anticline transmission line—with or without the Wind Projects. (Vail Direct, lines 72–83, 313–528; Vail Supplemental Direct and Rebuttal, lines 260–424.) As discussed further by Ms. Crane and Company witness Mr. Rick T. Link, the parties also ignore the Company's comments and testimony in the Utah proceeding approving the 2017R RFP, as well as the 2017 Integrated Resource Plan.

In my previously filed testimony, I explained that the Aeolus-to-Bridger/Anticline line is necessary to relieve *existing* congestion on the system and that without the new transmission line, the Company's ability to deliver resources to load will remain constrained. I further described how the North American Electric Reliability Corporation's and Western Electricity Coordinating Council's standards and criteria influenced the need for the Aeolus-to-Bridger/Anticline line. The Company made it clear that the Aeolus-to-Bridger/Anticline line has been an integral component of the long-term transmission plan for the region long before the Wind Projects were contemplated.

I then reiterated these points in my rebuttal testimony, responding explicitly to the argument that there was no need for the Aeolus-to-Bridger/Anticline line. As further explained in my rebuttal testimony, the Aeolus-to-Bridger/Anticline line and the Wind Projects are mutually dependent on one another because the Wind Projects affect the *timing* of the construction of the line and provide PTC benefits to offset the cost of the line, but contrary to assertions from Mr. Peaco, the Company did *not* testify that the *need* for the Aeolus-to-Bridger/Anticline line was related to the development of the Wind Projects. The parties ignore my rebuttal testimony entirely and, in doing so, mischaracterize the record on this point.

Q. Why are the Transmission Projects needed even without the Wind Projects?

A. The transmission system in eastern Wyoming is currently extremely constrained. Beyond one project with an in-service date before the end of 2020 and an interconnection agreement that allows interconnection without the Aeolus-to-Bridger/Anticline line, no additional generation can be reliably interconnected today. This means that additional generation cannot even "clamp on" to the Company's system, much less be reliably integrated and delivered to load.

Since 2007, PacifiCorp's integrated resource plans have identified that PacifiCorp's long-term transmission plan calls for the construction of multiple segments of Energy Gateway, including the Aeolus-to-Bridger/Anticline line. Although (as parties have pointed out, *see, e.g.*, Hayet Second Rebuttal, lines 867–875) the planned permitting and construction dates—which depend on variety of factors—have changed over time, the estimated outer range has consistently been 2024. The

timeframe estimates, and the long-term transmission plan itself, take into account and are supported by many factors, including:

- Ensuring PacifiCorp's OATT network transmission customers can deliver their designated network resources to their designated network loads on a firm basis, as required by FERC;
- Accommodating requests for long-term firm point-to-point transmission service under PacifiCorp's OATT;
- Accommodating generator requests to interconnect with PacifiCorp's transmission system under the OATT; and
- The results of the coordinated local and regional planning process set forth in PacifiCorp's OATT Attachment K and primarily memorialized in the study plans issued by the Northern Tier Transmission Group ("NTTG").

In addition, generally speaking, the transmission system planning reliability standards set out detailed requirements for conducting annual studies to assess the performance of the transmission system over certain time horizons. While reliability standard studies of this nature are technically distinct from the transmission planning factors listed above, the information they provide about current system operations under a variety of conditions generally informs and supports PacifiCorp's long-term planning initiatives as well.

Furthermore, the Aeolus West Transmission Path Transfer Capability Assessment report, the most recent version of which is attached as Exhibit RMP___(RAV-2SR) and dated March 30, 2018, identifies all reliability standards that are required for construction of the Aeolus-to-Bridger/Anticline line and

all performance standards that require the construction of the Aeolus-to-Bridge/Anticline.

Q. What other benefits do the Transmission Projects provide?

A. Independent of the need to integrate additional wind in eastern Wyoming, the Transmission Projects will provide the following reliability benefits to the transmission system:

- The projects will strengthen the overall reliability of the existing transmission system by providing critical voltage support to the Wyoming transmission network.
- The addition of new transmission lines will mitigate the impact of outages on the existing system, and will increase the system reliability under the various multiple contingencies of the North American Electric Reliability Corporation ("NERC") transmission planning TPL-001-4 standard.
- If there is a line outage, the redundancy provided by the projects will allow the Company to continue to meet native load service obligations and continue to meet other contractual obligations to third parties.
- The project will improve the Company's ability to perform required maintenance without significant operational impacts to the system, and will reduce impacts to customers during planned and forced system outages.

In addition to reliability benefits, the Transmission Projects will also:

- Increase the transfer capability across Wyoming by 951 megawatts ("MW") and enable interconnection of the proposed Wind Projects;

- Reduce congestion on the heavily used transmission system in Southeast Wyoming;
- Provide greater flexibility in managing existing resources and reduce energy and capacity losses; and
- Support the long-term transmission expansion planning established in the most recent NTTG Regional Transmission Plan.

Q. Mr. Peaco claims that the Company has "historically" relied on "economic justifications" to build new transmission, including the Aeolus-to-Bridger/Anticline line, and that no economic justification for the projects would exist without the Wind Projects. Is this correct?

A. No. Mr. Peaco cites to the Company's integrated resource plans ("IRPs") to support his statements. But whether or not transmission projects are needed is not determined in an IRP. Instead, it is determined through the long-term transmission plans that Mr. Peaco dismisses. (Peaco Supplemental Rebuttal and Surrebuttal, lines 250–261.) The IRP process is focused on determining the least-cost, least-risk portfolio of *generation* resources needed to serve load. While some regulatory commissions require consideration of transmission needs in an IRP, including these needs in an integrated resource plan is problematic from my perspective because the benefits of new transmission are often not quantifiable, making it difficult to demonstrate that transmission is cost-effective in the context of an IRP. But the Company's long-term transmission planning *does* consider reliability requirements and FERC precedent that can require a line to be built regardless of economics (see the factors listed above, lines 111–120), which are what primarily drive the need for transmission investments.

Q. Has DPU previously supported the use of long-term transmission planning to justify the construction of transmission resources?

A. Yes. In the Company's 2015 IRP docket, DPU's comments indicated: "In spite of delays, the Energy Gateway strategy is a fundamental part of the Company's long-term plan for existing and future customers, and the Division stresses the importance of transmission planning because of its long lead time." *In the Matter of PacifiCorp's 2015 Integrated Resource Plan,* Docket No. 15-035-04, Division Comments at 12 (June 29, 2016).

Q. Mr. Peaco states that you provided no information regarding how the Aeolus-to-Bridger/Anticline transmission line would be "economically justified solely for the reliability and system performance improvements [you] described." (Peaco Supplemental Rebuttal and Surrebuttal, lines 218–221.) Does Mr. Peaco accurately state the drivers for investing in new transmission infrastructure?

A. No. As mentioned above, the need to for new transmission infrastructure is driven by reliability requirements and FERC polices and precedent, not economics. The fact that the Company tries to find ways to reduce the impact of transmission investments on its customers by finding alternatives to delay those investments as long as possible or, as in this case, use the availability of federal tax credits to reduce the rate impact of transmission investment, should be lauded rather than held against the Company.

Q. Dr. Zenger argues that the Aeolus-to-Bridger/Anticline line is an unnecessary "early acquisition" and that there is little downside risk to customers if the Combined Projects are not built. (Zenger Supplemental Rebuttal and Surrebuttal, lines 512–546, lines 591–592.) How do you respond to this claim?

A. I disagree. As Mr. Link explains in detail in his testimony, there is current need for resources and the Combined Projects are part of the least-cost, least-risk portfolio of resources needed to meet this need. While it is true that long-term transmission plans evolve as circumstances change over time, they remain the most important tool the Company has for determining the need for transmission resources, particularly because of the long lead time required for permitting and construction of major transmission facilities, as DPU has previously acknowledged. Since there is an immediate need for the Combined Projects, this is not an "early acquisition."

Dr. Zenger's casual dismissal of the current need for the Aeolus-to-Bridger/Anticline transmission line and the assertion that there is little downside risk to not moving forward with the Combined Projects does not consider that even a small change in generation resources or load will require the line to be built without the benefit of the federal production tax credits to offset the costs. This means that retail customers would bear the $697 million in costs with only revenue from third-party transmission customers as an offset. This is not an insubstantial or speculative risk. The Company has managed to postpone the construction of this transmission line by making incremental improvements to the system, but there are no other options at this point. I have no doubt that the Aeolus-to-Bridger/Anticline line will be built in the near future.

Not acting now to capture PTC benefits to offset the costs would be detrimental to customers.

Q. Mr. Peaco claims the fact that the Aeolus-to-Bridger/Anticline transmission line is included in the NTTG's recent regional study of transmission alternatives "does not provide any evidence that there is a need for the Transmission Projects independent of the Wind Projects." (Peaco Supplemental Rebuttal and Surrebuttal, lines 230–237.) Is Mr. Peaco correct?

A. No. NTTG concluded that the "NTTG area would be reliably served in the year 2026 only by including" several proposed transmission projects, including the Aeolus-to-Bridger Anticline line.[1] Contrary to Mr. Peaco's implication, the transmission line was not included in the study solely to accommodate PacifiCorp's plans for new wind generation. In the 2016-17 biennial study process, the NTTG transmission model did include high levels of wind resources in eastern Wyoming, but the size and location of the various resources were based on the needs of all of the load-serving entities and not based on the needs of a specific transmission project or a single load-serving entity. As part of the analysis, the NTTG Technical Work Group performed a critical review of each Energy Gateway sub-segment and included only required sub-segments in the 2016-17 NTTG Regional Transmission Plan.

Q. If the Company pursued solar projects instead of the Wind Projects, would the Aeolus-to-Bridger/Anticline transmission line still need to be built?

A. Yes, although the timing may be different. Based on current system conditions and

[1] NTTG 2016-2017 Regional Transmission Plan at 24 (Jan. 9, 2018) (available online at https://www.nttg.biz/site/index.php?option=com_docman&view=list&slug=2016-2017-regional-transmission-plan-final&Itemid=31).

demand for interconnection and transmission capacity in eastern Wyoming, the construction of the line will more likely than not be needed no later than 2024.

RISKS OF THE TRANSMISSION PROJECTS HAVE DECREASED

Cost Estimates

Q. Dr. Zenger asserts that the Company's cost estimates for the Combined Projects have been ever-evolving. (*See* Zenger Supplemental Rebuttal and Surrebuttal, lines 115–117.) Do you agree?

A. No. The Company's cost estimate for the Aeolus-to-Bridger/Anticline transmission line has remained the same ($679.2 million) throughout this proceeding. (Vail Direct, page 12, Confidential Table 1). And the Company has confirmed through a competitive market solicitation that the cost estimate for the Aeolus-to-Bridger/Anticline transmission line is valid. Because the Aeolus-to-Bridger/Anticline line is 85 percent of the total cost of the Transmission Projects, cost certainty for that piece decreases the cost risk for the Transmission Projects as a whole.

The costs for the network upgrade piece of the Transmission Projects has changed as the results of the 2017R RFP have been finalized, as I described in my previous testimonies. (Vail Supplemental Direct and Rebuttal, lines 52–96; Vail Second Supplemental Direct, lines 27–44, 97–130.) But these changes are not surprising—the Company stated that the costs would be reassessed as the 2017R RFP process progresses. (Vail Direct, lines 290–293.)

Q. Dr. Zenger questions the Company's ability to accurately forecast the costs of the Transmission Projects, relying on an alleged discrepancy between the cost estimate for the Company's Populus-to-Terminal project and the actual costs. (Zenger Supplemental Rebuttal and Surrebuttal, lines 248–256.) Is Dr. Zenger's argument well-founded?

A. No. Dr. Zenger repeats the mistake made by Mr. Mullins in his direct testimony, (Mullins Direct, lines 11–15), and completely ignores my rebuttal testimony on this point. (Vail Supplemental Direct and Rebuttal, lines 571–595.) Both Dr. Zenger and Mr. Mullins identify $78 million as the Company's cost estimate for the Populus-to-Terminal project, but this is incorrect. As described in my rebuttal testimony, the $78 million relied upon by Dr. Zenger and Mr. Mullins was a high-level estimate of the cost to construct a 300-MW transmission line that was called for in one of the Company's 2006 merger commitments. The original cost estimate for the Populus-to-Terminal project was actually $750 million, which was within seven percent of the final project costs. In addition, the $750 million estimate was developed at an earlier stage of the process than the estimate for the Aeolus-to-Bridger/Anticline transmission line, so the Company has more data informing the estimate in this case (including a clear understanding of permit requirements, status, and progress, as well as the information from the competitive solicitation).

In addition, both Dr. Zenger and Mr. Mullins ignore my testimony on the Company's recent delivery of major transmission projects on time and on budget, namely the Mona-to-Oquirrh and the Sigurd-to-Red-Butte transmission lines. (Vail Supplemental Direct and Rebuttal, pages 24–25, lines 528–542.) Similarly, Mr. Hayet

ignores this evidence in implying that PacifiCorp is relying on little more than "confidence" as evidence that it can deliver projects on time and on budget. (Hayet Second Rebuttal, lines 770–779.)

Q. Did Mr. Mullins address your rebuttal testimony regarding the Populus-to-Terminal project?

A. Yes, but Mr. Mullins inaccurately states that I "acknowledge[d] that the Populous [sic] to Terminal line was originally forecast to cost only $78 million, but ultimately cost $801 million" and dismisses my rebuttal on this point as a disagreement "with the relevance of that estimate." (Mullins Supplemental Rebuttal, lines 845–848.) This is a complete misstatement of my testimony. My rebuttal made it clear that the original estimate for the Populus-to-Terminal project was $750 million, not $78 million. (Vail Supplemental Direct and Rebuttal, lines 575–595.)

Mr. Mullins also claims that the Idaho Public Utilities Commission relied on the $78 million in disallowing a major portion of the Populus-to-Terminal line. (Mullins Supplemental Rebuttal Testimony, lines 848–850.) Mr. Mullins does not, however, provide a citation for this assertion, probably because he is wrongly describing the Idaho commission's order. The Idaho commission did not even reference the $78 million in its final order approving the Populus-to-Terminal transmission line. The Idaho commission did refer to the 300-MW line included in the merger commitment, but this was not relevant to the commission's decision regarding the Populus-to-Terminal line. Finally, the Idaho commission did not disallow recovery of any portion of the Populus-to-Terminal line. Instead, the Idaho commission bifurcated recovery of the line, allowing 73 percent of the investment in rates right away, and placing the

remaining 27 percent in the account for plant held for future use. The Idaho commission explicitly explained: "This is not a disallowance requiring a write off but a deferral[.]" Case No. PAC-E-10-07, Order No. 32196 at 12 (Feb. 28, 2011).

Q. Mr. Mullins states that the Company is using "untested, undeveloped technology" rather than steel lattice transmission towers described in the Company's opening testimony, which could result in increased or unexpected costs. (Mullins Supplemental Rebuttal, lines 820–822.) Is Mr. Mullins correct?

A. No. The tower technology the Company proposes to use is neither "new" nor "undeveloped." The Company proposed steel lattice towers in direct testimony and continues to propose steel lattice towers—the only difference is that the Company changed to a "flat" configuration rather the previous "delta" configuration. Both configurations are commonly used in the transmission industry, but the advantage of the new configuration is that it will be shorter, lighter, and easier to build, which will reduce overall construction costs. Moreover, all of the new towers will be full-scaled tested to ensure that they meet or exceed the design loads before usage.

Q. Please summarize the progress of the tower design and development program.

A. The Company is making excellent progress towards completing the tower design and development program. As of May 1, 2018, all design work is complete for all six towers in the program. The primary tangent tower successfully completed full-load case testing in the last week of April 2018. This tower represents over 80 percent of all towers for the Aeolus-to-Bridger/Anticline line, providing certainty to the design and costs of the project for this item. Remaining tower-load case testing is scheduled for mid-May and early June 2018, with all tests complete by mid-June 2018.

Q. Mr. Mullins cites problems with the use of "new technologies," specifically relying on issues with NV Energy's "One Nevada Line." (Mullins Supplemental Rebuttal, lines 833–836.) Are the transmission towers proposed in this case comparable to those used on the One Nevada Line?

A. No. The One Nevada Line towers are constructed using long, slender, and smooth tubular members that, under specific wind conditions, can oscillate and result in severe structural damage. The phenomenon of wind-induced vortex shedding and harmonic oscillating motion (commonly referred as vortex-induced vibration) on long, slender structures is well understood and can be mitigated. Unlike the towers used for the One Nevada Line, the towers proposed to be used in this case are a common lattice type constructed of "L-shaped" angle members that have been successfully deployed worldwide. Also unlike the towers used for the One Nevada Line, lattice towers do not offer a single continuous and symmetrical smooth surface to support vortex shedding. Much like a guitar string, long, tubular poles may have one natural frequency enabling harmonic oscillation when subjected to wind of matching velocity. Lattice towers, which are comprised of irregular shapes in varying member lengths, will not have just one single composite frequency and are therefore naturally resistant to wind-induced harmonic resonance.

Q. Relying on the Company's response to UAE Data Request 5.4, Mr. Mullins claims that the ongoing capital maintenance and replacement costs for the Transmission Projects were not considered in the Company's economic analysis. (Mullins Supplemental Rebuttal, lines 485–487.) Is Mr. Mullins correct?

A. No. Mr. Mullins misstates the Company's response to UAE Data Request 5.4. He

claims that the Company "states that is analyses did not consider the ongoing capital maintenance and replacements of the Transmission Projects." But what the response actually says is that ongoing capital additions or replacements are not expected, and ongoing operations and maintenance costs of $1 million per year in 2017 dollars are included in the economic analysis.

Q. Mr. Mullins claims that "ongoing capital cost of the transmission investment is significant in the study period." (*Id.*, lines 499–500.) Is he correct?

A. No. The Company currently operates and maintains 16,500 miles of transmission and over 1,000 substations, and has a number of preventative and corrective maintenance programs to extend the life of transmission assets. The addition of the transmission projects will not materially impact the overall capital maintenance budget for the system. The Company focuses on identifying efficiencies and prioritizes spend within the capital maintenance program and does not expect an increase to overall system costs associated with the new Transmission Projects.

Construction Schedule

Q. Mr. Peaco reiterates his concern that there is risk of losing PTCs if the Transmission Projects are not in service by December 31, 2020, claiming that PacifiCorp has changed its story about the importance of the timing of the Aeolus-to-Bridger/Anticline transmission line? (Peaco Supplemental Rebuttal and Surrebuttal, lines 39–42.) Do you agree?

A. No. The completion of the Aeolus-to-Bridger/Anticline transmission line has been and continues to be one of the key drivers of timing in this case. The Company did not change its position that completion of the line on time is important and is the

Company's "Plan A" to secure PTC eligibility and the full benefits of the Combined Projects.

In response to parties' concerns about PTC eligibility, the Company clarified that there is a "Plan B"—PTC eligibility can be secured if the Wind Projects are synchronized to the grid, which requires completion of the network upgrades identified in Exhibit RMP___(RAV-1SS). The Company should not be accused of changing position simply because it is responding to parties' arguments.

The network upgrades identified in Exhibit RMP___(RAV-1SS) are the types of transmission projects that the Company routinely builds in the ordinary course of business. The Company has extensive experience designing, constructing, and operating these types of facilities. The Company is confident that it can timely complete the projects necessary to secure PTC eligibility.

Q. Mr. Peaco claims that you did not clearly identify which facilities are needed to synchronize the Wind Projects to the grid. Did you provide this information?

A. Yes. The facilities that need to be in service for synchronization of the Wind Projects to the grid are identified in my Exhibit RMP____(RAV-1SS), although Mr. Peaco is correct that I did not explicitly identify these facilities as those necessary to synchronize the Wind Projects to the grid.

Q. Mr. Peaco states that customers would bear the risk of losing PTC benefits when wind production is curtailed for system-protection reasons (Peaco Supplemental Rebuttal and Surrebuttal, lines 334–336.) What is your response?

A. While Mr. Peaco is technically correct, he overstates the likelihood and the impact of this risk. Wind would only be curtailed under certain severe outage scenarios and, even

then, only to generator-tripping amount required. The transmission system is designed to meet all NERC and Western Electricity Coordinating Council ("WECC") reliability and operating criteria for outage conditions. I also addressed this issue in my Supplemental Direct and Rebuttal testimony, lines 697–709.

Regulatory Approvals and Permits

Q. Dr. Zenger expresses concern that the Company has not obtained the necessary permits for the Aeolus-to-Bridger/Anticline line. (Zenger Rebuttal and Surrebuttal, page 5, lines 75–76). What is the current status of the permitting process?

A. The Company has made significant progress towards obtaining its remaining permits and authorizations, including:

- Receiving certificates of public convenience and necessity for the Transmission Projects (and the Wind Projects), conditioned on obtaining rights-of-way, from the Wyoming Public Service Commission, as discussed by Ms. Crane in her surrebuttal testimony.
- Receiving notice to proceed from the Bureau of Land Management ("BLM") for 30 percent of the Plan of Development appendices required for construction. One additional group (Group 2) of appendices have been through BLM review and are awaiting final approval letter from BLM. The final group of appendices (remaining 20 percent) will be submitted for review and approval on schedule after construction contractor selection and subsequent input to the remaining appendices.

- Submitting the Class III Cultural report to the BLM. This requirement is on track for completion in accordance with the project schedule.
- Receiving confirmation of the Aquatic Resources Inventory from the U.S. Army Corps of Engineers regarding acquisition of the required wetlands permits. This significant progress, in accordance with the project schedule, mitigates most of the project permitting risk.

PARTIES MISUNDERSTAND THE INTERCONNECTION STUDY AND RESTUDY PROCESSES

Q. Witnesses for DPU, OCS, and UAE/UIEC claim that the Company disqualified projects from the 2017R RFP based solely on interconnection queue position. (*See, e.g.*, Peterson Supplemental Rebuttal and Surrebuttal, lines 379–381 ("…the most significant failure of the RFP process was the last minute elimination of essentially all projects but the final short list projects due to the restudy by PacifiCorp transmission of the transmission interconnections."); Hayet Second Rebuttal, lines 726–730 ("…PacifiCorp determined bids had to be eliminated because those bids required completion of all Gateway West and South upgrades[.]")). Are they correct?

A. Absolutely not. As described in more detail by Mr. Link, the final shortlist of projects selected from the 2017R RFP was initially developed based on *economic analysis alone*. The interconnection restudy process was initiated and conducted completely independently from the 2017R RFP.

PacifiCorp transmission's restudies of the interconnection customers in the generation interconnection queue were initiated given the change in the in-service date of the Aeolus-to-Bridger/Anticline transmission line, which is a sub-segment of

Gateway West. Historically, the Company's interconnection studies did not include consideration of the components of its long-term transmission plan by sub-segment. Given the change in the expected in-service date from 2024 to 2020, PacifiCorp transmission initiated restudies to determine whether interconnection requirements changed based on this change.

Furthermore, only one of the resources selected to the final shortlist was eliminated after the interconnection restudy process—McFadden Ridge II, which was the Company's own bid. But the interconnection restudies revealed additional interconnection capacity, which allowed the selection of the more-economic Ekola Flats project, as described further by Mr. Link.

Contrary to some of the parties' assertions, and as discussed further by Mr. Link, the interconnection restudies did not result in "disqualification" of any of the RFP bidders. Before the restudies were conducted, the need for full build-out of the Gateway West and Gateway South projects to allow interconnection of additional wind resources was triggered at queue position Q708. Including the addition of the Aeolus-to-Bridger/Anticline transmission line in 2020 in the interconnection restudies created *additional* interconnection capacity. This means that, as a result of the restudies, *additional* projects became viable with the addition of the Aeolus-to-Bridger/Anticline line. After the restudies, the need for full build-out of Gateway West and Gateway South was triggered at queue position Q713. Those projects at Q713 and higher than that queue position were not viable without Gateway West and South both before and after the restudies.

Q. Mr. Peaco also contends that bidders were not aware of the interconnection constraints and would not have bid if they had been aware. (*See, e.g.*, Peterson Supplemental Rebuttal and Surrebuttal, lines 88–89.) Is this a reasonable argument?

A. No. The fact that full build-out of Gateway South was triggered at queue position Q708 before the restudies was publicly available because the interconnection studies for Q708 were publicly available on OASIS. The bidders to the RFP in lower queue positions knew or should have known that interconnection capacity was scarce. And in fact, the Company very publicly stated throughout multiple proceedings regarding the Combined Projects that no additional generators behind the TOT 4A constraint could interconnect today. This is one of the reasons the Company initially proposed including a requirement for completed system impact studies in the 2017R RFP—a requirement that was removed at the request of stakeholders and the independent evaluator in Utah. The lack of interconnection capability is and has been one of the primary drivers for the need for the new line, and this fact was well known.

Q. Mr. Mullins claims that the Company never disclosed its "position with respect to the interconnection queue" until January 31, 2018. (Mullins Supplemental Direct, lines 5–10.) Is this true?

A. No. Mr. Mullins implies that the Company's treatment of the interconnection queue was somehow novel or a change from prior practice, and therefore the Company should have provided earlier notice as part of the 2017R RFP. But there was nothing unusual about how the Company treated its interconnection queue or performed the restudies necessary to identify interconnection network upgrades. As described above, the

Company's treatment of the queue was consistent with long-standing FERC precedent and the clear terms of its OATT.

It is theoretically possible for PacifiCorp to file at FERC to change the required processing of its interconnection queue, but PacifiCorp transmission would still need to allocate interconnection capacity in sequential queue order. Changes to interconnection queue processing are generally used to address cost allocation among interconnection customers. But for facilities that are part of a utility's long-term transmission plan (like the Energy Gateway projects), the costs cannot be allocated to interconnection customers, so the method of conducting interconnection studies is irrelevant to the allocation of limited interconnection capacity to interconnection customers.

Q. Mr. Mullins further claims that he "was under the impression that all Wind RFP bids would be scored or evaluated on the same basis, with the Company being able to then either equalize or mitigate the bidding advantage otherwise available to a bidder with a higher queue position." (Mullins Supplemental Rebuttal, lines 283–286.) How do you respond?

A. First, the bids were evaluated and scored on the same basis, as described by Mr. Link. Second, the Company cannot "equalize" or "mitigate" the fact that some projects are higher in the interconnection queue than others. That would give preferential treatment to lower-queued projects, and such preferential treatment is prohibited by the terms of the Company's OATT.

Q. Mr. Hayet claims that the interconnection studies increased "transfer capability" from 1,270 MW to 1,510 MW. (Hayet Second Rebuttal, lines 227–229 and lines 252–254.) Is this correct?

A. No. Mr. Hayet is confusing *interconnection capacity* with *transfer capability*. The interconnection restudies resulted in an increase of interconnection capacity from 1,270 MW to 1,510 MW, meaning additional megawatts can *interconnect* to the transmission system. Although interconnection studies can include some deliverability analysis, interconnection studies are not used to determine *transfer capability* of a transmission line. Transfer capability is determined through transfer capability assessment studies. In this case, the transfer capability assessments show that transfer capability is increased by 951 MW with the addition of the Aeolus-to-Bridger/Anticline transmission line.

Mr. Mullins makes a similar error when he states that PacifiCorp's "position" is that it must reserve "transmission capacity" for each project in the interconnection queue. (Mullins Supplemental Rebuttal, lines 168–174.) In the interconnection study process, PacifiCorp must assume that every project higher in the interconnection queue has been interconnected, meaning we reserve *interconnection capacity* (not transmission capacity) for higher-queued projects, as required by FERC.

From my perspective as the vice president responsible for one of largest transmission systems in the western United States, this confusion over basic transmission concepts demonstrates these witnesses' lack of expertise on transmission issues.

THE PARTIES' CRITICISMS OF THE TRANSMISSION STUDIES ARE NOT WELL-FOUNDED OR ACCURATE

Q. Why have there been three different Aeolus West Transmission Path Transfer Capability Assessments?

A. The first version of the Aeolus West Transmission Path Transfer Capability Assessment (1.0 – October 2017; a copy of version 1.0 was provided with my supplemental direct and rebuttal testimony as Exhibit RMP___(RAV-4SD)) used resources in PacifiCorp's large generator interconnection queue as a proxy for new wind resources because the specific size and location of the new wind resources that would ultimately be selected through the 2017R RFP was not known at the time of the study. The Company selected projects for the assessment based on queue order and proximity to the proposed Aeolus substation, one terminus of the Aeolus-to-Bridger/Anticline line. The study indicated that the new Aeolus West path could achieve a transfer level of 1,696 MW and allow interconnection of up to 1,270 MW of new wind projects.

After this first report, the 2017R RFP shortlist was issued, which provided more information about the size and location of anticipated new wind projects. The Aeolus West Transmission Path Transfer Capability Assessment was therefore updated and version 2.0 (February 12, 2018) was developed (a copy of version 2.0 was provided to the parties through discovery). As updated, the assessment indicated that the new Aeolus West path could achieve a transfer level of 1,792 MW and allow interconnection of up to 1,510 MW of new wind generation.

When the change to the 2017R RFP shortlist was made, another updated Aeolus West Transmission Path Transfer Capability Assessment was performed, called version 2.1 and dated March 30, 2018. A copy of version 2.1 is attached as

Exhibit RMP___(RAV-2SR)[2]. Version 2.1 shows transfer levels of 1,829 MW and interconnection of up to 1510 MW of new wind generation.

Q. Mr. Peaco repeatedly emphasizes that the Aeolus West Transmission Path Transfer Capability Assessments are "preliminary." (*See, e.g.*, Peaco Supplemental Rebuttal and Surrebuttal, lines 64–65.) Does Mr. Peaco appear to understand the significance of this designation?

A. No. Mr. Peaco seems to believe that the preliminary nature of the assessment means that further studies are needed before the Company can determine whether the Wind Projects can be reliably interconnected. This is not correct, as discussed in more detail later in my testimony.

Q. What is the significance of the "preliminary" designation?

A. For the Aeolus West Transmission Path Transfer Capability Assessments, simultaneous interaction between the Aeolus West path and the TOT 4B path was evaluated; however, the interactions with other transmission paths (Yellowtail South, Jim Bridger West, TOT 1A and TOT 3) were monitored throughout the study. The interaction between the Aeolus West and the TOT 4B transmission paths is the most critical analysis that needs to be performed when evaluating facility additions necessary to support increasing transfers east to west across Wyoming. Because the interaction of the Aeolus West transmission path with TOT 3 (Path 36), Bonanza West (Path 33) and TOT 1A (Path 30) transmission paths was not studied, the three versions of the Aeolus West Transmission Path Transfer Capability Assessment is labeled "preliminary." Follow-on FAC-013-2 transfer capability assessments will be performed jointly with a

[2] The appendices to version 2.1 are voluminous and included in my workpapers.

Project Review Group made-up of affected parties (Idaho Power Company, Black Hills Power, Basin Electric, Western Area Power Administration, etc.). This process is not unusual and will not result in changes to the Aeolus-to-Bridger/Anticline transmission line.

Q. Mr. Peaco states that version 2.1 of the transfer capability study indicates that changes have been made to Aeolus-to-Bridger Anticline line that "will certainly add cost to the project." (**Peaco Supplemental Rebuttal and Surrebuttal, lines 1077–1079.) Is this true?**

A. No. Mr. Peaco identifies three "new" components: (1) an increase in the assumed size of the Aeolus 230-kV shunt reactor from 50 MVAr to 60 MVAr; (2) a new 60-MVAr shunt reactor added to Shirley Basin 230 kV; and (3) a change to the reconductoring of the Aeolus-to-Shirley-Basin 230-kV #1 and #2 lines. (Peaco Supplemental Rebuttal and Surrebuttal, lines 1048–1056.) The decrease in estimated costs for the Latham dynamic voltage controller help offset the cost of the change in size of the Aeolus shunt reactor and the addition of the Shirley Basin shunt reactor. The costs are still within the tolerance of the estimate for the project. The reconductoring change for the Aeolus-to-Shirley Basin 230-kV #1 line is included in the updated 230 kV network upgrade costs that are part of the revised analysis.

Q. Mr. Peaco also notes uncertainty regarding the dynamic voltage controller at Latham. (*Id.*, lines 1057–1062.) Has that uncertainty been resolved?

A. Yes. PacifiCorp's transmission planning team determined that Static Synchronous Condenser (STATCOM) technology is not required to provide dynamic voltage control at Lathan 230-kV substation. Instead, voltage control can be achieved by installing a

Static VAr Compensator (SVC) with an estimated size of +275/-60 MVAr. The size of this device is currently being evaluated by an outside consultant (Electranix) to verify system performance needs. To be clear, however, the Company's economic analysis conservatively assumed that it would require the highest cost dynamic support device at Latham; therefore, the additional studies will result in a decrease in project cost and a corresponding increase in customer benefits.

Q. Did the location of the final wind projects have an impact on the transfer capability achieved on the Aeolus West Transmission Path?

A. Yes. The location of the wind projects does result in the ability to achieve different levels of transfer capabilities across Aeolus West simultaneous with the TOT 4B path. It is not surprising that the locations of the projects were modified as the 2017R RFP processed progressed.

Q. Mr. Peaco claims that including the Uinta projects decreases stress on the Aeolus West path, thereby increasing transfer capability. (Peaco Supplemental Rebuttal and Surrebuttal, lines 1150–1152.) Is this accurate?

A. No. Due to the location of the Uinta projects in southwest Wyoming, these projects have no impact on the transfer capability of the Aeolus West path and did not contribute to increasing or decreasing the transfer capability achieved in the Aeolus West Transmission Path Transfer Capability Assessments.

Treatment of Interconnection Queue in Assessments

Q. Mr. Peaco claims that the Company's treatment of projects in the interconnection queue was "inconsistent" and implies that the inconsistencies were intentional and designed to increase transfer capability. (Peaco Supplemental Rebuttal and Surrebuttal, line 1096.) Is there any validity to these assertions?

A. No. Mr. Peaco bases his allegations on the mistaken belief that the interconnection agreements for the Ekola Flats (Q706), Bowler Flats (Q542), and Boswell (Q409) projects include similar requirements for the completion of Gateway West and Gateway South, and therefore there was no basis to remove Boswell from version 2.1 of the transfer assessment and include Ekola Flats and Bowler Flats.

Mr. Peaco is wrong. The LGIAs for Ekola Flats and Bowler Flats *do not require* the completion of Gateway West and Gateway South. The LGIA for Boswell explicitly does, and explicitly notes that these projects will not be in-service before 2024.

Q. Why was Boswell included in an earlier version of the transfer capability assessments if it has an executed LGIA requiring Gateway West and Gateway South?

A. As discussed above, the projects initially included in version 1.0 of the transfer capability assessment were proxies chosen based on queue position and proximity to the Aeolus substation. As the 2017R RFP process progressed, the Company no longer needed to include proxies in the assessment, so Boswell was removed.

Q. Bowler Flats is not one of the Wind Projects selected through the 2017R RFP, so why is it included in version 2.1 of the transfer capability assessment when none of the other non-selected generators in the interconnection queue were?

A. Version 2.1 of the transfer capability assessment includes Bowler Flats because that project has an executed LGIA that allows it to interconnect without the addition of the Aeolus-to-Bridger/Anticline line. Bowler Flats is the generator described above as the last generator that can interconnect today. To comply with this LGIA, the Company must reserve sufficient interconnection capacity for Bowler Flats.

Q. Mr. Peaco implies that the Company "updated" the interconnection agreement for Ekola Flats without restudying its interconnection. (Peaco Confidential Supplemental Rebuttal and Surrebuttal, lines 1137–1144.) How do you respond?

A. [redacted]

Q. Mr. Peaco states that the transfer capability assessment should include "all valid/active interconnection queue projects that would be in-service by the start of the study period." (Peaco Confidential Supplemental Rebuttal and Surrebuttal, lines 1089–1092.) How do you respond?

A. The Aeolus West Transmission Path Transfer Capability Assessment study included those resources that will be in-service by the end of 2020, which includes those resources selected in the 2017R RFP. Because the focus of the transfer capability assessment study was to evaluate the increase in east-to-west transfers across Wyoming as a result of adding the Aeolus-to-Bridger/Anticline line, the specific focus was on addition of Wyoming generation resources. Other valid/active interconnection queue projects not included in the analysis were outside the scope of the project and will require additional transmission facilities to integrate. It makes no sense to include projects that cannot even "clamp on" to the system in a transfer capability assessment.

Use of Remedial Action Schemes in Assessments

Q. Mr. Peaco again criticizes the use of remedial action schemes ("RAS") to increase transfer capability in the transfer capability assessment study. (Peaco Confidential Supplemental Rebuttal and Surrebuttal, lines 387–398.) Are Mr. Peaco's criticisms valid?

A. No. The use of RAS is an accepted transmission planning tool. There is a formal process that is followed in the Western Interconnect for technical evaluation and approval by the Western Electricity Coordinating Council Remedial Action Scheme Review Subcommittee. All remedial action schemes must be vetted through this process before activation. The proposed Aeolus RAS will be subject to this same procedure.

Q. Would the planned implementation of the Aeolus West RAS scheme be considered an "excessive generator tripping" scheme as Mr. Peaco alleges? (Peaco Confidential Supplemental Rebuttal and Surrebuttal, lines 389–391.)

A. No. The planned Aeolus West RAS would not be considered excessive as it limits generator tripping to the single largest generator contingency (megawatt level) for the PacifiCorp East balancing authority area.

THE NEW WIND PROJECTS CAN BE RELIABLY INTERCONNECTED AND INTEGRATED

Q. Mr. Peaco appears to believe that additional studies are required to ensure "100 percent deliverability to network load." (Peaco Supplemental Rebuttal and Surrebuttal, lines 1155–1168.) Is he correct?

A. No. Mr. Peaco misunderstands the deliverability analysis conducted in the context of interconnection studies, and seems to confuse reliable interconnection with reliable integration. The system impact studies for the shortlisted projects demonstrate that the Wind Projects can be reliably interconnected. Mr. Peaco cites these studies to argue that "additional Energy Gateway projects and other system improvements would also be required" to ensure 100 percent deliverability of the project. Mr. Peaco is misunderstanding the deliverability information in the system impact studies, which is provided for informational purposes only and is non-binding. The focus of an interconnection study is *interconnection service*. While these studies include some information about deliverability, the information is preliminary, non-binding, and for informational purposes only. Full integration and deliverability requirements are determined when a customer requests *transmission service*.

Q. Do the Aeolus West Transfer Capability Assessments demonstrate full deliverability of the Wind Projects?

A. Yes. Study findings demonstrated that the output of all existing and new wind resources can be fully delivered by displacing Wyoming thermal generation with renewable generation. Mr. Peaco's concerns that there are no guarantees that the Company would be able to dispatch other resources to maintain 100 percent deliverability is belied by the assessments and is further discussed by Mr. Link.

The transfer capability assessments also confirm that the Wind Projects can be reliably interconnected. Version 2.1 of the assessment included detailed modeling of the Wind Projects, and both power flow and dynamic stability analysis was performed. This analysis demonstrated that with the Aeolus-to-Bridger/Anticline transmission line and the Wind Projects, system performance will meet all NERC and WECC performance criteria.

Q. Mr. Peaco notes that the March 30, 2018 Aeolus West Transmission Path Transfer Capability Assessment study report identified "poor" voltage performance and "unacceptable" oscillations for the Vestas wind turbines for specific wind farms identified on the wind project shortlist. (Peaco Supplemental Rebuttal and Surrebuttal, lines 1020–1026.) What is the current status of efforts to resolve the "unacceptable" oscillations identified for the Vestas wind turbine models?

A. Follow-on analysis has identified that the "poor" voltage performance and "unacceptable" oscillation for the Vestas wind turbines for specific wind farms identified on the wind project shortlist were due to a tuning problem with the power plant controller at specific wind farms. This problem has been corrected and a complete

set of transmission system outages has been rerun to verify wind turbine performance. Additionally, the most recent transmission system model, including updates to the Vestas dynamic wind turbine models and parameters, has been forwarded to an outside consultant (Electranix) for more detailed Power System Computer Aided Design (PSCAD) modeling. The pre- and post-tuning correction plots are available upon request.

Q. Does this address Mr. Peaco's concern that changes to the wind turbines models could further modify the transfer capability and require revisions to system impact studies for the Wind Projects, potentially leading to increased costs? (*Id.*, lines 1027–1036.)

A. Yes. The issue is resolved, so there is no risk of reduced transfer capability or modified interconnection requirements. I would also note that the system impact studies are *interconnection* studies. The outcome of the transfer capability assessments does not affect the findings in the interconnection studies. Moreover, as described by Mr. Link in his second supplemental direct testimony, the Company negotiated commercial terms that fully addressed the risk associated with the wind-turbine issue identified in the transfer capability assessment (Link Second Supplemental Direct, lines 497–532.)

OATT REVENUES

Q. Mr. Mullins and Mr. Peaco again question the Company's assumption that the Company will recover 12 percent of the revenue requirement of the Transmission Projects through its OATT rates. (Peaco Supplemental Rebuttal and Surrebuttal, lines 400–414; Mullins Supplemental Rebuttal, lines 598–670.) How do you respond?

A. The Company's estimate of third-party transmission revenues continues to be reasonable based on historical data and given the expected decline in PacifiCorp's load. As discussed in more detail below, transmission costs are allocated between transmission customers based primarily on load. If PacifiCorp's load decreases, its relative share of transmission costs also decreases. This makes the 12-percent assumption conservative rather than unreasonably high.

Q. Mr. Mullins claims that your "description of PacifiCorp's formula rate overlooks the way that costs get allocated between point-to-point and network integration transmission customers." (Mullins Supplemental Rebuttal, lines 625–626.) Do you agree with Mr. Mullins's argument?

A. No. Mr. Mullins's argument misunderstands how transmission rates are calculated. Mr. Mullins's argument assumes that the construction of the Wind Projects will increase the load served by network resources and therefore reduce the loads served by front-office transactions that rely on point-to-point transmission. He then speculates that this would increase PacifiCorp's network service load, but the Company would still have to pay for the same amount of point-to-point transmission service used to deliver front-office transactions.

Q. Is this a valid assumption?

A. No. Transmission costs are based on customers' relative share of load at the time of the transmission system peak plus long-term point-to-point capacity. Network transmission capacity is measured monthly at time of system peak. Therefore, over time, loads typically grow or shrink depending on many factors, including such items as population change, business mix, and the effects of weather. The addition of generation capacity by itself does not change a customer's load share of the transmission costs. PacifiCorp continually monitors and adjusts its transmission requirements, as do all other third-party customers. PacifiCorp's relative share of transmission costs are dependent on its load growth relative to third parties. Historically, allocation of PacifiCorp's use of transmission has been around 12 percent. Recent trends indicate that the Company's percent might be shrinking and the amount allocated to third parties increasing. Adding generation capacity is not expected to impact this trend. As a result, PacifiCorp's share of additional transmission costs would not be expected to increase relative to third parties based on constructing additional generation and transmission assets.

Q. Mr. Mullins claims that the cost of the Transmission Projects maybe directly assigned to PacifiCorp. (Mullins Supplemental Rebuttal, lines 646–649.) Is this a material risk?

A. No. Once again, Mr. Mullins appears to misunderstand how the Company's OATT formula rates are calculated. As mentioned above, PacifiCorp's transmission costs are recovered through a formula rate mechanism approved by FERC, so the risk of these costs being directly assigned is extremely low given how transmission costs are incorporated into the formula rate. Furthermore, under FERC policy and precedent, the

costs of portions of a long-term transmission plan are not directly assignable to specific transmission customers, whether PacifiCorp's merchant function or third-party transmission customers.

Q. Mr. Mullins states that the Wind Projects will cause the Company's load to increase by about 450 megawatts per month, which will increase the Company's relative share of transmission costs. (Mullins Supplemental Rebuttal, lines 657–660.) Is this correct?

A. No. As noted above, the addition of generation resources does not necessarily mean that the Company will increase its share of the transmission usage. As previously described, transmission costs are allocated by demand during the transmission system peak. Mr. Mullins's own testimony therefore undermines his argument because he states that PacifiCorp's peak loads are forecasted to be down approximately 14 percent by 2026. (Mullins Supplemental Rebuttal, lines 783–784.) If peak loads are decreasing, as Mr. Mullins claims, then the Company's share of transmission costs will also decrease. Mr. Mullins cannot simultaneously argue that the new Wind Projects will increase transmission costs paid by retail customers while also arguing that load is decreasing, which has the practical effect of decreasing transmission costs paid by retail customers.

CONCLUSION

Q. Does this conclude your surrebuttal testimony?

A. Yes.