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Docket No. 20000-____-EA-17

Witness: Rick A. Vail

BEFORE THE WYOMING PUBLIC SERVICE
COMMISSION

ROCKY MOUNTAIN POWER

REDACTED

Direct Testimony of Rick A. Vail

June 2017

1 **Q. Please state your name, business address, and present position with PacifiCorp.**

2 A. My name is Rick A. Vail. My business address is 825 NE Multnomah, Suite 1600,
3 Portland, Oregon 97232. My present position is Vice President of Transmission. I am
4 responsible for transmission system planning, customer generator interconnection
5 requests and transmission service requests, regional transmission initiatives, asset
6 management, capital budgeting for transmission, and administration of the Company's
7 Open Access Transmission Tariff ("OATT"). I am testifying on behalf of Rocky
8 Mountain Power ("Company").

9 **QUALIFICATIONS**

10 **Q. Please describe your educational background and professional experience.**

11 A. I have a Bachelor of Science Degree with Honors in Electrical Engineering with a focus
12 in electric power systems from Portland State University. I have been employed at the
13 Company since 2001, and have had a range of management responsibility within the
14 asset management group, including capital planning, maintenance policy, maintenance
15 planning, and investment planning. I served as director of asset management from 2007
16 to 2012. I became Vice President of Transmission in December 2012.

17 **PURPOSE AND SUMMARY OF TESTIMONY**

18 **Q. What is the purpose of your testimony?**

19 A. My testimony supports the Company's application for certificates of public
20 convenience and necessity ("CPCNs") for the construction or acquisition of four wind
21 facilities in Wyoming ("Wind Projects") totaling approximately 860 megawatts
22 ("MW") and the construction of new transmission facilities that are necessary to relieve
23 existing congestion and enable interconnection of the proposed Wind Projects into the

1 Company's transmission system. Specifically, my testimony describes the purpose for
2 and customer benefits resulting from the construction of the following proposed
3 facilities, which I refer to collectively as the "Transmission Projects":

4 "Aeolus-to-Bridger/Anticline Line"

- 5 • A 140-mile, 500 kilovolt ("kV") transmission line ("Aeolus-to-Anticline line"),
6 which includes construction of the new Aeolus (500/230 kV) and Anticline
7 (500/345 kV) substations;
- 8 • A five-mile, 345 kV transmission line that will extend from the proposed
9 Anticline substation to the Jim Bridger substation, along with associated
10 interconnection facilities at the Jim Bridger substation to accommodate the
11 interconnection of the 345 kV line from the proposed Anticline substation;
- 12 • A voltage control device at the existing Latham substation;

13 "230 kV Network Upgrades"

- 14 • A new 16-mile 230 kV transmission line parallel to an existing 230 kV line from
15 Shirley Basin substation to the proposed Aeolus substation, including
16 modifications to the Shirley Basin substation to accommodate the new line;
- 17 • The reconstruction of four miles of an existing 230 kV transmission line
18 between the proposed Aeolus substation and the Freezeout substation, including
19 modifications of the Freezeout substation to accommodate the new line; and
- 20 • The reconstruction of 14 miles of an existing 230 kV transmission line between
21 the Freezeout substation and the Standpipe substation, including modifications
22 to the Freezeout and Standpipe substations to accommodate the transmission
23 lines.

1 The reconstructed sections are proposed to be in a parallel alignment to the
2 existing 230 kV transmission lines. The 230 kV Network Upgrades are needed to
3 support interconnection of the Wind Projects, which are described in the testimony of
4 Company witness Mr. Chad A. Teply.

5 My testimony and exhibits provide the information required by Wyoming
6 Public Service Commission (“Commission”) Rule Chapter 3, Section 21, related to
7 applications for CPCNs for the Transmission Projects and additional information
8 required by the stipulation approved in Docket No. 20000-384-ER-10, Record
9 No. 12702 (“2010 Stipulation”).

10 **Q. Please summarize your testimony.**

11 A. The Transmission Projects support the Company’s short- and long-term energy
12 demands and will strengthen the overall reliability of the existing transmission system.
13 While the Aeolus-to-Bridger/Anticline Line has long been recognized as an integral
14 component of the Company’s long-term transmission planning, its construction and
15 that of the other components of the Transmission Projects has not been economic until
16 now. Renewal of the federal wind production tax credit (“PTC”) has created a time-
17 limited opportunity for the Company to acquire significant cost-effective, zero-fuel-
18 cost wind resources, generating PTCs that provide cost savings necessary to construct
19 the Transmission Projects.

20 To achieve the full customer benefits of the PTCs, however, the Company
21 must develop the Wind Projects with the Transmission Projects and bring them into
22 service by December 31, 2020. The Wind Projects are not economic without the
23 Transmission Projects, which are needed to relieve existing congestion and to

1 interconnect new PTC-eligible wind facilities in high-wind areas of Wyoming. The
2 Transmission Projects are not economic without incremental cost-effective wind
3 facilities producing zero-fuel-cost energy and PTCs.

4 Congestion on the current transmission system in eastern Wyoming limits the
5 ability to deliver energy from eastern Wyoming to the Jim Bridger energy hub. The
6 Aeolus-to-Bridger/Anticline Line will relieve this congestion and increase the
7 transmission capacity across Wyoming by 750 MW. The Transmission Projects will
8 allow the Company to interconnect up to approximately 1,270 MW of wind resources,
9 including the 860 MW of Wind Projects that are the subject of this application, and
10 create substantial benefits for Wyoming customers and customers throughout the
11 Company's service area. Construction of the Transmission Projects will also enable the
12 Company to more efficiently utilize existing generation resources in Wyoming to serve
13 loads in Wyoming, Idaho, Utah and the Pacific Northwest. The Transmission Projects
14 also better position the Company to interconnect and integrate future resources in
15 southeastern Wyoming and more efficiently serve expected customer load.

16 In addition to increasing the transmission capacity out of southeastern
17 Wyoming, the Transmission Projects will also provide critical voltage support to the
18 Wyoming transmission network and enhance the overall reliability of the transmission
19 system by adding incremental new transmission capacity westbound between the
20 Company's existing thermal and renewable facilities, the proposed Wind Projects in
21 eastern Wyoming, and other sources of energy in northern Utah. Additional
22 transmission paths will mitigate the impact of outages on the existing system. The
23 Transmission Projects will also enhance the Company's ability to comply with

1 mandated North American Electric Reliability Corporation (“NERC”) and Western
2 Electricity Coordinating Council (“WECC”) reliability and performance standards.

3 The Aeolus-to-Bridger/Anticline Line is also an important component of the
4 Company’s Energy Gateway Transmission Expansion Project (“Energy Gateway”) and
5 has long been recognized as a key transmission segment in the region’s long-term
6 transmission planning. By acting on this time-limited opportunity to develop the
7 Transmission Projects and the associated Wind Projects, the Company can provide
8 substantial customer benefits.

9 **GENERAL DESCRIPTION OF THE TRANSMISSION PROJECTS**

10 **Q. Please describe the Aeolus-to-Anticline Line.**

11 A. The proposed Aeolus-to-Anticline Line is a single-circuit 500 kV line that will begin at
12 the proposed Aeolus substation, which will be located approximately 11 miles
13 northwest of Medicine Bow, Wyoming. From the Aeolus substation, the transmission
14 line will run west across the Medicine Bow River past the Hanna Draw. The line will
15 then continue southwesterly to Walcott Junction and then west across the Platte River
16 and south of Sinclair and Rawlins, where it will then largely follow an existing 230 kV
17 transmission line to the proposed Anticline substation.

18 From the proposed Anticline substation, the Company will construct a 345 kV
19 transmission line that will extend north for approximately five miles and terminate into
20 an expansion of the existing Jim Bridger generating plant substation.

21 The Aeolus-to-Anticline Line will be located in Sweetwater and Carbon
22 Counties and will primarily cross open rangeland. Approximately 49 percent of the land
23 crossed is federally owned, seven percent state owned, and nearly 44 percent privately

1 owned.

2 Attached as Exhibit RMP____(RAV-1) is a map showing the proposed route for
3 the Aeolus-to-Anticline Line, along with the other facilities included in the
4 Transmission Projects.

5 **Q. What types of towers and conductors will be used to construct the Aeolus-to-**
6 **Anticline line?**

7 A. The Aeolus-to-Anticline line segment will be constructed using approximately
8 522 lattice steel towers with heights about 115 to 160 feet. The steel towers will have a
9 “flat” configuration with each phase being parallel to each other in a horizontal
10 arrangement. Attached to my testimony as Exhibit RMP____(RAV-2) is a sample
11 drawing of proposed 500 kV tower designs.

12 The conductor for the Aeolus-to-Anticline line will be triple bundled
13 1272 kcmil 45/7 Aluminum Conductor Steel Reinforced (“ACSR”) “Bittern” per
14 phase. Each conductor in the phase bundle will have a diameter of 1.345 inches, with
15 three phases, comprised of three conductors each, for a total of nine conductors in the
16 circuit.

17 The 345 kV Anticline-to-Jim Bridger line segment will use 25 to 30 of either of
18 the following types of structures: (1) tubular steel H-frames; or (2) poles with heights
19 from about 110 to 150 feet. Attached to my testimony as Exhibit RMP____(RAV-3) is a
20 sample drawing of proposed 345 kV tower designs. The conductor for this segment will
21 also be triple bundled 1272 kcmil 45/7 ACSR Bittern per phase. The steel poles will
22 have two arms on one side, with one arm on the other side to carry one phase per arm.

23 In addition, each of the transmission line segments will also carry two overhead

1 ground wires. One of the wires will be galvanized steel while the other will be Optical
2 Ground Wire (“OPGW”) to facilitate communications. Each wire will have a diameter
3 of approximately 0.5 inches.

4 **Q. Please describe the proposed new Aeolus substation.**

5 A. The new Aeolus 500/230 kV substation will be located approximately 11 miles
6 northwest of Medicine Bow, Wyoming, and will be sited on a Company-owned parcel
7 of land (Township 24 North, Range 80 West, Section 35) and occupy approximately
8 100 acres. The substation will include security fencing and an improved access road
9 from U.S. Highway 30. The substation will be constructed using conventional air
10 insulated bus and equipment and connect to existing Shirley Basin and Freezeout
11 substations via the connection of an existing 230 kV transmission line into the new
12 Aeolus site (discussed in more detail below). Attached to my testimony as Exhibit
13 RMP___(RAV-4) are the preliminary Aeolus substation one-line diagram and general
14 arrangement drawings.

15 Construction of the Aeolus substation will require the following:

- 16 • Construction of a 230 kV yard, including all work to support the
17 installation of 230 kV breaker bays for termination of the existing
18 Freezeout-to-Shirley Basin 230 kV transmission line and to support the
19 low side of the 500/230 kV transformer;
- 20 • Installation of a 230 kV shunt reactor;
- 21 • Completion of all site development, civil work, bus work, protection
22 and controls, security and communications, and construction of a
23 control building;
- 24 • Construction of a 500 kV yard including all work to support the
25 termination of one 500 kV transmission line to Anticline substation,
26 including two 500 kV breaker bays to support termination of the 500 kV
27 line and connection to the high side of a 500/230 kV transformer;
- 28 • Installation of three single phase 500/230 kV transformer units with one

- 1 additional spare unit;
- 2 • Installation of one 500 kV shunt capacitor, three single phase line
- 3 reactors and one 500 kV neutral reactor;
- 4 • Construction of a replacement access bridge over the Medicine Bow
- 5 River and associated upgrades to an existing unpaved county road from
- 6 U.S. Highway 30 to the substation location. The bridge will be
- 7 constructed to Wyoming Department of Transportation HS-20
- 8 (“Highway Semi-trailer”) specifications. Upon completion, the bridge
- 9 will become the property and responsibility of Carbon County;
- 10 • Completion of all site development, civil work, bus work, protection
- 11 and controls, security, communications, and construction of a control
- 12 building including site emergency power; and
- 13 • Implementation of a new generation tripping remedial action scheme,
- 14 which would trip generation in the Foote Creek/Aeolus area in the event
- 15 the Aeolus-to-Jim Bridger lines (or transformers) trip during high
- 16 transfers on the Aeolus West transmission path. Initial technical studies
- 17 indicate tripping up to approximately 660 MW of generation at the
- 18 following wind farms during high-transfer conditions:
 - 19 • Foote Creek: 108 MW
 - 20 • Carbon County 1 (Q706): 250 MW
 - 21 • High Plains/McFadden Ridge 1: 245 MW
 - 22 • Seven Mile I and II: 53 MW.
- 23 • Specific remedial action scheme arming levels for lower flow
- 24 conditions will need to be determined via follow-on technical studies.

25 In addition, the Aeolus substation will be designed to facilitate future expansion of
26 the site for additional resources.

27 **Q. Please describe the proposed new Anticline substation.**

28 A. The new Anticline 500/345 kV substation will be located approximately three miles
29 northeast of Point of Rocks, Wyoming and will be sited on a Company-owned parcel
30 of land (T20N, R100W, Sec. 13) and occupy approximately 140 acres. The new
31 substation will include security fencing and an improved access road and will be

1 constructed using conventional air insulated bus and equipment. The Anticline
2 substation will connect to the existing Jim Bridger generating plant substation via a
3 new 345 kV transmission line (discussed above) and can be expanded to accommodate
4 future 500 kV transmission lines. Attached to my testimony as Exhibit RMP____(RAV-
5 5) are the preliminary Anticline substation one-line diagram and general arrangement
6 drawings.

7 Construction of the Anticline substation will require the following:

- 8 • Construction of the new 500 kV substation yard including all work to
9 support the termination of one 500 kV transmission line to the Aeolus
10 substation;
- 11 • Construction of two 500 kV breaker bays to support termination of the
12 500 kV line and connection to the high side of a 500/345 kV
13 transformer;
- 14 • Installation of three single phase 500/345 kV transformer units with one
15 additional spare unit;
- 16 • Installation of one 500 kV shunt capacitor, three single phase line
17 reactors and one 500 kV neutral reactor;
- 18 • Construction of a 345 kV yard which includes a ring bus and 345 kV
19 breakers to facilitate 345 kV line termination to Jim Bridger and future
20 installation of phase shifting transformers; and
- 21 • Completion of all site development, civil work, bus work, protection
22 and controls, security and communications, and construction of a
23 control building including site emergency power.

24 **Q. Please describe the modifications to the Jim Bridger generating plant substation**
25 **that will be necessary to interconnect the new Anticline substation to the Jim**
26 **Bridger generating plant substation.**

27 A. The new Anticline substation will interconnect to the Jim Bridger substation via a new,
28 five-mile, 345 kV transmission line (discussed above). The Jim Bridger substation is
29 located west of, and immediately adjacent to, the Jim Bridger power plant. To

1 accommodate the interconnection of the Anticline substation, the Jim Bridger
2 substation will be expanded to include an additional transmission line termination bay.
3 Attached to my testimony as Confidential Exhibit RMP____(RAV-6) are the preliminary
4 Jim Bridger substation one-line diagram and general arrangement drawings related to
5 the construction at the Jim Bridger substation, which will include the following:

- 6 • Expanding the existing 345 kV substation yard to add one new 345 kV
7 line termination bay to the existing yard;
- 8 • Relocating the existing shunt capacitor to facilitate connection of a new
9 line termination bay to the existing 345 kV bus;
- 10 • Completion of all site development, civil work, bus work, protection
11 and controls, security and communications;
- 12 • Modification to the Jim Bridger remedial action scheme will be needed
13 due to the re-dispatch of Jim Bridger generation necessary to
14 accommodate new wind generation in eastern Wyoming, while
15 maintaining the 2,400 MW rating on the Bridger West transmission
16 path; and
- 17 • Modification of existing protection and control systems within the
18 existing 345 kV yard to enable safe operation of the expanded facility.

19 In addition, the existing Latham substation, located approximately four miles
20 south of Interstate Exit 187, adjacent to Wyoming Highway 789, will be expanded to
21 include a voltage control device. The type and design of the device will be defined
22 pending completion of future technical studies. The Company plans to install the device
23 within the constraints of the currently-leased property boundaries. Attached to my
24 testimony as Confidential Exhibit RMP____(RAV-7) are the existing Latham substation
25 one-line diagram and general arrangement drawings. The substations will be modified
26 once final design details of the voltage control device are determined.

27 **Q. Please describe the 230 kV transmission line from the Shirley Basin substation to**
28 **the Standpipe substation.**

1 A. The proposed 230 kV transmission line projects will begin at the Company's existing
2 Shirley Basin substation, located approximately 1.5 miles east of the south junction of
3 state highways 77 and 487. A new 230 kV line will parallel an existing 230 kV
4 transmission line running southwesterly along the western side of the Freezeout
5 Mountains and will connect into the Aeolus substation. South of Aeolus substation to
6 Standpipe substation, via the Freezeout substation, the 230 kV project is a
7 reconstruction of the existing 230 kV line. The line continues south out of the Aeolus
8 substation across the Medicine Bow River and connects into the Company's existing
9 Freezeout substation located between the Pine and South Pine Draws. The 230 kV line
10 then continues in a southwesterly direction to the Company's existing Standpipe
11 substation, which is located approximately two-and-one-half miles southeast of Hanna,
12 Wyoming.

13 All of the 230 kV segments are located in Carbon County and the new line will
14 cross areas of mountainous terrain reaching elevations of approximately 7,500 feet.
15 Attached to my testimony as Confidential Exhibit RMP___(RAV-8) are the existing
16 Shirley Basin, Freezeout and Standpipe substations one-line diagrams and general
17 arrangement drawings. These substations may be modified to accommodate the 230 kV
18 transmission line project. Final drawings will be provided when they become available.

19 **Q. What types of towers and conductors will be used for the 230 kV transmission**
20 **line?**

21 A. The single circuit 230 kV transmission line will be rebuilt using either wood or steel
22 H-frame structures with heights ranging from 90 to 120 feet. Attached to my testimony
23 as Exhibit RMP___(RAV-9) is a sample drawing of proposed 230 kV tower designs.

1 The conductor for the section north of the Aeolus substation to the Shirley Basin
2 substation will be double bundle 1575 kcmil ACSR/TW “Potomac” per phase. The
3 conductor for the section south of the Aeolus substation will be a double bundle
4 1272 kcmil 45/7 ACSR Bittern per phase.

5 **Q. Please describe the estimated total cost of the Transmission Projects.**

6 A. The Aeolus-to-Bridger/Anticline Line is estimated to cost [REDACTED], as
7 summarized in Confidential Table 1 below:

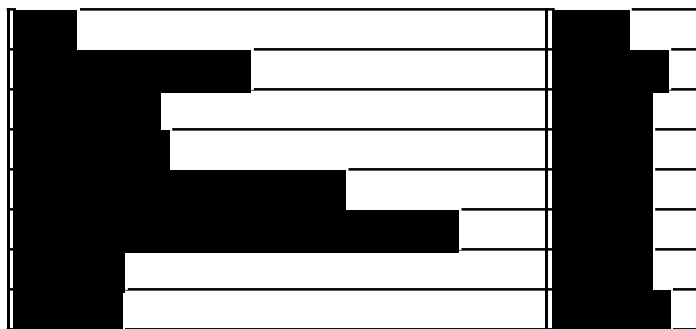
Confidential Table 1



8 The entire cost of the Aeolus-to-Bridger/Anticline Line will be paid by the
9 Company without contribution from any third-party customer projects.

10 The 230 kV Network Upgrades are estimated to cost [REDACTED] as
11 summarized in Confidential Table 2 below:

Confidential Table 2



12 The Company expects that the costs of the 230 kV Network Upgrades will be re-

1 assessed and assigned to the wind resource facilities selected via the Company's 2017R
2 request for proposals (“2017R RFP”) process under their respective interconnection
3 agreements. The 230 kV Network Upgrades are necessary to support the
4 interconnection of up to 1,270 MW of new or repowered wind generation in eastern
5 Wyoming.

6 **Q. When does the Company expect to complete the construction of the Transmission**
7 **Projects?**

8 A. The Transmission Projects are being developed together with the Wind Projects, which
9 will generate zero-fuel-cost energy and PTCs that make the codependent projects
10 economic. To obtain the full benefits of the PTCs, the Transmission Projects and the
11 Wind Projects must be in service no later than December 31, 2020.

12 **Q. Why must the Company receive a CPCN now for a project that is not scheduled**
13 **for completion until December 2020?**

14 A. The Company does not currently have all of the necessary rights-of-way to construct
15 the Transmission Projects. To achieve an in-service date before the end of 2020, the
16 Company must acquire the necessary rights-of-way by March 31, 2019. Thus, the
17 Company respectfully requests a conditional CPCN from the Commission by
18 December 2017 for the Transmission Projects conditional upon acquiring all rights-of-
19 way and a demonstration of the economic benefits from the Wind Projects in the
20 proposed second phase of the proceeding. A delay in approval of the conditional CPCN
21 jeopardizes the December 31, 2020 deadline and risks the loss of PTC benefits—which
22 will mean that neither the Transmission Projects nor the Wind Projects will move
23 forward. A project critical path schedule is attached to my testimony as Exhibit

1 RMP___(RAV-10).

2 **BENEFITS OF THE TRANSMISSION PROJECTS**

3 **Q. How will the Transmission Projects benefit customers and improve system**
4 **performance?**

5 A. The Transmission Projects will: (1) relieve congestion and increase transmission
6 capacity across Wyoming, allowing interconnection of new generation resources and
7 greater flexibility in managing existing resources; (2) provide critical voltage support
8 to the transmission system; (3) improve system reliability; and (4) reduce energy and
9 capacity losses. Because the cost of the Transmission Projects are substantially offset
10 by the generation of zero-fuel-cost energy and PTCs from the Wind Projects, customers
11 receive substantial benefits as quantified by Mr. Rick T. Link.

12 **Q. How will the Transmission Projects increase transmission capacity in**
13 **southeastern Wyoming?**

14 A. Currently, the Company’s transmission system in southeastern Wyoming is operating
15 at capacity, which limits transfer of existing resources from eastern Wyoming. Also,
16 due to limited fault current in the southeastern portion of the transmission system,
17 which indicates a weak grid, interconnection of additional resources in this prime wind
18 region is precluded to maintain grid stability. The Transmission Projects will not only
19 increase the transfer capability from east to west by 750 MW, but will also improve the
20 fault current providing “stiffness” to the grid. This will allow additional wind facilities
21 in and around the proposed Aeolus substation, which is not possible today.

22 When the Transmission Projects are complete, the Company estimates that it
23 can interconnect up to approximately 1,270 MW of additional wind facilities east of

1 the Bridger/Anticline substation. The assumed level of new wind resources is higher
2 than the assumed incremental transfer capability of the transmission facilities because
3 wind resources do not generate at their full capability in all hours of the year. At times
4 when wind resources in southeastern Wyoming are operating near full output, other
5 resources in the area can be re-dispatched to accommodate PTC-producing wind
6 generation. Installing more variable resources in an area relative to total transmission
7 capacity allows for more efficient use of the transmission system and the ability to use
8 the most cost-effective resources to meet customer demand.

9 The increased capacity also provides improved access to existing generation
10 resources, and increased opportunities to move incremental energy from Wyoming to
11 offset higher-priced generation in the PacifiCorp system or other energy imbalance
12 market participants' systems, as noted by Mr. Link.

13 **Q. Is the increased capacity from the Transmission Projects consistent with the**
14 **Company's obligation to provide transmission service under its OATT?**

15 A. Yes. The Company's OATT, approved by the Federal Energy Regulatory Commission
16 ("FERC"), details the Company's requirements and obligations to provide transmission
17 service. Section 28.2 defines the Company's responsibilities, which include the
18 requirement to "plan, construct, operate and maintain the system in accordance with
19 good utility practice." Section 28.3 states the requirement for the Company to provide
20 "firm service over the system so that designated resources can be delivered to
21 designated loads." The Company is required to provide adequate and non-
22 discriminatory service to all network customers. Although the Transmission Projects
23 are not specifically mandated by the Company's obligations under its OATT, the

1 Transmission Projects will allow the Company to more efficiently meet current and
2 forecasted customer energy demand by relieving the existing transmission congestion
3 in southeastern Wyoming.

4 **Q. Will the up-front transmission costs of the Transmission Projects be recovered in**
5 **PacifiCorp’s transmission rates?**

6 A. Yes, the Transmission Projects are considered network transmission assets under
7 PacifiCorp’s OATT and provide a number of benefits to the transmission grid, as
8 discussed earlier in my testimony. Because the Transmission Projects are integrated
9 into PacifiCorp’s transmission network and provide benefits to that network, such as
10 congestion relief, increased transmission capacity and improved system reliability,
11 FERC precedent for ratemaking supports rolling the costs of these assets into
12 PacifiCorp’s transmission rates.

13 **Q. How will the costs of the Transmission Projects flow into PacifiCorp’s**
14 **transmission rates, and who will pay these rates?**

15 A. All transmission rates charged to wholesale transmission customers must be approved
16 by FERC. PacifiCorp’s transmission rate structure is a FERC-approved formula that
17 has been in place since 2012. A formula rate is a method of calculating a rate, but is not
18 the rate itself; the actual transmission rate that is charged to wholesale transmission
19 customers is produced annually by updating FERC-approved inputs to the formula rate.
20 Formula rates rely on annual updates using inputs from the detailed, publicly available,
21 and audited FERC Form No. 1, along with other Company data. The annual update
22 process includes transmission capital additions such as the Transmission Projects.

23 PacifiCorp’s merchant function is the largest transmission customer of

1 PacifiCorp's transmission system, but there are third-party transmission customers as
2 well. While all transmission customers pay OATT transmission rates, third-party
3 transmission customers generate revenue credits that offset the cost of PacifiCorp's
4 transmission revenue requirement in retail rates, as discussed in Mr. Link's testimony.

5 **Q. What are the benefits resulting from the critical voltage support that will be**
6 **provided by the Transmission Projects?**

7 A. Under certain operating conditions, voltage control issues have limited the ability to
8 add additional resources, particularly wind facilities, in southeastern Wyoming. The
9 Transmission Projects will solve the voltage control issues and allow up to 1,270 MW
10 of additional wind generation to be interconnected into the transmission system.

11 **Q. How will the Transmission Projects improve system reliability?**

12 A. The transmission grid can be affected in its entirety by what happens on an individual
13 transmission line or path. For example, the transmission system between eastern and
14 central Wyoming is comprised of several individual transmission lines or line
15 segments. Attached to my testimony as Exhibit RMP___(RAV-11) is a diagram of the
16 existing Wyoming transmission system. A single outage on any of the individual lines
17 or line segments due to storm, fire, or other interference can and does cause significant
18 reductions in transmission capacity and can negatively impact the Company's ability
19 to serve customers. Line outages require the Company to significantly curtail
20 generation resources to stabilize system voltages and require less efficient re-dispatch
21 of system resources to meet network load requirements.

22 In the event of a line outage, the redundancy provided by the Transmission
23 Projects will allow the Company to continue to meet native load service obligations

1 and continue to meet other contractual obligations to third parties. Strengthening this
2 path and increasing system redundancy with the new Transmission Projects will benefit
3 all customers by reducing the risk of outages and inefficient dispatch resulting from
4 those outages.

5 In addition, the Transmission Projects will improve the Company's ability to
6 perform required maintenance without significant operational impacts to the system,
7 and will reduce impacts to customers during planned and forced system outages.
8 Transmission line and substation maintenance windows are currently limited because
9 the system is highly utilized. By relieving congestion and providing additional
10 transmission paths, the Transmission Projects will allow greater flexibility for the
11 Company.

12 **Q. Can you provide an example where the Transmission Projects will mitigate the**
13 **impact of an outage on the 230 kV transmission system?**

14 A. Yes. The following are examples of potential outages that will be mitigated by the
15 Transmission Projects:

- 16 • For an outage of the Latham-to-Point of Rocks 230 kV line, the Project
17 eliminates the overload on the Dave Johnston to Amasa 230 kV line;
- 18 • For an outage of the Mustang-to-Spence 230 kV line, the Project
19 eliminates the overload on 230 kV lines west of Platte;
- 20 • For an outage of the Riverton-to-Wyopo 230 kV line, the Project
21 eliminates overloads on 230 kV lines west of Platte;
- 22 • For an outage of the Dave Johnston-to-Amasa 230 kV line, the Project
23 eliminates the overload on the 230 kV lines west of Platte; and
- 24 • For an outage of the Platte-to-Standpipe 230 kV line, the Project
25 eliminates the need to trip approximately 130 MW of generation at
26 Foote Creek.

1 **Q. Will the Transmission Projects also enhance the Company’s ability to meet the**
2 **reliability standards applicable to its transmission system?**

3 A. Yes. Although the Company currently meets or exceeds the applicable reliability
4 standards and criteria, the addition of the Transmission Projects will allow the
5 Company to more efficiently meet or exceed those standards and criteria.

6 **Q. Please describe the applicable reliability standards.**

7 A. The Company plans, designs, and operates its transmission system to meet or exceed
8 NERC Standards for Bulk Electric Systems (“BES”) and WECC Regional standards
9 and criteria. The NERC standards are set forth in 18 CFR Part 40 (Mandatory
10 Reliability Standards for Bulk-Power Systems). The WECC standards and criteria are
11 deemed necessary for the Western Interconnection to meet or exceed NERC standards.
12 The Company must currently comply with more than 100 approved NERC standards.
13 These standards dictate the minimum levels of transmission system reliability,
14 redundancy, and performance required for transmission facilities.

15 The most relevant standard here is NERC’s Transmission Planning
16 Performance Requirements set forth in NERC TPL-001-4, which establishes
17 transmission system planning performance requirements intended to ensure that the
18 BES will operate reliably over a broad spectrum of system conditions and following a
19 wide range of probable contingencies.

20 **Q. How do NERC’s and WECC’s standards and criteria influence the need for the**
21 **Transmission Projects?**

22 A. The mandatory standards, particularly, NERC’s TPL-001-4 standard, require the
23 Company to have a forward-looking transmission plan to reliably serve current and

1 anticipated customer demands under all expected operating conditions, including
2 normal system operations (all system elements in service) and during system
3 contingencies (where elements of the transmission system are out of service), both
4 planned or otherwise.

5 The Company performs annual reliability assessments to determine whether its
6 transmission system complies with minimum mandatory system performance
7 standards, which require that during loss of any single transmission system element
8 (“N-1 single contingencies”) that firm service is maintained, no system overloads exist,
9 and there is no loss of customer demand.

10 The Aeolus-to-Anticline line is sub-segment D.2 of Gateway West, which, as
11 part of Energy Gateway, has been included in the Company’s annual TPL-001-4
12 assessment as part of its short- and long-term plans to dependably meet NERC and
13 WECC reliability requirements. The Transmission Projects’ new transmission
14 segments are particularly effective in increasing system reliability under the various
15 multiple contingency categories of the TPL-001-4 standard.

16 **Q. Can you explain the TPL-001-4 standard?**

17 A. Yes. The NERC Standard TPL-001-4 requires the Company to plan for a scenario with
18 outages of multiple transmission elements. The Company must plan how it will adjust
19 the transmission system after the first outage and then respond to the second outage
20 (this type of scenario is referred to as an N-1-1 condition). The Aeolus-to-Anticline line
21 will significantly help under these types of N-1-1 conditions. For example, without the
22 Aeolus-to-Anticline line, the N-1-1 outage of Riverton to Wyopo 230 kV line followed
23 with an outage of Spence to Mustang 230 kV line would require curtailment of the TOT

1 4A path by approximately 500 MW. But with the addition of the Aeolus-to-Anticline
2 line, this curtailment would not be required. The study was performed with TOT 4A
3 flows at 1,030 MW in the original case. The addition of the Aeolus-to-Anticline line
4 prevents thermal overload on the 230 kV transmission system west of Platte.

5 **Q. What are the WECC path rating studies?**

6 A. The WECC path rating studies follow a three-phase process established by the Planning
7 Coordination Committee (“PCC”) that utilizes peer review study groups, made up of
8 the project sponsor and other interested WECC members, to establish a path rating for
9 a given transmission path or set of transmission paths, which may exhibit simultaneous
10 interactions with each other. Path rating studies utilize a transmission model of the
11 Western Interconnection and will take multiple months to evaluate the performance of
12 the new transmission facilities and to demonstrate that the proposed transmission
13 project will have no negative impacts on previously established transmission path
14 ratings. The path ratings that are established following this process represent the
15 “Maximum Path Transfer Capability” of a transmission path.

16 Once projects complete the second phase of the path rating studies, they are
17 granted an “Accepted” rating and placed in Phase 3 (construction phase) status. After
18 the Accepted status is granted, other projects currently going through the WECC path
19 rating process must recognize the project in their studies and cannot negatively impact
20 the path rating for the project.

21 **Q. Has the Aeolus-to-Anticline line been included in WECC path rating studies?**

22 A. Yes. The Aeolus-to-Anticline line has undergone WECC’s Three Phase Ratings
23 Process, and has been approved by WECC for Phase 3-Construction Phase status as

1 part of the overall Energy Gateway project. The Aeolus West transmission path and
2 three other Gateway West transmission paths (TOT 4A, Bridger/Anticline West, and
3 Path C) have completed the Three Phase Rating Process and were granted Phase 3
4 status on January 5, 2011. This WECC approval is necessary because it allows the
5 Company to interconnect the Aeolus-to-Anticline line to the wider transmission system
6 in the area and to reliably operate the project at its approved ratings. This line will
7 strengthen the Company's transmission capacity and flexibility, especially when
8 complemented with other Energy Gateway projects, specifically Anticline-to-Populus,
9 Aeolus-to-Clover and Oquirrh-to-Terminal. The Aeolus-to-Anticline line is regarded as
10 a necessary interconnection point to support the long-term transmission expansion
11 planning established in the WECC Region plans and in the most recent Northern Tier
12 Transmission Group sub-regional plan. The construction of this project, as an integral
13 component of the larger Energy Gateway project, provides options to access additional
14 resources.

15 **Q What are the impacts to the system and the Company if the Transmission Projects**
16 **are not completed?**

17 A. If the projects are not completed, the existing congestion will remain and the
18 Company's ability to deliver resources to load will remain constrained. Because the
19 Company currently meets all applicable system reliability and performance criteria, the
20 Transmission Projects are not strictly required to satisfy those standards. Rather, the
21 Transmission Projects have long been identified as an important addition to Wyoming's
22 transmission system, and the zero-fuel-cost energy and PTCs generated by the
23 incremental wind resources provide a time-limited opportunity to build the projects

1 now and deliver significant savings to customers over the projects life.

2 **Q. How will the Transmission Projects reduce energy and capacity losses?**

3 A. Reduced energy and capacity losses on the transmission system have the potential to
4 provide significant cost savings over time. Generally, the addition of a new
5 transmission path in parallel with existing lines, like the Transmission Projects, will
6 reduce the energy and capacity losses by reducing the impedance of the transmission
7 system. Reduced line losses mean more efficient delivery of energy and capacity at
8 reduced costs.

9 **Q. Did the Company consider alternatives to the Transmission Projects?**

10 A. Yes. While long-term alternatives to constructing new transmission lines are limited,
11 the Company did consider other approaches, but none were as cost-effective. As
12 described more fully in the testimony of Mr. Link, the Transmission Projects and Wind
13 Projects were included in the Company's 2017 Integrated Resource Plan, where they
14 were analyzed in comparison to alternatives. The resource portfolios that included the
15 Transmission Projects and Wind Projects were consistently least cost, least risk.

16 **Q. Has the Company considered any other alternatives to the Transmission Projects?**

17 The Company also considered the ability to obtain additional transmission capacity by
18 upgrading the existing transmission system or implementing alternative transmission
19 technologies. Since 2013 the Company has completed several important projects to
20 enhance the transmission system in southeast Wyoming, including the dynamic line
21 rating of the Miners (Standpipe) – Platte 230 kV (2013); Southern Wyoming Voltage
22 Control Scheme, which coordinated wind generation reactive output to stabilize local
23 area voltages (2015); and construction of the Standpipe substation and (60 MVAR)

1 synchronous condenser for voltage control (2016). These projects allowed the
2 Company to delay the Transmission Projects until 2020, but are not a long-term
3 substitute for the Transmission Projects.

4 **REQUIREMENTS OF RULE CHAPTER 3, SECTION 21**

5 **AND 2010 STIPULATION**

6 **Q. Please summarize how the Company’s Application meets the requirements for a**
7 **CPCN application.**

8 A. Commission Rule Chapter 3, Section 21(c)(i) describes what must be included in an
9 application for a CPCN. If the CPCN is for a “major utility facility,” as defined by
10 Commission Rule Chapter 1, Section 2, then Commission Rule Chapter 3, Section
11 21(c)(ii) provides additional requirements for the CPCN application. A transmission
12 line or substation qualifies as a major utility facility if the facility is “more than three
13 miles [and] designed for operation at 69 kV or above.”

14 Here, the Transmission Projects are major utility facilities. The following
15 section of my testimony provides the technical information required by Commission
16 Rule Chapter 3, Section 21(c)(i)(B), (C), (E), and (J) related to the Transmission
17 Projects. The remaining requirements set forth in Section 21(c)(i) are addressed by
18 other witnesses. In addition, my testimony provides all of the information required by
19 Commission Rule Chapter 3, Section 21(c)(ii) related to the Transmission Projects, and
20 the additional requirements set forth in the 2010 Stipulation related to the construction
21 of Energy Gateway transmission projects.

1 **Q. Please describe the type of plant, property or facility proposed to be constructed**
2 **or acquired ((Section 21(c)(i)(B)).**

3 A. I described the Transmission Projects in the introductory sections of my testimony.

4 **Q. Please describe the facilities proposed to be constructed or acquired, including**
5 **preliminary engineering specifications in sufficient detail to properly describe the**
6 **principal systems and components, and final and complete engineering**
7 **specifications when they become available (Section 21(c)(i)(C)).**

8 A. In addition to the description included above, Exhibits RMP__(RAV-2),
9 RMP__(RAV-3), RMP__(RAV-4), RMP__(RAV-5), RMP__(RAV-9) and
10 Confidential Exhibits RMP__(RAV-6), RMP__(RAV-7) and RMP__(RAV-8)
11 provide engineering specifications, drawings, and other pertinent technical information
12 for the Transmission Projects.

13 **Q. Please describe the estimated total cost of the proposed construction or acquisition**
14 **(Section 21(c)(i)(E)).**

15 A. The estimated total cost for the Transmission Projects is [REDACTED].

16 **Q. Please describe the estimated start and completion date of the proposed**
17 **construction (Section 21(c)(i)(J)).**

18 A. To meet the December 2020 deadline, the Company expects to execute contracts for
19 the upgrades to access roads and the bridge to the Aeolus substation site by September
20 2017 and construction on those components is expected to begin in May 2018 for
21 completion by November 2018.

22 The Company expects to provide a limited notice-to-proceed for the Aeolus-to-
23 Bridger/Anticline Line and 230 kV Network Upgrades by the end of 2018, so that the

1 Company can acquire the necessary rights-of-way by March 31, 2019. The final notice-
2 to-proceed for the Transmission Projects is expected to be issued by April 1, 2019, so
3 that construction can begin.

4 The Company expects the Transmission Projects to become commercially
5 operational by October 31, 2020.

6 A project critical-path schedule is attached to my testimony as Exhibit
7 RMP__(RAV-10).

8 **Q. Has the Company entered into a binding contract for design and construction of**
9 **the Transmission Projects?**

10 A. No. The Company has engaged the services of an owner’s engineer to provide
11 engineering and design services for the Transmission Projects’ scope of work. The final
12 designs will be performed by the engineer, procurement and construction (“EPC”)
13 contractor(s) selected via competitive market solicitation.

14 **Q. Are there additional technical studies that are necessary before the Transmission**
15 **Projects are completed?**

16 A. Yes. While many technical studies have been completed to date, a number of technical
17 studies will need to be performed to assure that the completed projects will meet all
18 national standards for engineering, reliability and system operations, specifically:

- 19 • Substation and Line Design Studies;
- 20 • Static VAr Compensator Design Studies;
- 21 • Jim Bridger – Subsynchronous Resonance (“SSR”) Analysis Studies
22 and SSR Mitigation Analysis;
- 23 • Dynamic Voltage Control Analysis;
- 24 • Remedial Action Scheme (Bridger/Aeolus) Studies;

- 1 • FAC-013-2 Assessment of Transfer Capability for the Near-Term
- 2 Transmission Planning Horizon Studies; and
- 3 • System Operating Limit Studies.

4 These technical studies will be completed in phases as required to support the

5 design during the engineering phase of the Transmission Projects. All studies will be

6 completed by late 2018. Near-term planning and operational studies will be completed

7 in the middle of 2020, in preparation for the Transmission Projects being placed in-

8 service by October 31, 2020.

9 **Q. Please describe the proposed site, including the county or counties in which the**

10 **facility will be located, with a metes and bounds description, and a description of**

11 **the terrain where the facility will be constructed (Section 21(c)(ii)(A)).**

12 A. The Transmission Projects will be sited entirely in Wyoming’s Carbon and Sweetwater

13 counties and the terrain is primarily open rangeland. The map attached as Exhibit

14 RMP___(RAV-1) describes the proposed route for the transmission lines and the

15 proposed locations for the associated substations.

16 Cadastral surveying (which is a field survey that establishes or re-establishes

17 legal property boundaries) for all transmission lines and associated access roads is in

18 progress, so metes and bounds descriptions are not available at this time. The Company

19 will provide the results of the surveys once they are complete. The attached Exhibit

20 RMP___(RAV-12) provides the Transmission Projects’ sections on federal, private, and

21 state lands.

1 **Q. Please provide a geological report of the proposed site, including foundation**
2 **conditions, groundwater conditions, operating mineral deposits within a one-mile**
3 **radius and a topographical map showing the area within a five-mile radius**
4 **(Section 21(c)(ii)(B)).**

5 A. As part of the federal permitting process for the Energy Gateway project, the Company
6 conducted a two-year geotechnical exploration and geologic hazards assessment. For
7 the Aeolus-to-Bridger/Anticline Line, the geotechnical exploration program consisted
8 of advancing 44 borings, collection of soil samples for laboratory testing, lab testing
9 and determination of soil properties, and reporting for use in the foundation design. The
10 Company intends to advance an additional 44 borings to further inform the foundation
11 design. During the same period, the Company conducted surficial geology and geologic
12 hazard reconnaissance. Recommendations regarding noted geologic hazards were
13 published in reports for all segments of the Aeolus-to-Bridger/Anticline Line. The
14 geological reports are included in Exhibit RMP____(RAV-13). The work is also
15 generally applicable to the balance of the Transmission Projects and will be validated
16 as such.

17 The geotechnical engineering studies concluded that all tower sites were
18 suitable for drilled pier foundations as planned, as long as the recommended values for
19 soil engineering properties are used in the design and consideration is given to potential
20 excavation difficulties during construction.

21 A geotechnical study consistent in scope and technical approach to that
22 described above and as contained within Exhibit RMP____(RAV-13) will be performed
23 for the 230 kV Network Upgrades.

1 Shallow groundwater is not likely to pose a significant constraint on the
2 Transmission Projects, but could complicate foundation drilling and construction.
3 Areas where annual or seasonal groundwater depths are less than 10 feet below the
4 ground surface are considered high risk. Geologic hazard reconnaissance confirms high
5 ground water in only few isolated locations.

6 Operating mineral deposits are provided in Exhibit RMP___(RAV-14) and a
7 topographical map showing the substation locations and right-of-way overlay is
8 included in Exhibit RMP___(RAV-15).

9 **Q. Please describe the Company’s plans for protecting the surrounding scenic,**
10 **historical, archaeological, and recreational locations; natural resources; plant and**
11 **animal life; and land reclamation (Section 21(c)(ii)(C)).**

12 A. The Company has conducted a thorough assessment of the impacts of the Transmission
13 Projects on the surrounding environment and resources. Much of this assessment
14 occurred as part of the permitting process required by National Environmental Policy
15 Act (“NEPA”) because portions of the Transmission Projects will be sited on federal
16 land. For the 230 kV line section between Aeolus and Standpipe substations, the route
17 was analyzed for impacts as an alternative under the Gateway South project. The
18 Company and Bureau of Land Management (“BLM”) are currently evaluating any
19 requirements necessary to complete the impacts assessment.

20 In addition to requirements developed as part of the NEPA process, the
21 Company will also ensure compliance with the Company Avian Protection Plan and
22 other Company Standards.

1 **Q. Please describe the NEPA process.**

2 A. In December 2008, the Company filed a right-of-way permit application with the BLM
3 and the U.S. Forest Service, which triggered the need for BLM to prepare an
4 Environmental Impact Statement (“EIS”) in accordance with the requirements of
5 NEPA. The draft EIS was released for public comment on July 29, 2011, and the Final
6 EIS was published on April 26, 2013. The Record of Decision was released on
7 November 14, 2013.

8 The BLM used the following criteria to select the authorized route:

- 9 • Allow for reasonable construction costs associated with the preferred
10 route;
- 11 • Route on public land where practical;
- 12 • Avoid cultural and natural resource areas;
- 13 • Avoid sensitive species habitat, including bald eagle nests and big game
14 winter range;
- 15 • Follow existing corridors or linear structures;
- 16 • Avoid Visual Resource Management Class II areas;
- 17 • Avoid designated areas such as National Monuments, Wilderness Study
18 Areas, National Landscape Conservation System areas and State and
19 local parks; and
- 20 • Avoid BLM-identified preliminary priority sage-grouse habitat and
21 Wyoming core habitat areas.

22 The assessment that supported BLM’s EIS analyzed the impact of construction,
23 ongoing operation and maintenance, and decommissioning and reclamation of the
24 Aeolus-to-Bridger/Anticline Line. The assessment considered the cumulative effects
25 of the proposed Transmission Projects, together with past, present, and reasonably
26 foreseeable future actions, and addressed the following:

- 1 • Cultural resources, such as prehistoric or historic archaeological sites,
2 districts, buildings, historic trails, roads, and landscapes;
- 3 • Vegetation communities, including the potential impact of invasive
4 plant species due to the construction process;
- 5 • Wetlands and riparian areas;
- 6 • Wildlife and fish, including big game, small mammals, reptiles,
7 amphibians, migratory birds and raptors;
- 8 • Special status species, including those listed under the federal
9 Endangered Species Act (“ESA”), those proposed for federal listing as
10 well as candidates under the ESA, BLM, or Forest Service Sensitive
11 species, Forest Service Management Indicator Species, and State
12 Heritage Program plant species of concern;
- 13 • Soils, include clearing, grubbing, and grading along the rights-of-way
14 and at additional temporary workspaces; trenching; backfilling;
15 excavating; and construction of permanent structures, such as
16 transmission line structures, access and service roads, co-generation
17 sites, and substations;
- 18 • Paleontological resources;
- 19 • Water resources;
- 20 • Agricultural resources;
- 21 • Air quality; and
- 22 • Noise.

23 Based on that analysis, the BLM and cooperating agencies concluded that for
24 many resources, the effects of the Transmission Projects, coupled with the effects of
25 other known projects, will not be substantial. To the extent that resources may be
26 impacted, the Company has proposed reasonable mitigation efforts to minimize the
27 impact.

28 **Q. What impact assessment studies have been performed?**

29 A. The studies related to the impact assessment are included in BLM’s Record of Decision.

30 The studies are voluminous and can be found at following websites:

- 1 • The Final EIS:

2 <https://eplanning.blm.gov/epl-front->
3 [office/eplanning/docset_view.do?projectId=65164¤tPageId=92763&do-](https://eplanning.blm.gov/epl-front-office/eplanning/docset_view.do?projectId=65164¤tPageId=92763&documentId=78833)
4 [cumentId=78833](https://eplanning.blm.gov/epl-front-office/eplanning/docset_view.do?projectId=65164¤tPageId=92763&documentId=78833)

- 5 • The Final EIS Appendices:

6 <https://eplanning.blm.gov/epl-front->
7 [office/eplanning/docset_view.do?projectId=65164¤tPageId=92763&do-](https://eplanning.blm.gov/epl-front-office/eplanning/docset_view.do?projectId=65164¤tPageId=92763&documentId=78834)
8 [cumentId=78834](https://eplanning.blm.gov/epl-front-office/eplanning/docset_view.do?projectId=65164¤tPageId=92763&documentId=78834)

9 The mitigation plans are also included in the above links, and identified in the
10 attached Exhibit RMP___(RAV-16).

11 **Q. Please provide a general description of the devices to be installed at the major**
12 **utility facility to protect air, water, chemical, biological and thermal qualities**
13 **(Section 21(c)(ii)(C)(I)).**

14 A. Once the Transmission Projects are in service, they will not produce any emissions into
15 the environment. The Company is preparing the plan of development, which will
16 govern the construction phase of the Aeolus-to-Bridger/Anticline Line and must be
17 approved by BLM. This plan will include specific requirements to ensure full
18 compliance with all applicable regulations and requirements of the right-of-way permit
19 granted by BLM for siting the Aeolus-to-Bridger/Anticline Line on federal lands. The
20 plan of development will also include best practices for all aspects of environmental
21 protection. The Company anticipates that, at a minimum, the plan of development for
22 the construction phase will account for fugitive dust control, storm water pollution
23 prevention, spill containment and counter measures, plant/wildlife restrictions, and
24 ground disturbance reclamation. The Company anticipates that the protection measures
25 it will use for the Transmission Projects as shown in Exhibit RMP___(RAV-17) will be
26 similar to those implemented on the Company's Mona-to-Oquirrh and Sigurd-to-Red

1 Butte transmission projects, adjusted to meet the specifics of this project as necessary.

2 Once the Transmission Projects are in service, the Company will install three
3 primary devices to protect air, water, chemical, biological, and thermal qualities:

4 • Construction of retention basins at the substation sites to control storm
5 water runoff, to manage erosion control and waterflows across adjacent
6 properties as well as at the substation sites;

7 • Storm water control along the transmission line access routes will be
8 managed using ditches at the verge of new access roads along with water
9 control and diversion techniques, such as the use of water bars; and

10 • At the substation sites, an oil containment plan will be incorporated into
11 the final design such that, in the event of a leak, the contents of any oil-
12 filled equipment would be contained within the substation site and not
13 leach into the underlying soils.

14 **Q. Please describe the effectiveness of the three protective devices you describe above**
15 **and the operational conditions for which the Company designed and tested the**
16 **devices (Section 21(c)(ii)(C)(II) - III).**

17 A. The devices all represent proven technology employed at numerous substations and
18 other facilities across the United States. Water-retention designs will comply with all
19 relevant codes as well as the Clean Water Act requirements, where applicable. The
20 Company has successfully employed all of these techniques on recent transmission
21 projects including Populus-to-Terminal, Mona-to-Oquirrh, and Sigurd-to-Red Butte
22 transmission projects.

23 **Q. Please describe the potential safety hazards (Section 21(c)(ii)(D)).**

24 A. The Company requires a high standard of safety performance and planning by all of its
25 employees and contractors. During the construction phase, the primary safety hazards
26 will vary somewhat by stage of the project, but will generally relate to:

27 • Heavy equipment operations;

- 1 • Open excavations;
- 2 • Slips, trips and falls;
- 3 • Crane operations;
- 4 • Working at height;
- 5 • Working around energized facilities; and
- 6 • Climatic conditions.

7 The Company will require all personnel working on the Transmission Projects
8 to perform safety training specific to the Transmission Projects. The safety plan will
9 require appropriate safety markings, barriers and other restriction devices to prevent
10 worker or public access to potentially unsafe conditions.

11 During operations, the main safety hazard will be the energized facilities. Tower
12 structures are designed to provide electrical clearances to the ground and structures and
13 prevent climbing without specialist equipment, so that the public cannot reach the
14 conductor.

15 All substation energized facilities are constructed so that the high-voltage
16 equipment is placed with sufficient clearances from the site security fence to prevent
17 accidental contact with the energized equipment. All substations will include security
18 fencing, controlled access devices, security monitoring to limit and manage personnel
19 gaining access to the site.

20 **Q. Please describe the real property, fuel and water requirements, including any**
21 **source of water along which the major utility facility will be constructed or from**
22 **which it will obtain or return water (Section 21(c)(ii)(E)).**

23 A. The real property requirements consist of the rights-of-way and are discussed above.

24 The Transmission Projects will not use any water or fuel during the operation of the

1 facilities. During construction, the contractors will be responsible for sourcing any
2 water requirements. Alternates to water for fugitive dust control during construction
3 will be included in the plan of development and future detailed construction
4 specifications.

5 The map attached as Exhibit RMP___(RAV-1) describes the sources of water
6 along which the Aeolus-to-Bridger/Anticline Line will be constructed.

7 **Q. Please describe the acquisition status, source and location of real property, rights-**
8 **of-way, fuel and water requirements (Section 21(c)(ii)(F)).**

9 A. The Company has not yet acquired all rights-of-way for the Transmission Projects.
10 Upon issuance of a conditional CPCN, the Company will obtain all necessary rights-
11 of-way to construct the Transmission Projects.

12 Fuel will be sourced by the Company's contractor at wholesale or retail
13 locations within a reasonable distance from the equipment working location.

14 Water will be sourced from previously allocated public or private sources. The
15 locations have not been identified. Water will be used primarily in the production of
16 concrete for foundations and dust control. Concrete will be procured from local batch
17 plants or temporary batch plants where required.

18 **Q. Please describe the proposed means of transporting fuel and water requirements**
19 **(Section 21(c)(ii)(G)).**

20 A. Where required, the Company's contractor will transport fuel in placarded and
21 appropriately licensed tanker trucks. Refueling will be completed away from locations
22 where inadvertent spills could have a detrimental environmental impact. These
23 locations have been identified in the Final EIS prepared for the Aeolus-to-

1 Bridger/Anticline Line and will be set forth in the plan of development. Inadvertent
2 spills will be immediately contained and cleaned up according to requirements detailed
3 in the plan of development.

4 Water will be transported using a properly placarded and appropriately licensed
5 water tanker truck. It will be spread along the Transmission Projects roads at a rate that
6 effectively controls dust. Where water needs for dust control are deemed excessive,
7 other environmentally approved dust palliatives may be used.

8 **Q. Please describe the mineral rights associated with the facility and plans for**
9 **addressing any split-estate issues (Section 21(c)(ii)(H)).**

10 A. No mineral rights or minerals are required for the construction, operation, and
11 maintenance of the Transmission Projects. If during negotiations with landowners,
12 conflicts arise with the placement of the transmission line, mineral rights or extraction
13 terms will be negotiated with the landowner to mitigate the impact (*i.e.*, line relocation,
14 compensation, etc.).

15 **Q. Please describe the need for the facility in meeting present and future demands**
16 **for service, in Wyoming or other states (Section 21(c)(ii)(J)).**

17 A. I discuss this in the introductory sections of my testimony.

18 **Q. Please describe the commodity or service the facility will make available (Section**
19 **21(c)(ii)(K)).**

20 A. The Transmission Projects will relieve existing transmission congestion and provide
21 additional capacity to interconnect generation resources, including the proposed
22 860 MW of new wind resources. The increased capacity also provides improved access
23 to existing generation resources and increased opportunities to move incremental

1 energy from Wyoming to offset higher-priced generation in the PacifiCorp system or
2 other energy imbalance market participants' systems as noted by Mr. Link.

3 **Q. Please describe the facility's effect on the applicant's and other systems' stability**
4 **and reliability (Section 21(c)(ii)(L)).**

5 A. I discuss the positive effects of the Transmission Projects on system reliability in the
6 introductory sections of my testimony.

7 **Q. Please describe the status of satisfying local, state, tribal, or federal governmental**
8 **agency requirements (Section 21(c)(ii)(M)).**

9 A. The Company has obtained a federal right-of-way permit from the BLM, which covers
10 approximately half of the 140 mile-length of the Aeolus-to-Anticline line. The right-
11 of-way grant was authorized concurrently with the release of the Record of Decision,
12 discussed above. The BLM's decision provides the authorizations, with stipulations,
13 necessary for the Company to begin construction on federally administered lands.

14 Stipulations in the right-of-way grant require additional environmental surveys
15 to be completed to clear construction areas before receiving the notice to proceed to
16 construct on public land. The Company is currently conducting surveys for cultural,
17 paleontological, biological and potential wetland resources that will need to be
18 protected and, if adversely impacted, mitigated. The BLM and the U.S. Corp of
19 Engineers will issue final notices to proceed after receipt and approval of survey
20 reports, pre-construction notifications, and payment of any required mitigation funds
21 determined.

22 In addition, the right-of-way grant includes the requirement to comply with
23 several additional federal agency required permits and approvals, which the Company

1 is currently in the process of completing, including Section 106 Consultation under the
2 National Historic Preservation Act, Section 404 Clean Water Act Permit, and Resource
3 Protection Plans required by the BLM.

4 The Company is in the process of securing all relevant federal, state, and local
5 permits for the 230 kV section between the Aeolus substation and the Standpipe
6 substation. The Company anticipates that this section will be subject to the same or
7 similar conditions included in the Record of Decision, released November 12, 2013.

8 **Q. What is the current status of the necessary permits from local government**
9 **entities?**

10 A. The Company has or will receive the required consents, franchises, and permits from
11 all the local governmental entities having jurisdiction over the proposed route for the
12 Transmission Projects. These will include an application to the Wyoming Department
13 of Environmental Quality and the Wyoming Industrial Siting Council for the issuance
14 of a permit. The Company will also obtain a conditional use permit from Carbon
15 County and a construction permit from Sweetwater County.

16 In addition to the conditional use permit, the Company is in the process of
17 obtaining the required consents and permits from the State of Wyoming, subject to
18 completion of the final design of the transmission line alignment. In addition, the
19 Company will obtain any permits and approvals required from state agencies for actual
20 construction and operation of the Transmission Projects in the ordinary course of
21 development. These required consents and permits may include, but may not be limited
22 to, stream alteration permits from the Wyoming Game and Fish Department, highway
23 encroachment permits from the Wyoming Department of Transportation, storm water

1 permits from the Wyoming Department of Environmental Quality (Water Quality
2 Division), rights-of-way grants from the Wyoming State Trust Lands Administration,
3 and approvals from the State Historic Preservation Office of Wyoming.

4 Based on the current routing plan, these are the only permits, franchises, and
5 consents required for the Transmission Projects. If a routing change resulting from the
6 environmental approval process require any additional local consents, franchises, or
7 permits, the Company will immediately seek such approval and inform the
8 Commission.

9 Exhibit RMP___(RAV-18) provides additional details on the required permits.

10 **Q. Please describe the 2010 Stipulation.**

11 A. In the 2010 Stipulation, the Company agreed to request a CPCN before beginning
12 construction on several segments of the Energy Gateway Transmission Project,
13 including the Gateway West Transmission Line consisting of the Windstar-to-Populus
14 Line Segment and the Populus-to-Hemingway Line Segment. A portion of the
15 Transmission Project is a sub-segment of the Windstar-to-Populus transmission project
16 and is therefore subject to the Company's commitment in the 2010 Stipulation.

17 **Q. What additional requirements did the Company agree to as part of the 2010**
18 **Stipulation?**

19 A. As part of the 2010 Stipulation, the Company agreed to provide the following
20 additional details relating to CPCN requests:

- 21 • A description of the proposed facilities;
- 22 • An estimate of the cost to construct the proposed facilities;
- 23 • A detailed analysis and quantification of the benefits of the facilities
24 both to the overall PacifiCorp system and to Wyoming customers in
25 particular in terms of increased reliability or relatively lower net power

- 1 costs, increased generation alternatives and the benefits of generation
2 diversity;
- 3 • A discussion of alternatives to the facilities including but not limited to
4 new generation sited more proximate to load;
 - 5 • A discussion of the impact on access to renewable generation
6 resources;
 - 7 • A discussion of the proposed allocation of the cost of the facilities
8 between the federal and state jurisdictions; and
 - 9 • Description of any sage grouse habitat in the vicinity of the facilities.

10 My testimony describes the proposed Transmission Projects, provides an
11 estimated cost, describes the benefits in terms of increased reliability, and discusses
12 how the Transmission Projects will increase access to renewable generation resources.
13 I also address sage grouse habitat below. Mr. Link provides testimony on other benefits
14 of the Transmission Projects, including lower net power costs, increased generation
15 alternatives, and generation diversity, and describes the Company's assessment of
16 alternatives to the Transmission Projects. Mr. Jeffrey K. Larsen describes allocation of
17 the costs of the Transmission Projects.

18 **Q. Please describe the sage grouse habitat in the vicinity of the Transmission Projects.**

19 A. As part of the NEPA process, the Company's assessment specifically addressed the
20 potential impact of the Aeolus-to-Bridger/Anticline Line on sage grouse habitat. The
21 studies related to sage grouse are included in the Final EIS issued by BLM. In addition,
22 the mitigation plan associated with sage grouse is described in Exhibit
23 RMP___(RAV-16).

24 The Company is also in the process of developing a Greater Sage Grouse
25 Avoidance, Minimization, and Mitigation Plan to demonstrate compliance with BLM
26 and state policies designed to minimize impacts to sage grouse and their habitat, and

1 support the position that a listing as threatened or endangered under the ESA is not
2 needed.

3 **RECOMMENDATION AND CONCLUSION**

4 **Q. Please summarize your recommendation to the Commission.**

5 A. I recommend that the Commission approve the Company's Application. The
6 Transmission Projects will provide substantial benefits to its customers and are prudent
7 and in the public interest. Based on this conclusion, I recommend that the Commission
8 grant the Company a conditional CPCN for the Transmission Projects, to allow right-
9 of-way acquisition to proceed expeditiously.

10 **Q. Does this conclude your direct testimony?**

11 A. Yes.

BEFORE THE PUBLIC SERVICE COMMISSION OF WYOMING

IN THE MATTER OF THE)	
APPLICATION OF ROCKY)	
MOUNTAIN POWER FOR)	DOCKET NO. 20000-__-EA-17
CERTIFICATES OF PUBLIC)	(RECORD NO. _____)
CONVENIENCE AND NECESSITY)	
AND NONTRADITIONAL)	
RATEMAKING FOR WIND AND)	
TRANSMISSION FACILITIES)	

AFFIDAVIT, OATH AND VERIFICATION

Rick A. Vail (Affiant) being of lawful age and being first duly sworn, hereby deposes and says that:

Affiant is the Vice President of Transmission, PacifiCorp, which is a party in this matter.

Affiant prepared and caused to be filed the foregoing testimony. Affiant has, by all necessary action, been duly authorized to file this testimony and make this Oath and Verification.

Affiant hereby verifies that, based on Affiant's knowledge, all statements and information contained within the testimony and all of its associated attachments are true and complete and constitute the recommendations of the Affiant in his official capacity as Vice President of Transmission.

Further Affiant Sayeth Not.

Dated this 29 day of June, 2017



Rick A. Vail
VP, Transmission
825 NE Multnomah Street, Suite 1600
Portland, Oregon 97232
(503) 813-6938

STATE OF OREGON)
) SS:
COUNTY OF MULTNOMAH)

The foregoing was acknowledged before me by Rick A. Vail on this ___ day of June, 2017. Witness my hand and official seal.

Patricia Ann Deas

Notary Public

My Commission Expires:

March 12, 2019

