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TESTIMONY of

BYRNE LOVELL, DANNY L. CHEN, LAUREN E. TENNEY, AND KARL VISCHER

Witnesses for Bonneville Power Administration

SUBJECT: TRANSMISSION RISK ANALYSIS **Page**

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Section 1. Introduction and Purpose of Testimony

Q. Please state your names and qualifications.

A. My name is Byrne Lovell, and my qualifications are contained in BP-14-Q-BPA-42.

A. My name is Danny L. Chen, and my qualifications are contained in BP-14-Q-BPA-10.

A. My name is Lauren E. Tenney, and my qualifications are contained in BP-14-Q-BPA-60.

A. My name is Karl Vischer, and my qualifications are contained in BP-14-Q-BPA-62.

Q. Please state the purpose of your testimony.

A. The purpose of this testimony is to explain and support the risk analysis portion of the development of the transmission revenue requirements for fiscal years (FY) 2014 and 2015 (the rate period). This testimony sponsors the risk analysis portions of the Transmission Revenue Requirement Study (Study), BP-14-E-BPA-08, and the Documentation for the Transmission Revenue Requirement Study (Documentation), BP-14-E-BPA-08A.

Section 2. Risk Analysis

Q. Please describe the purpose of the risk analysis.

A. We run the risk analysis to simulate changes in financial reserves from year to year to evaluate whether BPA's 95 percent Treasury Payment Probability (TPP) standard will be met. TPP is the probability that BPA will be able to meet all of its cash requirements in full and on time during the two-year rate period.

Q. Have you made any major changes to the risk analysis methodology for this rate proceeding?

A. No. The methodology used in this rate proceeding is essentially the one that has been used in the last six rate proceedings. *See* Study section 2.2 and Documentation Chapter 10.

We calculate TPP using a Monte Carlo simulation. Monte Carlo simulation is a method of determining the probability of various outcomes by running multiple trial runs, called games, using randomized input variables for each run. We run 3,500 games (or iterations), each of which uses randomly generated cash flows (created from probability distributions of the values of several revenue and expense items), and then we examine the output of the simulations to see how often all of BPA's financial obligations associated with TS have been met. We start each game with the known level of financial reserves available for risk that are attributed to Transmission (TS Reserves) at the end of FY 2012. In each game, the model draws randomly from the distributions of possible values for the items that can vary during FY 2013 and calculates the ending reserves balance for FY 2013. This process is repeated for FY 2014 and for FY 2015. Then another game is run, starting with FY 2013.

When all 3,500 games have been run, we count the number of games in which the Treasury payment was made in both FY 2014 and FY 2015. If the Treasury payment was made in both years in at least 95 percent of the games, the TPP standard has been met.

Q. Have you made any changes to the transmission risk analysis model (TRAM)?

A. Only minor ones. We have removed one of the expenses we modeled in the BP-12 rate case, and we have made some changes to the ways that revenue and expense variability are modeled.

Q. What change have you made to the expenses modeled?

A. As in the previous rate case, we have modeled the variability, or uncertainty, of the following expenses: (1) Transmission Operations; (2) Transmission Maintenance; (3) Agency Services General and Administrative Expense; and (4) Interest on Long-Term Debt Issued to the Treasury. We are no longer modeling variability in Additional Post-Retirement Contributions to Retirement Plans because the subject matter experts we consulted no longer think there is significant uncertainty in those expenses.

We have changed how we model interest expense uncertainty. In the BP-12 rate case, the distributions of interest rates were created from a single forecast value that was used as the mean of a log-normal distribution. Log-normal distributions are asymmetrical, which is appropriate for interest rates: interest rates can increase greatly but cannot decrease below zero. Log-normal distributions are defined by two settings—the mean, which was set to the forecast interest rate, and the standard deviation, which governs the variability in the distribution. The variability was created from an assumption of one percent for the standard deviation of the distribution.

In this Initial Proposal, we have nine different forecast values that we can use in creating our distributions, letting us create a much more detailed picture of our expectations for interest rates. For each year, FY 2013 through FY 2015, we have a most-likely rate, which becomes the mean of the distribution, and high and low forecasts. To take advantage of the additional information we have now, we used a gamma distribution, which has more settings than a log-normal distribution. We used the high and low forecasts to define the high-side and low-side variabilities of the distributions separately. The forecast rates are correlated across the three years.

The resulting distributions are very lopsided, with long tails on the high end, because current interest rates and projections for the next few years are very low by historical standards, making it unlikely that interest rates can be very much below the most-likely forecasts, while there is a non-trivial chance that rates will be significantly higher than the most-likely forecasts. A detailed description of the risk analysis is provided in Documentation Chapter 10.

Q. What changes have you made to the modeling of revenue variability?

A. We have made small changes to the way that variability associated with revenues from long-term Point-to-Point (PTP) transmission and long-term Southern Intertie transmission is modeled. In the previous rate case we modeled risk for these products by categorizing requests for service into groups: service that was requested but not yet sold (that is, requests that have not been granted service); requests that have the right to extend their service commence date (defer) during the rate period; requests that have the right to renew their service during the rate period; and requests that might convert from another service (Formula Power Transmission (FPT) service or Integration of Resources (IR) service) to PTP service. For each group, we looked at historical information to determine the probability of requests actually taking the action in question (defer, renew service, or convert from another service). We applied the historical probability for each group to the forecast revenues from the requests in the rate period to model the risk associated with the revenue.

For this rate case, we continue to model risk related to renewals of service as described above. For other types of revenue variability, however, we have modeled risk for each service request individually. We consulted with BPA's account executives to determine the likelihood that a particular customer would extend its service commencement date or convert from FPT or IR service to PTP service. We made this change because the likelihood of a request extending its service commencement date or converting to PTP service varies widely based on individual circumstances. For example, the likelihood of a request extending its commencement date may depend on whether the generating facility associated with the transmission is completed.

In addition, we are modeling risk around potential defaults, using credit rating information from Standard and Poor's. We are using this information to estimate the likelihood that transmission service customers will default on their service. We then model the likelihood of the transmission capacity being resold after the default occurs. Similarly, we now model possible sales of capacity that may occur due to competitions for capacity under section 17.7 of BPA's tariff. Documentation Chapter 10.3.

Q. Are you continuing to apply a calibration adjustment in the risk analysis?

A. Yes, because we think that TRAM would underestimate the uncertainty in TS net revenue without it. We benchmarked the model by comparing the standard deviation of the distribution of 3,500 net revenue values that are generated by TRAM against historical data. The historical data we used are the differences between the transmission rate case net revenue forecasts for fiscal years 2008 through 2012 and the actual net revenue for the same years. The standard deviation for these five differences between forecasts and actuals is $49.1 million. The standard deviation for the unadjusted TRAM results is $22.1 million for

FY 2014 and $27.3 million for FY 2015, with a two-year average of $24.7 million. The disparity between the standard deviation of the forecasts and actuals and the standard deviation of the TRAM results shows that we have not yet captured in TRAM all of the sources of uncertainty or variability in transmission net revenue forecasts.

Q. Why does this matter?

A. We are using TRAM to determine if transmission rates meet BPA's TPP standard with the planned uses of transmission reserves described in the Initial Proposal. If TRAM underestimates the uncertainty in transmission net revenue, it will overestimate Transmission Services' TPP. Since the main function of the transmission risk analysis is to ensure that Transmission Services' TPP is high enough, this would be a serious shortcoming.

Q. How did you calculate and apply the calibration adjustment?

A. We ran TRAM once to collect the data needed for computing and applying the calibration—the mean net revenues for each of the three years from this first TRAM run, and the average of the standard deviations of the FY 2014 and FY 2015 net revenues. We divide the standard deviation of the historical differences between forecasts and actuals by the two-year average of the standard deviations from the first TRAM run to compute the calibration multiplier. In the Initial Proposal, this value is 49.1 / 24.7 = 1.99. We use this value to compute new, adjusted net revenue values for each year of each game so that the distribution of 3,500 values will reflect the level of net revenue forecast uncertainty we observed in the historical data. In each game, the difference between the adjusted net revenue and the mean adjusted net revenue is 1.99 times the difference between the unadjusted net revenue and the mean unadjusted net revenue. The mean adjusted net revenue is the same as the mean unadjusted net revenue. Documentation Chapter 10.5 describes in detail how we use this value to compute the new, adjusted net revenue values.

Q. What are the main impacts of applying the calibration adjustment?

A. The chief impact is that the standard deviation of the distributions of net revenues in TRAM now matches the historical data. This gives us confidence that when we assert that rates are meeting BPA's TPP standard, we are taking into account a realistic view of how uncertain Transmission Services' future net revenue and cash flows are. The standard deviation of the FY 2014 adjusted net revenue is $43.9 million, and the corresponding value for FY 2015 is $54.3 million. The average of these two numbers is $49.1 million, the same as the standard deviation of the historical differences between forecasts and actuals, so the calibration adjustment achieves its objective. The expected value of the calibration adjustments is $0, which confirms that the calibration adjustment does not change the mean of the distribution, but only the standard deviation; that is, it has not introduced a bias.

Q. What are the results of the risk analysis for this rate period?

A. BPA has identified and quantified transmission risks and designed risk mitigation tools that achieve BPA's policy standard of at least a 95 percent TPP. *See* Study section 2.2. Simulations of TS Reserves have expected values of $437 million, $437 million, and $410 million at the end of fiscal years 2013, 2014, and 2015 respectively. *Id.* These reserves and the cash flow anticipated from the proposed rates for FY 2014 and FY 2015 yield a two-year TPP of over 99.9 percent, thereby meeting BPA's TPP standard of 95 percent for a two-year period. In this analysis, there was no need to include any planned net revenues for risk in the revenue requirement. *Id.*

Q. Does your analysis incorporate any proposed use of TS Reserves in the rate period?

A. We are proposing to use $15 million of TS Reserves in each year in the rate period in lieu of borrowing to fund capital projects. *Id.* section 2.3.3. That is, our planned borrowing is $15 million less than our planned use of cash for capital investments, which will result in drawing down reserves by $15 million per year. The risk analysis and calculation of TS Reserves include this proposed use.

Q. Have you made any other changes to the transmission risk analysis?

A. No.

Q. Do you anticipate making any changes to the risk analysis for the Final Proposal?

A. Yes. We plan to update the data in our risk models. We also plan to examine historical data to determine whether the uncertainty in Dispatchable Energy Resource Balancing Service revenue is significant enough to merit inclusion in our revenue risk modeling.

Q. Does this conclude your testimony?

A. Yes.