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TESTIMONY of

GERARD C. BOLDEN, JUERGEN M. BERMEJO, DANNY L. CHEN, DANIEL H. FISHER, DAVID L. GILMAN, AND JANET ROSS KLIPPSTEIN

Witnesses for Bonneville Power Administration

SUBJECT: OPERATING RESERVE COST ALLOCATION

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SUBJECT: Operating Reserve Cost Allocation

Section 1: Introduction and Purpose of Testimony

Q. Please state your names and qualifications.

A. My name is Gerard C. Bolden, and my qualifications are contained in WP-10-Q-BPA-08.

A. My name is Juergen M. Bermejo, and my qualifications are contained in WP-10-Q-BPA-05.

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

A. My name is Daniel H. Fisher, and my qualifications are contained in WP-10-Q-BPA-18.

A. My name is David L. Gilman, and my qualifications are contained in WP-10-Q-BPA-23.

A. My name is Janet Ross Klippstein, and my qualifications are contained in WP-10-Q-BPA-34.

Q. What is the purpose of your testimony?

A. The purpose of this testimony is to sponsor section 5 of the Generation Inputs Study, WP-10-E-BPA-08, and explain how Operating Reserve amounts are forecast and the proposed cost allocation for Operating Reserve.

Q. How is your testimony organized?

A. Our testimony contains three sections. Section 1 is this introduction. In section 2, we describe Operating Reserve, discuss the method for forecasting the amount of Operating Reserve that Power Services (PS) is expected to provide to Transmission Services (TS) in FY 2010-2011, and discuss the pending changes to the Operating Reserve

requirements. In section 3 we describe our proposed methodology for allocating costs to Operating Reserve and the estimated effect of the pending change in the Operating Reserve requirement.

Section 2: Operating Reserve Forecast

Q. What is Operating Reserve?

A. Operating Reserve constitutes the generating capacity necessary to replace generating capacity and energy lost due to forced outages of generation or transmission equipment. Within a Balancing Authority Area (BAA), adequate generating capacity must be available at all times to maintain scheduled frequency and avoid loss of firm load following transmission or generation contingencies. Operating Reserve is required for the reliable operation of the interconnected power system. Operating Reserve is described as "contingency reserves" under the Western Electric Coordinating Council (WECC) reliability standard. For the purpose of this testimony, we refer to such reserve as Operating Reserve, which is consistent with definitions contained in BPA's Open Access Transmission Tariff (OATT).

Q. What is the WECC Operating Reserve requirement that applies to BAA operators?

A. The current WECC standard for Operating Reserve (BAL-STD-0002-0) establishes the minimum amount of Spinning and Supplemental (Non-Spinning) reserve that BPA must set aside for the BAA. Spinning and Supplemental reserves are described later in this section. The minimum Operating Reserve is the greater of: (a) the loss of generating capacity due to forced outages of generation or transmission equipment that would result from the most severe single contingency; or (b) the sum of 5 percent of load responsibility served by hydro and wind generation or 7 percent served by thermal generation. At least half of the reserve must be Spinning reserve.

Q. Please describe BPA's relationship to the Northwest Power Pool (NWPP).

A. BPA is a participating member of the NWPP Reserve Sharing Program for Contingency Reserves. By participating in the Reserve Sharing Program, BPA is better positioned to meet the North American Electric Reliability Corporation (NERC) disturbance control standard, because BPA will have access to a deeper and more diverse pool of shared reserve resources. BPA's membership in the NWPP Reserve Sharing Program also increases efficiency, because the shared reserve obligation for the group as a whole is less than the sum of each participant's reserve obligation computed separately. By sharing reserves, participants are entitled to use not only their own "internal" reserve resources, but may call on other participants for assistance if their internal reserves do not fully cover a contingency.

Q. When is Operating Reserve needed?

A. Operating Reserve is needed to replace generating capacity and energy lost due to generation contingencies in NWPP member BAAs. According to the NWPP, a generation contingency occurs when generation is lost due to unit trips, loss of the transmission path between generator and the network point of interconnection, internal plant problems, or failure of a generating unit to start.

Q. What is Spinning Operating Reserve?

A. Spinning Operating Reserve is a portion of the total Operating Reserve. Spinning reserve is provided by unloaded generating capacity that is synchronized to the power system and ready to serve additional demand. These resources must be able to respond immediately to serve load in the event of a system contingency, and must be capable of fully responding to the contingency within 10 minutes. In contrast, Supplemental Operating Reserve, discussed below, is not required to be able to respond immediately to a contingency. WECC requires that each balancing authority maintain a Spinning

Operating Reserve equal to a minimum of 50 percent of its Operating Reserve obligation.

Q. What is Supplemental (Non-Spinning) Operating Reserve?

A. Supplemental Operating Reserve is generating capacity that is not synchronized to the system, but is capable of serving demand within 10 minutes, or interruptible load that can be removed from the system within 10 minutes. These reserves must be capable of fully synchronizing to the system and ramping to meet load within 10 minutes of a contingency.

Q. Are transmission customers allowed to obtain Operating Reserve from other suppliers?

A. Yes. The BPA OATT allows transmission customers the option of obtaining Operating Reserve by: (1) self-supply; (2) purchase from a third party; or (3) purchase from TS. Currently the TS business practice for Operating Reserve allows transmission customers to make a two-year election to have TS as their supplier or choose another supplier. The transmission customer has the option to change non-TS suppliers annually. If the customer does not make an affirmative election to self-supply or acquire Operating Reserve from a third party, the customer must purchase Operating Reserve from TS.

Q. Have any transmission contract holders elected to obtain Operating Reserve from sources other than TS?

A. Yes, some transmission customers have elected to obtain Operating Reserve from other suppliers, either by self-supply or third-party supply, to meet their reserve obligation within the BPA BAA.

Q. If transmission contract holders elect alternative sources to Operating Reserve, what is the impact to BPA generation inputs for Operating Reserve?

A. If transmission customers elect to self-supply or third-party supply their Operating Reserve obligation, the amount of PS-supplied generation inputs for Operating Reserve is reduced. In FY 2008-2009, the amount of PS-supplied generation inputs for

Operating Reserve was reduced by approximately one-third because of transmission customer self-supply or third-party supply of Operating Reserve.

Q. How does TS determine the PS reserve obligation for Operating Reserve?

A. TS forecasts the PS requirement based on historical Operating Reserve requirements in the BPA BAA. TS first determines the BAA requirement consistent with the WECC standard. TS reduces the total Operating Reserve requirement by the amount supplied by current transmission customers who have elected to self-supply or purchase Operating Reserve from a third-party supplier. The remainder is the amount forecast to be supplied by PS through generation inputs to TS. The annual forecast Operating Reserve requirement to be supplied by PS averages 513 MW over the two-year rate period. Study WP-10-E-BPA-08, Table 5.3. The forecast of Operating Reserve requirement is described fully in the Generation Inputs Study. *Id.*, Section 5.2.

Section 3: Allocating Cost For Operating Reserve

Q. What changes to methodology and inputs are being proposed for the Operating Reserve cost allocation as compared to the WP-07 cost allocation for Operating Reserve?

A. Fundamentally, there are no proposed changes to the methodology to allocate costs that are attributed to Operating Reserve. The subset of resources available to provide Operating Reserve has been modified from the WP-07 proceeding because resources outside of the BPA BAA and some other independent hydro projects do not have the ability to provide Operating Reserve at this time.

In addition to a change in the subset of resources, we update all required reserve quantities to reflect changes in system requirements since the WP-07 rate proceeding. This includes the addition of Wind Balancing Reserve as a component of the total reserve requirement.

Q. Please give a general overview of the proposed embedded cost calculation for Operating Reserve.

A. In the simplest terms, we take the costs associated with the subset of resources capable of providing Operating Reserve and divide those costs by the amount of load-serving capacity plus the reserve requirement that those same resources provide. Dividing these two values results in a unit cost of total capacity uses, which is used to allocate embedded costs to the Operating Reserve use.

Q. What was the derivation of the revenue requirement attributable to the subset of resources capable of providing Operating Reserve?

A. The embedded cost Net Revenue Requirement for Operating Reserve is composed of; 1) power-related costs of the relevant hydro projects and associated fish mitigation on a project-specific basis; 2) allocation of the administrative and general expense; and 3) three revenue credits. Study WP-10-E-BPA-08, Table 5.6. The revenue requirement associated with the resources capable of providing Operating Reserve is consistent with BPA's Revenue Requirement Study Documentation, WP-10-E-BPA-02A, section 2.3. As discussed in Klippstein *et al.*, WP-10-E-BPA-24, our proposed embedded cost Net Revenue Requirement for Operating Reserves does not include Planned Net Revenue for Risk.

Q. Please describe the system resources available for providing Operating Reserve.

A. To determine the system resources available for Operating Reserve, we first identify those Federal resources in the BPA BAA. We evaluate these resources based on their attributes and whether or not they are available to supply reserve capacity (either Spinning or Supplemental). For example, Columbia Generating Station (CGS) is removed from the list of resources providing reserves because the most economic use of CGS is to generate at 100 percent capacity, which is the point of maximum efficiency. Resources generating at 100 percent capacity have no ability to respond to requests for

additional capacity to be dispatched in the event of a disturbance. Therefore, these resources are excluded from the system resources available to provide reserve. We also recognize that some small run-of-river independent resources are not able to supply reserve capacity due to operational limitations. We remove these small independent resources from the system resources available to supply reserve. All remaining system resources are the resources determined to be available to provide Operating Reserve. Study WP-10-E-BPA-08, Tables 3.1, 3.2, and 3.5.

Q. *Please describe how you quantify the size of the system that is used to allocate costs for the capacity uses of the system.*

A. We use a 120-hour peaking capability measurement for the regulated hydro resources, while the independent hydro resources' capacity is based on mid-month elevations. For a detailed discussion of the 120-hour peaking capability and the treatment of the independent hydro resources, *see* Klippstein *et al*., WP-10-E-BPA-24. We add these values for the resources determined capable of providing reserves and further add the forecast reserve needs for Regulating, Operating, Load Following, and Wind Balancing Reserves capacity as determined by the Generation Reserves Forecast. *See* McManus *et al*., WP-10-E-BPA-23.

Q. *Please describe why Regulating, Operating, Load Following, and Wind Balancing Reserves are added to the regulated and independent resource capacity value for purposes of determining the total capacity system uses.*

A. The two models (a combination of HYDSIM and HOSS models, *see* Klippstein *et al*., WP-10-E-BPA-24) used to quantify the 120-hour peaking capability of the regulated hydro include a reduction to the system capability for reserves. Therefore, to correctly capture the entire amount of capacity available for system uses, the reserves (which is a use of the system) must be added back into the capacity quantities.

Q. How do you forecast the annual revenue received for Operating Reserve?

A. The annual revenue forecast is derived by multiplying the forecast quantity of Operating Reserve in kW of capacity times the capacity unit cost in dollars per kW. Study WP-10-E-BPA-08, Table 5.7.

Q. Does the same methodology proposed to allocate embedded costs to Operating Reserve apply to both Spinning Operating Reserve and Supplemental Operating Reserve?

A. Yes. We do not distinguish between Spinning and Supplemental Operating Reserve for purposes of allocating embedded costs to these system uses. The Spinning portion, however, does have a variable cost component added to its cost allocation.

Q. Why is a variable cost component added to the Spinning portion of the Operating Reserve Requirement and not the Supplemental portion?

A. The Spinning portion of the Operating Reserve Requirement is assigned a variable cost component because ensuring that sufficient Spinning capability exists at all times to respond to a qualifying contingency has associated costs that the Supplemental portion does not incur. Because Operating Reserve is deployed infrequently compared to balancing reserves, which are continuously deployed, Operating Reserve deployments are not modeled. Consequently, deployment costs, including Supplemental costs, associated with Operating Reserve are not captured. Study WP-10-E-BPA-08, section 4 and Table 4.19, line 7.

Q. What is the unit cost and total forecast cost allocation for Operating Reserve?

A. The total forecast cost allocation for Operating Reserve on an annual average basis is $47,172,693. The unit cost for the Supplemental portion is $7.19 per kW per month, comprised of only an embedded cost allocation. The unit cost for the Spinning portion is $8.14 per kW per month, comprised of an embedded cost allocation of $7.19 per kW per month plus a variable cost allocation of $0.95 per kW per month. Study WP-10-E-BPA-08, Table 1.1 and section 5.9.

Q. Are there any further changes or modification to the embedded cost calculation that are not yet reflected in Initial Proposal?

A. Yes. During the final iterations of the rate development process for the Initial Proposal a small adjustment to the revenue requirement for the Operating Reserve cost allocation was not included. The revenue requirement for the Operating Reserve cost calculation for these reserves contains three revenue credit adjustments. One of the revenue credits is the annual capital cost associated with the investment in plant modifications at John Day and The Dalles to enable synchronous condense capability. The synchronous condensing generation input recovers those costs and this revenue credit adjustment must be done manually since it is not removed from the revenue requirement for the Operating Reserve embedded cost allocation provided by the revenue requirement panel. That the adjustment was not made was not discovered until it was too late to incorporate this adjustment into the Initial Proposal.

Q. What effect would this correction have on the unit cost and total revenue for embedded costs described above?

A. The unit cost is reduced by $0.01 per kW per month. The revenue forecast for the Operating Reserve embedded cost allocation would decrease by $61,560 on an annual average basis from the Initial Proposal. The $338,000 synchronous condensing revenue credit is small compared to the $918,749,000 revenue requirement, but the correction rounds the unit cost down by $0.01.

Q. How do you propose BPA recover its costs when Operating Reserve is called upon to deliver energy?

A. When Operating Reserve is utilized to provide energy, that energy would be priced based on an hourly energy index in the Pacific Northwest, or an alternative index if an adequate hourly index is not available, as determined by PS. PS will determine an energy index based on the volume of trade, liquidity, and price transparency that best

reflects market value. We are forecasting no revenue from the energy associated with deployment of reserves, because PS will be compensated at the current market price at the time of deployment; thus, there is no difference between using the energy for an Operating Reserve deployment or selling the power off the trading floor.

Section 4: Proposed WECC Standard

Q. Please describe the proposed WECC standard for Operating Reserve that could be effective during the FY 2010-2011 rate period.

A. WECC has proposed a new standard for Operating Reserve, BAL-002-WECC-1, which is currently pending approval before the Federal Energy Regulatory Commission (Commission). Under the new standard, the minimum Operating Reserve that the BPA Balancing Authority would be required to have is reduced. The new requirement would be an amount of reserve equal to the sum of three percent of the load (generation minus station service minus Net Actual Interchange) and three percent of net generation (generation minus station service). NERC has already approved the proposed WECC standard. We expect the Commission to approve the proposed WECC standard before the beginning of the rate period.

Q. For this Initial Proposal, are you assuming the use of the current or the proposed WECC standard?

A. We are assuming the current WECC standard to forecast the Operating Reserve requirement for the Initial Proposal. At the time we had to decide the forecast for the Initial Proposal, the status of the proposed WECC standard and the implementation date were uncertain, so we elected to use the current standard.

Q. What would be the TS forecast Operating Reserve requirement under the proposed WECC standard?

A. The annual forecast Operating Reserve requirement under the proposed WECC standard to be supplied by PS is an average of 380 MW over the two-year rate period compared to an average of 513 MW under the current standard. Study WP-10-E-BPA-08, section 5.10 and Tables 5.3 and 5.5. This is split 50 percent each to the Spinning and Supplemental reserve requirement.

Q. How and when will BPA make the determination whether to use the existing 5 and 7 percent standard or the WECC-proposed 3 and 3 percent standard for purposes of allocating cost in the Final Proposal?

A. If the Commission does not approve the new WECC standard before the Administrator must make decisions for the Final Proposal, the Administrator will decide the basis for the Operating Reserve requirement forecast based on the rate case record.

Q. If BPA determines that it should use the WECC-proposed 3 and 3 standard to allocate costs to Operating Reserve, what would be the approximate impact on the unit cost and total cost allocation for Operating Reserve?

A. Changing the standard would increase the unit cost by approximately $0.09 per kW per month and decrease the total cost allocation by approximately $11 million per year.

Q. How did you estimate the effects of changing to the new standard?

A. In providing the estimate of the change, we did not have time to do a full analysis of the impacts to the cost allocation. The forecast Operating Reserve quantity is an input to the hydro-regulation studies that determines the 120-hour peaking capability amount that serves as the base number in the Operating Reserve embedded cost calculation. Study WP-10-E-BPA-08, Table 5.8. There was not time to run the hydro-regulation studies for the Operating Reserve quantity that would result from the change to the 3 and 3, so the base number under the current proposal was used for this estimate. The steps in the

embedded cost allocation calculation for the estimate remain the same as in the Initial Proposal calculation except that 380 MW is used in place of 513 MW. The embedded cost allocation applies to the Spinning and Supplemental Operating Reserve. The Spinning Operating Reserve also has a variable cost component. There was also not time to run the Generation And Reserves Dispatch (GARD) model to calculate the revised variable cost allocated to the Spinning Operating Reserve under the new standard, so the existing variable cost allocation was applied.

Q. Why does your estimate of the unit cost rise, when the total cost allocation would be reduced?

A. The revenue requirement associated with the set of resources that are capable of providing Operating Reserve remains the same for both the current and pending WECC Operating Reserve requirements. The Operating Reserve quantity is less under the 3 and 3 standard than under the current standard. Dividing the same revenue requirement by a smaller number yields a larger unit cost. The unit cost is applied to a smaller MW amount of Operating Reserve under the WECC-proposed standard, so the total cost allocation would be reduced from the forecast in the Initial Proposal.

Q. Why do you refer to this as an estimate?

A. The amount of Operating Reserve forecast due to the WECC-proposed standard has not been run through the hydro-regulation models. The Operating Reserve cost allocation calculation is also dependent on the Wind Balancing Reserve assumption, because changing the Wind Balancing Reserve forecast would change the cost allocation for Operating Reserve. Study WP-10-E-BPA-08, Table 5.8. These uncertainties lead us to call this an estimate rather than a forecast.

Q. Does this conclude your testimony?

A. Yes.