

2003 Safety-Net Cost Recovery Adjustment Clause Initial Proposal

Direct Testimony

SN-03-E-BPA-05 LOADS AND RESOURCES

March 2003



INDEX

TESTIMONY OF

JON A. HIRSCH, TIMOTHY C. MISLEY, JANET ROSS KLIPPSTEIN, HARRY W. CLARK,
STEVEN R. KERNS, AND ROGER P. SCHIEWE

Witnesses for Bonneville Power Administration

SUBJECT: Loads and Resources

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5
6 **SUBJECT: LOADS AND RESOURCES**

7 **Section 1. Introduction and Purpose of Testimony**

8 *Q. Please state your names and qualifications.*

9 A. My name is Jon A. Hirsch and my qualifications are contained in SN-03-Q-BPA-05.

10 A. My name is Timothy C. Misley and my qualifications are contained in SN-03-Q-BPA-17.

11 A. My name is Janet Ross Klippstein and my qualifications are contained in
12 SN-03-Q-BPA-09.

13 A. My name is Harry W. Clark and my qualifications are contained in SN-03-Q-BPA-18.

14 A. My name is Steven R. Kerns and my qualifications are contained in SN-03-Q-BPA-08.

15 A. My name is Roger P. Schiewe and my qualifications are contained in SN-03-Q-BPA-26.

16 *Q. Please state the purpose of your testimony.*

17 A. The purpose of our testimony is to sponsor the Loads and Resources Study portion of
18 Bonneville Power Administration's (BPA) 2003 Safety-Net Cost Recovery Adjustment
19 Clause Initial Proposal Study (SN-03 Study), SN-03-E-BPA-01, and Documentation for
20 SN-03 Study, SN-03-E-BPA-02.

21 *Q. How is your testimony organized?*

22 A. Section 2 discusses the process used to generate load forecasts for the public body and
23 cooperative utilities and Federal agencies (Public Agencies) served by BPA. Section 3
24 describes BPA's Priority Firm (PF) sales forecasting process. Section 4 addresses BPA's
25 forecast of sales to the investor-owned utilities (IOU) and direct service industries (DSI).
26 Section 5 describes BPA's Loads and Resources Study process. Section 6 describes

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1 BPA's hydro regulation study. Section 7 describes BPA's Federal generation. Section 8
2 addresses BPA's treatment of contracts. Section 9 describes BPA's treatment of Federal
3 transmission losses. Finally, section 10 addresses regional hydro resources.

4 **Section 2. Public Agency Load Forecasts**

5 *Q. Please generally describe the process used to produce the Public Agency Load Forecasts.*

6 A. BPA routinely produces, or obtains from its customers, forecasts of its customers' loads.
7 In general, the method BPA uses is a linear trend approach, projecting annual loads based
8 on annual historical values. The annual projections are then shaped to monthly and
9 diurnal periods using historical relationships. A more detailed description of the method
10 BPA uses to generate the forecasts is included in SN-03 Study, SN-03-E-BPA-01,
11 Chapter 2, and the Documentation for SN-03 Study, SN-03-E-BPA-02, Chapter 2.

12 **Section 3. PF Sales Forecasting Process**

13 *Q. Please generally describe BPA's PF sales forecasting process.*

14 A. BPA prepared Federal system sales forecasts as part of this ratemaking process. BPA's
15 forecasts of Public Agency loads described above were used as the basis for BPA's
16 Priority Firm (PF) sales forecast. Customer-owned generation or contracted generation
17 purchases were subtracted from the load forecast to produce a sales forecast for those
18 customers for whom BPA follows load. For the Slice/Block and Block customers the
19 sales were designated by contract. Slice sales are also defined by contract, as a
20 percentage of Federal Columbia River Power System (FCRPS) output. Details pertaining
21 to BPA's Federal sales forecasting process are contained in the Documentation for
22 SN-03 Study, SN-03-E-BPA-02, Chapter 2.

23 *Q. Please summarize BPA's forecast for Public Agency sales growth.*

24 A. Full Service customer sales are projected to grow at an average annual rate of
25 approximately 1.8 percent for FY 2004-2006. Partial Service customer sales are
26 projected to grow at an average annual rate of about 0.3 percent for FY 2004-2006.

1 Pre-Subscription customer sales are projected to grow at an average annual rate about
2 0.2 percent over the FY 2004-2006 period. Overall, the sales obligations for which BPA
3 follows the load are projected to grow at an average annual rate of about 0.9 percent over
4 the FY 2004-2006 period. Block sales grow at an average annual rate of about
5 0.9 percent, while Slice/Block sales decline at a rate of 0.7 percent per year. These
6 percentages reflect contractual step amounts that change BPA's sales obligations. BPA's
7 total Public Agency load obligation is projected to grow at an average annual rate of
8 0.6 percent per year over the FY 2004-2006 period.

9 *Q. How have recent actual sales compared to BPA's FY 2002 sales forecasts?*

10 A. For FY 2002, actual sales of the load following customers, including the pre-Subscribers,
11 exceeded the forecast for those customers' loads by 1.2 percent. For the first quarter of
12 FY 2003, actual sales were 0.9 percent lower than forecast.

13 *Q. For which products are load forecasts required?*

14 A. As indicated earlier, load forecasts are needed for both the Full and Partial Service
15 product customers. Because sales to customers purchasing the Block product, whether in
16 conjunction with the Slice product or by themselves, are specified by contract, no
17 forecast is required for these products.

18 *Q. Please describe how the Heavy Load Hour (HLH) and Light Load Hour (LLH) splits
19 were developed.*

20 A. Historic relationships of HLH and LLH for each customer were used to break the total
21 monthly load into heavy and light load hours.

22 *Q. How did BPA forecast Public Agency Full Service demand sales?*

23 A. Monthly load factors are calculated from historical data and applied to the monthly
24 energy sales forecasts to project demand sales. Load factors are typically calculated as
25 monthly energy divided by monthly peak. However, for this process, since the demand
26 billing determinant is the load at the time of BPA's system peak, BPA uses the load at the

1 time of the BPA system peak as the denominator. A description of BPA's process for
2 forecasting Full Service peak sales is contained in the SN-03 Study, SN-03-E-BPA-01,
3 Chapter 2, and in the Documentation for SN-03 Study, SN-03-E-BPA-02, Chapter 2.

4 *Q. How did BPA forecast Public Agency Partial Service peak sales?*

5 A. Monthly load factors, using the load at the time of the BPA system peak as the
6 denominator, are applied to the monthly energy load forecasts to derive peak load
7 forecasts by month. The Partial Service customers' peak resources are then subtracted to
8 derive the demand billing determinant for the Partial Service customers. A description of
9 BPA's process for forecasting Partial Service customer peak sales is contained in the
10 SN-03 Study, SN-03-E-BPA-01, Chapter 2, and in the Documentation for SN-03 Study,
11 SN-03-E-BPA-02, Chapter 2.

12 *Q. How were the billing determinants for the Load Variance charge estimated?*

13 A. The Load Variance charge is charged against a utility's total retail load for utilities
14 purchasing the Full and Partial Service products. The total retail load forecasts for
15 utilities with products subject to the Load Variance charge are summed by product.

16 **Section 4. IOU and DSI Sales Forecasts**

17 *Q. What is BPA's forecast for IOU sales during the rate period?*

18 A. BPA forecasts the IOUs will purchase 382 aMW at the Residential Load (RL) rate or the
19 PF Exchange Subscription rate from BPA for their residential and small farm loads for
20 FY 2003-2006. The 382 aMW includes a reduction of 124 aMW due to power buybacks
21 from three IOUs. The IOU sales forecast is shown in the SN-03 Study,
22 SN-03-E-BPA-01, Chapter 2, and in the Documentation for SN-03 Study,
23 SN-03-E-BPA-02, Chapter 2.

24 *Q. What is BPA's forecast for DSI sales during the rate period?*

25 A. BPA forecasts sales to the DSIs will be 35 aMW in FY 2003 and 350 aMW for
26 FY 2004-2006. The DSI sales forecast is shown in the SN-03 Study, SN-03-E-BPA-01,

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1 Chapter 2, and in the Documentation for SN-03 Study, SN-03-E-BPA-02, Chapter 2.
2 BPA continues to review the DSI sales forecast, which may be revised to reflect further
3 reductions in DSI loads.

4 **Section 5. Loads and Resources Study Process**

5 *Q. How are Federal loads, sales, and contract obligations forecasted?*

6 A. BPA treats all Federal loads, sales, and contract obligations as firm obligations to the
7 Federal system. To provide input into the SN-03 Study, SN-03-E-BPA-01, Chapter 6,
8 these obligations are presented as monthly energy in average megawatts as well as HLH
9 energy in megawatt hours and LLH energy in megawatt hours.

10 *Q. How are the Federal resources and contract purchases treated?*

11 A. BPA treats all Federal resources and contract purchases, with the exception of Federal
12 regulated and independent hydro resources, as firm resources. To provide input into the
13 Risk Analysis, these resources are presented as monthly energy in average megawatts as
14 well as HLH and LLH. The HLH/LLH split of the regulated and independent hydro is
15 completed in the Risk Analysis. See SN-03 Study, SN-03-E-BPA-01, Chapter 6.

16 **Section 6. Hydro Regulation Study**

17 *Q. Please describe the primary drivers of reservoir operations in the hydro regulation*
18 *studies.*

19 A. Hydro plant operating requirements are used to regulate plant operations. Operating
20 requirements and project operating characteristics are based on data submittals taken
21 from the Pacific Northwest Coordination Agreement (PNCA). Operating requirements
22 include, but are not limited to, storage content limits determined by rule curves,
23 maximum project draft rates determined by each project, and flow and spill objectives
24 determined by the 2000 National Marine Fisheries Service's (NOAA Fisheries) and
25 2000 United States Fish and Wildlife Service (USFWS) Biological Opinion for salmon.

1 Q. *Does this reflect the current method of reservoir operation in the PNCA planning*
2 *process?*

3 A. Yes, for FY 2004-2006. However, for FY 2003, some deviations from the PNCA data
4 submittals occurred when specific operating decisions were made in order to implement
5 the Biological Opinion for this time period. Since BPA is already operating within
6 FY 2003, more is known about the range of possible streamflows that need to be
7 considered and their effects on elements such as flood control draft requirements and fish
8 operating requirements that vary with the amount of spring runoff expected.

9 Q. *In the Loads and Resources Study, why is the hydro regulation study called a “50-year*
10 *study”?*

11 A. Hydro system operations under current operating requirements are simulated over the
12 50 historic water conditions from August 1928 through July 1978. This simulation
13 produces an estimate of what could reasonably be expected of the hydropower system
14 over a wide range of runoff conditions, and determines the firm energy production under
15 critical water conditions. The full range of water conditions is used as an input for
16 estimating the revenues and risks associated with various subscription and rate scenarios.
17 *See SN-03 Study, SN-03-E-BPA-01, Chapter 4.*

18 Q. *Please describe the steps in the hydro regulation study.*

19 A. First, an Actual Energy Regulation (AER) study is run to determine the operation of the
20 Federal (U.S.) hydro projects under each of the 50 historic water conditions while
21 meeting the Firm Energy Load Carrying Capability (FELCC) produced in the PNCA
22 final regulation. In this step, the Canadian operation is fixed to that specified in the
23 assured operating plan (AOP). The U.S. projects draft to meet the Coordinated System
24 FELCC while meeting their operating requirements. All projects draft to their Energy
25 Content Curve (ECC) if possible, to produce secondary energy. The project operation
26

1 from the AER study determines the drafting rights of each of the projects for use in the
2 operational study.

3 Second, a 50-year operational study is run with estimated regional firm loads
4 developed for the hydro regulation study. The proportional draft points (PDP) developed
5 in the 50-year AER study limit the operation of the non-Federal projects.

6 *Q How do you account for the differences between the FY 2003 and the FY 2004-2006*
7 *studies?*

8 *A* There are two modes for hydro regulation studies: refill and continuous. Both are used to
9 estimate the energy production of the hydro system. However, each mode differs in how
10 it treats initial reservoir conditions. Continuous hydro studies operate from one water
11 year to another, using the previous water year's final reservoir elevations as the initial
12 reservoir elevations for the next water year. Refill studies operate each water year
13 independent of all other water years, using the same initial reservoir elevations for each
14 water year. Continuous studies are typically used when there is little or no information
15 on initial reservoir elevations, such as when considering operations for a future year.
16 Since the initial conditions are known, a refill study was used for the FY 2003 analysis.
17 For the FY 2004-2006 studies, each was run in the continuous mode.

18 The 2003 study reflected several operational decisions for fish, specific to the
19 2003 water conditions. The FY 2004-2006 studies reflect the most likely fish operations
20 such as Chum salmon, the Vernita Bar minimum flow, and the Non-Treaty Storage
21 operation for flow augmentation.

22 *Q. How will assumptions about fish operations be determined in the analysis for the Final*
23 *SN-03 Rate Proposal?*

24 *A.* This is addressed in the testimony of Keep, *et al.*, SN-03-E-BPA-04.
25
26

1 Q *How are the current below-average streamflow conditions reflected in the FY 2003*
2 *analysis?*

3 A Due to projected below normal runoff for the FY 2003 water year, the 50-year modified
4 flow set was weighted to reflect the latest projections for the 2003 January through July
5 runoff. The latest Northwest River Forecast Center volume forecast, the February early
6 bird of 74.8 million acre-feet (maf), was used to base the weightings. The result was a
7 weighted 50-year set of years with a weighted mean of 75 maf. In addition to having a
8 weighted mean of 75 maf, the set was also truncated above 108.5 maf (all years above
9 108 maf were weighted zero) to reflect the less than 1 percent probability of any of this
10 subset occurring. The resulting set of years with weights greater than zero contained a
11 subset of 30 years out of the original 50-year set. For fiscal years 2004-2006, all
12 50 water years, equally weighted, were used. These water year weights are used in the
13 Risk Analysis of the SN-03 Study, SN-03-E-BPA-01, Chapter 6.

14 Q *Are there any impacts to FY 2004 from a drier than normal 2003?*

15 A Yes. A significant difference was noted in the Columbia River Treaty reservoirs' storage
16 levels when comparing the end of the FY 2003 study with the starting storage levels for
17 the reservoirs in the FY 2004 study. In order to transition smoothly from the FY 2003
18 study to the FY 2004 study, an energy adjustment was made to the federal system energy
19 production in the FY 2004 study results. A table of these energy adjustments is found in
20 the Documentation for SN-03 Study, SN-03-E-BPA-02, Chapter 2.

21 **Section 7. Federal Generation**

22 Q. *How are generating improvements treated in the Loads and Resources Study?*

23 A. The Loads and Resources Study includes increases in hydro generation anticipated to
24 result from hydro generation optimization, turbine runner replacement, and reliability
25 increases through BPA's capital improvements programs at Federal regulated and
26 independent hydro projects. These improvements are estimated by individual project and

1 are included in each respective project's generation. Generation increases in aggregate
2 are expected to yield as much as 102.9 average megawatts in FY 2006 under 1937 water
3 conditions. In addition, the projected output of the Columbia Generating Station includes
4 facility improvements and changes in the refueling cycle to once every 2 years. *See*
5 Documentation for SN-03 Study, SN-03-E-BPA-02, Chapter 2, Table A-3 (Independent
6 Hydro), Table A-4 (Regulated Hydro), and Table A-10 (Large Thermal).

7 *Q. What Federal regulated and independent hydro generation is included in the Loads and*
8 *Resources Study?*

9 A. The generation from the Federal system regulated and independent hydro projects is set
10 by the hydro regulation study and produces generation by project for the August 1928
11 through July 1978 water years. Due to the monthly span of operating years, such years
12 are usually called the 1929 through 1978 water years, and are also called the 50 water
13 years on record. The Federal system regulated and independent hydro generation also
14 includes estimated generation increases from capital improvements at each project. The
15 Federal regulated and independent hydro resources incorporate the Loads and Resources
16 Study's hydro regulation analysis; however, only the traditional monthly energy in
17 average megawatts is passed as input to the Risk Analysis of the SN-03 Study,
18 SN-03-E-BPA-01, Chapter 6. The HLH/LLH split of the regulated and independent
19 hydro is completed in the Risk Analysis of the SN-03 Study, SN-03-E-BPA-01,
20 Chapter 6.

21 *Q. What other Federal generation is included in the Loads and Resources Study?*

22 A. Besides the generation associated with the Federal system regulated and independent
23 hydro projects, BPA also has contracted, or is negotiating, for the output of several
24 generation projects that are included in the Loads and Resources Study. To provide input
25 into the Risk Analysis of the SN-03 Study, SN-03-E-BPA-01, Chapter 6, these resources
26 are presented in monthly energy in average megawatts as well as HLH and LLH. BPA

1 contracted for the output of the Columbia Generating Station. *See* Documentation for
2 SN-03 Study, SN-03-E-BPA-02, Chapter 2, Table A-10 (Large Thermal). Other projects
3 include small hydro (Elwah and Glines Hydro through July 31, 2005, Clearwater,
4 Dworshak Small Hydropower); wind (shares of Foote Creek 1, 2, and 4 Wind Projects;
5 Stateline Wind Project; Condon Wind Project; and Klondike Phase 1 Wind Project);
6 geothermal (100 percent of Fourmile Hill Geothermal Project); and a small amount of
7 solar resources. *See* Documentation for SN-03 Study, SN-03-E-BPA-02, Chapter 2,
8 Table A-23 (Non-Utility Generation). BPA will not be acquiring 1.8 aMW of output
9 from the Nine Canyon Wind Project, as assumed in this Loads and Resources Study for
10 the initial SN-03 Proposal. This change will be reflected in the final Loads and
11 Resources Study. BPA also has contracted for the output of the gas-fired James River
12 Wauna project. *See* Documentation for SN-03 Study, SN-03-E-BPA-02, Chapter 2,
13 Table A-8 (Renewables).

14 **Section 8. Treatment of Contracts**

15 *Q. Please describe how BPA treats Federal contract obligations and contract resources in*
16 *the Loads and Resources Study.*

17 *A. To provide heavy and light load-hour analysis for uses in the Risk Analysis, SN-03*
18 *Study, SN-03-E-BPA-01, Chapter 6, all BPA contracts are split into monthly energy in*
19 *average megawatts, HLH and LLH. The HLH/LLH splits in contracts are forecast for all*
20 *BPA sales, including capacity and capacity-for-energy exchange contracts. *See**
21 *Documentation for SN-03 Study, SN-03-E-BPA-02, Chapter 2.*

22 *Q. Please describe how BPA's surplus firm power contracts with Pacific Southwest (PSW)*
23 *utilities were treated in the Loads and Resources Study.*

24 *A. The Loads and Resources Study includes several contracts with PSW utilities that contain*
25 *power sales and capacity-for-energy exchange agreements. The Loads and Resources*
26 *Study assumes that these contracts with the cities of Burbank, Glendale, and Pasadena are*

1 capacity-for-energy exchange through the study horizon. Power sales and
2 capacity-for-energy exchange agreements with Southern California Edison (SCE) have
3 been terminated.

4 **Section 9. Federal Transmission Losses**

5 *Q. Please describe BPA's treatment of Federal transmission losses in the Loads and*
6 *Resources Study.*

7 A. Transmission losses are estimated as generation reductions of 2.82 percent to the energy
8 output of all Federal hydro, small and large thermal, renewable, and non-utility
9 generation resources. This reduction allows transmission losses to be calculated for all
10 50 water years, which allows losses to be reflected in surplus energy availability. This
11 adjustment ensures the Loads and Resources Study is consistent with the Risk Analysis
12 Study, SN-03 Study, SN-03-E-BPA-01, Chapter 6.

13 **Section 10. Regional Hydro Resources**

14 *Q. Please describe the treatment of the regional hydro resources used in the Loads and*
15 *Resources Study.*

16 A. The set of regional hydro resources necessary for the Secondary Revenue Forecast in the
17 SN-03 Study, SN-03-E-BPA-01, Chapter 4, includes all regional regulated and
18 independent hydro projects, plus non-utility generating (NUG) hydro projects. BPA
19 estimates the regional hydro generation energy by month for each of the 50 water years
20 of record (1929 through 1978) using the hydro regulation study developed for this rate
21 case analysis. The set of NUG hydro projects are not estimated in the hydro regulation
22 study. Instead, the projects' owners submit NUG generation estimates. The regional
23 hydro summary for 50 water years for FY 2004-2006 is shown in the SN-03 Study
24 Documentation, SN-03-E-BPA-02, Chapter 2. These estimates are the basis for the
25 Secondary Revenue Forecast, SN-03-E-BPA-01, Chapter 4.

1 Q. *Does this conclude your testimony?*

2 A. Yes.