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**BEFORE THE IDAHO PUBLIC UTILITIES COMMISSION**

IN THE MATTER OF THE APPLICATION ) CASE NO. AVU-E-16-03  
OF AVISTA CORPORATION FOR THE )  
AUTHORITY TO INCREASE ITS RATES )  
AND CHARGES FOR ELECTRIC SERVICE ) DIRECT TESTIMONY  
TO ELECTRIC CUSTOMERS IN THE ) OF  
STATE OF IDAHO ) CLINT G. KALICH  
)

FOR AVISTA CORPORATION

(ELECTRIC)

1 I. INTRODUCTION

2 Q. Please state your name, the name of your employer,  
3 and your business address.

4 A. My name is Clint Kalich. I am employed by Avista  
5 Corporation at 1411 East Mission Avenue, Spokane,  
6 Washington.

7 Q. In what capacity are you employed?

8 A. I am the Manager of Resource Planning & Power  
9 Supply Analyses in the Energy Resources Department of Avista  
10 Utilities.

11 Q. Please state your educational background and  
12 professional experience.

13 A. I graduated from Central Washington University in  
14 1991 with a Bachelor of Science Degree in Business Economics.  
15 Shortly after graduation, I accepted an analyst position  
16 with Economic and Engineering Services, Inc. (now EES  
17 Consulting, Inc.), a Northwest management-consulting firm  
18 located in Bellevue, Washington. While employed by EES, I  
19 worked primarily for municipalities, public utility  
20 districts, and cooperatives in the area of electric utility  
21 management. My specific areas of focus were economic  
22 analyses of new resource development, rate case proceedings  
23 involving the Bonneville Power Administration, integrated

1 (least-cost) resource planning, and demand-side management  
2 program development.

3 In late 1995, I left Economic and Engineering Services,  
4 Inc. to join Tacoma Power in Tacoma, Washington. I provided  
5 key analytical and policy support in the areas of resource  
6 development, procurement, and optimization, hydroelectric  
7 operations and re-licensing, unbundled power supply rate-  
8 making, contract negotiations, and system operations. I  
9 helped develop, and ultimately managed, Tacoma Power's  
10 industrial market access program serving one-quarter of the  
11 company's retail load.

12 In mid-2000 I joined Avista Utilities and accepted my  
13 current position assisting the Company in resource analysis,  
14 dispatch modeling, resource procurement, integrated resource  
15 planning, and rate case proceedings. Much of my career has  
16 involved resource dispatch modeling of the nature described  
17 in this testimony.

18 **Q. What is the scope of your testimony in this**  
19 **proceeding?**

20 A. My testimony will describe the Company's use of  
21 the AURORA<sub>XMP</sub> dispatch model, or "Dispatch Model." I will  
22 explain the key assumptions driving the Dispatch Model's  
23 market forecast of electricity prices. The discussion  
24 includes the variables of natural gas, Western Interconnect

1 loads and resources, and hydroelectric conditions. I will  
2 describe how the model dispatches its resources and  
3 contracts to maximize customer benefit and tracks their  
4 values for use in pro forma calculations. Finally, I will  
5 present the modeling results provided to Company witness Mr.  
6 Johnson for his power supply pro forma adjustment  
7 calculations.

8 **Q. Are you sponsoring any exhibits in this**  
9 **proceeding?**

10 A. Yes. I am sponsoring one exhibit marked Exhibit  
11 No. 5, Confidential Schedule 1C. It provides summary output  
12 from the Dispatch Model and data that are used by Company  
13 witness Mr. Johnson as input for his work. All information  
14 contained in the exhibit was prepared under my direction.

15

16

## **II. THE DISPATCH MODEL**

17 **Q. What model is the Company using to dispatch its**  
18 **portfolio of resources and obligations?**

19 A. The Company uses EPIS, Inc.'s AURORA<sub>XMP</sub> market  
20 forecasting model ("Dispatch Model") and its associated  
21 database for determining power supply costs.<sup>1</sup> The Dispatch  
22 Model optimizes Company-owned resource and contract dispatch

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<sup>1</sup> The Company uses AURORA<sub>XMP</sub> version 12.0.1090 with a Windows 7 operating system.

1 during each hour of the January 1, 2017 through December 31,  
2 2017 pro forma year.

3 **Q. Please briefly describe the Dispatch Model.**

4 A. The Dispatch Model was developed by EPIS, Inc. of  
5 Sandpoint, Idaho. It is a fundamentals-based tool  
6 containing demand and resource data for the entire Western  
7 Interconnect. It employs multi-area, transmission-  
8 constrained dispatch logic to simulate real market  
9 conditions. Its true economic dispatch captures the  
10 dynamics and economics of electricity markets—both short-  
11 term (hourly, daily, monthly) and long-term. On an hourly  
12 basis the Dispatch Model develops an available resource  
13 stack, sorting resources from lowest to highest cost. It  
14 then compares this resource stack with load obligations in  
15 the same hour to arrive at the least-cost market-clearing  
16 price for the hour. Once resources are dispatched and market  
17 prices are determined, the Dispatch Model singles out Avista  
18 resources and loads and values them against the marketplace.

19 **Q. What experience does the Company have using**  
20 **AURORA<sub>XMP</sub>?**

21 A. The Company purchased a license to use the  
22 Dispatch Model in April 2002. AURORA<sub>XMP</sub> has been used for  
23 numerous studies, including each of its integrated resource  
24 plans and rate filings after 2001. The tool is also used

1 for various resource evaluations, market forecasting, and  
2 requests-for-proposal evaluations.

3 **Q. Who else uses AURORA<sub>XMP</sub>?**

4 A. AURORA<sub>XMP</sub> is used all across North America, Europe,  
5 and the Middle East. In the Northwest specifically, AURORA<sub>XMP</sub>  
6 is used by the Bonneville Power Administration, the  
7 Northwest Power and Conservation Council, Puget Sound  
8 Energy, Idaho Power, Portland General Electric, PacifiCorp,  
9 Seattle City Light, Grant County PUD, and Snohomish County  
10 PUD.

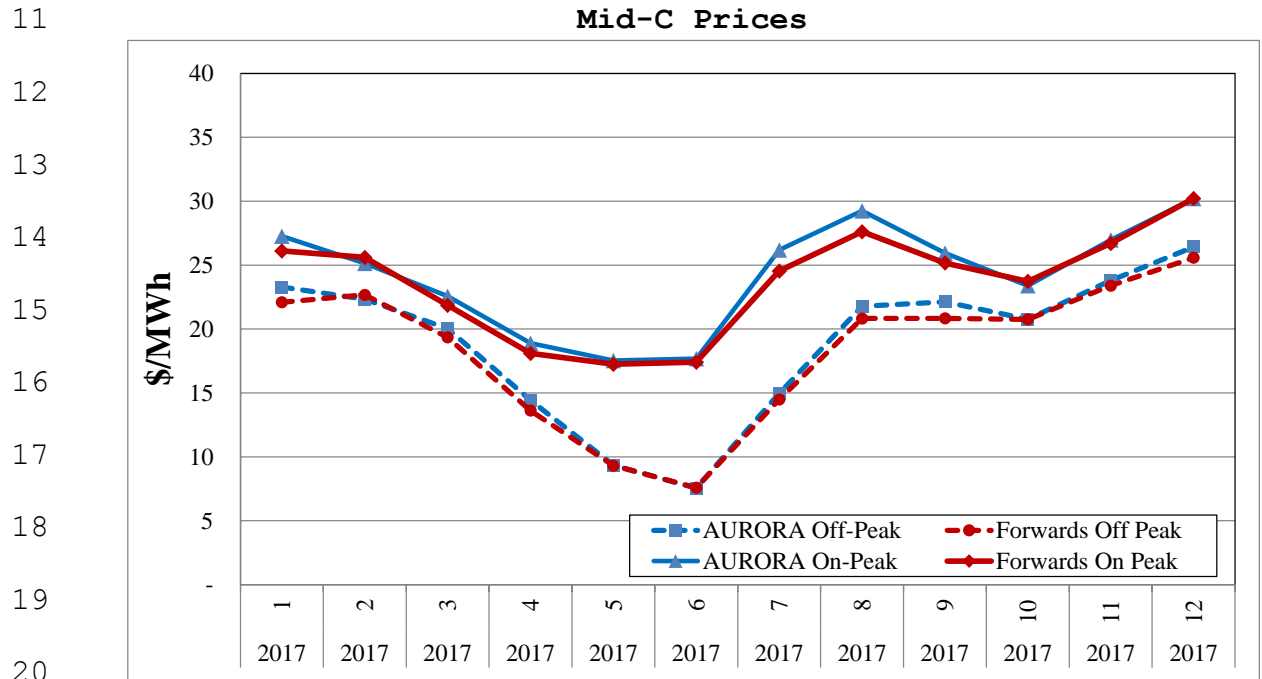
11 **Q. What benefits does the Dispatch Model offer for**  
12 **this type of analysis?**

13 A. The Dispatch Model generates hourly electricity  
14 prices across the Western Interconnect, accounting for its  
15 specific mix of resources and loads. The Dispatch Model  
16 reflects the impact of regions outside the Northwest on  
17 Northwest market prices, limited by known transfer  
18 (transmission) capabilities. Ultimately, the Dispatch Model  
19 allows the Company to generate price forecasts in-house  
20 instead of relying on exogenous forecasts.

21 The Company owns a number of resources, including  
22 hydroelectric plants and natural gas-fired peaking units  
23 serving customer loads during more valuable on-peak hours.  
24 By optimizing resource operation on an hourly basis, the

1 Dispatch Model is able to appropriately value the  
 2 capabilities of these assets. Forward prices for the pro  
 3 forma 2017 period are 29% higher in the on-peak hours than  
 4 off-peak hours at the time this case was prepared. The  
 5 Dispatch Model forecasts on-peak prices for the pro forma  
 6 period to average 28% higher than off-peak prices, a figure  
 7 very close to forwards. A graphical representation of the  
 8 differences in on- and off-peak prices over the pro forma  
 9 period is shown below in Illustration No. 1.

10 **Illustration No. 1 - Monthly AURORA modeled versus forward**



21 Forward Mid-Columbia prices shown are the latest one  
 22 month average (Feb 4, 2016 through Mar 3, 2016) of  
 23 Intercontinental Exchange (ICE) quarterly prices at the time  
 24 the study was prepared.

1 Dispatch Model and forward prices can and sometimes  
2 will differ, as forward prices are based on market  
3 expectations whereas the data used in the Dispatch Model are  
4 normalized for hydro, loads, and resource outages. Where  
5 the market expects a low hydro year forthcoming, forward  
6 market prices could be higher than Dispatch Model prices.  
7 Referring back to Illustration No. 1, the average price for  
8 the 2017 forward period is \$20.72 per MWh; the Dispatch model  
9 result is \$21.96 per MWh. These results explain that the  
10 market is not forecasting a bias in future conditions (e.g.,  
11 a low hydro year). The Dispatch Model therefore provides a  
12 very close approximation to what the actual market is  
13 predicting, and provides a good data set for the pro forma.

14 **Q. On a broader scale, what calculations are being**  
15 **performed by the Dispatch Model?**

16 A. The Dispatch Model's goal is to minimize overall  
17 system operating costs across the Western Interconnect,  
18 including Avista's portfolio of loads and resources. The  
19 Dispatch Model generates a wholesale electricity market  
20 price forecast by evaluating all Western Interconnect  
21 resources simultaneously in a least-cost equation to meet  
22 regional loads. As the Dispatch Model progresses from hour  
23 to hour, it "operates" those least-cost resources necessary  
24 to meet load. With respect to the Company's portfolio, the



1 Dispatch Model tracks the hourly output and fuel costs  
2 associated with Avista's portfolio generation. It also  
3 calculates hourly energy quantities and values for the  
4 Company's contractual rights and obligations. In every  
5 hour, the Company's loads and obligations are compared to  
6 available resources to determine a net position. This net  
7 position is balanced using the simulated wholesale  
8 electricity market. The cost of energy purchased from or  
9 sold into the market is determined based on the electric  
10 market-clearing price for the specified hour and the amount  
11 of energy necessary to balance loads and resources.

12 **Q. How does the Dispatch Model determine electricity**  
13 **market prices, and how are the prices used to calculate**  
14 **market purchases and sales?**

15 A. The Dispatch Model calculates electricity prices  
16 for the entire Western Interconnect, separated into various  
17 geographical areas such as the Northwest and Northern and  
18 Southern California. The load in each area is compared to  
19 available resources, including resources available from  
20 other areas that are linked by transmission connections, to  
21 determine the electricity price in each hour. Ultimately,  
22 the market price for an hour is set based on the last  
23 resource in the stack to be dispatched. This resource is  
24 referred to as the "marginal resource." Given the prominence

1 of natural gas-fired resources on the margin, this fuel is  
2 a key variable in the determination of wholesale electricity  
3 prices.

4 **Q. How does the Dispatch Model operate regional**  
5 **hydroelectric projects?**

6 A. The model begins by "peak shaving" loads using  
7 hydro resources with storage. When peak shaving, the  
8 Dispatch Model determines the hours with the highest loads  
9 and allocates to them as much hydroelectric energy within  
10 the constraints of the hydro system. Remaining loads are  
11 then met with other available resources.

12 **Q. Has the Company made any modifications to the EPIS**  
13 **database for this case?**

14 A. Yes. As we have in the past, Avista's resource  
15 portfolio is modified from EPIS's default database to  
16 reflect actual project operating characteristics. Also,  
17 natural gas prices are modified to match the latest one month  
18 average of forward prices over the pro forma period, regional  
19 resources and loads are modified where better information is  
20 made available, and Northwest hydro data are replaced with  
21 Bonneville Power Administration data. The EPIS database is  
22 modified to include various assumptions used in the  
23 Company's 2015 Integrated Resource Planning process and  
24 other new resource information where available.

1           **Q. Has the Company made any changes to the way it**  
2 **models hydro in this case compared to prior cases?**

3           A. No it has not.

4           **Q. How does the AURORA<sub>XMP</sub> Dispatch Model operate**  
5 **Company-controlled hydroelectricity generation resources?**

6           A. The Dispatch Model dispatches all hydro resources  
7 first through an algorithm that matches generation to load.  
8 To account for the actual flexibility of Company  
9 hydroelectricity resources, Avista develops individual hydro  
10 operations logic for each of its facilities. This separation  
11 ensures that the flexibility inherent in these resources is  
12 credited to customers in the pro forma exercise.

13           **Q. Please compare the operating statistics from the**  
14 **Dispatch Model to recent historical hydroelectric plant**  
15 **operations.**

16           A. Over the pro forma period the Dispatch Model  
17 generates 67% of Clark Fork hydro generation during on-peak  
18 hours (based on average water). Since on-peak hours  
19 represent only 57% of the year, this demonstrates a  
20 substantial shift of hydro resources to the more expensive  
21 on-peak hours. This is identical to the five-year historical  
22 average of on-peak hydroelectric generation at the Clark  
23 Fork through November 2015. Similar relative performance is  
24 achieved for the Spokane and Mid-Columbia projects

1 **III. OTHER KEY MODELING ASSUMPTIONS**

2 **Q. Please describe your update to pro forma period**  
3 **natural gas prices.**

4 A. Consistent with past general rate case filings,  
5 natural gas prices are based on a one-month average of  
6 forward prices; in this case from February 4, 2016 through  
7 March 3, 2016 for calendar-year 2017 monthly forward prices.  
8 Natural gas prices used in the Dispatch Model are presented  
9 below in Table No 1.

10 **Table No. 1 - Pro Forma Natural Gas Prices**

11

<b>Basis</b>	<b>Price (\$2017/dth)</b>	<b>Basis</b>	<b>Price (\$2017/dth)</b>
AECO	1.91	Stanfield	2.45
Malin	2.53	Sumas	2.29
Spokane	2.59	Henry Hub	2.60
Rockies	2.43	S. Calif.	2.69

12  
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14  
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16 **Q. What is the Company's assumption for rate period**  
17 **loads?**

18 A. Consistent with prior general rate case  
19 proceedings, historical loads are weather-adjusted. For  
20 this filing weather normalized 2015 load is 1,051.5 average  
21 megawatts compared to actual loads of 1,046.6. Table No. 2  
22 below details data included in this proceeding. Further  
23 information on the weather normalization is within Company  
24 witness Ms. Knox's testimony.

1 **Table No. 2 - Pro Forma Loads**

2

Month	Load	Month	Load
Jan	1,210.1	Jul	1,048.0
Feb	1,151.5	Aug	1,031.0
Mar	1,067.0	Sep	938.3
Apr	975.5	Oct	964.1
May	956.9	Nov	1,070.4
Jun	991.5	Dec	1,215.7

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5

6 **Q. Please discuss your outage assumptions for the**  
7 **Colstrip units.**

8 A. As with our assumptions for other plants, and  
9 consistent with prior cases, Avista uses the most recent  
10 available five-year average forced outage rate to estimate  
11 long-run performance at the Colstrip plant. The 11.48%  
12 forced outage rate is based on the average outages for 2010  
13 through 2014. Maintenance outages use the six-year average  
14 of planned outages. Six years is used because the plant  
15 maintenance schedule is every three years.

16 **Q. Are there any other significant modeling changes**  
17 **from the last rate filing?**

18 A. No.

19  
20 **IV. RESULTS**

21 **Q. Please summarize the results from the Dispatch**  
22 **Model.**

23 A. The Dispatch Model tracks the Company's portfolio  
24 during each hour of the pro forma study. Fuel costs and

1 generation for each resource are summarized by month. Total  
2 market sales and purchases, and their revenues and costs,  
3 are also determined and summarized by month. These values  
4 are contained in Exhibit No. 5, Confidential Schedule 1C and  
5 were provided to Mr. Johnson for use in his calculations.  
6 Mr. Johnson adds resource and contract revenues and expenses  
7 not accounted for in the Dispatch Model (e.g., fixed costs)  
8 to determine net power supply expense.

9 **Q. Does this conclude your pre-filed direct**  
10 **testimony?**

11 A. Yes, it does.