BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,	
Complainant,	
v.	**Docket No. UE-06____** **Docket No. UG-06____**
PUGET SOUND ENERGY, INC.,	
Respondent.	

SECOND EXHIBIT (NONCONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF
SALMAN ALADIN
ON BEHALF OF PUGET SOUND ENERGY, INC.

FEBRUARY 15, 2006

PUGET SOUND ENERGY, INC.

**SECOND EXHIBIT (NONCONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF SALMAN ALADIN**

4 **Q. What is the purpose of this exhibit?**

5 A. As described in my prefiled direct testimony, Exhibit No. ___(SA-1CT), the

6 Company undertook additional modeling as a check on the AURORA Monte

7 Carlo simulation that is presented in my direct testimony. Specifically, the

8 Company manually ran 25 scenarios in AURORA based on historical hydro

9 conditions and load as well as historical forward gas prices.

10 **Q. What was the Company trying to show by using these 25 scenarios?**

11 A. Rather than just relying on the Monte Carlo feature of AURORA, the Company

12 was interested in observing power cost variability based on known historical

13 outcomes. The Company wanted to assess the variability of power costs based on

14 different combinations of historical gas prices, hydro conditions and load. In any

15 given year, the actual outcome of hydro, load and gas prices could be drastically

16 different from what was forecasted. The 2005 PCORC historical data set was

17 used to generate the 25 scenarios, a data set familiar to the parties.

1 **Q. Why did the Company select only 25 scenarios?**

2 A. Running and compiling data from the AURORA model can be a tedious and

3 lengthy process. Each scenario requires careful analysis to ensure the generated

4 results are accurate. Hence, economizing on time is always a consideration for

5 the Company when running manual AURORA scenarios. The Company felt that

6 25 different combinations of a broad range of historical outcomes would

7 adequately serve the purpose of explaining power cost variability without

8 overburdening the Company or, ultimately, other rate case parties that might wish

9 to check or replicate the Company's modeling.

10 **Q. Please explain generally what the 25 scenarios represent?**

11 A. The 25 scenarios are the 25 possible combinations of a matrix the Company

12 developed that consists of: (i) five different average forward gas price marks,

13 based on historical data, that range from very low to very high; and (ii) five

14 different actual historical hydro conditions that range from very low to very high

15 water years, combined with load forecasts based on the actual historical

16 temperatures in those years.

17 **Q. What process did the Company employ to select the 25 scenarios?**

18 A. The Company first analyzed the variance of historical hydro conditions and

19 historical gas prices in order to determine the mean of this data and standard

20 deviations from the mean. By using different multiples of the standard deviation,

1   the Company was able to generate scenarios that have both a high and low chance

2   of occurring.

3 **Q.   What historical gas prices were used?**

4 A.   Historical forward marks that were filed for the 2005 PCORC were used. The

5   average of all historical forward prices in the three month period ending April 29,

6   2005 was used along with four actual historical forward marks. These four

7   scenarios were approximations of one and two standard deviation moves to the

8   upside as well as downside. Please see the table below for a list of the exact dates

9   utilized.

10 **Q.   What historical hydro conditions were used?**

11 A.   Five historical hydro conditions were selected from the 1929-1978 hydro data set.

12   The hydro conditions selected attempted to represent the mean and one and two

13   standard deviation moves to the upside as well as downside. Please see the table

14   below for the specific years selected.

15 **Q.   What did the Company do next?**

16 A.   The Company then created load forecasts based on historical temperatures from

17   the year of the selected hydro condition. Hence, the load forecast and hydro

18   conditions were always based on the same historical year. Since load was directly

19   tied to temperatures from the year of the selected hydro condition, there were five

1   hydro/load scenarios to analyze in combination with five different gas scenarios.

2   The number of all combinations possible is 25, thus the 25 total scenarios.

3   **Q.**   **What load scenarios were used?**

4   A.   Loads were forecasted based on historical temperatures stemming from the

5   selected hydro year. For example, the year 1953 was selected as the hydro mean,

6   so 1953 temperatures were used as inputs to forecasting load.

7   **Q.**   **Would you please further illustrate the Company's 25 scenarios analysis?**

8   A.   The analysis can be visually depicted as shown in the below table:

		Gas Price Cases				
	St Dev	+2	+1	0	-1	-2
	Date	4/4/2005	3/30/2005	Average	2/14/2005	2/7/2005
St Dev Year	Ref No.	1	2	3	4	5
Load & Hydro Cases +2 - 1937	1	1 - High Power Costs	2	3	4	5
+1 - 1973	2	6	7	8	9	10
0 - 1953	3	11	12	13	14	15
-1 - 1933	4	16	17	18	19	20
-2 - 1959	5	21	22	23	24	25 - Low Power Costs

16   As shown in the table above, the 1937 hydro/load conditions were selected as

17   representing the worst (approximately +2 standard deviation) hydro year. The gas

18   price forward marks as of April 4, 2005 were selected as the highest

1   (approximately +2 standard deviation) gas prices. This combination of

2   hydro/load conditions and gas prices were used in Scenario 1 to produce the

3   highest power costs. The input data assumptions for the other scenarios are also

4   illustrated in this table.

5   **Q.**   **What conclusions was the Company able to make from this analysis?**

6   A.   The results showed that the Company is exposed to considerable power cost

7   variability even when relying on a limited historical data set such as the forward

8   gas prices that happened to prevail during the three-month time period that was

9   used for the 2005 PCORC. These results confirmed the results of the AURORA

10   Monte Carlo simulations, by showing that the Company is consistently exposed to

11   substantial power cost uncertainty.

12   [BA060420027]