EXHIBIT NO. ___(SJC-1T)
DOCKET NO. _____
2005 POWER COST ONLY RATE CASE
WITNESS: SARA J. CARDWELL

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

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

PREFILED DIRECT TESTIMONY OF SARA J. CARDWELL (NONCONFIDENTIAL) ON BEHALF OF PUGET SOUND ENERGY, INC.

JUNE 7, 2005

PUGET SOUND ENERGY, INC.

PREFILED DIRECT TESTIMONY OF SARA J. CARDWELL

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PUGET SOUND ENERGY, INC.

PREFILED DIRECT TESTIMONY OF SARA J. CARDWELL

I. INTRODUCTION

Q. Please state your name, business address, and position with Puget Sound Energy, Inc.

A. My name is Sara J. Cardwell, and I am Manager, Pricing and Cost of Service with Puget Sound Energy, Inc. ("PSE" or "the Company"). My business address is 10885 NE 4th Street, Bellevue, Washington, 98004-5591.

Q. What are your responsibilities as Manager, Pricing and Cost of Service?

A. As Manager, Pricing and Cost of Service, I am responsible for electric and gas rate spread and design, electric and gas cost of service studies and load research at PSE.

Q. Have you prepared an exhibit describing your education, relevant employment experience, and other professional qualifications?

A. Yes, I have. It is Exhibit No. ___(SJC-2).

Q. Please summarize your testimony in this proceeding.

A. My testimony describes: (1) the temperature adjustment methodology used to

develop the pro forma kilowatt-hours for the test year in this case ending March 2005; (2) the allocation of the proposed Power Cost Rate and the Production Tax Credits as described in the testimony of Mr. John H. Story to the various customer classes; (3) the rate design for the Power Cost Rate and the Production Tax Credits; and (4) the revised and new tariff schedules. The Company's total proposed rate increase, incorporating both the Power Cost Rate increase and Production Tax Credits, to be allocated to the customer classes is $55,571,666, an average 3.65 percent increase over the rates set in the Company's 2004 general rate case (Docket Nos. UG-040640 et al.) that became effective on March 4, 2005.

II. TEMPERATURE ADJUSTMENT

A. Overview

Q. What is the purpose of a temperature adjustment?

A. Energy usage is highly dependent on the weather, especially on a day to day basis. The purpose of a temperature adjustment is to estimate what the loads would have been during a year if weather had been "normal" during that year. This allows for comparisons of loads on a year to year basis. By performing such "weather normalization", changes in loads can more accurately be attributed to factors other than weather such as customer growth or changes in use per customer. Additionally, by setting rates based on normalized temperature, prices are more stable over time and more accurately reflect the costs to serve customers because they are not based merely on weather conditions that happened to prevail during a

test year for a given rate case.

Q. Generally speaking, how is the weather normalization calculation performed?

A. The Company first compares actual daily loads for a multi-year period of time to actual daily temperatures for the same multi-year period in order to develop a coefficient that describes the relationship between temperature and load. This is sometimes referred to as the "weather sensitivity coefficient."

The "normal" weather data is calculated from actual historical temperature data. Then the Company uses the weather sensitivity coefficient and "normal" weather data to convert the actual test year loads to "normal" loads.

Q. Have there been disputes about the temperature adjustment methodology in the Company's recent cases?

A. Yes. In PSE's 2003 Power Cost Only Rate Case, Docket No. UE-031725 ("2003 PCORC"), discussions between PSE and Washington Utilities and Transportation Commission ("Commission") Staff led to the conclusion that the weather normalization methodology and calculations would best be refined and resolved in a collaborative discussion permitting further research and analysis rather than in a contested adjudicative proceeding. In the meantime, PSE agreed to accept Commission Staff's weather normalization adjustment only for the purposes of the 2003 PCORC case. A stipulation outlining this agreement was accepted by the

Commission in Order No. 10 in the 2003 PCORC on February 11, 2004.

Q. How were temperature adjustment issues addressed in PSE's 2004 general rate case?

A. Commission Staff challenged PSE's "normal" weather dataset with respect to PSE's weather normalization for natural gas rates. Commission Staff proposed instead that gas weather normalization should be based on NOAA's "normal" weather dataset. Commission Staff did not propose any changes to the Company's electric weather normalization in the 2004 general rate case.

The Company's electric weather normalization for the 2004 general rate case included a change from prior cases that grew out of the collaborative process. Commission Staff had recommended that the Company review other customer groups beyond the residential class to ascertain whether or not there are classes in addition to the residential customer group that are affected by temperature. The Company performed that analysis and, as a result, shifted approximately 5% of the temperature adjustment to classes other than residential as part of its original rate increase request in the case. Thus, rather than receiving 100% of this adjustment as in prior cases, the Company proposed that the residential class receive approximately 95% of the adjustment. (This proposal was not contested in the 2004 GRC as it had been discussed in the collaborative process.)

Q. Does the Company's allocation of the temperature adjustment in this case follow the same allocation with respect to residential and non-residential classes as presented in the 2004 GRC?

A. Yes, it does.

Q. Does the Company's electric weather normalization in this case apply the same methodology as the electric weather normalization in the 2004 general rate case?

A. In most respects, it does. However, the Company has made two changes to the calculation of the weather sensitivity coefficients. As described below, these changes arose out of the analysis the Company has been conducting in the weather normalization collaborative, and improve the statistical soundness of the coefficients.

B. <u>Methodological Issues and Analysis</u>

Q. Please describe the work that has been undertaken within the temperature adjustment collaborative process with respect to the electric temperature adjustment methodology?

A. PSE and Commission Staff met twice in August of 2004 and again in November of 2004. The Commission Staff suggested that the Company conduct the following analysis:

1. Research the differences in weather sensitivity across PSE's service territory and whether it is appropriate to use weather data from

multiple weather stations or a single weather station to normalize actual loads.

2. Investigate whether or not adding non-weather variables such as income or retail rate changes to the temperature adjustment equation would impact the weather sensitivity coefficient or add to its explanatory powers. As part of this analysis, Staff suggested including ten years of load data versus PSE's previous use of eight years.

3. Compare the existing sample used to develop weather adjustments at the rate schedule level relative to the population to see if the sample is statistically representative of the population.

4. Compare the differences in the definition of normal Heating Degree Day ("HDD") and Cooling Degree Day ("CDD"), and specifically compare NOAA's 30-year normal dataset to a normal dataset made up of the average of the most recent 30 years of temperature data reported at Seattle Tacoma Airport, to determine which is more appropriate to use in normalizing PSE's actual loads.

Consistent with this direction, the Company performed econometric and statistical analyses of these issues.

Q. What did the Company conclude with respect to which weather stations should be used?

A. The Company's analysis showed that while differences in weather sensitivities across the region exist, using a single weather station to weather adjust loads is appropriate because of the high correlation of weather patterns in the region. Even though the temperatures may be slightly colder or warmer in one region of PSE's service area versus another region, the trend in weather and usage is similar. In addition, the Company concluded that using the data from the weather station at Seattle-Tacoma International Airport is appropriate because it is a first order

station with the most complete and accurate data compared to other stations. By contrast, the Company found that many of the other stations had missing data or experienced other technical issues from time to time that made the data less reliable for use in comparing temperatures on a daily basis over time.

Q. What did the Company conclude with respect to adding income and rate changes to the weather normalization analysis?

A. Adding income and rate changes to the temperature adjustment equation did not statistically change the weather sensitivity coefficient. The coefficient for rates yielded theoretically counterintuitive results, in that the estimated coefficient for rates was positive implying increasing energy use with price increases, with all other variables being kept the same. The coefficient for income was positive but not significant when a time trend variable was added due to the high correlation between income and trend. The time trend variable is a variable that grows over time at a constant rate and is designed to capture trends in energy usage not captured by other variables in the equation.

However, the Company found that using load data from the period 1994-2004, as Staff suggested, rather than just 1994-2001, changed the weather sensitivity coefficients to a degree that is statistically significant. This appears to be due in part to the inclusion in the more expansive load dataset of the cold snap which occurred in January 2004.

In the course of performing this analysis, the Company identified an apparent deficiency in its historical weather sensitivity coefficient calculation in that it did not adequately capture the historical reduction to system loads in the post-2001 time period, after Schedule 48 customers switched to transportation schedules. The Company determined that by adding a variable to its calculations to account for this change, it improved the accuracy of the equation.

The Company's weather normalization calculation for this case incorporates the above two improvements to its weather sensitivity coefficient calculation.

Q. What did the Company conclude with respect to whether the samples used to develop rate schedule weather adjustments are representative of the population of PSE's customers?

A. The Company found that the samples used to develop rate schedule weather adjustments are statistically representative of the population for the majority of rate schedules.

Q. What did the Company conclude with respect to use of the NOAA 30-year normal versus use of an average of the most recent 30 years of Sea-Tac data?

A. The Company concluded that the NOAA 30-year normal dataset should not be used to develop the Company's electric rates for several reasons.

First, the NOAA normal dataset is a "black box." NOAA does not make all of its underlying data or its equations available. PSE has attempted to replicate the

NOAA results from existing weather data but has been unable to do so. By contrast, PSE's 30-year normal data is transparent and can be replicated by other parties.

Second, NOAA smooths its 30-year normal results by averaging minimum and maximum temperatures to the point that actual daily temperature variances, such as the difference between temperatures at daybreak and several hours after the sun comes up, or variances within a season, such as an occasional warm day in October, disappear from the dataset. The type of data that is lost by this smoothing is significant with respect to energy usage. The load data that PSE compares to "normal" temperature reflects changes at an hourly level.

PSE's 30-year average values retain the hourly and daily granularity of the underlying weather data. PSE's 30-year average includes the average over thirty years of 24 hourly temperatures per day. PSE believes that this type of granularity should be taken into consideration in calculating "normal" energy usage based on "normal" weather.

Third, the NOAA normal dataset is updated only every ten years. That could result in a weather adjustment that is not well correlated to energy usage behavior as the test year moves further and further away from the period used by NOAA to define normal weather (for example, the effect of cyclical climate changes). It could also result in significant changes in rates at the time a new ten-year increment is added to the NOAA data. By contrast, PSE's method uses updated

weather data that is readily available for use. In addition, by updating the dataset to the most recent 30-years each time it files a rate case, PSE's method will result in more gradual rate changes related to weather normalization if the climate is changing over time.

Finally, there is some debate currently regarding whether a base temperature of 65 degrees is the correct base temperature for determining heating and cooling degree days. As an article in the March 2005 Public Utilities Fortnightly points out, 65 degrees is not appropriate across the country and nor is it appropriate for all customer classes. See Exhibit No.___(SJC-3). NOAA's normal and PSE's normal both currently reflect 65 degrees as the base. However, to the extent alternatives to that base temperature are to be tested or applied, only PSE's method would be capable of adjustment for base temperature because of the "black box" nature of the NOAA dataset.

Q. Are the Company's conclusions and revisions to its weather adjustment methodology endorsed by the collaborative?

A. That is not yet clear. Commission Staff has responded to the information that the Company provided about its analysis by making some additional suggestions. The Company was not able to review these suggestions in enough detail prior to filing this case to determine if the suggestions would materially change the weather adjustment factors or raise the explanatory powers of the equation. Because the Staff's suggestions involve potential further refinements to the

variables that the Company has already studied, the Company is not inclined to believe these refinements will significantly change the results of the weather adjustment. The Company is not, however, opposed to continuing discussions through the collaborative.

C. Application of the Weather Adjustment Methodology

Q. Please describe how the Company normalized the test year delivered load in this case.

A. The test year Generated, Purchased and Interchange ("GPI") load of 21,357,621 MWh was normalized using the equations developed as discussed above to reflect normal temperature. PSE used weather sensitivity coefficients calculated from actual daily load data from 1994 through 2004. PSE's "normal" weather dataset was developed by calculating daily heating degree days (HDDs) and cooling degree days (CDDs) using 65 degrees as the base temperatures compared to temperatures as reported at Sea-Tac Airport over the 30-year period from 1975 through 2004, and averaged on a daily basis. The actual HDDs and CDDs were calculated using the average of the 24 hourly temperatures as opposed to the average of daily minimum and maximum temperatures. The amount of weather adjustment was calculated by taking these coefficients and multiplying it by the difference between the actual and normal HDDs and CDDs.

Q. How did the Company use this temperature normalized GPI to calculate the load adjustment that should be made to various customer classes related to weather effects?

A. The adjustments were made in a three-step process. The first step was to develop linear regression equations to characterize the relationship between temperature and load for each customer class. The coefficients of those equations were permitted to vary by month as well as by class. The data source for this step was made up of daily energy readings from the Company's Automated Meter Reading (AMR) database.

The second step was to simulate daily customer loads over 31 years using the historical heating and cooling degree days and determine the average monthly load for each customer class.

The third step was to weight the sample to the population, adjust for losses and normalize the class loads to the net weather-normalized GPI load. The amount of weather adjustment at the GPI level was allocated to each of the applicable schedules by taking the percentage share of each schedule's weather adjustment amount to total weather adjustment for all schedules as calculated by the rate schedule normalization equations, and multiplying the system load temperature adjustment by these percentage shares.

The application of these monthly coefficients to the test year is shown in Exhibit No. ___(SJC-4) and resulted in a total adjustment of 122,070 MWh, or 114,014

MWh delivered load when adjusted for losses. As the test year was warmer than normal, on average, this adjustment adds MWhs to the actual load.

III. RATE SPREAD/RATE DESIGN

Q. Please describe Exhibit No. ___(SJC-5), entitled "Revenue Allocation and Customer Impacts."

A. Page 1 of Exhibit No. ___(SJC-5) presents the allocation of the proposed power cost rate deficiency to applicable schedules using the peak credit weighted allocation factors. A description of each of these columns is included as page 2 of the exhibit. Page 3 of this exhibit demonstrates the effect on customers of this change in revenues. Page 4 describes the calculations on pages 3 and 6. The Allocation of the Production Tax Credit is shown on Page 5. Page 6 contains the Statement of Proforma and Proposed Revenues for the Production Tax Credit and Page 7 summarizes the total change in revenue for each schedule as a result of the combined adjustments.

Q. Please summarize how the proposed change to the Power Cost Rate will be charged to customers.

A. The PCA Settlement Stipulation from WUTC Docket No. UE-011570 requires that changes in rates attributable to adjustments to the Power Cost Rate as a result of a PCORC be charged to customers based upon the peak credit methodology. *See* Exhibit A to Settlement Stipulation, Docket No. UE-011570, page 7.

Accordingly, the Company has applied the peak credit methodology to the total deficiency in Power Costs shown on Page 1 of Exhibit No. ___(SJC-5) in Column F. This determines the amount of the power cost deficiency to be recovered from each rate schedule. This rate schedule power cost deficiency will then be charged to customers on a cents per kWh basis for each schedule using test year pro forma volumes.

Q. Please describe the peak credit methodology utilized in the rate spread methodology.

A. The peak credit methodology classifies historic test year production costs between demand and energy according to demand/energy relationships. Further, the peak credit methodology calls for the demand-related portion of the production costs to be assigned to schedules based on their contribution to the top 200 hours of system peak load. The energy-related portion of these costs is allocated to schedules based on the schedule's share of total annual kWh consumption for the test period. In this case, we used the peak credit classification factors of 14 percent and 86 percent for demand and energy, respectively, that were approved in PSE's 2004 general rate case.

Q. Please describe Page 3 of Exhibit No. ___(SJC-5), entitled "Statement of Pro forma and Proposed Revenue for the Power Cost Adjustment."

A. Page 3 of Exhibit No. ___(SJC-5) shows the pro forma and proposed revenue under current and proposed rates that include the effect of the revised power cost

adjustment based on test period sales volumes and billing determinants. On this page, Column (a) represents the test year pro forma sales volumes for each schedule; Column (b) shows total test year pro forma revenue produced at current rates; and Column (c) shows the cents/kWh attributable to the revised Power Cost Rate to be charged to customers on each of the applicable schedules. Total revenue under the proposed rates which include the revised Power Cost Rate is shown in Column (d), and the total increase in revenue due to the proposed change in the Power Cost Rate is shown in Column (e). The percentage impact of the proposed change on each of the applicable schedules is shown in Column (f).

Q. Does the test year proforma load in Exhibit No. ___(SJC-5) incorporate the temperature adjustment as presented in Exhibit No. ___(SJC-4)?

A. Yes, the test year sales load (or billed load) shown on Exhibit No. ___(SJC-5) incorporates the temperature adjustment presented in Exhibit No.___(SJC-4).

Q. How does the Company propose to credit Customers for the Production Tax Credit?

A. Because the Production Tax Credit is related to production costs, the Company has used the peak credit methodology to allocate the credit to the rate schedules in the same manner as the allocation of the PCORC Revenue Requirement. Page 5 of Exhibit No.___(SJC-5) presents the allocation of the credit. Page 6 of Exhibit No. ___(SJC-5) demonstrates the effect of the credit on each schedule.

Q. Has the Company prepared a table demonstrating the combined effect of the Power Cost Adjustment Rate and the Production Tax Credit?

A. Yes. Page 7 of Exhibit No. ___(SJC-5) shows the combined effect of these changes on customers. The combined effect is a revenue increase of $55,571,666, or 3.65 percent over the electric rates set in the 2004 general rate case.

Q. Has the Company prepared a revised Schedule 95 Power Cost Adjustment Clause to reflect the proposed adjustments to the Power Cost Rate?

A. Yes, a revised Schedule 95 Power Cost Adjustment Clause is presented in Exhibit No.___(SJC-6). The revised Schedule 95 Power Cost Adjustment Clause reflects the amount to be charged to customers on each of the applicable schedules as calculated in Page 1 of Exhibit No.___(SJC-5)**.**

Q. Please describe Schedule 95-A, Production Tax Credit.

A. Schedule 95-A, Production Tax Credit, as presented in Exhibit No. ___(SJC-6) reflects the cents per kilowatt-hour credit adjustment as calculated in Page 5 of Exhibit No.___ (SJC-5). The purpose of this schedule is to pass the benefits of the Production Tax Credit directly to Customers as it is generated. The Credit is available for a ten year period and will expire on December 31, 2015. The Company may adjust the credit annually based on the differences between the credits provided to Customers and the credits actually accumulated plus the estimated credits for the next year, less the interest on the associated deferred tax

account. If the difference between the actual tax credits and the estimated credits for a period is greater than 25 percent, the Company may file to update the credit more often than annually.

IV. CONCLUSION

Q. Does that conclude your testimony?

A. Yes, it does.

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