Exhibit No.___(RB-1T)
Docket No. UE-09___
Witness: Romita Biswas

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, Complainant, vs. PACIFICORP dba Pacific Power Respondent.	)	Docket No. UE-09_____

PACIFICORP

DIRECT TESTIMONY OF Romita Biswas

February 2009

Q. Please state your name, business address and present position with PacifiCorp (the Company).

A. My name is Romita Biswas, and my business address is 825 N.E. Multnomah, Suite 600, Portland, Oregon 97232. My present position is Director, Load and Revenue Forecasting.

Qualifications

Q. Briefly describe your educational and professional background.

A. I joined PacifiCorp in my current position in April 2008. Prior to joining PacifiCorp, I was a Senior Manager in the Cost Forecasting and Revenue Requirement group at the National Exchange Carrier Association in Whippany, New Jersey. I was a Manager in the Rate Development Group at the same company prior to joining the Cost Forecasting and Revenue Requirement group. From 1998 to 1999, I was a lecturer at Marist College in Poughkeepsie, New York. I received an undergraduate degree and Masters degree in Economics from Jadavpur University, India. I have a Doctor of Philosophy Degree in Economics from the University of Maryland, College Park.

Q. Please describe your current duties.

A. I am responsible for the development of the forecasts of kilowatt hour ("kWh") sales, number of customers, system loads, and system peaks for the Company's six retail electric service areas. I am also responsible for the accounting of revenues and sales for the Company at the state level.

Purpose of Testimony

Q. Please explain the purpose of your testimony in this proceeding.

A. The purpose of this testimony is two-fold. First, I describe the process by which the Company developed temperature normalized sales for the historical test period, twelve months ended June 30, 2008. Second, I describe the Company's methodology and process for forecasting west control area loads for the states of California, Oregon and Washington for the twelve months ended December 31, 2010, which is the rate effective period.

Q. How were the temperature normalized sales for the historical test period utilized in the preparation of this general rate case?

A. The temperature normalized retail sales by rate schedule, for the historical test period, were used by Company witness Mr. William R. Griffith to develop present revenues and proposed rates. In addition, the historic temperature normalized monthly energy and coincident peaks, were used by Company witness Mr. R. Bryce Dalley to calculate inter-jurisdictional allocation factors for the West Control Area ("WCA") allocation methodology.

Q. How were the forecasted loads for the west control area utilized in preparation of this general rate case?

A. The forecasted loads for the west control area for the twelve months ended December 2010 were used by Company witness Dr. Hui Shu to calculate west control area net power costs.

Temperature Adjustment of Historical Sales

Q. What is the Company's framework for temperature normalization of historic sales in Washington?

A. In Docket UE-050412, the Commission approved a Stipulation, which set forth an interim approach to temperature normalization, employed in Docket UE-060817, and an agreement to develop a longer-term approach. This longer-term approach was codified in a document entitled "The Company's Plan for a Long-Term Temperature Normalization Solution in Washington", dated January 22, 2007 ("the Plan").

Q. Does the Plan recognize the need for the Company to continue to make refinements to its long-term approach to temperature normalization in Washington?

A. Yes. Section VII of the Plan recognizes that the Company will continue to work collaboratively with interested parties to refine and implement long-term solutions as new load research data becomes available and new information comes to light through additional research. Section V of the Plan specifically sets forth a process for sharing future research findings and issues through testimony and workshops related to specific rate cases. My testimony, exhibits and workpapers present the Company's latest research and development findings on load forecasting and temperature normalization.

Q. Is the Company proposing improvements to its temperature normalization methodology in this case?

A. Yes**.** While the Company has filed this case using the same basic methodology

for temperature normalization set forth in the Plan, this filing reflects two changes designed to refine and improve the methodology.

Q. Has the Company reviewed the proposed changes to the temperature normalization methodology collaboratively with interested parties?

A. Yes. The Company reviewed and discussed these changes at the Integrated Resource Planning ("IRP") public input meeting held on June 26, 2008, at which the Company and the consultant from ITRON were present. The Company also addressed these changes in a meeting with Commission Staff on July 22, 2008.

Q. **Please outline the temperature normalization improvements.**

A. There are two changes in the Company's approach:

(a) The time-frame over which the Company establishes normal weather has changed from a thirty year period (1971-2000) to a twenty year period (1988-2007); and

(b) To determine temperature levels over which load response varies (i.e., breakpoints), the Company has implemented a more robust and flexible regression approach using load research data.

Q. In all other respects, does the Company's methodology reflect that described in the Plan?

A. Yes.

Q Why has the Company updated its definition of normal weather from a thirty-year average to a twenty-year average?

A. The Company identified a trend of increasing temperature in the west control area that was not being captured in the thirty-year data. This trend is shown in Exhibit

No.___(RB-2). In 2008, the Company retained the services of ITRON to assist the Company in improving its sales and load forecasting methods, capabilities, and accuracy. ITRON surveys identified many other utilities that were using more recent data for determining normal temperatures. Based on this review and on the recommendation of ITRON, the Company is implementing a twenty-year rolling average as the basis for determining normal temperatures. This better captures the trend of increasing temperatures observed in both summer and winter.

Q. How did the Company calculate the breakpoints (i.e., temperature levels over which load response varies) used in temperature normalizing data for this filing?

A. The Company has historically calculated breakpoints using Multivariate Adaptive Regression Splines ("MARS"). In this case, the Company identified multipart slopes and breakpoints through a Neural Network framework. The Company used load research data by customer class in this modeling. The Neural Network model identifies the break points and shape of the weather impacts. From load research data, the Company analyzes the sensitivities of sales at different temperature levels and a composite weather variable is developed in order to capture extreme temperature within a month. The Company moved from MARS to a Neural Network framework to allow more precise and thorough analysis of load research data.

Q. Have you provided all data and analysis associated with weather normalization of historic sales?

A. Yes. In compliance with the Plan, this data and analysis is provided as part of my workpapers.

Development of the Hourly Load Forecast for 2010

Q. Please describe the process by which the hourly load forecast for 2010 was developed?

A. The Company first developed monthly sales forecasts for each of the customer classes. These were then aggregated to sales forecasts for each of the Company's jurisdictions. The next step is to develop monthly peak and energy load forecasts for each of the jurisdictions. The final step is to develop an hourly load forecast.

Q. Does the Company's approach to its hourly load forecast also reflect changes and improvements?

A. Yes. There are six changes, all designed to improve the accuracy of the forecast:

- The impact of the 2008 economic downturn was incorporated into the forecast.
- Load research data was used to model the structure of the weather response function, improving the temperature normalization methodology.
- As discussed above, the time period used to define normal weather was updated from the National Oceanic and Atmospheric Administration's ("NOAA") thirty-year period of 1971-2000 to the 20-year period of 1988-2007.
- Monthly peaks were forecasted with a new modeling approach that relates

peak loads to the weather that generated the peaks.

- The historical data period used to develop the monthly retail sales forecasts was updated to the period from 1997-2007.
- A twenty-year rank and average weather pattern was implemented to provide more accurate hourly load forecasts.

Q. Please describe how the impact of the current economic conditions is reflected in the Company's sales forecast for the west control area.

A. The Company reflected the impact of the economic slowdown in two steps: First, the Company developed a model-driven sales forecast without reflecting any economic slowdown. Second, the Company adjusted the model-driven results to reflect the economic slowdown. The forecast was adjusted downward by the megawatt hours listed in Table 1 to recognize the projected reduction in sales for each class of service from the economic conditions impacting that class.

Table 1
West Control Area Forecast Adjustment
Calendar Year ("CY") 2010
(MWhs)

	West Control Area Reduction in MWHs for CY 2010 (Oregon and Washington)	Washington, Recessionary Reduction in MWHs for CY 2010
Residential	46,572	3,917
Commercial	66,379	14,654
Industrial	457,713	32,093
Total	570,665	50,664

Residential, Commercial, and Industrial sales for 2010 for the west control area were reduced by 46,572 MWh, 66,379 MWh, and 457,713 MWh respectively. This equates to a sales reduction of 0.61 percent, 0.96 percent, and 10.91 percent

respectively for the west control area, and 0.25 percent, 1 percent, and 3.68 percent respectively for Washington. These reductions were made on the basis of various inputs including load reduction experienced as an aftermath of the 2000 and 2001 recession and discussions with the Company's personnel in the customer and community department.

Q. Why is it necessary to make an adjustment to the model to account for the economic downturn?

A. Because the model is estimated over a period of relative growth, it is necessary to make an additional adjustment for the downturn.

Q. Why have you used load research data to model the impact of weather?

A. The Company collects hourly load data from a sample of customers for each class in each state. These data are primarily used for rate design but they also provide an opportunity to better understand usage patterns particularly as they relate to changes in temperature. The greater frequency and more data points associated with this hourly data make it better suited to capture load changes driven by changes in temperature than the monthly data used in the Company's prior forecasts.

Q. Why has the Company updated the time period used to establish normal temperatures?

A. The same reasons that lead to the adoption of a twenty-year average for weather normalization of historic sales also support the adoption of a twenty-year average normal definition for the load forecast.

Q. Why did the Company develop a peak model to forecast monthly peaks?

A. As an improvement to the forecasting process, the Company developed a model which relates peak loads to the weather that generated the peaks. This model allows the Company to better predict monthly and seasonal peaks. The peak model is discussed in greater detail in the hourly forecasting section.

Q. Please explain why the Company developed a rank and average method to replace the simple average method.

A. The simple average method understates the weather highs and lows. Because the weather is averaged for the particular date and time and extreme temperatures will occur on different dates, the extremes are not correctly reflected in the average. The rank and average method preserves the extreme temperatures and maps them to a year to produce a more accurate estimate of daily temperatures.

Q. Is there a difference between sales forecasts and load forecasts?

A. Yes. The first step in developing a load forecast is to develop a sales forecast by customer class. The sales forecast is a measurement of sales to customers at the meter and is an input to development of the load forecast, which is expressed at system input. Line losses make up for the difference between sales and loads.

Forecasts for Non-Industrial Customer Classes

Q. How are monthly sales forecasts developed by customer class?

A. Monthly sales forecasts are developed as a product of two separate forecasts: the number of customers, and sales per customer. This methodology is used for all customer classes except for the industrial customer class.

Q. How are the forecasts for number of customers developed?

A. With the exception of industrial customers, which are discussed later in my testimony, the forecast of number of customers are generally based on a combination of regression analysis and exponential smoothing techniques using historical data from 1997 to 2007. For the residential class, the forecast of number of customers is developed using a regression model with Global Insight's forecast of each state's number of households as the major driver. For the commercial class, forecasts rely on a regression model with the forecasted residential customer numbers used as the major driver. For irrigation and street lighting classes, customer forecasts are developed based on exponential smoothing models.

Q. How is average use per customer for customer classes forecasted?

A. Sales per customer for the residential class are modeled through a Statistically Adjusted End-use ("SAE") model, which combines the end-use modeling concepts with traditional regression analysis techniques. Major drivers of the SAE-based residential model are weather-related variables, end-use information such as equipment shares, saturation levels and efficiency trends, and economic drivers such as household size, income and energy price.

For the commercial class, sales per customer are forecasted using regression analysis techniques with non-manufacturing employment used as the major economic driver in addition to weather-related variables.

For other classes, sales per customer are forecasted through regression analysis techniques using time trend variables.

Industrial Class Forecasts

Q. How does the Company forecast sales for the industrial customer class?

A. The industrial customers are separated into three categories: i) existing customers that are tracked by the Customer Account Managers ("CAMs"), ii) new large customers or expansions by existing large customers, iii) industrial customers that are not tracked by the CAMs. Customers are tracked by the CAMs if they have a peak load of 1 megawatt or more at a single site.

The forecast for the first two categories is developed through the data gathered by the CAM assigned to each customer. The CAMs have ongoing direct contact with large customers and are in the best position to know about the customer's plans for changes in business processes which might impact their energy consumption.

The portion of the industrial forecast related to new large customers and expansion by existing large customers is developed based on direct input of the customers, forecasted load factors, and the probability of the project occurrence.

Smaller industrial customers are more homogeneous and are modeled using regression analysis with trend and economic variables. Manufacturing employment is used as the major economic driver.

The total industrial sales forecast is developed by aggregating the forecast for the three industrial customer categories.

Q. Why are industrial sales forecasted by a different methodology than the other customer classes?

A. This class is forecasted differently because of the diverse makeup of the

customers within the class. In the industrial class, there is no "typical" customer. Large customers have very diverse usage patterns and power requirements. It is not unusual for the entire class to be strongly influenced by the behavior of one customer or a small group of customers.

In contrast, customer classes that are made up of mostly smaller, homogeneous customers are best forecasted as a use per customer multiplied by number of customers. Those customer classes are generally composed of many smaller customers that have similar behaviors and usage patterns. No small group of customers, or single customer, influences the movement of the entire class. This difference requires the different processes for forecasting.

Hourly Load Forecast

Q. Please outline how the hourly load forecast is developed.

A. After the forecasts of monthly energy sales by customer class are developed, a forecast of hourly loads is developed in two steps:

First, monthly and seasonal peak forecasts for each state are developed. The monthly peak model uses historic peak-producing weather for each state, and incorporates the impact of weather on peak loads through several weather variables. These weather variables include the average temperature on the peak day and lagged average temperatures. The peak forecast is based on average monthly historical peak-producing weather for the period 1990-2007.

Second, hourly load forecasts for each state are obtained from hourly load models using state-specific hourly load data and daily weather variables. Hourly loads are developed using a model which incorporates the twenty-year average

temperatures, a typical weather pattern for each year, and day-type variables such as weekends and holidays. The hourly loads are adjusted for line losses and calibrated to monthly and seasonal peaks.

Q. How are monthly system coincident peaks derived?

A. After the hourly load forecasts for each state are developed, hourly loads are aggregated to the total west control area level. West control area coincident peaks can then be identified as well as the contribution of each jurisdiction to those monthly peaks.

Summary of Results

Q. How do the temperature normalized historical sales in this proceeding compare to those in Docket UE-080220, the Company's last general rate case ("2008 Rate Case")?

A. Table 2 shows that the temperature normalized historical sales for the twelve months ended June 30, 2008 are approximately 1.2 percent lower than the 2008 Rate Case.

Table 2

Comparison of Washington Sales				
Description	Current Rate Case	2008 Rate Case	Difference	Percentage Difference
Total Residential	1,581,851	1,581,587	265	
Total Commercial, Industrial and Irrigation	2,438,421	2,485,823	(47,402)	
Total Public Street Lighting	10,259	13,716	(3,457)	
Total Sales to Ultimate Consumers	4,030,532	4,081,126	(50,594)	-1.2%

Q. How does the load forecast for the twelve months ended December 31, 2010 compare to the load forecast in the 2008 Rate Case?

A. The projected load in the west control area is slightly higher (0.1%) for the twelve months ended 2010 than in the 2008 Rate Case (see Table 3). This increase is moderated by the loss of a large customer in Washington effective September 2009.

Table 3

Comparison of West Control Area* Loads in Net Power Costs				
Description	Current Rate Case	2008 Rate Case	Difference	Percentage Difference
West Control Area* Load	20,849,362	20,823,512	25,850	0.1%

* West control area includes loads for California, Oregon, and Washington

Q. Does this conclude your testimony?

A. Yes.