EXHIBIT NO. ___(CKC-1T)
DOCKET NO. UE-11___/UG-11___
2011 PSE GENERAL RATE CASE
WITNESS: DR. CHUN K. CHANG

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY, INC.,** **Respondent.**	**Docket No. UE-11____** **Docket No. UG-11____**

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF
DR. CHUN K. CHANG
ON BEHALF OF PUGET SOUND ENERGY, INC.

JUNE 13, 2011

PUGET SOUND ENERGY, INC.

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF
DR. CHUN K. CHANG

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PUGET SOUND ENERGY, INC.

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF DR. CHUN K. CHANG

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Chun K. Chang, and my business address is 10885 N.E. Fourth Street, Bellevue, Washington 98004. I am employed by Puget Sound Energy ("PSE") as a Regulatory Consultant in Pricing and Cost of Service.

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

A. Yes. It is the First Exhibit to my Prefiled Direct Testimony, Exhibit No. ___(CKC-2).

Q. Please summarize the purpose of your testimony.

A. The purpose of my testimony is to present PSE's electric and gas temperature adjustment methodologies and results used to develop the pro forma electric and gas sales for the test year in this proceeding, January through December 2010.

II. ELECTRIC AND GAS SALES WEATHER NORMALIZATION

Q. Generally speaking, what is sales weather normalization and how does PSE perform its sales weather normalization?

A. The sales weather normalization is performed to adjust the test year sales volume so that the adjusted sales represent what the test year sales volume would have been if the weather had been normal. Weather normalization modifies the test year billing determinants and revenue requirements to be more representative of the average weather conditions expected when the rates proposed in this case go into effect.

PSE first analyzes the relationship between actual loads and temperatures for the most recent four-year period (2007 through 2010) and develops econometric models to measure temperature sensitivity of electric and gas energy use. Multivariate regression analysis is used to isolate the weather effects from other factors such as type of day (*e.g.*, weekdays, weekends or holidays) and seasonal effects not related to temperature. The estimated model coefficients of temperature variables are called "weather sensitivity coefficients."

Then, PSE uses the weather sensitivity coefficients and "normal" weather data to convert the actual test year sales to "normal weather" sales. PSE calculates the "normal" weather data from the actual historical temperature data compiled for the most recent thirty years.

Q. Did PSE use the same weather normalization methodology in this case as in its last general rate case?

A. Generally, yes; the methodology used in this case is the same temperature adjustment methodology PSE used in its 2009 general rate case ("2009 GRC"), except for a few minor improvements to be discussed later in this testimony. The Commission approved the weather normalization analysis PSE performed in its 2009 GRC.[1]

A. Normal Versus Actual Test Year Weather

Q. Please describe the actual weather experienced during this proceeding's test year.

A. Based on monthly history of heating degree days, Table 1 compares the actual monthly weather in the test year and the previous nine years with the normal weather defined by the average values calculated for the most recent thirty years of 1981-2010. The hourly temperatures recorded at Seattle-Tacoma International Airport ("Sea-Tac") were used to calculate daily average temperatures. The daily average temperatures were then converted to heating degree days ("HDDs") with a base temperature of 65˚F.[2] Monthly total HDDs were obtained by adding the

[1] See Docket No. UE-090704 and UG-009075 (consolidated), Order 11, ¶¶256-57 (April 2, 2010).

[2] A heating degree day (HDD) is the negative deviation in average daily temperature from the base temperature. For a base temperature of 65˚F, heating degree days equal 65 minus the average daily temperature (if the average temperature is less than 65). If the average daily temperature is greater than 65,

daily HDD for each month. For the test year, the overall weather, as measured by annual total HDD, was fairly close to normal.

Table 1

Heating Degree Days (Base 65)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	**2010**	30-Year Normal*	2010 % Diff from Normal
Jan	707	738	602	766	709	581	833	820	813	**562**	719	-21.8%
Feb	688	648	659	598	646	624	610	630	660	**515**	618	-16.7%
Mar	618	726	575	543	508	623	567	694	725	**564**	591	-4.5%
Apr	533	507	504	365	443	461	464	568	486	**486**	460	5.6%
May	330	392	342	276	245	281	302	306	294	**388**	310	24.9%
Jun	246	167	134	113	185	126	176	252	95	**224**	170	31.6%
Jul	118	76	29	40	45	54	19	71	41	**113**	69	64.4%
Aug	72	70	28	35	33	60	49	77	59	**95**	54	78.2%
Sep	176	158	131	211	188	133	193	144	122	**155**	154	0.9%
Oct	441	436	344	378	354	415	462	422	404	**377**	400	-5.7%
Nov	551	549	675	605	671	623	625	482	556	**652**	596	9.4%
Dec	723	679	716	693	701	761	778	866	841	**683**	762	-10.3%
Total	5,201	5,146	4,739	4,622	4,727	4,743	5,079	5,332	5,095	**4,816**	4,903	-1.8%
% Diff. from Normal	6.1%	4.9%	-3.3%	-6.1%	-3.6%	-3.3%	3.6%	8.3%	3.9%	**-1.8%**		

*February normal is based on 28 days for non-leap year. Percent differences from normal for 2004 and 2008 are based on a 29-day normal February with 638 HDDs.

However, the deviation from normal weather was more substantial on a monthly basis, especially for mid-winter and mid-summer months. As shown in the last column of Table 1, the winter weather in January, February and December was greater than 10 percent warmer than normal, while the weather in July and August was cooler than normal by 64.4 percent and 78.2 percent, respectively.

B. Temperature Adjustment of Electric Sales

Q. Please describe how the electric sales temperature adjustment was calculated.

HDD is 0. Thus, one day that averages 35˚F would have 30 HDDs (using a base of 65˚F). Similarly, 30 days with an average temperature of 64˚F each day would also have 30 HDDs.

A. The system-level temperature adjustment was calculated by month and allocated to each of the applicable rate schedules, based on a temperature adjustment methodology similar to the one used in PSE's 2009 GRC, with the hourly temperature and daily energy use data updated for 2009 and 2010. The difference in methodology is described later in my testimony and is related to simplifying the mechanics of calculation. Results of the simplified calculation would be the same as the complex calculation used in prior filings.

Q. Please describe how the system-level test year load was normalized for weather.

A. PSE used weather sensitivity coefficients based on actual daily load data and actual temperature data at Sea-Tac to adjust system-level delivered load (Generated, Purchased and Interchanged load, or "GPI") for weather. The weather sensitivity coefficients were estimated by developing an econometric model with a four-year (2007-2010) history of daily GPI, HDDs and cooling degree days ("CDDs").[3] This is the same methodology PSE used in its last three general rate cases.

PSE's "normal" weather dataset was developed using the hourly temperature data recorded at Sea-Tac over the 30-year period from 1981 through 2010 by calculating daily HDDs and CDDs using several base temperatures (45˚F and

[3] A Cooling Degree Day is calculated in the same way as a Heating Degree Day is calculated, except that it counts number of degrees above the base temperature.

65˚F for HDDs; 60˚F and 65˚F for CDDs). PSE then calculated the amount of temperature adjustment by taking the temperature variable coefficients from the econometric model and multiplying them by the difference between the actual and normal HDDs and CDDs. This process was performed on a monthly basis and aggregated for all of the HDD and CDD variables included in the model.

Q. How did you allocate the temperature adjustment among electric rate schedules?

A. PSE used a three-step process to allocate the system-level temperature adjustment to rate schedules (classes) in order to produce rate schedule pro forma temperature-adjusted billing determinants. The first step was to develop econometric model equations to characterize the relationship between the temperature variables and the daily energy use per customer by class. The temperature variable coefficients of those equations vary by month and by rate class. The data source for this step was a large sample of daily energy readings by rate schedule from PSE's automated meter reading database. The historical data period set for modeling is the same four-year period of 2007 through 2010 as used for the system weather sensitivity modeling.

The second step was to calculate the temperature adjustment to monthly energy use per customer for each rate schedule by taking the temperature variable coefficients from the class model equation and multiplying them by the difference between the actual and normal HDDs and CDDs for the month.

The third step was to estimate monthly adjustment to class total sales by multiplying the monthly adjustment per customer calculated in the previous step by the actual number of customers by month and rate schedule. The amount of monthly adjustment at the GPI level was allocated to each of the applicable schedules by calculating the percentage share of each schedule's adjustment amount relative to the sum of temperature adjustment for all classes as estimated through the rate class normalization process, and by multiplying the system total temperature adjustment by these percentage shares.

Q. Has PSE made any change to the electric temperature adjustment method since its last general rate case?

A. Yes. PSE has simplified the second step in the procedure described above to estimate temperature adjustment to monthly energy use per customer by rate schedule.

Q. What was the approach followed in the second step of estimating the rate class sales temperature adjustment in PSE's previous rate cases?

A. In PSE's 2006, 2007 and 2009 GRCs, weather-normalized daily energy use by rate class was estimated by 1) simulating the daily energy use per customer using the actual daily average temperature history over the last thirty years and the rate-class model equations; and 2) taking the mean value of the simulation results for each of the corresponding weather days in the test year. The temperature adjustment to per-customer energy use by class and month was then calculated by subtracting the actual energy use from the weather-normalized energy use.

Q. How has PSE simplified the second step in this proceeding?

A. Instead of going through the long process of simulating the daily energy use over thirty years, PSE calculated the temperature adjustment to monthly energy use per customer by class by applying the class temperature variable coefficients directly to the difference between monthly actual and normal HDDs and CDDs.

Q. Does this simplified approach produce a different result?

A. No. Since the model coefficients of the weather variables are only differentiated by month (*i.e.*, not by day), and because monthly HDDs and CDDs are simply the total daily HDDs and CDDs for the month, the simplified approach used in this case produces exactly the same results for the rate class sales adjustments as the previous approach, given the same model coefficients and thirty year temperature data.

Q. Please summarize the final results of electric sales weather normalization.

A. As shown in Table 2, below, applying the process described above to the test year GPI load of 22,594,274 megawatt hours ("MWhs") resulted in a total adjustment of 252,056 MWh, or 234,916 MWh delivered load when adjusted for losses. Because the test year winter was warmer than normal, this adjustment resulted in a pro forma delivered system load that is larger than actual load delivered during the test year. When the GPI temperature adjustment was allocated to the rate schedules, residential sales increased by 133,625 MWh and the loads of all but Schedule 29 Irrigation also increased.

Table 2

Temperature Adjustment of Test Year Electric GPI

Month	Actual GPI (MWH)	Temp. Adj. GPI (MWH)	Adj. (MWH)	Adj. (MWH) net of Losses
(1)	(2)	(3)	(4)=(3)-(2)	(5)=(4)*(1-0.071)
Jan-10	2,154,814	2,282,983	128,169	119,453
Feb-10	1,895,526	1,986,793	91,267	85,061
Mar-10	2,022,382	2,041,217	18,835	17,554
Apr-10	1,844,814	1,833,221	(11,593)	(10,805)
May-10	1,764,805	1,748,090	(16,715)	(15,578)
Jun-10	1,618,462	1,630,730	12,267	11,433
Jul-10	1,688,022	1,697,904	9,882	9,210
Aug-10	1,703,415	1,695,906	(7,509)	(6,999)
Sep-10	1,637,493	1,642,184	4,691	4,372
Oct-10	1,814,110	1,830,543	16,433	15,316
Nov-10	2,122,228	2,059,041	(63,187)	(58,890)
Dec-10	2,328,203	2,397,719	69,516	64,789
Total	22,594,274	22,846,330	252,056	234,916

The irrigation load is sensitive only to the summer weather. Monthly CDDs in August 2010 were 27.6 percent higher than normal while the weather in July 2010 was close to normal. Consequently, the actual irrigation sales were lowered by 0.7 percent when the sales were temperature normalized. Table 3 presents the temperature adjustment of electric sales by rate schedule.

Table 3

Temperature Adjustment of Test Year Electric Sales by Rate Schedule (MWH)

	Residential (Sch. 7, 17, 27, 37 & 47)			General Service (GS) (Sch. 8 & 24)			Small Demand GS (Sch. 7A, 11 & 25)		
Month	Actual	Normalized	Adj.	Actual	Normalized	Adj.	Actual	Normalized	Adj.
Jan-10	1,128,395	1,224,600	96,206	238,182	247,025	8,844	254,112	261,964	7,852
Feb-10	943,660	1,012,057	68,397	207,741	214,058	6,317	227,632	233,297	5,665
Mar-10	991,020	1,005,379	14,359	222,542	223,796	1,254	248,075	249,093	1,018
Apr-10	864,728	854,565	(10,163)	204,825	204,372	(453)	233,539	233,585	46
May-10	784,562	767,404	(17,157)	201,826	201,820	(5)	235,661	236,727	1,066
Jun-10	694,826	699,220	4,394	193,068	195,164	2,095	226,299	228,694	2,395
Jul-10	692,463	691,180	(1,283)	208,285	211,503	3,218	243,336	246,936	3,600
Aug-10	693,023	651,986	(41,037)	210,499	221,425	10,926	245,754	257,605	11,851
Sep-10	685,402	687,046	1,644	196,597	197,416	818	231,710	232,629	919
Oct-10	837,053	849,841	12,788	210,736	211,807	1,072	242,722	243,342	620
Nov-10	1,066,357	1,019,875	(46,482)	228,400	223,789	(4,611)	247,861	243,461	(4,400)
Dec-10	1,250,685	1,302,643	51,958	251,908	256,804	4,895	262,994	267,329	4,335
Total	10,632,173	10,765,798	133,625	2,574,610	2,608,978	34,368	2,899,697	2,934,661	34,964

	Large Demand GS (Sch. 10 & 31)			Primary GS (Sch. 10 & 31)			Seasonal Irrigation (Sch. 29)		
Month	Actual	Normalized	Adj.	Actual	Normalized	Adj.	Actual	Normalized	Adj.
Jan-10	182,733	184,772	2,039	114,920	116,457	1,537	358	358	0
Feb-10	163,829	165,296	1,467	105,735	106,829	1,093	314	314	0
Mar-10	178,610	178,873	264	114,745	114,977	231	367	367	0
Apr-10	166,705	166,783	79	107,222	107,129	(93)	559	559	0
May-10	172,202	172,847	644	108,755	108,873	118	1,173	1,176	3
Jun-10	168,329	169,647	1,318	103,740	104,536	797	1,379	1,391	12
Jul-10	180,888	182,922	2,034	109,818	111,024	1,206	4,267	4,263	(4)
Aug-10	180,767	187,674	6,907	110,247	114,253	4,006	3,843	3,719	(124)
Sep-10	170,012	170,520	508	105,822	106,132	311	1,142	1,147	5
Oct-10	172,087	172,293	206	110,517	110,783	266	496	496	0
Nov-10	166,772	165,689	(1,083)	109,842	109,103	(739)	361	361	0
Dec-10	172,984	174,052	1,068	114,021	114,862	842	376	376	0
Total	2,075,916	2,091,367	15,451	1,315,384	1,324,958	9,574	14,634	14,527	(107)

	Interrupt. Primary GS for Schools (Sch. 43)			Large General Service (Sch. 40)			Resale (Sch. 5)		
Month	Actual	Normalized	Adj.	Actual	Normalized	Adj.	Actual	Normalized	Adj.
Jan-10	16,809	19,249	2,440	51,741	52,234	492	918	962	44
Feb-10	14,516	16,252	1,736	46,613	46,968	355	756	787	31
Mar-10	15,017	15,376	359	50,961	51,025	63	748	754	6
Apr-10	12,971	12,735	(236)	54,402	54,423	21	618	613	(6)
May-10	11,701	11,296	(405)	57,682	57,850	168	505	495	(10)
Jun-10	8,239	8,302	63	55,825	56,183	358	399	400	1
Jul-10	5,666	5,648	(18)	59,282	59,737	455	333	336	2
Aug-10	6,391	5,806	(585)	59,645	60,695	1,051	324	332	8
Sep-10	8,768	8,792	23	56,035	56,178	143	371	371	1
Oct-10	11,743	12,046	303	56,835	56,890	55	510	517	7
Nov-10	15,449	14,257	(1,192)	54,211	53,846	(366)	764	747	(17)
Dec-10	17,366	18,680	1,313	56,020	56,377	357	985	1,006	21
Total	144,637	148,438	3,801	659,254	662,406	3,151	7,231	7,320	88

	Total		
Month	Actual	Normalized	Adj.
Jan-10	1,988,168	2,107,621	119,453
Feb-10	1,710,796	1,795,857	85,061
Mar-10	1,822,085	1,839,639	17,554
Apr-10	1,645,570	1,634,765	(10,805)
May-10	1,574,066	1,558,487	(15,578)
Jun-10	1,452,104	1,463,537	11,433
Jul-10	1,504,340	1,513,550	9,210
Aug-10	1,510,494	1,503,495	(6,999)
Sep-10	1,455,859	1,460,231	4,372
Oct-10	1,642,699	1,658,014	15,316
Nov-10	1,890,017	1,831,126	(58,890)
Dec-10	2,127,340	2,192,129	64,789
Total	20,323,537	20,558,453	234,916

Q. What is the effect of weather normalization on the electric revenue in the test year?

A. The positive adjustment to electric load had the effect of increasing pro forma revenue by $20,896,426, as shown on page 6.01 of the Fifth Exhibit to the Prefiled Direct Testimony of John H. Story, Exhibit No. ___(JHS-6).

Q. Is PSE's electric cost of service analysis and rate design study based on the weather-normalized sales?

A. Yes. Please see the Prefiled Direct Testimony of Jon A. Piliaris, Exhibit No. ___(JAP-1T), for an explanation of PSE's electric cost of service analysis and rate design study. PSE's electric cost of service analysis includes the temperature-adjusted power costs, and the electric rate design is based on the pro forma adjustment of energy sales made for the milder than normal test year weather. In addition, the energy cost allocation factors used in PSE's electric cost of service analysis reflect the temperature-adjusted loads.

C. Temperature Adjustment of Gas Sales

Q. Please describe how the gas sales weather normalization was calculated.

A. The system-level temperature adjustment was calculated in total and allocated to each of the applicable classes by month based on a gas temperature adjustment methodology similar to the one used in PSE's 2009 GRC and, most recently, in

PSE's 2010 gas tariff increase proceeding, UG-101644. The hourly temperature and daily and monthly gas sales data used for modeling were updated for this proceeding.

Q. Please describe how the system-level gas throughput in the test year was normalized for weather.

A. As was done in PSE's 2009 GRC and 2010 gas tariff increase proceeding, PSE used the weather-sensitivity model coefficients based on actual daily load data and actual temperature at Sea-Tac to adjust system-level delivered gas load (Firm, Interruptible and Transport) for weather. The weather-sensitivity model coefficients were estimated on the basis of the daily gas load and weather data compiled for the most current four-year period of 2007 through 2010. As with the electric model, PSE's "normal" weather dataset was developed using the hourly temperature data recorded at Sea-Tac over the 30-year period from 1981 through 2010. Also consistent with the electric model, the actual daily HDDs were calculated using the average of the 24 hourly temperatures compared against the base temperature. The amount of temperature adjustment was calculated by multiplying the weather sensitivity coefficients by the difference between the actual and normal HDDs. This calculation was performed on a monthly basis and aggregated for all of the HDD variables included in the system model.

Q. How did you allocate the temperature adjustment among gas rate schedules?

A. Initially, monthly gas usage patterns by rate schedule were evaluated to identify which rate classes are weather sensitive. Monthly histories of class gas sales and HDDs were plotted for the most recent four years and the scattergrams were evaluated for any correlation between the changes in class gas sales and temperature. This analysis revealed that the following rate classes are temperature sensitive:

- Schedule 23 (Residential),
- Schedule 31 (Commercial, Industrial),
- Schedule 41 (Commercial, Industrial),
- Schedules 85 (Commercial),
- Schedule 86 (Commercial),
- Schedule 87 (Commercial, Transport), and
- Special Contracts.

Econometric model equations were developed and estimated to characterize the relationship between monthly HDDs and average use per customer for each of the above weather sensitive classes. For each month of the test year, the amount of temperature adjustment to system total delivered load was then allocated to each of the applicable classes by taking the percentage share of each schedule's temperature adjustment relative to the sum of temperature adjustment for all weather sensitive schedules as calculated by the class sales normalization equations, and by then multiplying the system load temperature adjustment by these percentage shares.

Q. Has PSE made any change to the gas system temperature adjustment model since its 2009 GRC and 2010 gas tariff increase proceeding?

A. Yes. As shown in Table 1, the summer weather in July and August 2010 was unusually cooler than normal. The 208 HDDs accumulated for those two mid-summer months were the highest in the last ten years. Therefore, it appeared cool enough for some space-heating energy use, even in these summer months. The firm load weather sensitivity model equation developed for this proceeding confirms this observation by showing statistical significance for the heating load in those two summer months. Unlike in the 2009 GRC and 2010 gas tariff increase proceeding, the new gas model equation for the firm load therefore includes the HDD variable for July and August. Consequently, the firm gas sales in July and August were adjusted slightly downward for normal summer weather.

Q. Was there any change in the gas class models of temperature adjustment model?

A. Yes. PSE also evaluated the class-level gas sales for space-heating energy use in July and August. The econometric modeling results of class gas sales reveal that some residential gas sales in those two mid-summer months were used for heating. As in the case of the system model equation, but different from PSE's 2009 GRC and 2010 gas tariff increase proceeding, the residential class model equation includes the HDD variable for July and August. Since the residential class is the only class of significant heating load in July and August 2010, all of the firm load adjustment made for those two months was allocated to the residential class.

Q. Are the changes made to the system and rate schedule models in this case a departure from the theory and methodology approved in PSE's 2006 GRC?

A. No. These changes are merely updates and improvements to the existing methodology, reflecting the unusually cool summer weather experienced in 2010.

Q. Was there any unusual circumstance related to the historical gas sales data used for the class gas sales weather-sensitivity modeling?

A. Yes. Rate schedules 36, 51 and 57 were closed, and new rate schedules 41T, 85T and 87T were opened on November 1, 2008. Since modeling requires a four-year history of class sales for January 2007 through December 2010, consistent monthly sales histories of the rate schedules had to be constructed for rate schedules 41T, 85T and 87T. The monthly sales histories of those new rate schedules for January 2007 through October 2008 were built by tracking the monthly billings over this time period for the customers who were reclassified from the old rate schedules, 36, 51 and 57.

Q. Please summarize the final results of gas sales weather normalization.

A. Table 4 presents the temperature adjustment of sales by rate schedule. As shown in the table, applying the process described above to the test year sales to the weather sensitive rate classes results in a total temperature adjustment of

32,926,082 therms. Because the test year winter was warmer than normal, this adjustment resulted in a pro forma delivered system load larger than actual load delivered during the test year. When the system temperature adjustment was allocated to the rate schedules, the gas sales to all of the weather-sensitive schedules were increased. The residential class represented 64.7 percent of the total temperature adjustment, increasing by 21,293,690 therms.

Table 4

Temperature Adjustment of Test Year Gas Sales by Rate Schedule

Month	Residential (Sch.23)			General service - commercial (Sch.31)			Large volume - commercial (Sch.41)		
	Actual	Normalized	Adjustments	Actual	Normalized	Adjustments	Actual	Normalized	Adjustments
Jan-10	71,187,692	86,695,171	15,507,479	23,016,166	27,566,601	4,550,435	6,036,466	6,686,815	650,349
Feb-10	58,357,925	68,940,933	10,583,008	18,812,793	21,916,584	3,103,791	5,206,460	5,649,194	442,734
Mar-10	59,215,201	61,849,675	2,634,474	19,150,536	19,922,735	772,199	5,526,561	5,637,786	111,225
Apr-10	46,508,498	44,615,309	(1,893,189)	15,524,159	14,970,230	(553,929)	4,764,151	4,684,262	(79,889)
May-10	33,382,131	28,758,422	(4,623,709)	12,049,759	10,962,543	(1,087,216)	4,144,132	3,969,201	(174,931)
Jun-10	21,957,138	19,470,630	(2,486,508)	9,005,427	8,558,003	(447,424)	3,239,970	3,111,902	(128,068)
Jul-10	15,080,375	13,949,021	(1,131,354)	7,221,778	7,221,778	0	2,639,853	2,639,853	0
Aug-10	14,189,236	13,135,550	(1,053,686)	7,068,070	7,068,070	0	2,578,521	2,578,521	0
Sep-10	18,121,975	18,065,576	(56,399)	7,946,422	7,936,342	(10,080)	2,868,927	2,866,078	(2,849)
Oct-10	36,524,174	38,477,158	1,952,984	12,676,289	13,131,242	454,953	4,012,545	4,083,597	71,052
Nov-10	67,472,591	60,610,432	(6,862,159)	21,511,392	19,525,584	(1,985,808)	5,575,772	5,298,386	(277,386)
Dec-10	84,734,325	93,457,074	8,722,749	27,256,517	29,784,482	2,527,965	6,473,096	6,825,278	352,182
Test Year	526,731,261	548,024,951	21,293,690	181,239,308	188,564,194	7,324,886	53,066,454	54,030,873	964,419

Month	Trans. non-exclus inter w/ firm option - com (Sch.87T)			Interruptible with firm option - com (Sch.85)			Limited interrupt w/ firm option - com (Sch.86)		
	Actual	Normalized	Adjustments	Actual	Normalized	Adjustments	Actual	Normalized	Adjustments
Jan-10	1,937,952	2,327,496	389,544	1,540,528	1,795,306	254,778	1,663,779	1,968,191	304,412
Feb-10	1,707,812	1,927,458	219,646	1,365,910	1,534,143	168,233	1,409,469	1,609,877	200,408
Mar-10	1,821,369	1,886,886	65,517	1,543,042	1,593,625	50,583	1,462,011	1,522,268	60,257
Apr-10	1,678,807	1,623,768	(55,039)	1,351,647	1,310,019	(41,628)	1,219,957	1,174,316	(45,641)
May-10	1,544,678	1,418,938	(125,740)	1,142,807	1,030,744	(112,063)	979,898	857,031	(122,867)
Jun-10	1,294,429	1,294,429	0	861,289	812,784	(48,505)	626,681	516,896	(109,785)
Jul-10	1,196,692	1,196,692	0	719,459	719,459	0	362,839	362,839	0
Aug-10	1,164,811	1,164,811	0	682,351	682,351	0	338,531	338,531	0
Sep-10	1,237,757	1,236,580	(1,177)	737,916	736,716	(1,200)	494,396	491,729	(2,667)
Oct-10	1,487,119	1,512,003	24,884	1,088,491	1,129,128	40,637	927,504	970,448	42,944
Nov-10	1,981,257	1,880,569	(100,688)	1,469,983	1,378,725	(91,258)	1,494,947	1,399,110	(95,837)
Dec-10	1,990,898	2,127,715	136,817	1,567,374	1,699,716	132,342	1,707,029	1,846,010	138,981
Test Year	19,043,581	19,597,345	553,764	14,070,797	14,422,716	351,919	12,687,041	13,057,246	370,205

Month	Non-excl interrupt w/ firm option - com (Sch.87)			General service - industrial (Sch.31)			Large volume - industrial (Sch.41)		
	Actual	Normalized	Adjustments	Actual	Normalized	Adjustments	Actual	Normalized	Adjustments
Jan-10	2,992,144	3,400,443	408,299	1,818,921	2,249,912	430,991	1,320,289	1,372,293	52,004
Feb-10	2,636,531	2,906,136	269,605	1,477,370	1,770,209	292,839	1,220,657	1,256,456	35,799
Mar-10	2,769,578	2,850,641	81,063	1,448,095	1,520,682	72,587	1,395,878	1,405,044	9,166
Apr-10	2,479,235	2,417,465	(61,770)	1,133,284	1,081,321	(51,963)	1,342,442	1,335,920	(6,522)
May-10	2,256,353	2,090,067	(166,286)	798,015	719,006	(79,009)	1,336,026	1,302,180	(33,846)
Jun-10	1,872,603	1,738,825	(133,778)	545,398	521,740	(23,658)	1,195,554	1,174,152	(21,402)
Jul-10	1,565,592	1,565,592	0	432,613	432,613	0	1,164,314	1,164,314	0
Aug-10	1,423,850	1,423,850	0	426,650	426,650	0	1,214,353	1,214,353	0
Sep-10	1,529,532	1,526,222	(3,310)	491,935	491,402	(533)	1,194,311	1,193,831	(480)
Oct-10	2,142,717	2,203,016	60,299	879,645	912,661	33,016	1,336,180	1,350,479	14,299
Nov-10	2,807,516	2,672,102	(135,414)	1,575,222	1,389,364	(185,858)	1,382,308	1,358,705	(23,603)
Dec-10	3,255,881	3,452,258	196,377	2,070,494	2,307,296	236,802	1,379,711	1,409,657	29,946
Test Year	27,731,532	28,246,617	515,085	13,097,642	13,822,856	725,214	15,482,023	15,537,384	55,361

Month	Special contracts - ind			Total adjustment (Therms)		
	Actual	Normalized	Adjustments	Actual	Normalized	Adjustments
Jan-10	3,517,110	4,174,040	656,930	128,745,037	151,950,258	23,205,221
Feb-10	3,347,997	3,718,409	370,412	107,438,064	123,124,539	15,686,475
Mar-10	3,654,461	3,764,950	110,489	111,751,311	115,718,871	3,967,560
Apr-10	3,238,199	3,145,382	(92,817)	92,608,601	89,726,214	(2,882,387)
May-10	2,805,705	2,395,387	(410,318)	74,871,802	67,935,817	(6,935,985)
Jun-10	2,216,168	2,216,168	0	56,233,149	52,834,021	(3,399,128)
Jul-10	2,006,793	2,006,793	0	45,903,282	44,771,928	(1,131,354)
Aug-10	1,941,842	1,941,842	0	44,931,621	43,877,935	(1,053,686)
Sep-10	1,979,407	1,974,119	(5,288)	49,140,650	49,056,667	(83,983)
Oct-10	2,787,377	2,868,579	81,202	77,063,217	79,839,487	2,776,270
Nov-10	3,842,036	3,672,235	(169,801)	121,261,601	111,333,789	(9,927,812)
Dec-10	3,871,544	4,102,274	230,730	146,682,208	159,387,099	12,704,891
Test Year	35,208,639	35,980,178	771,539	1,056,630,543	1,089,556,625	32,926,082

Q. What is the effect of the temperature adjustment on revenue for the test year in this proceeding?

A. The positive adjustment to volume had the effect of increasing pro forma revenue by $33,261,442 as shown on page 2 of the Second Exhibit to the Prefiled Direct Testimony of Janet K. Phelps, Exhibit No. ___(JKP-3).

Q. Is PSE's gas cost of service analysis and rate design study based on the weather-normalized sales?

A. Yes. Please see the Prefiled Direct Testimony of Janet Phelps, Exhibit No. ___(JKP-1T), for a description of PSE's gas cost of service analysis and rate design study. PSE's gas cost of service and rate design is based on the pro forma adjustment of energy sales made for the milder than normal test year weather. In addition, the energy cost allocation factors used in PSE's cost of service analysis reflect the temperature-adjusted loads.

III. CONCLUSION

Q. Does this conclude your testimony?

A. Yes, it does.