BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,	DOCKET NO. UE-070565
Complainant,	
v.	
PUGET SOUND ENERGY, INC.	
Respondent.	

EXHIBIT TO
TESTIMONY OF

Yohannes K.G. Mariam

STAFF OF
WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION

June 15, 2007

CONFIDENTIAL PER PROTECTIVE ORDER

REDACTED VERSION

1. Statistical Tests on Forced Outage Rates for Colstrip 1&2, and Colstrip 3&4

1A. Tests of Structural Break for Colstrip 1&2 from a regression of the form {outage= f (time) + error term}:Chow Breakpoint Test: 2003

F-statistic	0.131093	Prob. F(1,5)	0.732100
Log likelihood ratio	0.181167	Prob. Chi-Square(1)	0.670373

Interpretation: The results indicate no structural change or break over the period 2000-2006. It means that it is plausible to take an average for seven years or any number of years to represent a normal outage rate.

1B. Tests of Structural Break for Colstrip 3&4 from a regression of the form {outage= f (time) + error term}:Chow Breakpoint Test: 2003

F-statistic	7.472822	Prob. F(1,5)	0.041102
Log likelihood ratio	6.398799	Prob. Chi-Square(1)	0.011420

Interpretation: The results indicate the presence of structural change or break when data for the period 2000-2002 is compared with data for the period 2003-2006. It means that it is not plausible to take an average for seven years to represent a normal outage rate.

2. Tests for significance of variances and means of two times: 2000-2002 and 2003-2006.

Table 2A: Tests of Variances of Forced Outage Rates for Colstrip 1 &2

t-Test: Two-Sample Assuming Equal Variances	2000-2002	2003-2006
Mean	2294.883333	618.525
Variance	1423542.041	23330.43583
Observations	3	4
Pooled Variance	583415.0778	
Hypothesized Mean Difference	0	
df	5	
t Stat	2.873555809	
P(T<=t) one-tail	0.01742473	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.03484946	
t Critical two-tail	2.570581835	

Interpretation: The means of the two time periods are statistically different. It is not plausible to take an average for seven years to represent a normal outage rate.

Table 2B: Tests for Mean Forced Outage Rates for Colstrip 1 &2 (Using standardized or Z-values)

z-Test: Two Sample for Means	2000-2002	2003-2006
Mean	565.9133333	618.525
Known Variance	1	1
Observations	3	4
Hypothesized Mean Difference	0	
Z	-68.8848414	
P(Z<=z) one-tail	0.00	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Interpretation: The means of the two time periods are statistically different. It is not plausible to take an average for seven years to represent a normal outage rate.

Table 2c: Tests of Variance of Forced Outage Rates for Colstrip 3&4

t-Test: Two-Sample Assuming Equal Variances	2000-2002	2003-2006
Mean	2294.883333	704.75
Variance	1423542.041	21752.25
Observations	3	4
Pooled Variance	582468.1663	
Hypothesized Mean Difference	0	
Df	5	
t Stat	2.727966591	
P(T<=t) one-tail	0.020690168	
t Critical one-tail	2.015048372	
P(T<=t) two-tail	0.041380336	
t Critical two-tail	2.570581835	

Interpretation: The means of the two time periods are statistically different. It is not plausible to take an average for seven years to represent a normal outage rate.

Table 2d: Tests for Mean Forced Outage Rates for Colstrip 3 &4 (Using standardized or Z-values)

z-Test: Two Sample for Means	2000-2002	2003-2006
Mean	2294.883333	704.75
Known Variance	1	1
Observations	3	4
Hypothesized Mean Difference	0	
z	2081.973247	
P(Z<=z) one-tail	0	
z Critical one-tail	1.644853627	
P(Z<=z) two-tail	0	
z Critical two-tail	1.959963985	

Interpretation: The means of the two time periods are statistically different. It is not plausible to take an average for seven years to represent a normal outage rate.

3.   Graphical Representation of Trends in Forced Outage Rates, 2000-2006