BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

UE 192

In the Matter of	)
PORTLAND GENERAL ELECTRIC,	)
2008 Annual Power Cost Update Tariff.	)

REPLY TESTIMONY
OF THE
CITIZENS' UTILITY BOARD OF OREGON

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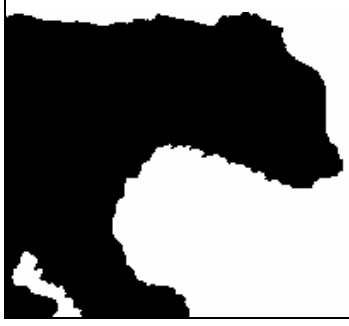

June 13, 2007

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OF OREGON

UE 192

In the Matter of PORTLAND GENERAL ELECTRIC, 2008 Annual Power Cost Update Tariff.	)	REPLY TESTIMONY OF THE CITIZENS' UTILITY BOARD OF OREGON

My name is Lowrey Brown, and my qualifications are listed in CUB Exhibit 101.

I. Introduction

PGE's forecast of its net variable power costs for 2008 includes an abnormally high forced outage rate for the Company's Boardman coal-fired generating plant. This is because the Company, though not including November 18, 2005 through June 6, 2006 in the calculation of Boardman's forced outage rate, does include the rest of 2005 and 2006. The plant's performance during the periods of 2005 and 2006 that are included in PGE's calculation was exceptionally poor and was likely impacted by both the cracked rotor as well as the turbulent period following the rotor's repair. The purpose of the forced outage rate is to predict future normal plant performance, not to provide recovery of specific past outages. It is not, therefore, reasonable to include Boardman's extremely poor performance in 2005 and 2007 when forecasting the plant's future normal forced outage rate.

II. Boardman Forced Outage Rate

In UE 180 Order No. 07-015, the Commission directs PGE to remove from Boardman's 4-year average forced outage rate, the 2005 hours of the extended cracked rotor outage. In calculating Boardman's 2003-2006 average forced outage rate, the Company carries the Commission's direction through the entire rotor outage, and excludes the period of November 18, 2005 through June 6, 2006 from the calculation.[1]

A. Boardman's Performances In 2005 & 2006 Were Abnormally Low

Removing the November 18, 2005 through June 6, 2006 from Boardman's 4-year average of forced outages is appropriate and consistent with the Commission's Order in UE 180, but the portions of 2005 and 2006 that are not removed, also do not represent normal operating performance, and are not, therefore, appropriately used to forecast future, normal plant operation. In 2005, the increased vibrations in the low pressure turbine resulting from the cracked rotor began in July, and the plant was taken off-line in October, so we know that serious problems were developing in the plant well before the November 18th deferral period.[2]

Given that problems with the cracked rotor clearly began before the deferral period, and the Commission considers the cracked rotor outage to be an extreme event,[3] Boardman's performance during the time period when the plant was affected by an extreme malfunction should not be used to forecast future, normal plant operations. Though plant engineers first noticed an increase in vibration in July of 2005, it is not clear exactly when the problem started or how it developed, so it is appropriate to remove

[1] PGE/100/Tooman-Tinker-Schue/8.
[2] UM 1234 PGE/200/Quennoz-Mayer/3.
[3] UE 180 OPUC Order No. 07-015 p. 15.

the entirety of Boardman's performance during 2005 as a measure of future, normal performance.

Boardman's operation from June through December of 2006, with its dramatic forced outage rate, came on the heels of major repairs, and a period when the plant had not been reliably up and running for 8 months. Indeed, though PGE excludes the portion of 2006 through June 6th, Boardman was not actually available for dispatch until July 1st.[4] The Company claims this problem was unrelated to the extended rotor outage, and therefore appropriately included in the plant's forced outage rate, but the plant wasn't even operating when this supposedly unrelated outage occurred. This begs the philosophical question of whether one can have an outage when the plant isn't running. Boardman's extremely high forced outage rate for the second half of 2006 indicates a period of turbulent maintenance, and, again, this is not a good measure of normal operation.

Boardman's performance, that PGE includes in its calculation, from January through October of 2005 and June through December of 2006 is extremely poor, so much so that it is difficult to see how these periods could be used as a measure of normal performance. Indeed, Boardman's forced outage rates in the included portions of 2005 and 2006 are [redacted] both Boardman's average forced outage rate from 1998 through 2004, as well as the North American Electric Reliability Corporation (NERC) averages for similar-sized, coal-fired plants.[5]

[4] Though the excluded period of Boardman's performance ended on June 6, 2006, due to another problem, the plant was not released for dispatch until July 1, 2006. PGE/100/Tooman-Tinker-Schue/8.
[5] CUB Exhibit 102. NERC introductory brochure and excerpt from brochure data.

	Boardman 2006 June 7 – Dec 31	Boardman 2005 Jan 1 – Nov 17	Boardman Avg 1998 – 2004	NERC 2001-2005
Forced Outage Rate[6]	____%	____%	____%	5.29%
Equivalent Forced Outage Rate[7]	____%	____%	____%	7.47%
Modified Equivalent FOR[8]	____%	____%	____%	- - - - -

Neither the parties nor the Commission reached consensus in UE 180 regarding the use of NERC data for rate setting purposes, though Staff, ICNU, and CUB found value in doing so.[9] While PGE opposed using NERC data for rate setting, the Company did acknowledge that "NERC data are useful for general comparisons."[10] We do not propose using NERC data to set rates in this case; instead we are using NERC data, in combination with Boardman's own past performance, to establish that Boardman's performance in the included periods of 2005 and 2006 was so low that those time periods were exceptional and should not be used for future rate setting purposes.

B. PGE Combines High Forced Outage Rate With Significant Planned Outages

In UE 180, PGE argues that comparison of Boardman's equivalent availability factor to the NERC data, instead of its forced outage rate, is more reasonable.

> A more reasonable comparison examines the EAF [Equivalent Availability Factor] as there may be issues with reporting NERC data, as we discuss further below. Using the same NERC data and peer groups as

[6] The formulas used by PGE and NERC to calculate the forced outage rate are the same, though the variables used may be measured differently. See CUB Exhibit 103.
[7] The equivalent forced outage rate is a measure of both the full-plant forced outages included in the forced outage rate and partial forced outages where the plant is not entirely offline. The formulas used by PGE and NERC to calculate the equivalent forced outage rate reach similar results, but are not identical. See CUB Exhibit 103.
[8] There are times when a plant operator is faced with a forced outage, but can continue operation for a short period in order to wait until a time of lower market prices before taking the plant offline. This is recorded as a planned outage, as the operator chooses when to take the plant offline, but, in the past, the equivalent forced outage rate has been modified to include these outages as forced, given that the plant operator was faced with a forced outage that had to be dealt with in a timely manner.
[9] UE 180 OPUC Order No. 07-015 p. 13-15.
[10] UE 180 PGE/1900/Tinker-Schue-Drennan/37.

> ICNU and Staff, it is obvious that PGE's plants perform at reasonable levels. Table 6 below compares the NERC EAF data with actual plant performance. The comparison below demonstrates that while Staff and ICNU claim that PGE's plants show slightly higher forced outage rates, these are offset by lower planned maintenance outages.

UE 180 PGE/1900/Tinker-Schue-Drennan/38.

We are not alone in finding PGE's final sentence troubling, as it suggests the Company is indifferent between forced outages and planned ones. In its UE 180 Surrebuttal, Staff states:

> First, the identified offset is not a good economic tradeoff. Forced outages are likely to be more expensive than planned outages. Planned outages are scheduled for periods of the year when wholesale power prices are expected to be at their lowest levels.

UE 180 Staff/1500/Galbraith/18.

In its UE 180 Surrebuttal, ICNU states:

> PGE concedes that it has higher unplanned outage rates than comparable plants in the NERC peer groups, but contends these are offset by lower planned maintenance outages. This is an unwise trade-off, however, because planned outages are coordinated to occur when replacement power is available at the lowest possible cost. Unplanned outages can (and, as shown in the case of the Boardman plant, do) occur at times when replacement power costs are high.

UE 180 ICNU/108/Falkenberg/17.

Though PGE clarifies, in its UE 180 Sursurrebuttal, that it does not intentionally "forego planned maintenance at the expense of forced outage rates," we too balk at the Company's suggestion that Boardman's high forced outage rate is somehow balanced by a low planned outage rate. In addition, regardless of how bad such a trade-off may be, if the Company performs what would otherwise have been planned maintenance during forced outages, why is Boardman's planned outage days for 2008 on the higher end of what Boardman has needed in the past?

PGE forecasts 44 days of planned outages for Boardman in 2008.[11] The planned 44 days is by no means the longest of Boardman's planned outage days, and we certainly want Boardman to get the appropriate maintenance, but significant planned outages and an abnormally high forced outage rate make strange bedfellows. The combination of these two would mean that customers would be paying for both Boardman's abnormally poor past performance as well as its extensive 2008 maintenance. If, as the Company has suggested, more forced outage hours can be balanced by fewer planned ones, then why, only a year after two years with abnormally-high forced outage rates, is the number of days Boardman is scheduled to be on planned outage in 2008 comparatively large?

From 1998 through 2004, the average of the combination of forced plus planned outage days is [redacted] days, if the average is extended through 2006, it [redacted] days. For 2008, PGE is proposing an equivalent sum of 82 days.[12] Since 1998, this would be the highest number of outage days second to [redacted].[13] Given how much the plant was on outage in 2005 and 2006 ([redacted]), it does not seem reasonable that the Company expects the plant to be on outage for 82 days in 2008.

That Boardman's forced outage rates for the included portions of 2005 and 2006 are [redacted] both the NERC averages as well as its own past operating performance is troubling and should not be considered normal. The extended length of time Boardman was offline in 2005 and 2006 provided the Company with a great deal of time to perform planned maintenance that was scheduled for the following years. That PGE is forecasting a combination of planned and forced outage days for 2008 that is comparatively high

[11] CUB Exhibit 104.
[12] CUB Exhibit 105.
[13] *Ibid.*

after the amount of time Boardman was offline in 2005 and 2006 is unreasonable and not likely to be a good measure of the plant's normal performance in 2008. Though we do not take issue with PGE's forecast of planned outages for 2008 in this testimony, Boardman's performances in the included periods of 2005 and 2006 were not normal, and, as such, should not be included in an average that purports to forecast normal performance.

C. Boardman's Forced Outage Rate Should Be Adjusted

In its Order in UE 180, the Commission affirmed its use of past plant performance as an accurate indicator of future performance.

> In determining a method for establishing the forced outage rate, we seek the most accurate forecast of forced outages at the relevant plants. We continue to believe that past performance is the best predictor of a plant's outage rate. For this reason, we adhere to our long-standing practice of using actual plant outage rates to predict the future activity of that plant.
>
> … While we decide that this is the best decision for this case, we appreciate the concerns of the parties that the four-year rolling average may not always be the most accurate forecast of future outages. For this reason, we will open a new generic docket to examine this issue.

UE 180 OPUC Order No. 07-015 p.15.

The Commission plans to open an investigation into the method used to forecast a plant's normal forced outage rate, but for this docket, there is clearly a problem with using Boardman's 4-year average from 2003 through 2006. Boardman's anomalous performance in 2005 and 2006 is not an appropriate measure of the plant's future normal performance. We recommend using Boardman's 4-year average of forced outages from 2001 through 2004, as this excludes the exceptionally high forced outage rates and any impact of the cracked rotor repairs on Boardman's performance outside of the excluded periods of 2005 and 2006. This would base Boardman's average forced outage rate on a

full 4 years, as opposed to the shortened time period resulting from exclusion of the cracked rotor outage.

The following table shows Boardman's 4-year average forced outage rates for 2006 through 2003. As can be seen, Boardman's forced outage rate drops noticeably when the second half of 2006 is removed, and noticeably again when the first half of 2005 is removed. The two anomalous partial-year periods in 2005 and 2006 do not represent normal operating performance, and should not be used to forecast Boardman's future performance.

	NERC[14]	**Boardman[15]**			
	2001-05	2003-06	2002-05	2001-04	2000-03
Forced Outage Rate	5.29%	____%	____%	____%	____%
Equivalent Forced Outage Rate	7.47%	____%	____%	____%	____%
Modified Equivalent FOR	- - - - -	10.30%	9.01%	____%	____%

The modified equivalent forced outage rate is the number used for setting rates, and Boardman's equivalent forced outage rate as filed is 10.3%.[16] In this case, we recommend continuing the Commission's use of a 4-year rolling average, but recommend using the years 2001-2004, as Boardman's performance in those years is a better representation of normal performance than an average containing the included portions of 2005 and 2006. Using 2001-2004 also means that Boardman's forced outage rate would be calculated using 4 full years, as opposed too 2 full and 2 partial years. In addition, Boardman's performance from 2001-2004 is reasonable when compared to the plant's performance from 1998 on, and when compared to NERC data.

[14] CUB Exhibit 102.
[15] Boardman's modified equivalent forced outage rates for 2003-2006 and 2002-2005 are from PGE/100/Tooman-Tinker-Schue/8. The rest of Boardman's statistics can be found in CUB Exhibit 103.
[16] PGE/100/Tooman-Tinker-Schue/8.

III. Conclusion

We recommend that the Commission use Boardman's 2001-2004 modified equivalent forced outage rate of ___%[17] when calculating the forecast of PGE's 2008 net variable power costs, as Boardman's performance in the included periods of 2005 and 2006 were abnormally high and not a good representation of normal plant operation.

[17] A publicly available approximation of this number can be calculated from data included in Staff Testimony in UE 180, Staff/100/Galbraith/6.

Year	Modified Equivalent Forced Outage Rate
2001	2.89%
2002	8.12%
2003	4.21%
2004	11.51%
Avg 01-04	**6.68%**

WITNESS QUALIFICATION STATEMENT

NAME Lowrey R. Brown

EMPLOYER Citizens' Utility Board of Oregon

TITLE Utility Analyst

ADDRESS 610 SW Broadway, Suite 308
Portland, OR 97205

EDUCATION Master of Science, Engineering
Bachelor of Science, Civil Engineering
Stanford University, Stanford California

EXPERIENCE Provided comments and participated in settlement discussions in OPUC dockets AR 495, UE 161, UE 173, UM 1014, UM 1147, UM 1158, UM 1169, UM 1206, and UM 1209. Presented testimony and engaged in settlement proceedings in UE 165, UE 167, UE 170, UE 179, UE 180, UM 1121, UM 1187, and UM 1271. Participated in technical subcommittees for the Governor's Advisory Group on Global Warming, and in the Regional Representatives Group for Grid West. Currently involved in the development of PacifiCorp's and PGE's integrated resource plan.

Prior to this, worked as a consultant with KEMA-Xenergy in Portland from 2002 to 2003 on energy and energy efficiency issues. Between 1997 and 2001, freelanced in Colorado for The Valley Journal, Solar Energy International, Energy Systems Engineering, and Resource Engineering providing writing and technical assistance.

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Generating Unit Statistical Brochure

2001–2005

November 2006

Generating
Availability
Data
System

EQUATIONS

Unweighted

Average Run Time - ART
[SH/Actual Unit Starts]

Starting Reliability - SR
[Actual Unit Starts/Attempted Unit Starts] x 100 (%)

Net Capacity Factor - NCF
[NAG/(PH x NMC)] x 100 (%)

Net Output Factor - NOF
[NAG/(SH x NMC)] x 100 (%)

Service Factor - SF
(SH/PH) x 100 (%)

Availability Factor - AF
(AH/PH) x 100 (%)

Equivalent Availability Factor - EAF
{[AH □ (EUDH + EPDH + ESEDH)]/PH} x 100 (%)

Forced Outage Rate - FOR
[FOH/(FOH + SH)] x 100 (%)

Equivalent Forced Outage Rate - EFOR
[(FOH + EFDH)/(FOH + SH + EFDHRS)] x 100 (%)

Scheduled Outage Factor - SOF
(SOH/PH) x 100 (%)

Forced Outage Factor - FOF
(FOH/PH) x 100 (%)

Equivalent Forced Outage Rate demand – EFORd

$$\frac{[(f*FOH) + (fp*EFDH)]*100}{[SH + (f*FOH)]}$$

where fp= (SH/AH)

$$f = \left(\frac{1}{r} + \frac{1}{T}\right) / \left(\frac{1}{r} + \frac{1}{T} + \frac{1}{D}\right)$$

r = Average Forced Outage duration = [FOH / (number of FO occurrences)]
D = Average demand time = [SH/ (number of actual unit starts)]
T = Average Reserve Shutdown time = [RSH / (number of attempted unit starts)]

Unplanned Outage Factor - UOF
(UOH/PH) x 100 (%)

Equivalent Unplanned Outage Factor - EUOF
[(UOH + EUDH)/PH] x 100 (%)

Equivalent Unplanned Outage Rate - UFOR
[(UOH + EUDH)/(UOH + SH + EUDHRS)] x 100 (%)

*Capacity Weighted**

Weighted Service Factor - WSF
[Σ(SH x NMC)/ Σ(PH x NMC)] x 100 (%)

Weighted Availability Factor - WAF
[Σ(AH x NMC)/ Σ(PH x NMC)] x 100 (%)

Weighted Equivalent Availability Factor - WEAF
{Σ (AH x NMC) – Σ[(EUDH + EPDH + ESEDH) x NMC]/
Σ(PH x NMC)} x 100 (%)

Weighted Forced Outage Rate - WFOR
{Σ(FOH x NMC)/ Σ[(FOH + SH) x NMC]} x 100 (%)

Weighted Equivalent Forced Outage Rate - WEFOR
{Σ[(FOH + EFDH) x NMC]/
Σ[(FOH + SH + EFDHRS) x NMC]} x 100 (%)

Weighted Scheduled Outage Factor - WSOF
[Σ(SOH x NMC)/ Σ(PH x NMC)] x 100 (%)

Weighted Forced Outage Factor - WFOF
[Σ(FOH x NMC)/ Σ(PH x NMC)] x 100 (%)

*Applies to groups of units only.

Notes:

Equivalent hours are computed for each derating and then summed. Size of Reduction is determined by subtracting the Net Available Capacity (NAC) from the Net Dependable Capacity (NDC). In cases of multiple deratings, the Size of Reduction of each derating is the difference in the NAC of the unit prior to the initiation of the derating and the reported NAC as a result of the derating.

DEFINITIONS

Actual Unit Starts
Number of times the unit was synchronized to the transmission system.

Attempted Unit Starts
Number of attempts to bring the unit from shutdown to synchronization.

Available Hours - AH
Sum of all SH, RSH, Pumping Hours, and Synchronous Condensing Hours.

Equivalent Forced Derated Hours - EFDH
Product of the Forced Derated Hours and the Size of Reduction, divided by the NMC.

Equivalent Forced Derated Hours During Reserve Shutdowns - EFDHRS
Product of the Forced Derated Hours (during Reserve Shutdowns (RS) only) and the Size of Reduction, divided by the NMC.

Equivalent Planned Derated Hours - EPDH
Product of the Planned Derated Hours and the Size of Reduction, divided by the NMC.

Equivalent Seasonal Derated Hours - ESEDH
NMC less the NDC, times the Available Hours (AH), divided by the NMC.

Equivalent Unplanned Derated Hours - EUDH
Product of the Unplanned Derated Hours and the Size of Reduction, divided by the NMC.

Equivalent Unplanned Derated Hours During Reserve Shutdowns - EUDHRS
Product of the Unplanned Derated Hours (during Reserve Shutdowns (RS) only) and the Size of Reduction, divided by the NMC.

Forced Derated Hours - FDH
Sum of all hours experienced during Forced Deratings.

Forced Outage Hours - FOH
Sum of all hours experienced during Forced Outages.

Net Available Capacity - NAC
The NDC, modified for equipment limitations.

Net Actual Generation - NAG
Net electrical megawatt hours (MWh) produced by the unit during the period being considered.

Net Dependable Capacity - NDC
NMC modified for ambient limitations.

Net Maximum Capacity - NMC
Capacity a unit can sustain over a specified period when not restricted by ambient conditions or equipment deratings, minus the losses associated with station service or auxiliary loads.

Period Hours - PH
Number of hours a unit was in the active state. A unit generally enters the active state on its commercial date.

Reserve Shutdown Hours - RSH
Total number of hours the unit was available for service but not electrically connected to the transmission system for economic reasons.

Service Hours - SH
Total number of hours a unit was electrically connected to the transmission system.

Scheduled Outage Hours - SOH
Sum of all hours experienced during Planned Outages and Maintenance Outages plus any Scheduled Outage Extensions associated with those outages.

Unplanned Derated Hours - UDH
Sum of all hours experienced during Forced Deratings and Maintenance Deratings plus any Scheduled Derating Extensions of any Maintenance Deratings.

Unplanned Outage Hours - UOH
Sum of all hours experienced during Forced Outages and Maintenance Outages plus any Scheduled Outage Extensions of any Maintenance Outages.

INTRODUCTION

This brochure highlights some of the information from NERC's *Generating Availability Report* (GAR). Statistics are shown for the cumulative five years, 2001–2005, and are calculated using both the capacity-weighted technique and the traditional, unweighted method.

Generating Availability Report

Continuing the effort to bring timely, useful information to the industry in an efficient manner, NERC again will "publish" the *2001–2005 Generating Availability Report* in electronic format. The report is available for downloading from the Internet. A printed, bound version of the GAR is not available.

The electronic GAR consists of a series of formatted files ready for printing on any laser printer set to a condensed font. Included are all the tables and graphs found in previous printed editions of the report, and more. The traditional unit groupings – by generation technology, size and, in some cases, fuel type – have been retained.

The new GAR is available to everyone at no cost. To download the GAR from the NERC home page (http://www.nerc.com) go to "GADS Services," and then "Generating Availability Report" and download the self-extracting zip file GAR2005.EXE. That's all there is to it!

GADS Data Applications

The statistics in this brochure and the GAR are calculated from data that electric utilities report voluntarily to NERC's Generating Availability Data System (GADS). Operating histories for more than 6,500 electric generating units reside in GADS. Data are reported by more than 200 utilities in the United States and Canada representing investor-owned, municipal, state, cooperative, provincial, and federal segments of the industry. NERC aggregates these data and presents the results annually in its GAR.

The GAR provides an overview of the availability performance of classes of generating units. More specific data are available from NERC's GADS database to use in detailed unit- or equipment-level reliability, availability, and maintainability (RAM) analyses. GADS data are used in a wide variety of deterministic and probabilistic applications to:

- benchmark unit performance against statistically validated peers,
- conduct loss-of-load and similar system-wide analyses,
- optimize maintenance schedules and prepare cost-benefit analyses,
- compare the reliability of original equipment manufacturers' (OEM) components, and
- prepare reports for state and federal regulators.

You can conduct your own GADS special analyses with a software product called pc-G.A.R., available from NERC on CD-ROM. GADS data for special applications are also available by calling NERC. Call or e-mail (gads@nerc.com) NERC for further information.

Historical Availability Statistics

Back again this year is the *1982-2005 Historical Availability Statistics* (HAS) report. Based on previous GAR publications, this report provides statistics for individual, five, ten, and twenty-three-year periods.

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EXCERPT: NERC 2001-2005 Generating Unit Statistical Brochure -- All Units Reporting

NOTE: This brochure contains data on all units, whether they reported event records or not. For a review of statistics containing only those units that reported events, see the brochure "2001-2005 Generating Unit Statistical Brochure -- Units Reporting Events".
(The differences between statistics with or with events will appear in equations needing derating information such as EAF, EFOR, and other equations. The equations are more accurate if events are reported.)

Unit Type	MW Trb/Gen Nameplate	# of Units	Unit-Years	ART	SR	NCF	NOF	SF	AF	EAF	FOR	EFOR
Coal	All Sizes	899	4163.92	478.49	97.18	72.20	84.69	82.82	87.65	84.85	4.72	6.66
Primary	1-99	160	722.17	290.66	98.69	53.65	72.66	72.57	88.03	85.27	5.09	7.48
	100-199	244	1140.33	481.51	97.99	65.36	78.17	83.06	88.52	85.27	4.46	6.48
	200-299	117	563.25	593.53	97.92	71.21	82.51	86.20	88.54	85.70	4.27	5.63
	300-399	82	368.50	578.83	94.22	71.02	82.18	86.17	87.27	84.80	4.39	6.24
	400-599	167	747.92	501.67	96.00	73.37	86.00	85.17	86.17	83.50	5.29	7.47
	600-799	92	441.92	644.11	94.62	75.75	87.49	86.56	87.01	84.44	4.73	6.58
	800-999	25	120.00	766.28	97.75	77.63	88.89	87.25	87.63	86.25	3.17	4.22
	1000 Plus	12	59.83	709.85	95.54	74.23	88.78	83.26	83.61	81.24	7.72	9.22

Unit Type	MW Trb/Gen Nameplate	# of Units	Unit-Years	EFORd	SOF	FOF	UOF	EUOF	EUOR	POF	MOF
Coal	All Sizes	899	4163.92	6.42	8.25	4.10	5.86	7.91	8.92	6.50	1.76
Primary	1-99	160	722.17	6.72	8.08	3.89	5.97	7.94	10.11	6.00	2.08
	100-199	244	1140.33	6.21	7.60	3.88	5.87	8.23	9.25	5.62	1.98
	200-299	117	563.25	5.53	7.62	3.84	5.45	7.15	7.80	6.01	1.61
	300-399	82	368.50	6.18	8.78	3.95	5.73	7.67	8.34	7.00	1.77
	400-599	167	747.92	7.41	9.07	4.76	6.45	8.57	9.35	7.38	1.69
	600-799	92	441.92	6.56	8.69	4.29	5.46	7.49	8.14	7.53	1.17
	800-999	25	120.00	4.21	9.52	2.85	4.07	5.33	5.84	8.30	1.21
	1000 Plus	12	59.83	9.19	9.42	6.97	8.06	9.89	10.83	8.33	1.09

CUB/102
Brown/6

REDACTED

Boardman 585 MW Coal	Abbrv	2003-06	2002-05	2001-04	2000-03	1998-04	2006	2005	2004	2003	2002	2001	2000	1999	1998
Period Hours[1]	PH														
Service Hours[2,3]	SH														
Planned Outage Hours	POH														
Forced Outage Hours[1]	FOH														
Reserve Shutdown Hours	RSH														
Equivalent Availability Factor[1]	EAF														

Boardman Calculated Values	Abbrv	2003-06	2002-05	2001-04	2000-03	1998-04	2006	2005	2004	2003	2002	2001	2000	1999	1998
Forced Outage Rate[4]	FOR														
Equivalent Forced Outage Rate[5]	EFOR														

Boardman Modified EFOR	Abbrv	2003-06	2002-05	2001-04	2000-03	1998-04	2006	2005	2004	2003	2002	2001	2000	1999	1998
Planned Outage Hours	POH														
Forced POH															
Non-Forced POH															
Modified EFOR[9,10]		10.29%	9.02%												

NERC 400-599 MW Coal[6]	Abbrv	2001-05
Forced Outage Rate[7]	FOR	5.29%
Equivalent Forced Outage Rate[8]	EFOR	7.47%

Note: Boardman data from PGE response to Staff data request 4, confidential attachment B.
Note: For some mysterious reason, Excel sometimes rounds up when a 5 appears as a fraction of a hundred, but then sometimes it doesn't.

1. 2005 does not include 11/18/05-12/31/05 and 2006 does not include 1/1/06-6/6/06.
2. 2006 does not include 1/1/06-6/6/06.
3. For 2006: Assumes service hours corresponds to partial forced hours. (A comment in PGE's original spreadsheet).
4. = FOH/(FOH+SH)
5. = 1 - [(PH*EAF-RSH)/(PH-POH-RSH)]
6. These NERC statistics are 5-year, as opposed to Boardman's 4-year, averages. CUB Exhibit 102.
7. PGE and NERC appear to calculate the FOR in the same manner.
8. NERC calculates the EFOR as [(FOH + EFDH) / (FOH + SH + EFDHRS)] x 100%, which produces a similar, but not identical result as PGE's calculation. EFDH: Equivalent Forced Derated Hours; a measure of partial forced outages. EFDHRS: Equivalent Forced Derated Hours During Reserve Shutdowns; a measure of partial forced outages during times when the plant was out of the money. PGE's calculation starts with 100% and reduces it proportionally to the plant's equivalent availability factor. NERC directly takes the forced outage hours as a fraction of total hours.
9. The modified equivalent forced outage rate is calculated as the EFOR is, except that Non-Forced POH is used instead of POH.
10. At PGE/100/Tooman-Tinker-Schue/8, the EFOR for 03-06 and 02-05 are rounded to 10.3% and 9.01% respectively

REDACTED

May 15, 2007

TO: Vikie Bailey-Goggins
Oregon Public Utility Commission

FROM: Randy Dahlgren
Director, Regulatory Policy & Affairs

PORTLAND GENERAL ELECTRIC
UE 192
PGE Response to OPUC Data Request
Dated May 1, 2007
Question No. 004

Request:

Why does Boardman need 44 days of maintenance outage in 2008? How many days of planned outage did Boardman have in each year for the period 1995-2006?

Response:

Several factors combine to make the 2008 planned maintenance outage somewhat longer than normal. First, some boiler repairs are needed. These include tube replacement, tube shield replacement, tube re-alignment, tube section analysis, and soot blower repair and alignment. In 2008 we will also perform an acid cleaning of the boiler to the extent needed.

Second, we will realign the entire main turbine and generator shaft system. This will require multiple associated test start-ups. In addition to the realignment, we will rework the exciter shaft to prevent vibration oscillations in the bearings which support the generator and exciter shafts.

Attachment 004-A is an Excel file, "DR_004_Attach A_CONF.xls," which provides the historical data requested. Attachment 004-B, which is an Excel file, "DR_004_Attach B_CONF.xls," is the summary spreadsheet for the forced outage rates used in PGE's April 2, 2007, filing. The data for the 1998-2006 period in Attachment 004-A are consistent with those in cells N-127 through V-127 in the file, "DR_004_Attach B_CONF.xls." Attachments 004-A and 004-B are confidential and subject to Protective Order No. 07-135.

REDACTED

Boardman Historical Outage Data

Year	Planned Outage Hours[1]	Planned Outage Days[2]	Forced Outage Hours[3]	Forced Outage Days[4]	Forced & Planned Days
1998					
1999					
2000					
2001					
2002					
2003					
2004					
2005					
2006					

Boardman Forecast Outage Data

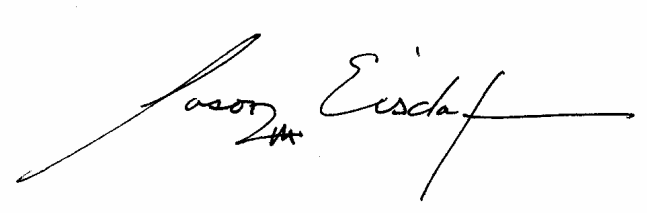
Year	Planned Outage Hours[5]	Planned Outage Days[6]	Forced Outage Hours[7]	Forced Outage Days[8]	Forced & Planned Days
2008	1056	44	902	38	82
			Average 1998-2006		
			Average 1998-2004		

1. Data from PGE response to Staff data request 4, confidential attachment A.
2. Planned outage hours divided by 24
3. Data from PGE response to Staff data request 4, confidential attachment B.
4. Forced outage hours divided by 24.
5. Planned outage days multiplied by 24.
6. PGE response to Staff data request 4. CUB Exhibit 104.
7. Forced outage rate of 10.3% from PGE/100/Tooman-Tinker/Schue/8 multiplied by 8760 hours per year.
8. Forced outage hours divided by 24.

CERTIFICATE OF SERVICE

I hereby certify that on this 13th day of June, 2007, I served the foregoing Reply Testimony of the Citizens' Utility Board of Oregon in docket UE 192 upon each party listed below, by email and, where paper service is not waived, by U.S. mail, postage prepaid, and upon the Commission by email and by sending 6 copies by U.S. mail, postage prepaid, to the Commission's Salem offices.

Respectfully submitted,



Jason Eisdorfer Attorney #92292
The Citizens' Utility Board of Oregon

W=Waive Paper service, C=Confidential, HC=Highly Confidential

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