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September 24, 2008

Via Electronic Mail and U.S. Mail

Public Utility Commission
Attn: Filing Center
550 Capitol St. NE #215
P.O. Box 2148
Salem OR 97308-2148

Re: In the Matter of PORTLAND GENERAL ELECTRIC COMPANY
Application to Amortize the Boardman Deferral.
Docket No. UE 196

Dear Filing Center:

Enclosed please find the original and five copies of the Confidential Reply Brief on behalf of the Industrial Customers of Northwest Utilities ("ICNU") in the above-captioned docket. Also included is a redacted version of the same. All confidential material has been sealed in a separate envelope pursuant to the protective order.

Thank you for your assistance.

Sincerely yours,

/s/Allison M. Wils
Allison M. Wils

Enclosures
cc: Service List

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that I have this day served the foregoing Confidential Reply Brief of the Industrial Customers of Northwest Utilities upon the parties indicated below with a (C), which are authorized to receive confidential information pursuant to the protective order, by causing the same to be deposited in the U.S. Mail, postage-prepaid.

In addition, I HEREBY CERTIFY that I have this day served the forgoing Redacted Reply Brief of the Industrial Customers of Northwest Utilities upon the parties shown below via electronic mail.

Dated at Portland, Oregon, this 24th day of September, 2008.

/s/ Allison M. Wils
Allison M. Wils

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(C) = Confidential

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

UE 196

In the Matter of)
)
PORTLAND GENERAL ELECTRIC)
COMPANY)
)
Application to Amortize the Boardman)
Deferral.)
_____)

**REPLY BRIEF
OF THE
INDUSTRIAL CUSTOMERS OF NORTHWEST UTILITIES**

REDACTED VERSION

September 24, 2008

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I. INTRODUCTION

Portland General Electric Company's ("PGE" or the "Company") opening brief ("Opening Brief") inaccurately characterizes the record in this proceeding and misconstrues ICNU's positions. In addition, PGE fails to show that it acted prudently in the operation and maintenance of the Boardman plant. Contrary to PGE's claims, the evidence demonstrates that:

- The LP1 rotor failed because it was misaligned.
- The misalignment was caused by Siemens incorrectly setting the shaft elevation at Bearing No. 3 and PGE and Siemens failing to identify missing and loose fasteners that attach the Bearing No. 2 Pedestal to its foundation.
- PGE was impudent in its management of Siemens during the installation and maintenance of the new LP and HP/IP turbines.
- PGE states that it was dependent on Siemens and did not have the required staff skills to oversee the installation and maintenance of the LP1 turbine. PGE should have had trained staff capable of managing the operation and maintenance of its facilities. Also, it should have had a well executed quality assurance/quality control ("QA/QC") program to insure the Boardman plant was prudently operated and maintained.
- Finally, the plant was operated well above its maximum design capacity between 2000 and the failure in 2005, which was a contributing factor to the failure.

Since PGE has failed to demonstrate the prudence of its actions, its request to amortize the cost of the outage should be denied.

II. ARGUMENT

PGE's Opening Brief focuses on a series of largely irrelevant issues to support its claim that it acted prudently. PGE argues:

- The decision to install the more efficient turbines was prudent. ICNU does not question the prudence of this decision. Instead, ICNU argues that the installation of an experimental and much heavier turbine created an obligation on PGE’s part to have a QA/QC program in place. PGE failed to meet this obligation.
- PGE argues that its dependence on Siemens relieves it of responsibility; however, PGE cannot contract away its responsibility for the integrity of its facilities, particularly when PGE negotiated a contract that excuses Siemens of responsibility.
- PGE says it “monitored” Siemens work. “Monitor” is a passive term. PGE should be required to actively manage the quality of the work performed at its facilities. Also, PGE should not be permitted to delegate its obligations by contract to a third party that has no liability for its actions.
- PGE says that it did not operate the turbine over-pressure. ICNU never suggested that it did. Instead, ICNU provided data from PGE’s own records that shows PGE operated at outputs above the design output most of the time before the failure.

A. PGE’s Decision to Upgrade the Turbine is Not at Issue

PGE states that it was “prudent in its initial decision to purchase high-efficiency steam turbines for the Boardman plant in 2000; was prudent in its operations of the upgraded turbines; and acted prudently to repair the cracked rotor as quickly and with as little interruption in service as possible.” Opening Brief at 1-2. While these statements may be true, that is not the central issue. The issues at hand are:

- Whether PGE was imprudent in its overall management of Siemens during the installation and the subsequent maintenance of the LP1 turbine;
- Whether PGE adequately filled its management role;

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- Whether PGE's staff was adequately trained and experienced; and
- Whether there was an active QA/QC program.

PGE claims that it's "monitors continually logged vibration and temperature readings along the array to detect any anomalous conditions or stresses on the turbines."

Opening Brief at 3. Monitoring vibration and bearing oil temperature is a very normal activity that is done automatically. [REDACTED]

[REDACTED] PGE/105C-C, Quennoz/5. This is indicative of a misaligned shaft or possibly an undersized bearing. The fact that the [REDACTED]

[REDACTED] would indicate the shaft was likely misaligned. [REDACTED]

[REDACTED] PGE/105C-C, Quennoz/5. As Alstom points out in its report, the tilt-pad bearings will tend to reduce the oil temperature difference between the bearings and mask the misalignment problem. PGE/105C-B, Quennoz/36. In the case of vibration monitoring, it is too late when the bearing vibration starts to increase.

Mr. Martin testified that PGE did not prudently oversee Siemens' work through an adequate QA/QC program. PGE responds that "PGE employees at Boardman were present for and monitored the results of maintenance and alignments, but did not physically align the turbines themselves." Opening Brief at 4. Monitoring implies the PGE personnel were merely observing. The PGE staff should have been experienced, well-educated, and actively engaged with Siemens as the work proceeded. This includes asking questions and following an active QA/QC program that includes taking measurements, making photographic records, parts out/in inventories, etc., and submitting reports to PGE management. However, PGE says they have no

records to substantiate such a program. Having no records is simply an admission by PGE of incompetent management oversight. As ICNU noted in its Opening Brief, Pilot Advisors concluded that:

The failure of the generator was the direct result of management failing to ensure critical personnel remain qualified to properly operate the assets. This led to ineffective supervision and accountability for performance, ultimately allowing personnel that were not qualified to perform critical activities.

Staff/203, Durrenberger/4. The same management failures appear to apply to the operation and maintenance of the LP1 turbine.

According to PGE, Siemens and Alstom focused on four potential causes:

- high cycle fatigue;
- low cycle fatigue;
- torsional overload; and
- environmental/manufacturing

Opening Brief at 5-6. All of the analysis concluded that high cycle fatigue was the type of failure that occurred. The causes of the failure include the following:

- Shaft misalignment (incorrect Bearing No. 3 elevation and a loose Bearing No. 2);
- Ineffective management; and
- Ineffective quality control.

Siemens was responsible for its mistakes, and PGE is responsible for its ineffective management and quality control. PGE also misconstrues the nature of ICNU's argument, stating "they have focused their attacks on PGE's initial decision to upgrade to high-

efficiency LP1 and LP2 Turbines in 2000, rather than on any particular aspect of PGE's operations." Opening Brief at 8. Similarly, PGE states: "ICNU and CUB are not asking for prudence, they are asking for precognition. But the reasonableness of PGE's decision to upgrade is not viewed in hindsight. Based on the information available to PGE at the time of the upgrade, this was the prudent decision." Opening Brief at 12

ICNU is not challenging the decision to upgrade. Instead, ICNU is challenging PGE's imprudent management (risk management, quality management, and project management) of the installation and maintenance of the new and experimental turbines from 2000 through the failure repair in 2006. PGE's management philosophy was to hire an expert and for PGE to take no responsibility. PGE must, however, ultimately bear responsibility for the integrity of the Boardman plant; and, it cannot contract that responsibility away to an entity like Siemens.

PGE also claims that "ICNU and CUB ignore the undisputed fact that the increase in efficiency from the LP turbine upgrade was so significant that the net impact of the upgrade was a financial benefit to customers even if the entire amount of this proposed deferral is granted." Opening Brief at 8. The upgrade may have been a good idea, but the failure could have been prevented by careful management of the operation and maintenance of the LP1 turbine.

B. PGE is Not Excused by the Fact That There Was Not a Single Root Cause

PGE makes much of the fact that "[n]either analysis identified a single cause. Alstom concluded that: "There has been no supporting evidence that the plant has been misoperated resulting in the failure of the LP1 turbine rotor. These results of the analysis, point

in the direction of a misalignment of the train and an unsecured bearing pedestal. All the data and associated information indicate the root cause for this failure lies in a combination of factors.” Opening Brief at 6. Because the term “Root Cause” is singular there could be more than one factor responsible. Experts in the field agree that there are almost always multiple factors in a failure such as this.

“Siemens further concluded that the rotor crack was caused by high-cycle fatigue due to an unknown condition or combination of conditions.” Opening Brief at 6. High cycle fatigue is not the cause of the failure—it is the type of failure. The cause was shaft misalignment, for which Siemens was responsible. It is obvious why Siemens did not conclude that it had misaligned the turbine. Mr. Quennoz even admitted that Siemens worded its report “[t]o some extent” as a way of avoiding placing blame and “had a lot at stake” in conducting the root cause analysis. Tr. at 27-29. He also acknowledges that Siemens “[tried] to protect themselves from design issues.” Id. at 27.

PGE’s summary also misstates Siemens conclusion. Siemens concluded that the cause was an “unknown operational condition.” Opening Brief at 15. Since PGE is responsible for the operation of the plant, it was responsible for ensuring that the unknown operational cause did not exist. Siemens and Alstom both conclude the shaft was properly designed, assuming it was properly aligned. PGE/105C-B, Quennoz/35; PGE/105C-C, Quennoz/20. The Alstom analysis showed what degree of misalignment could have caused a failure. PGE/105C-B, Quennoz/35. The analysis did not include consideration of the loose Bearing No. 2. The Alstom report did indicate the loose bearing could magnify the misalignment. PGE/105C-B, Quennoz/41; PGE Response to ICNU DR 058.

PGE acknowledges that “[a]ll of the rotor components, and the bearings that support them, must be aligned within specifications to assure proper operation.” Opening Brief at 3. This is correct, and when they are not properly aligned, a high cycle fatigue failure is possible. Both Alstom and Siemens believe the shaft was properly designed for the loads. Therefore, the only thing that could have caused this failure is the shaft misalignment. This was caused by the incorrect shaft elevation at Bearing No. 3 and the loose Bearing No. 2.

C. PGE Did Not Rebut Evidence That It Could have Mitigated the Risk of an Experimental Turbine

PGE also challenges ICNU’s claims that PGE failed to mitigate the risk of the experimental turbines: “as PGE’s witnesses testified, equipment manufacturers like Siemens do not enter into contracts that call for consequential damages in the event of power plant outages.” Opening Brief at 12. This is not true. Mr. Martin testified that General Electric has taken the development risk on a plant by building a plant and operating it before selling it to a utility. Deposition of J. Martin (April 10, 2008), page 48, lines 21-25; page 49, lines 1-5. PGE tried to minimize this conclusion: “By the same token, Mr. Martin testified on behalf of ICNU that, while he believes that some smaller privately owned projects may purchase replacement power insurance, he is not aware of any public utility ever having purchased it, or any insurance broker who offers such insurance, or what such insurance would cost.” Opening Brief at 12.

In ICNU response to PGE Data Request 13, ICNU stated the following;

“Business interruption insurance is available from ACE, AEGIS, AIG, Lloyds and other insurers and protects against the additional costs of market power purchases. Standby power capacity can be purchased in the market place. Considering the consequences of having to purchase power in a short market, it is my opinion that such practices are financially risky.”

PGE Ex. 409 (included in Ex. 1 to Deposition of J. Martin). PGE has never disputed or provided evidence that business interruption insurance and standby power contracts are not available.

PGE's policy is to let the ratepayers take the risk.

D. PGE's Operation at Higher than Design Output Contributed to the Failure

The record also supports the conclusion that PGE's operation of the Boardman plant contributed to the failure. PGE argues that "[e]ven ICNU's own expert, Mr. Martin, refused to point the finger at PGE's operations of the Boardman plant, stating that he did not believe that PGE's operations were a major cause of the rotor crack." Opening Brief at 13-14. However, Mr. Martin did conclude that it was a contributing factor. See Surrebuttal Testimony of J. Martin, ICNU/200, Martin/5-7. PGE again misconstrues ICNU's position, stating that "ICNU has argued that PGE had a practice of running the LP1 Turbine level above recommended operating pressure levels, and that this practice contributed to some degree to excessive torsional stresses that caused the rotor crack." Opening Brief at 14. Mr. Martin never said PGE operated above the **design operating pressure**. He did conclude, however, that the turbine operated consistently above the design output. ICNU/200, Martin/5-7.

PGE states: ". . . Mr. Martin's claim that PGE operated the Boardman turbine array at higher than recommended levels of pressure is false and based on a simple misunderstanding of the evidence." Opening Brief at 16. Mr. Martin never said that the plant was operated at **over-pressure**. He did say that for that for a vast majority of the time the plant was operated at **output levels that were above the design point**.

In response to an ICNU Data Request 3.6 in UM 1234 (May 16, 2006), PGE stated the following:

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“Since April 2001, the plant has been operated at a gross capacity of 585 MW [...] The maximum continuous rating for Boardman is based on the nominal 2,400-psi industry standard pressure at the steam turbine inlet throttle valve. Boardman is capable of operating at higher pressure, but experience by other utilities in their plants show that the results would be increased wear and decrease in reliability.”

ICNU/207, Martin/1-2.

This information supplied by PGE in response to UM 1234 in May of 2006 is completely incorrect. The information supplied in these proceedings (UE 196) shows that PGE operated [REDACTED]

[REDACTED] ICNU/104, Martin/1-7; ICNU/205, Martin/1-2. In addition, the information quoted above is in direct conflict with the written testimony provided by Mr. Quennoz, who has consistently stated that the plant can operate continuously up to 645 MW. PGE/400, Quennoz/13.

E. The Loose and Missing Sole Plate Fasteners Contributed to the Failure

PGE admits that “it could be argued that Siemens should have discovered the missing nuts during its installation or maintenance of the upgraded LP Turbines,” but goes on to conclude that “there is no compelling evidence to indicate that the absence of 2 of the 28 nuts in one part of one pedestal of the more than 100-foot array contributed in any significant way to causing this crack.” Opening Brief at 16. It should be understood that the 28 fasteners mentioned secure other parts of the turbine array and not just Bearing No.2. [REDACTED]

[REDACTED] PGE/105C-B, Quennoz/36; PGE/105C-B, Quennoz/41; PGE Response to ICNU DR 058, Attachment B, page 27, para. 3, and page 32 para. 1 and 2. [REDACTED]

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[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] PGE Response to ICNU Data Request 084.

PGE concludes that “[a]lthough Alstom stated that missing fasteners are a condition that might cause bending stresses along a turbine array, neither Alstom or Siemens identified these missing nuts as the major or precipitating cause of the LP1 rotor crack at Boardman.” Opening Brief at 15. This statement is untrue. The two missing nuts were critical in securing the Bearing No. 2 Pedestal. [REDACTED]
[REDACTED]

[REDACTED] PGE/105C-B,Quennoz/41.

PGE argues: “Nor were any of the operational conditions that ordinarily might accompany a loose or unsecured footing on a turbine pedestal – such as cracked or destroyed grout below the pedestal – present in this case.” Opening Brief at 15. The only conclusion to be reached from this statement is that Siemens removed the nuts between 2000 and the failure in 2005, and PGE and Siemens failed to notice the missing and loose nuts.

F. PGE or Siemens Should Have Discovered the Loose and Missing Sole Plate Fasteners

PGE argues that the missing and loose fasteners were not discovered, because “[t]he sole plate was not readily visible during routine operations at Boardman and was covered by protective decking during the turbine upgrade.” Opening Brief at 15-16. The missing nuts would have been clearly visible during the major turbine work that was conducted in 2000, 2002, 2004, and 2005. One of the primary purposes of a QA/QC program is to eliminate omission of

critical components. In addition, all of the soleplate attachments should have been inspected for tightness in 2000 and 2004. “PGE discovered the missing nuts during inspection after the rotor crack occurred, and brought them to the attention of Alstom and Siemens.” Opening Brief at 15. If PGE found the missing and loose nuts in 2006, why were they not found in 2000, 2002, 2004, or 2005?

G. The Fact that PGE Deferred Less than its Replacement Power Costs is Irrelevant

PGE points out in numerous places in its Opening Brief that it deferred less than all of its replacement power costs. Eg. Opening Brief at 7. In UM 1234, the Commission determined that PGE should only be allowed to defer those costs in excess of normal business risk. Order No. 070049 at 19. In other words, PGE is already compensated by current rates for those costs that were not deferred.

PGE is obligated to show that the costs that it currently seeks to recover are prudent. ORS § 757.259 (5). Therefore, the fact that PGE incurred replacement power costs in excess of the amount that it deferred is irrelevant to whether the deferred cost were prudently incurred.

H. OPUC Staff’s Arguments Are Unconvincing

OPUC Staff states in its Opening Brief (“Staff Brief”) that “[s]taff reviewed PGE’s testimony about the breakdown and subsequent repair, including a review of Root Cause Analysis (RCA) evaluations by PGE, by Siemens, and by Alstom. Not one of these RCAs was able to identify a specific action, event or omission that caused the cracks.” Staff Brief at 2-3. This is not true. All of the analyses concluded that the failure was caused by shaft misalignment. The shaft would not have failed otherwise. OPUC Staff also concludes that “[t]he RCAs also

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reviewed both routine and major maintenance and could not find any evidence of imprudent maintenance.” Staff Brief at 3. This also is incorrect. If the shaft were properly designed (which all parties agree on), then the only way the shaft would suffer a fatigue failure would be that it was misaligned. Staff does admit that “[a] potential cause of fatigue cracking could be that the rotor was not aligned properly.” Staff Brief at 3. It is not a potential cause; it is the only rational explanation.

According to OPUC Staff, “[t]he maintenance performed by Siemens included routine checking of the alignment of the turbine shaft and made adjustments where necessary.” Staff Brief at 3. No evidence was submitted by PGE to support its contention that Siemens provided routine checking of the shaft alignment. [REDACTED]

[REDACTED]
PGE/105C-B,Quennoz/25. [REDACTED]
[REDACTED]
[REDACTED]

Staff concludes that “[n]one of the RCAs identified any act or omission in maintenance that contributed to the failure.” Staff Brief at 3. This statement is incorrect. [REDACTED]

[REDACTED] PGE/105C-B,Quennoz/41;
PGE Response to ICNU Data Request 058. [REDACTED]

[REDACTED]
PGE Response to ICNU Data Request 084.

IV. CONCLUSION

No reasonable explanation has been given for why the LP1 turbine failed, other than misalignment of the turbine and the loose and missing sole plate fasteners. PGE contracted with Siemens to install and maintain the LP 1 turbine, while relieving Siemens from liability for consequential damages. Under such circumstances, PGE's failure to establish an adequate QA/QC program or otherwise monitoring Siemens' work was imprudent. PGE also operated the plant at excessive levels, which contributed to the failure. PGE has sole responsibility for prudently operating and maintaining the Boardman plant, and this is a responsibility that PGE cannot contract away. Due to improper operation and maintenance, the LP1 Turbine became misaligned resulting in a failure of the LP1 turbine. PGE has failed to demonstrate that it acted prudently; therefore, its request to amortize the costs resulting from the Boardman outage should be denied.

Dated this 24th day of September, 2008.

Respectfully Submitted,

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