Exhibit No.___(WWB-1T)
Docket Nos. UE-061546/UE-060817
Witness: Walter W. Bruehl

BEFORE THE

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, Complainant, vs. PACIFICORP d/b/a PACIFIC POWER & LIGHT COMPANY Respondent.	**Docket No. UE-061546**
In the Matter of the Petition of PACIFIC POWER & LIGHT COMPANY For an Accounting Order Approving Deferral of Certain Costs Related to the MidAmerican Energy Holdings Company Transition.	**Docket No. UE-060817**

DIRECT TESTIMONY OF WALTER W. BRUEHL

ON BEHALF OF

THE INDUSTRIAL CUSTOMERS OF NORTHWEST UTILITIES

February 16, 2007

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. Walter W. Bruehl. Boise Paper Solutions, 532 W. Sandstone Ct., Boise, Idaho 83702.

Q. PLEASE SUMMARIZE YOUR EXPERIENCE?

A. I am the Senior Staff Electrical Engineer, Paper Engineering for Boise Cascade Corporation ("Boise Cascade"). I have over thirty years of engineering experience and I have worked for Boise Cascade for nearly twenty years. I am appearing in this proceeding as a witness for the Industrial Customers of Northwest Utilities ("ICNU"). My qualifications are shown in Exhibit No.___(WWB-2).

I. INTRODUCTION AND SUMMARY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony establishes that Boise Cascade's facility in Wallula, Washington has experienced frequent and expensive reliability problems for a long period of time, and that PacifiCorp has not taken appropriate action to remedy these problems. I will first explain the history of problems at the Wallula facility that have been caused by the substandard transmission lines that serve the Wallula facility as well as a number of other commercial and industrial customers. Next, my testimony will identify the actions taken by Boise Cascade and PacifiCorp to date, and why PacifiCorp has not fulfilled its commitments made under the Mid-American Energy Holding Company ("MEHC") merger. Finally, I will discuss potential solutions to remedy some of these significant reliability problems.

As a preliminary matter, I want to express the seriousness that Boise Cascade views these reliability problems and our frustration with PacifiCorp in not fixing them. Boise Cascade would not raise this issue before the Washington Utilities and Transportation Commission ("WUTC" or the "Commission") if we did not strongly believe that the status quo is unacceptable and we had taken every reasonable step to resolve the problems. Not only are the reliability problems expensive and disruptive to our operations, but we believe that we have been very lucky that these service interruptions have not yet caused any serious injuries to our work force. The current situation is unacceptable to Boise Cascade from both an operational and an employee safety perspective.

II. TRANSMISSION PROBLEMS AT WALLULA

Q. PLEASE DESCRIBE THE LOCAL TRANSMISSION SYSTEM THAT SERVES THE WALLULA FACILITY.

A. Boise Cascade's Wallula facility is directly served by the Cascade Kraft substation. The Cascade Kraft substation is supplied by two 69 kV lines, one which connects to the Wallula substation. The Wallula substation is connected to major 230 kV sources through long transmission lines.

The Cascade Kraft and the Wallula substations and associated transmission lines were designed and built biased toward low cost rather than high reliability. For example, the transmission systems to serve the Wallula facility are vulnerable to damage caused by lightning. Lightning protection for transmission facilities was first considered in the 1920s and well established by the 1950s. The Cascade Kraft substation was built in the late 1960s and the Wallula substation was built in the early 1970s. Despite being built well after lightning protection

methods had been established, these transmission facilities do not include adequate line protection from lightning. It appears that PacifiCorp's prior owner simply chose low cost over higher reliability.

In addition, it is unusual for a large industrial process load to be served from a sub-transmission system. This is one of the key causes of many of the reliability problems we have experienced.

Q. IS THE BOISE CASCADE FACILITY THE ONLY BUSINESS SERVED BY THESE TRANSMISSION FACILITIES?

A. No. The transmission facilities serve a number of businesses and industries important to the economic viability of this area of Washington, including Tyson Foods, JR Simplot, Rail Ex Produce and Americold. The transmission lines may become even more important and stressed because a 10 to 20 megawatt ethanol plant is considering taking service from PacifiCorp. In addition, these transmission facilities serve as back-up connections to the communities of Touchet and Pasco. I am sure that these reliability problems and concerns are shared by many other PacifiCorp customers.

Q. PLEASE PROVIDE A BRIEF SUMMARY OF THE HISTORY OF THE RELIABILITY PROBLEMS EXPERIENCED BY THE WALLULA FACILITY.

A. Boise Cascade's Wallula facility has a long history of power reliability problems. Boise Cascade keeps power service reliability information on all five of its major mills, and Wallula has the worst electric service reliability record and is located in the area with the least amount of inclement weather. PacifiCorp has acknowledged that service has been poor and, in 2004, agreed that there are "reliability issues that have hampered the Wallula Plant over the past several

years."[1/] It is my view that Boise Cascade has paid for firm electric power, but been provided an inferior and, at times, interruptible product.

Boise Cascade has been experiencing significant reliability problems since at least the late 1980s. More recently, the Wallula facility has experienced at least twenty five outages since July 1998. The specific root cause for most of these outages has been a system that was not designed to minimize the impacts of operator errors, lightning, range fires, and equipment failure. These include two occasions in which the mill was shut down for 24 hours after lightning hit the 230 kV line, and a transformer that failed three times before PacifiCorp decided to replace certain faulty equipment.

Many of these outages have resulted in significant lost production time at the Walulla facility. A conservative estimate of the value of Boise Cascade's lost production since 1998 is over $2.5 million, with four individual outages causing over $200,000 of lost production. Lost production dollars only include the lost value of our products and the cost of paper machine rolls and fabrics. It does not include numerous other costs, like the cost to the environment, employee exposure to environmental and safety risks, and the value of equipment that was damaged as a result of an unscheduled and disorderly shutdown process.

Our equipment can be damaged during outages or voltage changes. Many safety shutdown systems must operate correctly to prevent equipment loss or failure. Paper machine felts, rolls and fabrics are frequently damaged during a loss of power due to the long time for these to coast to a stop. When power is

[1/] Exh. No.___(WWB-3) at 1 (Cascade Kraft Substation Outage and Power Quality Study).

available, these rolls are brought to a stop much faster through electrical braking that prevents the equipment from being damaged.

Boise Cascade considers many of these outages potentially dangerous safety problems for our employees. We view this problem very seriously. When we lose power, our entire facility shuts down in mid-production. There are numerous potential hazards when complex and expensive equipment shuts down without any notice, and our employees are forced to suddenly react to a potentially dangerous situation.

Power dips and outages can cause our lighting systems to extinguish. The restart time for these lamps is several minutes. While emergency lighting systems respond to a total loss of power, occasionally the main lighting goes out and the emergency lighting is unable to respond.

There are rotating machinery hazards, potential spillage of chemicals or hot water, and startling noises that can cause safety problems when we experience power dips or outages. For example, when we lose power, high inertial machines continue to rotate for some time. Similarly, uncontrolled shutdowns may result in chemical or hot water spills and employee exposures. In addition, there are often loud noises from steam venting and other noise sources that can startle employees who may be performing already difficult or dangerous work. All of these problems are exacerbated and made more dangerous because the loss of power during an outage often causes reduced illumination near our machines.

There are also potential environmental risks that result when our facility must shut down without notice. These include non-condensable gas venting,

waste water treatment release, and boiler combustion upsets. Our non-condensable gases are normally incinerated in either our lime kiln or hog fuel boiler; however, a loss of power causes these gases to be vented to the atmosphere. A loss of power places the plant at risk of releasing untreated waste water to the river, and will cause some out of range stack emissions on the hog fuel and recovery boilers.

III. SOLUTIONS TO THE RELIABILITY PROBLEMS AT WALLULA

Q. HAS BOISE CASCADE WORKED WITH PACIFICORP TO FIX THE RELIABILITY PROBLEMS AT THE WALLULA FACILITY?

A. Yes, Boise Cascade has worked hard to address this problem. I have personally been involved in attempting to remedy the reliability problems at the Wallula facility since I joined Boise Cascade in 1988. In 1988, Boise Cascade was considering protecting its load from voltage dips and requested that PacifiCorp make changes to reduce outages. Boise Cascade and PacifiCorp jointly produced a study that recommended analyzing a number of ways to improve reliability. Despite Boise Cascade's good faith efforts to have these and other recommended courses of action taken to fix the reliability problems, there has been limited improvement. Boise Cascade has continued to request service reliability improvements from PacifiCorp.

Q. CAN YOU PROVIDE SOME EXAMPLES OF ACTIONS BOISE CASCADE HAS TAKEN TO MITIGATE DAMAGES SINCE 1991?

A. Yes. Boise has worked to reduce the sensitivity of critical equipment to power disturbances and commissioned studies to better understand the issues. Siemens Westinghouse was hired to do an extensive study involving the plant voltage

profiles, load flows, protective relay settings and other system parameters, and to critique the Boise Cascade system. After meeting with PacifiCorp, Boise Cascade has implemented a number of measures to reduce damage to its operations when there is an outage or voltage dip, including critical system control changes, large motor protection changes, and installation of line side reactors to all adjustable frequency drives. For the most part, we would not have made these changes if we had a more reliable power supply because many of these changes increase our capital costs.

We have taken many steps to reduce the sensitivity of equipment to voltage disturbances. For example, we have installed line side reactors to all adjustable frequency drives to dampen over voltage disturbances. We also have upgraded some of the most critical motor control circuits in the mill by adding voltage stabilizing transformers to keep the motors running during low voltage incidents. These include air compressors and boiler feed water pumps. We have made changes to our large motors to allow them to operate during voltage dips. Specifically, we removed the under voltage and unbalanced voltage protection from all 4000 volt motors in an effort to improve ride through during voltage disturbances. These motors will now continue to run during brief voltage dips as low as 70% of normal. However, this increases the risk to Boise Cascade that a motor will fail due to extended operation at low voltage. Therefore, we have made changes because of our unreliable power supply that could harm our overall productivity and increase our operating costs.

We have also consulted with the manufacturer of the adjustable frequency drives to determine if settings or adjustments can be made to make the drives less sensitive and implemented the changes where possible. We adopted a voltage tolerance specification to use when purchasing some types of equipment.

In response to the reliability problems at the Wallula facility, PacifiCorp over the years has taken some steps to reduce the frequency and duration of power outages at the Kraft substation. For example, in 1991, PacifiCorp added lightning arrestors to a 7 mile section of the 230kV line, and in 1994, PacifiCorp added two 230 kV circuit breakers to Wallula substation. PacifiCorp has also improved dispatch operator training and procedures, reduced vegetation near the 230 kV power poles, added rodent guards to the Dodd road substation, and presently PacifiCorp is in the process of replacing fuse protection of the transformers at Kraft substation with "transrupters."

Despite these efforts, voltage dips and outages have continued to disrupt our operations. In 2004, Boise Cascade and PacifiCorp jointly formed a team to study the outages and suggest solutions and improvements to increase reliability and minimize lost production. The team produced a joint study titled: the "Cascade Kraft Substation Outage and Power Quality Study" which is attached as ICNU Exhibit No.___(WWB-3) ("2004 Outage Study"). The 2004 Outage Study identified twelve "possible actions" to increase power quality and minimize plant outages.

Q. IS IT IMPORTANT THAT THE POSSIBLE ACTIONS IDENTIFIED IN THE 2004 OUTAGE STUDY BE IMPLEMENTED?

A. Yes. Boise Cascade views the 2004 Outage Study as a roadmap that could remedy many of its reliability problems at the Wallula facility. Boise Cascade does not want the 2004 Outage Study to share the fate of past efforts and fail to result in PacifiCorp making the necessary changes that would actually result in improved reliability.

The 2004 Outage Study recommends that Boise Cascade make certain changes to improve the power factor. We would like to make this change; however, we have delayed installing additional power factor correction equipment in the Wallula facility because we are waiting on PacifiCorp to develop the solutions to the study's proposed action regarding improving voltage control and harmonic mitigation. We cannot make the power factor improvement until PacifiCorp makes its changes because the power factor improvement equipment interacts with PacifiCorp's equipment.

One of the most important "possible actions" from Boise Cascade's perspective is to provide lightning shielded 69 kV lines to supply the Cascade Kraft substation. The 69 kV system at the Wallula substation should be reconfigured to electrically isolate Cascade Kraft substation from the remainder of the unimproved sub-transmission lines and associated lower reliability 69 kV substations. As I previously mentioned, lightning has been a significant cause of outages at the Wallula facility. In addition, lightning is expected to cause an

average of over two outages each year on a going forward basis.[2/] This is unacceptable from Boise Cascade's perspective. Eliminating or substantially reducing the outages caused by lightning could significantly improve reliability for all the customers served by these transmission facilities.

Q. WHAT ACTIONS HAVE BEEN TAKEN TO ENSURE THAT THE ACTIONS IDENTIFIED IN THE 2004 OUTAGE STUDY ARE IMPLEMENTED?

A. Given the past difficulties in obtaining PacifiCorp's commitment to make reliability improvements, ICNU obtained a commitment from PacifiCorp and MEHC in the MEHC merger to take actions to implement the 2004 Outage Study. The merger commitment is intended to improve reliability for the Wallula facility. I have attached the merger commitment as an exhibit to my testimony, ICNU Exhibit No.___(WWB-5).

First, PacifiCorp and MEHC committed to three actions that I believe PacifiCorp should have automatically taken. These include to: 1) train system operators to mitigate against human errors; 2) control vegetation near the 230 kV lines to prevent range fires; and 3) replace certain capacitor banks in the Cascade Kraft substation. Second, PacifiCorp and MEHC committed to make certain necessary upgrades at the Cascade Kraft substation and Dodd Road substation. Id. at 2.

Third, PacifiCorp and MEHC committed to prepare two different engineering studies to analyze the costs of adding lightning protection to the 230 kV lines interconnected to the Wallula substation and to the 69 kV lines

[2/] Exh. No.___(WWB-4) at 24 (Lightning Performance Analysis of Pacific Power Company—Cascade Kraft Substation).

connected to the Cascade Kraft substation. The engineering studies were to be completed a year from the close of the MEHC transaction. The purpose was not to simply produce additional studies, but to create a plan of action to improve reliability. The actual merger commitment reads that the engineering study will include "a report specifying the actions that PacifiCorp intends to take with respect to such items and the timing of completion therefore and the means of financing such work . . . ." [3/]

Q. HAS PACIFICORP IMPLEMENTED ALL OF THESE MERGER COMMITMENTS?

A. No. After many meetings, PacifiCorp has unilaterally determined that the lightning solutions are too expensive.

First, PacifiCorp did not perform a study of the 230 kV lines interconnected to the Wallula substation. PacifiCorp has simply not performed this engineering study as required by the merger commitment. I believe this study should have been performed because we have seen power interruptions as a result of lightning strikes to the 230 kV transmission system.

Second, PacifiCorp performed an engineering study of the 69 kV lines interconnected to the Cascade Kraft substation ("Cascade Kraft Study"). The Cascade Kraft Study for the 69 kV lines recommended a number of potential options to address the problems related to lightning. The two main options to fix this lightning problem are to: 1) include shield wires; or 2) protect the insulators with line arrestors.[4/] The study estimated the cost of including shield wires on the

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[3/] Re MEHC and PacifiCorp, WUTC Docket No. UE-051090, Order No. 7, Appendix A at 19-21 (Feb. 22, 2006).

[4/] Exh. No.___(WWB-4) at 27.

entire line at almost $9 million.[5/] The study estimated the costs for adding lighting arrestors ranged from $2 to $5 million.[6/] The study presented solutions with an all or nothing approach to the problem and did not look at other potentially more cost effective and reliable alternatives or methods to reduce exposure at the Cascade Kraft substation.

While the Cascade Kraft Study was performed, the Company has refused to prepare a report specifying how the lightning protection would be added and financed.[7/] PacifiCorp has essentially told us that we should expect at least two outages a year due to lightning that could result in significant economic loss and safety issues. The engineering study itself has little value if PacifiCorp does not intend to implement any aspects of it.

Q. DO YOU BELIEVE THAT PACIFICORP SHOULD IMPLEMENT THESE ACTIONS TO REDUCE OUTAGES CAUSED BY LIGHTNING?

A. Yes. Given the significant damages that have been caused to Boise Cascade's facility (and likely other customers) in the past, and the guarantee that the current transmission facilities will cause costly outages in the future, I believe investments to reduce the damage from lightning to be warranted.

Q. DO YOU RECOMMEND THAT PACIFICORP TAKE OTHER ACTIONS TO IMPROVE RELIABILITY?

A. Yes. There are numerous other actions that could be taken which could improve the reliability.

A significant cause of the reliability problems is that the 69 kV sub-transmission system has "evolved" over the years without an adequate level of

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5/ Id.
6/ Id. at 36.
7/ Exh. No.___(WWB-6) (Letter from Paul Capell to Lester Whitehead).

planning and robust design features that process industries like Boise Cascade require for reliability. Boise Cascade believes that it is time to re-examine the 69 kV sub-transmission system from a standpoint of improving reliability to the Cascade Kraft substation and to reduce its unnecessary exposure to approximately 50 miles of unshielded line and associated lower reliability substations.

Boise Cascade recommends providing lightning shielded 69kV lines to serve the Cascade Kraft substation and reconfigure the Wallula substation to electrically isolate Cascade Kraft substation from the remaining unimproved 69kV lines and other lower reliability 69kV substations. This could be a lower cost alternative that could significantly improve reliability at the Wallula facility.

Boise Cascade also recommends that PacifiCorp make the necessary changes to improving voltage control and harmonic mitigation. This would allow Boise Cascade to make recommended changes to improve the power factor.

As I explained earlier, lightning is only one of the major causes of past reliability problems. Other problems have included operator errors, equipment failures, range fires, and lack of system robustness. As part of the MEHC merger commitments PacifiCorp has agreed to improve employee training to reduce operator errors and to control vegetation to reduce range fires. If these issues continue to cause reliability problems, Boise Cascade may make further recommendations in the future.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.