EXHIBIT NO. ___(GJZ-1T)
DOCKET NO. UE-07___/UG-07___
2007 PSE GENERAL RATE CASE
WITNESS: GREG ZELLER

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION, **Complainant,** **v.** **PUGET SOUND ENERGY, INC.,** **Respondent.**	**Docket No. UE-07____** **Docket No. UG-07____**

PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF GREG ZELLER ON BEHALF OF PUGET SOUND ENERGY, INC.

DECEMBER 3, 2007

PUGET SOUND ENERGY, INC.

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CONTENTS

PUGET SOUND ENERGY, INC.

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I. INTRODUCTION

Q. Please state your name, business address, and position with Puget Sound Energy, Inc.

A. My name is Greg Zeller. My business address is 10885 N.E. Fourth Street, Bellevue, WA 98004. I am the Director Electric Operations for Puget Sound Energy, Inc. ("PSE" or "the Company").

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

A. Yes, I have. It is Exhibit No. ___(GJZ-2**).**

Q. What are your duties as Director Electric Operations for PSE?

A. I am responsible for the overall operation of PSE's electric transmission and distribution systems. I work with all related groups to support the safe, reliable, compliant, and cost effective operation of the system. The Electric Operations organization is a 24 hours per day, 7 days per week operation. I direct and oversee functions relating to the construction, maintenance and operation of

electric substations, monitoring and control of PSE's electric transmission and distribution systems and the electric first response function. My responsibilities include emergency outage response and restoration management.

Q. What is the nature of your testimony in this proceeding?

A. My testimony describes the consequences to PSE's customers and to PSE's electric transmission and distribution infrastructure caused by storms in 2006 and 2007. During the test year, October 1, 2006 through September 30, 2007, and for the preceding months in 2006 (January 1, 2006 through September 30, 2006), PSE's customers and PSE's transmission and distribution electric system were subjected to weather-related events that caused extensive system damage and widespread power outages. It took great expenditures of time and capital to rebuild the damaged electric system to restore service and function to PSE's customers. My testimony provides a summary of the damage the storms caused, particularly the December 2006 Hanukkah Eve Storm, plus the costs to bring PSE's system back to normal. In addition, my testimony provides information relating to the changes PSE has made to its electric system construction and maintenance plans as a result of the storms during the test year.

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II. WEATHER-RELATED EVENTS DURING THE TEST YEAR

Q. Please describe the weather events that impacted PSE customers in 2006 and the during the test year.

A. As one publication described it, 2006 was "a year's worth of wicked weather." The Hanukkah Eve Storm plus many other weather-related events that occurred throughout the year wreaked havoc in the communities PSE serves. The costs to restore service and repair storm damage during the months of November and December 2006 were the highest ever recorded at PSE. Over 700,000 PSE customers, representing nearly 70% of the total electric customers, lost power during the Hanukkah Eve Storm. But that was only a single incident of several incidents during the test year. PSE and its customers experienced eleven IEEE-qualifying[1] storm events and seven non-qualifying[2] storm events in the calendar year 2006, and eight qualifying and five non-qualifying storm events during the test year. The damage did not stop at the end of 2006, but continued on through 2007.

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[1] A "qualifying" event is defined as any day where the daily System Average Interruption Duration Index ("SAIDI") is greater than the calculated Tmed Threshold due to a weather-related event. The Tmed Threshold is established by using the Institute of Electric and Electronic Engineer's ("IEEE") 1366-2003 standard, and is computed using the 2.5 Beta method. Costs of a qualifying storm are deferrable subject to a defined threshold dollar amount.

[2] A non-qualifying event is a storm event that is not greater that the calculated Tmed Threshold. Costs for restoration and repair of a non-qualifying event do not meet deferrable conditions.

Q. Do you have a summary of the storm events in 2006 and in the test year?

A. Yes. Exhibit No. ___(GJZ-3) provides a summary of the qualified and non-qualified storm events during 2006 and through September 30, 2007. This summary also provides details of outage events during the same period, such as the number of customers impacted by outages and the costs to repair and restore PSE's electric delivery system.

Q. How did the storms impact the Company's construction and operation and maintenance ("O&M") plans during 2006 and 2007?

A. The storms had "spillover impacts" on PSE operations. So many corporate resources had to be re-deployed to restore electric service and repair storm damage that a portion of PSE's normal and planned capital construction and maintenance work could not be completed as scheduled. The damage caused by the storms required replacement of millions of dollars of infrastructure that would not have otherwise required replacement. In addition, new customer construction work fell behind schedule because crews were focused on storm restoration efforts, and this back log had to be completed after the storm. Reliability projects that were delayed due to the necessity of the storm repairs are expected to be completed during 2007.

Regular planned O&M work such as substation transformer, breaker and relay maintenance, still needed to be performed. However, as with the personnel performing the capital work, personnel performing this O&M work were re-

deployed to the storm restoration effort instead of working on planned non-storm O&M activities. The result was that the O&M work was compressed into a shorter time frame. External resources had to be brought in so that the scheduled maintenance could be completed and equipment maintenance cycles could be preserved. Planned substation transformer, breaker and relay maintenance are expected to be completed by the end of 2007 and within the budget allocation.

Q. Returning to the test year, please describe the storm events that impacted PSE customers and damaged PSE's electric delivery system.

A. Thirteen weather-related events disrupted service to PSE customers during the 12-month test year. (The events ended in March 2007.) Several storms seemed to emerge one after another. For example, on November 15, 2006, winds from the "Mid-November Blast" interrupted service to nearly 180,000 customers. Trees and wind knocked out 24 transmission lines and 30 substations. Total restoration and final repairs took four days and costs exceeded $9.4 million.

One month later in mid-December, the Hanukkah Eve Storm hit. Its specific impacts will be discussed later in this testimony.

Next, the "Play-Off Storm" windstorm struck Whatcom, Island, Thurston, King and Kitsap counties on January 5, 2007. This storm disrupted service to over 43,000 customers. Total restoration and final repairs took two days and costs totaled over $2.9 million. During this storm, sixteen transmission lines and nine substations were knocked out of service.

Just four days later, on January 9, 2007, the "Northern Exposure Storm" disrupted service to over 56,000 customers in Whatcom, Skagit, Island, Kitsap and King counties. Total restoration and final repairs took three days and costs exceeded $4 million. During this storm, wind and trees knocked out seven transmission lines and five substations. See Exhibit No. ___(GJZ -4) for a summary of all test year qualified and non-qualified storm events.

Q. Please describe the total storm event restoration costs associated with the 13 test year weather events?

A. The total storm event restoration costs associated with the 13 weather-related events that impacted PSE customers during the 12-month test year totaled over $119 million. The O&M costs of these events totaled $112 million. PSE deferred $101 million of IEEE 1366-2003 qualified expenses that met the definition of a qualifying event, which left $11 million recorded in expense. Capital costs totaled $7.0 million. Capital storm costs represent storm restoration costs that are associated with the replacement of a damaged capital asset such as pole or transformer replacements. Capital amounts are accounted for in accordance with PSE capital accounting practices.

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Q. Please explain why PSE's $11 million of test year storm O&M expenses exceeded the $7 million catastrophic loss threshold that was established in the 2004 General Rate Case [3]?

A. During the test year, PSE storm event O&M expenses totaled $11 million. This amount is comprised of the $7 million cost deferral threshold and $4 million of non-deferrable expenses. Non-deferrable O&M expenses are storm event expenses that did not meet the IEEE 1366-2003 definition of a qualifying event or were IEEE 1366-2003 qualifying event expenses that are not deferrable per PSE's accounting practices. For example, non-deferrable qualifying event expenses include certain straight time labor charges, stores and fleet personnel labor charges, cost center assessments, and certain vehicle charges

Q. Is PSE requesting that the current catastrophic storm loss deferral mechanism be extended?

A. Yes, with slight modifications as discussed in the testimony of Mr. John Story. The Company benefits from this catastrophic storm cost deferral mechanism because it allows PSE to restore service in the most cost effective and expeditious manner, without first seeking approval to defer storm repair costs. Additionally, in his prefiled direct testimony, Mr. Story explains that customers also benefit because the mechanism levels rates for these uncontrollable storm costs and

[3] *See WUTC v. PSE,* Docket No. UE-040640, Final Order No. 06 (2004) at ¶¶ 231-46.

provides a known mechanism for review and recovery. *See* Exhibit No ___(JHS-1CT).

III. THE HANUKKAH EVE STORM

Q. Which test year storm provided the most significant service disruption to PSE's customers?

A. The Hanukkah Eve Storm severely impacted PSE's customers and inflicted the worst damage to PSE's electric transmission and distribution system, possibly in the history of the Company. The storm began on December 13, 2006, with the main thrust occurring late December 14 and into the early hours of December 15, 2006.

Q. Please describe the Hanukkah Eve Storm.

A. University of Washington climatologist Cliff Mass classified this December windstorm as a once-per-decade event based upon wind speeds alone. More significantly, he said that the damage caused by this storm was closer to what one would expect from a once-per-century event[4], an observation he attributed principally to soil saturation. The damage from the Hanukkah Eve Storm was exacerbated by the heavy rains that preceded the Hanukkah Eve Storm.

[4] The designation of a 100-year storm is an event that scientist predict has a one percent chance of happening in any given year, per the May 1, 2007 Crosscut Publication article, "Imperfect predictions of the perfect storm". This article states that there have been at least six "100-year" storms since 1986 in the greater Seattle area.

November 2006 was among the wettest months ever recorded in Pacific Northwest history (15.63 inches of rainfall). Another 3.31 inches of rain fell in early December prior to the storm, and nearly a full inch of rain fell in a one-hour period on the afternoon of December 14, 2006. The wet conditions resulted in widespread soil saturation, which significantly reduced soil/tree root stability and rendered thousands of otherwise healthy trees vulnerable to failure. *See* WUTC Workshop Summary Report (March 29, 2007), Exhibit No. ___(GJZ-5).

The Hanukkah Eve Storm carried the strongest winds since the Inauguration Day Storm of January 1993, with recorded wind gusts of 69 mph at Seattle Tacoma International Airport on December 15, 2006. Seemingly healthy trees with root systems that had survived prior windstorms were uprooted and damaged a substantial portion of PSE's transmission and distribution system. So severe was the destruction from uprooted trees that, in addition to the damage to PSE's electric infrastructure, trees also broke 30 natural gas lines by disrupting the ground around the lines.

Q. Please describe the magnitude of the structural damage to PSE's electric transmission and distribution system.

A. The Hanukkah Eve Storm damaged 85 PSE transmission lines, in turn disabling service to 159 substations. To put this in perspective, the damage affected approximately one-half of PSE's total transmission lines and distribution substations. The storm's initial damage and outages occurred late December 14,

and early December 15, 2006. Winds continued into late morning December 15, and further damaged many of the already de-energized transmission and distribution lines and equipment. This created many additional damage locations within line segments and exacerbated an already significant amount of repair and restoration work. Historically, in more routine weather events, a transmission or distribution line may be disabled due to damage from a single tree or limb. In the Hanukkah Eve Storm, many transmission and distribution lines sustained multiple tree-caused damage locations within a particular segment of line. This greatly complicated the restoration process. Additionally, repair was hampered due to the number of trees blocking roads and other access paths. Storm crews replaced approximately 750 poles, 670 transformers and 130 miles of electrical conductor.

The windstorm's destruction was the worst and most widespread that PSE has ever experienced. Damage occurred in each of the nine counties of PSE's service territory. The majority of damage occurred throughout King, Kitsap, Thurston, Pierce, and Island counties.

Q. Other than the scope of the damage, were there any other factors that were different from what has historically been experienced in storm restoration?

A. A key factor in the Hanukkah Eve Storm was the amount of damage that occurred to PSE's transmission system, particularly in Northeast King County. For example, the storm leveled six structures and tore down several spans of wire on PSE's Snoqualmie-Lake Tradition #1-115kV transmission line. In one three-mile

area, the damage was so severe and concentrated that engineering crews had to assess the damage and complete restoration drawings before the repair work could commence.

Q. What was the effect of this damage on PSE customers?

A. Over 700,000 PSE customers lost service early on December 15, 2006. By the end of the day on December 18, 2006, PSE had restored service to nearly 500,000 customers, and by the end of the day on December 23, 2006, PSE crews had re-energized nearly 625,000 customers. By the end of the day on December 25, 2006, those customers that remained out of power were out of power due to damage to their customer-owned equipment. These customers required a third party to repair their electrical entrance equipment, as PSE cannot repair customer owned equipment. See Exhibit No. ___(GJZ-6) for a detailed list of customer outages and durations resulting from this storm.

In addition to customers directly affected by storm-related outages, other PSE customers were indirectly affected by the "spill over impacts". During the storm and for an extended post-storm period after December 26, 2006, all resources were focused toward system repair. Accordingly, PSE was unable to perform normal system maintenance, capital construction projects, new customer line extensions, conversion or relocation projects, new services, or meter sets. Such work waited until additional resources were acquired, and the existing resources were dedicated to completing storm repairs.

Q. Please describe the total operations and maintenance and capital costs required to restore PSE customers and make needed electric system transmission and distribution repairs caused by the Hanukkah Eve Storm?

A. Overall, the storm repair costs totaled over $90 million. Storm repair labor costs (including overheads and assessments) totaled nearly $11 million, material costs totaled nearly $4 million, contractor costs totaled nearly $73 million and other miscellaneous expenses totaled over $3 million. Included in these amounts are post-storm repair costs of $2.5 million. Such post-storm repairs are discussed later in this testimony. The O&M portion of the $90 million total repair cost totaled nearly $85 million. Of this, $83.6 million was deferrable and $1.4 million was non-deferrable. Capital repair costs totaled over $5 million. Please refer to page 9 of Exhibit No. ___(GJZ-6), which provides a summary of these restoration costs.

Q. Why did this storm cost so much?

A. Costs of restoration and repair were high because of several factors, some of which I discussed above. The damage was widespread throughout PSE's service territory; damage was significant, in that many transmission and distribution lines were damaged and most had multiple damage locations; access was impaired due to the number of downed trees; and repairs required an enormous workforce. I will provide further information on workforce later in my testimony.

Q. Given the amount of money PSE spent repairing and replacing storm-damaged infrastructure, will future system maintenance costs be lower as a result?

A. Unfortunately, no. The storm broke transmission and distribution infrastructure of all types, sizes, locations, and service lives. In other words, not just the older lines, poles, and other equipment had to be replaced. The large number of trees and limbs did not discriminate in their damage to the transmission and distribution system. Crews had to repair and replace systems that had been functional and would not have been replaced or repaired except for the damage.

The system in place today requires ongoing inspection and maintenance, whether it is new or old. PSE is actually expanding its maintenance as a result of the storm. For example, PSE's vegetation management program has been expanded to address PSE's cross-country transmission corridor access and maintenance. PSE expects to spend nearly an additional $2 million in 2007 ($500,000 related to North American Electric Reliability Corporation ("NERC") Compliance and $1.1 million for other vegetation management.)

Q. How many PSE employees, service providers and contractors were involved in the restoration efforts?

A. Over 1,300 PSE employees performed some level of storm duty during this event. In addition, PSE engaged nearly 700 local service provider and contractor personnel and imported over 1,200 additional workers. Including PSE forces,

nearly 500 line, service and tree crews worked to repair and restore service. Crews came from as far away as Alaska, Wisconsin, Missouri, and Southern California. Please refer to Exhibit No. ___(GJZ-7) for a detail of contractors, and service providers who contributed to the restoration and repair efforts.

Q. What would have happened if PSE did not bring in outside resources?

A. Without a doubt, storm restoration effort would have been extended. For safety reasons, it is likely that shifts would have been shortened to provide more rest for the workers, further extending the repair.

Q. What impact, if any, did PSE's service provider model have on restoration efforts?

A. PSE's service provider model proved beneficial to restoration efforts, as PSE has access to contractors, outside of the state, that are affiliated with the Service Provider who would not otherwise be available to the Company. It is not reasonable for PSE to staff, on a routine basis, the labor resources that are necessary for the occasional catastrophic storm. PSE must maintain a balance between resources to match daily work volumes and those required to meet the demands of emergencies. A workforce larger than necessary for the daily work volume would drive up day to day business costs. However, PSE's service providers were committed by contract to provide all available staff to PSE during this storm. Without these contracts in place, the additional service provider

employees would not have been committed to work for PSE. As stated in PSE's Service Provider contract, "Emergency/Storm Event Response performed by Service Provider under this contract shall take precedence over all other work…for PSE or third parties."

Additionally, PSE maintains relationships with area contractors and other utilities through mutual exchange agreements. Such agreements provide access to additional resources in emergency situations and keeps non-storm costs in check. Such practices are common throughout the utility industry.

Q. Was it necessary to perform further repairs to PSE's electric transmission and distribution system, even after service was restored?

A. Yes. PSE's storm restoration goal is to restore service as quickly as possible. In some cases, this may mean simply operating a switch or resetting a protective device. In other cases, structural repairs or replacement of system components must be completed to restore service, such as when a tree falls and breaks a pole. In other cases, crews can make temporary repairs to expedite the restoration process. For example, a crew may bolt a cross arm vertically on a pole to repair a slightly broken pole top. This repair is much faster than replacing the entire pole, but the pole must later be replaced because it may have sustained other damage and is more susceptible to failure with less force. Another example is a damaged switch that is "by-passed" to initially restore service. The switch should not be left in an un-repaired state for a lengthy period because it would compromise the

operability of the system. These temporary repairs are tracked at PSE's storm base, and permanent repairs are completed as quickly as is reasonable.[5] In the case of the Hanukkah Eve Storm, the system faced many permanent repairs after crews made temporary repairs during the storm.

Due to the substantial amount of damage caused by the Hanukkah Eve Storm, PSE formed a post-storm project team to systematically assess and document all storm related temporary repairs. The scope of work for this team was to 1) patrol all impacted circuits, 2) identify temporary repairs in order to schedule permanent repairs, 3) identify abnormal open points (switches left in a different state during the storm than what is indicated on PSE maps), and 4) remove debris and surplus material left in the field at the various work sites throughout the storm-damaged area. Assessment started on January 4, 2007 and was completed by February 9, 2007. On January 15, 2007, crews began full-time post-storm repairs and completed repairs in mid-March. These crews worked only on storm damaged infrastructure and temporary repairs that had been documented by the PSE post-storm team.

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[5] But at no time is the safety of the general public or workers at risk if a temporary repair is left in

Q. How do PSE's restoration time and costs compare with industry standards or with those of neighboring utilities also impacted by the Hanukkah Eve Storm?

A. For the December windstorms, PSE's overall restoration cost was $129 per customer, and Seattle City Light reported a cost of $38 per customer. To put this comparison in perspective, PSE's electric service territory comprises nine counties, whereas Seattle City Light's includes only the city limits of Seattle, plus parts of Tukwila and Shoreline. PSE's overall customer density is around 230 customers per square mile compared to Seattle City Light's 2,860 customers per square mile. The storm left a significantly larger footprint in PSE's service territory than in Seattle City Light's territory. This comparison is similar to other local utilities as well. In addition, much of the damage in PSE's case occurred outside of core urban areas, and that affected power deliveries to both urban and rural electric service. Further, PSE has approximately 20,000 circuit miles of distribution and 50 customers per circuit mile compared to Seattle City Light's 2,500 circuit miles and 150 customers per circuit mile.

Taken together, these factors drove up the costs and time required to restore service while complicating the logistics of repairs and restoration. What the above statistics reflect is that storm-restoration in Seattle City Light's service territory was made within a much smaller geographic perimeter on a much

place.

smaller system (measured by distribution circuit miles). Further, Seattle City Light's customer density is such that a particular equipment repair results in restoration of service to proportionally more customers than the repair of equipment on PSE's system. The characteristics of Seattle City Light's territory would likely support a lower restoration cost per customer than PSE. As for restoration time, at the peak of the storm, Seattle City Light had 180,000 customers out of service, and it took nearly nine days to restore service (or approximately 20,000 customers per day, on average).[6] As mentioned previously, at the peak of the storm, PSE had over 700,000 customers and had restored service to all but a small number of customers within ten days, (or approximately 70,000 customers per day on average).

Q. Has PSE performed a post Hanukkah Eve storm review?

A. Yes. In July 2007 PSE completed an extensive review of its performance prior to, during and following the Hanukkah Eve Storm. In addition to seeking customer and employee feedback through telephone and Web surveys, focus groups, and internal debriefings, PSE hired KEMA, an energy consulting firm, to provide an independent, third-party, five-month analysis of PSE's pre-storm readiness and post-storm response. KEMA prepared a report that outlined its analysis of PSE's storm efforts, and well as recommended actions PSE can take now for continued service reliability and improved outage response during future storms and other

[6] *See* Davies Consulting, Inc. Seattle City Light December 2006 Wind Storm Report dated May

natural disasters. Please refer to the KEMA Report dated July 2, 2007, provided as Exhibit No ___(GJZ-8).

Q. Has the Company undertaken the actions recommended in the KEMA Report?

A. Yes, Please see PSE's After Action Report dated November 27, 2007 describing the implementation status of the KEMA recommendations, provided as Exhibit No. ___(GJZ-9).

Q. Please summarize the KEMA Report related to the restoration and repair effort as conducted by PSE.

A. The KEMA Report states as follows: "PSE, its employee, and service providers performed well in restoring power after this record-breaking storm. Employees at all levels overcame many obstacles caused by the sheer magnitude of the storm damage and overwhelming volume of restoration activities." Further, "[t]he rapid response by PSE management to secure additional resources was a significant factor in the company's ability to fully restore the system in approximately 12 days." KEMA points out the areas that PSE executed "extremely well" during this weather event: crew and materials acquisition to support restoration; employee and contractor safety; logistics support for the off-system crews brought to the area; and performance of PSE employees in rising to the extreme

31, 2007.

challenge presented in this storm. Additionally, "PSE performed very well in the execution of the CERP." (Corporate Emergency Response Plan) The KEMA Report goes on to say that "during the course of the unprecedented event, the company recognized the need to deviate from the plan and institute new processes to address previously unforeseen situations. This effort in itself was a major undertaking and one that demonstrated the intent of the company to respond in whatever manner necessary to restore service."

IV. CONCLUSION

Q. Does that conclude your testimony?

A. Yes, it does.