

**EXHIBIT NO. \_\_\_\_ (WJE-1HCT)**  
**DOCKET NO. UE-07 \_\_\_\_**  
**2007 PSE PCORC**  
**WITNESS: W. JAMES ELSEA**

**BEFORE THE  
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND  
TRANSPORTATION COMMISSION,**

**Complainant,**

**v.**

**PUGET SOUND ENERGY, INC.,**

**Respondent.**

**Docket No. UE-07 \_\_\_\_**

**PREFILED DIRECT TESTIMONY (HIGHLY CONFIDENTIAL) OF  
W. JAMES ELSEA  
ON BEHALF OF PUGET SOUND ENERGY, INC.**

**REDACTED  
VERSION**

**MARCH 20, 2007**

**PUGET SOUND ENERGY, INC.**

**PREFILED DIRECT TESTIMONY (HIGHLY CONFIDENTIAL) OF  
W. JAMES ELSEA**

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**PUGET SOUND ENERGY, INC.**

**PREFILED DIRECT TESTIMONY (HIGHLY CONFIDENTIAL) OF  
W. JAMES ELSEA**

**I. INTRODUCTION**

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

A. My name is W. James Elsea. My business address is 10885 N.E. Fourth Street Bellevue, WA 98004. I am the Financial Analysis Manager of Energy Resources 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. \_\_\_\_ (WJE-2).

**Q. What are your duties as Financial Analysis Manager of Energy Resources for PSE?**

A. My present responsibilities include oversight of analysis of individual power resources and portfolios of power resources for the Company's Least Cost Plan and resource acquisition processes.

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

2 A. My testimony describes the modeling tools and quantitative analyses the  
3 Company utilized to evaluate the various resource alternatives that were proposed  
4 in response to the Company's 2005 Request for Proposals ("RFP") process to  
5 meet the need for additional power resources.

6 In many ways, this testimony describes a continuation of the resource analysis  
7 process that I described in my testimony in (i) PSE's 2005 Power Cost Only Rate  
8 Case, Docket Number UE-050870, with respect to analyses performed for the  
9 Hopkins Ridge Wind Project and (ii) in PSE's 2006 General Rate Case, Docket  
10 Numbers UE-060266 and UE-060267, with respect to analyses performed for the  
11 Wild Horse Wind Project and the purchased power agreement with OrSumas,  
12 LLC for the output of the ORMAT Recovered Energy Generation resource.

13 My testimony explains the models, the assumptions, and RFP analysis undertaken  
14 in Phase I and Phase II of the RFP to determine the project Short List. I further  
15 describe the quantitative analysis of the Goldendale Generating Station performed  
16 subsequent to Phase II of the RFP.

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19 /////

## II. MODELING TOOLS

### A. Overview of the Company's Resource Planning and Acquisition Models

**Q. What approach did the Company take to modeling the various resource alternatives proposed in response to the 2005 RFP?**

A. Consistent with the methods described in both its 2003 and 2005 Least Cost Plans, PSE followed a resource planning approach in evaluating potential electric resource alternatives. This approach treats the Company's electric resource portfolio as an integrated whole and captures dynamic interactions between various parts of the portfolio, including but not limited to PSE's retail electric loads, its existing electric resources and potential new resources. The resource planning approach also identifies net effects on cost and risk of adding various individual resources and combinations of potential resource alternatives to the Company's overall portfolio.

**Q. What quantitative models did the Company use in evaluating potential resource alternatives?**

A. PSE used two quantitative models in evaluating potential resource alternatives: the AURORA model and the Portfolio Screening Model.

////

1 **Q. Please describe the AURORA model and the Portfolio Screening Model.**

2 A. The AURORA model is a fundamentals-based production costing model that  
3 simulates regional wholesale power market prices using, among other factors, the  
4 supply of resources, the demand for power and constraints due to transmission.

5 The Portfolio Screening Model is a Microsoft Excel-based model, specific to  
6 PSE, that allows the Company to evaluate alternative portfolios of existing and  
7 new resources to serve load.

8 **Q. Did the Company use the Acquisition Screening Model to screen initial bids?**

9 A. No, the Company used the Portfolio Screening Model for both the Phase I  
10 screening and the Phase II portfolio analysis. The Company used the Acquisition  
11 Screening Model for Phase I screening in its 2003 RFP because such model was  
12 more streamlined and required less computing power than the Portfolio Screening  
13 Model. The Acquisition Screening Model, however, screened potential new  
14 resources in isolation from the Company's existing electric resources. For the  
15 2005 RFP, the Company determined that use of the Portfolio Screening Model  
16 provided a more thorough screen than did the Acquisition Screening Model  
17 because the Portfolio Screening Model evaluates the interaction of potential new  
18 resources with the Company's resource portfolio.

19 /////

1     **B.     The AURORA Model**

2             **1.     Overview**

3     **Q.     Please describe the AURORA model.**

4     A.     The AURORA model is a fundamentals-based hourly production cost model that  
5             relies on factors such as supply resources, regional demand for power and  
6             transmission to simulate competitive wholesale power markets. AURORA uses  
7             hourly demand and individual resource operating characteristics in a transmission  
8             constrained, chronological dispatch algorithm for the entire Western Electricity  
9             Coordinating Council region.

10            AURORA simulates, on an hourly basis, economic dispatch of the regional fleet  
11            of generating resources to meet regional electric loads, based on fuel prices and  
12            other variable operating costs, inter-regional transmission limitations and other  
13            factors. A primary result produced by AURORA is a long-term forecast of  
14            wholesale market prices for power (the “optimization mode”) that simulates the  
15            addition of new generating resources, as needed, to maintain long-run market  
16            equilibrium. The 2005 Least Cost Plan provides a description of the AURORA  
17            electric simulation model. *See generally* Exhibit No. \_\_\_\_ (EMM-4) at pages 641-  
18            668.

19            /////

20            /////



1 **Q. Is AURORA a PSE Model?**

2 A. No. AURORA is a computer model developed by EPIS, Inc. (“EPIS”), that is  
3 used by utilities throughout the Northwest and across the country. AURORA is  
4 also used by the Northwest Power and Conservation Council.

5 **Q. Does PSE update or re-write AURORA model code?**

6 A. No. EPIS releases new versions of the model, as new versions are developed.  
7 Although PSE does not update the AURORA code, the Company does maintain  
8 and update certain data input assumptions, as discussed further below.

9 **Q. Can AURORA be used to model operation of a utility’s resource portfolio?**

10 A. Yes. In addition to the market-wide analysis described above, AURORA can  
11 simulate hourly economic dispatch of a utility’s generation resource portfolio.  
12 When used in this mode, AURORA produces forecasts of variable operating costs  
13 for the utility’s generating resources but does not include all fixed costs for  
14 existing or new resources. The Company used this mode of AURORA to forecast  
15 a portion of the power costs included in this filing, as described in the prefiled  
16 direct testimony of Mr. David Mills. *See* Exhibit No. \_\_\_\_ (DEM-1HCT).

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1 **Q. How does this use of AURORA to forecast power costs differ from the mode**  
2 **of AURORA used to develop pricing to evaluate various long-term resource**  
3 **alternatives?**

4 A. When forecasting power costs with AURORA for the rate year in a rate case, the  
5 Company focuses on the output related to near-term power cost projections (the  
6 first two years or less, depending on the date of the rate year and the time the  
7 Company prepares its initial case for filing). When forecasting prices for long-  
8 term resource evaluation, input assumptions regarding natural gas prices for the  
9 first 48 months are based on the forward market for natural gas prices and beyond  
10 48 months are based upon Global Insight fundamental gas price forecast.

11 Other input assumptions, such as hydro availability, also differ because the  
12 Commission has approved different inputs for purposes of developing projections  
13 of power costs to embed in rates than those the Company has historically used for  
14 long-term planning purposes.

15 **2. Assumptions Used by the Company in AURORA**

16 **Q. What assumptions does the Company use in AURORA and how do those**  
17 **differ from the AURORA assumptions used in the 2005 Least Cost Plan?**

18 A. For the 2005 Least Cost Plan and the 2005 RFP processes, the Company used  
19 AURORAxmp (v. 7.3.0.22), which EPIS released in 2004. For the Phase I  
20 screening analysis, PSE used this version of AURORA to develop a single price

1 scenario that was intended to reflect the following differences from PSE's 2005

2 Least Cost Plan Current Momentum Scenario:

- 3 1. a higher long-term natural gas price forecast;
- 4 2. greater restrictions on new coal-fired resources;
- 5 3. states are successful in meeting Renewable Portfolio Standards
- 6 requirements within their required time horizon;
- 7 4. extension of Production Tax Credits through 2010, but at declining
- 8 levels; and
- 9 5. higher resource costs for generation supplies.

10 See Exhibit No. \_\_\_\_ (RG-3HC) at page 9.

11 As PSE began to analyze the model results, it became clear that AURORAxmp  
12 (v. 7.3.0.22) did not have enough generation resources to serve load. In order to  
13 meet the unserved load, expensive demand-side curtailment resources were called  
14 upon resulting in extremely high power prices. Price caps usually mitigated this  
15 impact, but the amount of energy unserved was too great for the price caps to  
16 have their desired impact.

17 EPIS suggested that PSE move to a new version of AURORAxmp,  
18 Version 8.0.1001, released by EPIS in December of 2005. EPIS indicated that  
19 AURORAxmp, Version 8.0.1001, did not observe the same issues with unserved  
20 energy and large summer price spreads.

1 PSE subsequently adopted AURORAxmp, Version 8.0.1001, and associated input  
2 database but was unable to complete all its assumption updates in time to start the  
3 RFP Phase I analysis. PSE was able to complete the AURORAxmp,  
4 Version 8.0.1001, updates to be used for the Phase II analysis. Nevertheless, PSE  
5 still observed the price spreads. To solve the problem, PSE put back into the  
6 database plants that were economically retired by the model.

7 **Q. What are the fuel cost assumptions that PSE used for the AURORA model?**

8 A. PSE used a combination of market forward prices and forecasts from Global  
9 Insight as fuel input assumptions to AURORA. For the Phase I analysis, PSE  
10 used a 5-month average (July 20, 2005 to December 19, 2005) of natural gas  
11 prices based on (i) Kiorex forward marks through 2010 and (ii) Global Insight  
12 Reference case, dated December 2005, for calendar years 2011 through 2026.  
13 This became PSE's AURORA scenario for the Phase I analysis.

14 For the Phase II analysis, PSE developed four different price scenarios from three  
15 gas price forecasts and tested each resource under each scenario. Gas price input  
16 for the scenarios was taken from a three-month average of natural gas prices  
17 based on (i) Kiorex forward marks through 2010 and (ii) Global Insight  
18 fundamental forecast prices based on the following:

- 19 1. Current Trends Price Scenario: Global Insight Reference Case  
20 (December 2005) plus Kiorex forwards for calendar years 2007-  
21 2010 (average January 12, 2006 through April 11, 2006);
- 22 2. Reserve / Overbuild Price Scenario: Global Insight Reference

Case (December 2005) plus Kiodex forwards for calendar years 2007-2010 (average January 12, 2006 through April 11, 2006), with higher new plant builds assumed to meet seven percent reserve requirements;

3. High Price Green World Scenario: Global Insight High Case (December 2005) plus Kiodex forwards for calendar years 2007-2010 (average January 12, 2006 through April 11, 2006); and

4. Low Gas Price: Global Insight Low Case (December 2005) plus Kiodex forwards for calendar years 2007-2008 (average January 12, 2006 through April 11, 2006).

Specific AURORA input assumptions for these Phase II price scenarios are presented in Exhibit No. \_\_\_\_ (WJE-3C). Charts of these gas prices are provided in Exhibit No. \_\_\_\_ (WJE-5C) for Phase I and Exhibit No. \_\_\_\_ (WJE-16C) for Phase II, and charts of the resulting power prices are provided in Exhibit No. \_\_\_\_ (WJE-6C) and Exhibit No. \_\_\_\_ (WJE-17C), respectively.

**Q. Can AURORA be used to analyze new additions to a specific utility's electric resource portfolio?**

A. Yes, AURORA can be used to analyze new additions to a specific utility's electric resource portfolio--but not efficiently. First, AURORA produces large output data sets that are time-consuming to evaluate a large number of resources, scenarios and alternatives. Second, AURORA does not have sophisticated capabilities to model fixed costs associated with the acquisition of potential new resources to a utility's portfolio, including but not limited to a utility's specific financial and regulatory environment, which makes it difficult to compare total (fixed and variable) costs for different resource portfolio strategies.

1 To evaluate alternative resource portfolios PSE uses the Portfolio Screening  
2 Model.

3 **C. The Portfolio Screening Model**

4 **1. Overview**

5 **Q. Please describe the Portfolio Screening Model.**

6 A. PSE used a dedicated, PSE-specific model called the Portfolio Screening Model  
7 to analyze cost and risk for various portfolio-planning levels in PSE's resource  
8 planning efforts for the 2003 and 2005 Least Cost Plans. *See generally* Exhibit  
9 No. \_\_\_\_ (EMM-4) at pages 641-668.

10 As mentioned earlier, the Portfolio Screening Model is a Microsoft Excel-based,  
11 hourly dispatch, simulation model that the Company developed to evaluate  
12 incremental cost and risk for a wide variety of resource alternatives and portfolio  
13 strategies. The Portfolio Screening Model calculates the incremental portfolio  
14 costs of resources required to serve load. Incremental cost includes: (i) the  
15 variable fuel cost and emissions for PSE's existing fleet, (ii) the variable cost of  
16 fuel emissions and operations and maintenance for new resources, (iii) the fixed  
17 depreciation and capital cost of investments in new resources, (iv) the book cost  
18 and offsetting market benefit remaining at the end of the 20 year model horizon,  
19 and (v) the market purchases or sales in hours when resources are deficient or  
20 surplus to PSE's need.

1 **Q. Why did PSE decide to develop and use the Portfolio Screening Model?**

2 A. As part of the development of the 2003 Least Cost Plan, PSE sought a modeling  
3 tool that could

4 (i) quickly evaluate and compare results for a wide range and large  
5 number of alternative resource strategies;

6 (ii) calculate variable costs for all resources, including existing and  
7 new resources, as well as fixed costs for new resources (as noted  
8 above, AURORA does not address fixed costs for new resources  
9 added to a utility's portfolio);

10 (iii) perform probabilistic analyses of several key uncertainty factors,  
11 including multiple correlations among uncertainty factors; and

12 (iv) address other topics, such as end effects for resource alternatives  
13 that have varying lives.

14 Based on these specialized needs, PSE determined that a dedicated computer  
15 model would provide the most effective solution.

16 **Q. How has the Portfolio Screening Model been used by PSE in past resource  
17 planning and acquisition processes?**

18 A. PSE first used the Portfolio Screening Model in the Company's 2003 Least Cost  
19 Plan and subsequently used the model to evaluate alternative resources in the  
20 process that resulted in the acquisition of a 49.85% interest in the Frederickson 1  
21 generating facility.

22 PSE also used the Portfolio Screening Model to analyze offers received in  
23 response to the Company's 2004 RFP and in (i) the acquisition of the Hopkins

1 Ridge Wind Project, (ii) the acquisition of the Wild Horse Wind Project, (iii) the  
2 purchased power agreement and related transmission agreement with the Public  
3 Utility District No. 1 of Chelan County, Washington, for the Rocky Reach and  
4 Rock Island hydropower resources and (iv) other smaller purchased power  
5 agreements.

6 Most recently, PSE employed the Portfolio Screening Model in its 2005 Least  
7 Cost Plan, to analyze offers received in response to the Company's 2005 RFP,  
8 and to support the acquisition of the Goldendale Generating Station.

9 **Q. What types of resource planning issues did PSE address with the Portfolio**  
10 **Screening Model?**

11 A. In the planning process, PSE uses the Portfolio Screening Model to evaluate  
12 various combinations of generic electric resources to meet the Company's need  
13 for new resources. PSE used this analysis to develop a long-term strategy for  
14 types, amounts and timing of new electric resource additions.

15 In the acquisition process, PSE uses the Portfolio Screening Model to evaluate  
16 resource cost, overall portfolio cost of specific resource offers, and combinations  
17 of those offers.

18 /////

19 /////



1           2.     Assumptions Used by the Company in the Portfolio Screening  
2                 Model

3     **Q.     What assumptions does the Company use in the Portfolio Screening Model**  
4           **(“PSM”) and how do those differ from the PSM assumptions used in the**  
5           **2005 Least Cost Plan?**

6     A.     The primary input assumptions to the PSM are

- 7                 (i)     PSE’s existing portfolio,  
8                 (ii)    projected gas and power prices,  
9                 (iii)   costs of generic resources,  
10                (iv)   financial assumptions such as cost of capital and escalation rates,  
11                (v)    variability of prices, and  
12                (vi)   a generic resource mix that is assumed if no specific resource is  
13                       added to the portfolio.

14           Except for power and gas prices, which are addressed below, the Company used  
15           the same assumptions in the Portfolio Screening Model for the 2005 RFP as was  
16           used for the 2005 Least Cost Plan.

17           During the planning and acquisition process, PSE discovered certain  
18           improvements or corrections to the Portfolio Screening Model. Additionally, the  
19           Company seeks to improve the Portfolio Screening Model incrementally by  
20           making logic changes. A list of model logic and data updates is provided in  
21           Exhibit No. \_\_\_\_ (RG-3HC) at pages 180-184.

1 **Q. Please describe how the generic portfolio is used in the Portfolio Screening**  
2 **Model to calculate portfolio benefit.**

3 A. The portfolio benefit is calculated as the difference in the total portfolio cost  
4 between (i) Portfolio Screening Model runs using the subject resource or  
5 resources under evaluation and (ii) Portfolio Screening Model runs using the mix  
6 of generic resources. The base Portfolio Screening Model contains PSE's  
7 existing fleet of resources as well as an assumed fleet of generic resources to meet  
8 the planning standard for energy and capacity. The mix of generic resources in  
9 the Portfolio Screening Model is designed to reflect the low cost scenario from  
10 the 2005 Least Cost Plan. The costs associated with the generic resources are  
11 described in Exhibit No. \_\_\_\_ (EMM-4) at pages 660-661.

12 When a resource or group of resources is evaluated in the Portfolio Screening  
13 Model, that resource or group of resources displaces some or all of the generic  
14 resources. Thus, when a resource or group of resources offered in the 2005 RFP  
15 was evaluated in the Portfolio Screening Model, that resource or group of  
16 resources were compared against the low cost Least Cost Plan portfolio.

17 **Q. Do resources or groups of resources offered in the 2005 RFP displace "like-**  
18 **kind" generic resources?**

19 A. Yes, PSE evaluates resources or groups of resources offered in the 2005 RFP by  
20 displacing "like-kind" generic resources in the Portfolio Screening Model:

- (i) renewable resource offers to displace a generic renewable resource from the portfolio so that the Company continues to meet the corporate target of 10% renewable supply by 2013;
- (ii) non-renewable resource offers to displace a mix of generic non-renewable resources that consist of (a) a 50:50 combination of combined cycle combustion turbine and market purchases through calendar year 2015 and (b) a 50:50 mix of combined cycle combustion turbine and a conventional coal plant in calendar year 2016 and beyond; and
- (iii) capacity resources displace a generic gas tolling with a 10.75 high heat rate available October through March.

**3. Output Metrics Generated by the Portfolio Screening Model**

**Q. What are the primary metrics resulting from the Portfolio Screening Model?**

A. The key output metrics from the Portfolio Screening Model are:

1. Levelized Cost – The average annual cost per MWh produced during a 20-year period for each project;
2. Portfolio Benefit – The 20-year present value of all portfolio benefits derived from each project in comparison to the 2005 Least Cost Plan generic portfolio;
3. Portfolio Benefit Ratio – The present value of Portfolio Benefit divided by the present value of project revenue requirements; and
4. Ten Worst Trials Cost – The average of the incremental portfolio cost for the 10 worst trial runs amongst 100 total trial runs is used as a metric of risk.

From a quantitative perspective, the Company prefers projects with lower levelized costs, higher portfolio benefits, and higher benefit ratios. While each of these three key output metrics was used in selecting projects for the Candidate

1 Short List, the portfolio benefit ratio was the primary metric used to select the  
2 best resources from each fuel type. Exhibit No. \_\_\_\_ (WJE-7HC) and Exhibit  
3 No. \_\_\_\_ (WJE-8HC) provide details of the analyses of each metric in the Phase I  
4 analysis. Exhibit No. \_\_\_\_ (WJE-4HC) provides the portfolio benefit ratios for a  
5 sample of the responses to the 2005 RFP.

6 **Q. Please explain the levelized cost metric.**

7 A. The levelized cost metric is the level, non-escalating, cost (in dollars per MWh  
8 over the 20-year model horizon) that will recover all the revenue requirements for  
9 operating, fixed, emission, and administrative costs spread over the projected  
10 generation for a project. The levelized cost metric is easy to understand and a  
11 relatively good comparative measure but may not tell the entire story of how well  
12 a resource fits into the Company's portfolio. For example, an on-peak winter  
13 seasonal power purchase agreement may have a high levelized cost but be an  
14 excellent fit within PSE's portfolio.

15 **Q. Please explain the portfolio benefit metric.**

16 A. The portfolio benefit metric is the difference of the incremental portfolio cost  
17 with the tested resource compared with the incremental portfolio cost if the tested  
18 resource is replaced by the 2005 Least Cost Plan generic resource costs. The  
19 portfolio benefit metric provides an absolute measure of the increase or decrease  
20 in cost that a resource contributes to the Company's overall portfolio. The

1 portfolio benefit metric alone, however, may obscure relative results. For  
2 example, a large, high cost project may produce slightly more incremental  
3 portfolio benefit than a smaller, lower cost project. Although the portfolio benefit  
4 may be larger, this measure alone obscures the results by not identifying the  
5 project with the bigger benefit to cost ratio.

6 **Q. Please explain the portfolio benefit ratio metric.**

7 A. The portfolio benefit ratio metric corrects the bias resulting from plant size  
8 inherent in the portfolio benefit metric by dividing the portfolio benefit by the  
9 resource cost (i.e., its present value of revenue requirements). Nevertheless, the  
10 portfolio benefit ratio metric is not without its problems. For example, two  
11 similar sized projects may provide the same capacity benefit but the more  
12 efficient project is dispatched more often and has higher absolute costs thus  
13 lowering its portfolio benefit ratio.

14 **Q. Please explain the ten worst trials cost metric.**

15 A. The ten worst trials cost metric is the average of the 10 highest cost trials out of  
16 100 total trials resulting from the Monte Carlo simulation runs of the Portfolio  
17 Screening Model. The cost is the incremental portfolio cost discussed above.  
18 The ten worst trials cost metric is useful in determining risk of individual  
19 resources or combination of resources in PSE's portfolio.

20 /////

1 **Q. How does PSE interpret these key metrics?**

2 A. Each metric provides information about the cost and benefit of the resource being  
3 evaluated, and PSE did not rely on a single metric. Instead, PSE examined each  
4 of the metrics separately and interpreted the overall value of a resource or group  
5 of resources.

6 **III. 2005 RFP PHASE I QUANTITATIVE ANALYSIS**

7 **A. Overview of Phase I Quantitative Evaluation Process**

8 **Q. Please provide an overview of the stages of PSE's quantitative evaluation**  
9 **process in Phase I of the 2005 RFP.**

10 A. PSE received responses to its 2005 RFP in January of 2006. PSE began its  
11 Phase I analysis in January of 2006, and the Phase I process culminated in the  
12 creation of the Candidate Short List in April of 2006.

13 **Q. How many proposals did the Company evaluate in Phase I of its 2005 RFP?**

14 A. PSE received 48 project proposals from 38 different owners/developers in  
15 response to the 2005 RFP. Many of the proposals contained multiple offers such  
16 as power purchase agreements, asset ownership, and hybrid options. For a  
17 complete list of these proposals, please see Exhibit No. \_\_\_\_ (RG-3HC) at  
18 pages 168-172.

1 In addition to the 48 project proposals, PSE received seven additional proposals  
2 either prior to or during the Phase I of the 2005 RFP process. PSE evaluated  
3 these “unsolicited” proposals alongside the proposals to the 2005 RFP to  
4 determine the best resource options for PSE. Among the “unsolicited” proposals  
5 offered was the Goldendale Generating Station, a Montana coal plant, four wind  
6 projects and a single proposal with multiple system power purchase agreement  
7 alternatives.

8 In total, PSE evaluated 120 individual resource alternatives with the Portfolio  
9 Screening Model in Phase I of the 2005 RFP.

10 **Q. What was the Company’s goal in the quantitative analysis in Phase I of the**  
11 **2005 RFP?**

12 A. The Company’s goal for the Phase I quantitative screening was to identify a  
13 Candidate Short List with the top resource offers from each fuel category.

14 **Q. Why did the Company select resource offers from each fuel category?**

15 A. The Company identified the best projects in each fuel category to prevent against  
16 screening out good projects before the Company had a chance to evaluate the  
17 costs and benefits of these projects under the variable price scenarios and  
18 dynamic Monte Carlo simulations performed in Phase II.

19 /////

1 **Q. Into what types of fuel groups did the Company categorize the resources?**

2 A. PSE grouped the resources offered into the following five categories:

- 3 1. Renewable Resources – Projects fueled with renewable resources,  
4 including but not limited to wind, hydro, geothermal and landfill  
5 gas resources;
- 6 2. Natural Gas Resources – Projects fueled with natural gas  
7 resources, whether ownership offers or tolling contracts;
- 8 3. Coal Resources – Projects fueled with coal resources, including  
9 but not limited to conventional coal and integrated gasification  
10 combined cycle resources;
- 11 4. Capacity Resources – Projects that typically have quick starting  
12 and flexible operation characteristics, and are generally less  
13 efficient than other energy resources. Capacity resources may also  
14 be heat rate call option power purchase agreements that because of  
15 the strike price terms are usually only scheduled for a few peak  
16 hours in the winter season; and
- 17 5. System Power Purchase Agreements – System power purchase  
18 agreements, including but not limited to fixed price, index priced  
19 and financial option contracts.

20 After each resource was placed into the above categories, PSE used the Portfolio  
21 Screening Model to evaluate each proposal to determine the Candidate Short List  
22 for Phase II analysis.

23 /////

24 /////

25 /////



**B. Phase I Gas Price and Power Price Assumptions**

**Q. How does the Company's Phase I levelized gas price assumption compare with the levelized gas price assumption in the 2005 Least Cost Plan?**

A. The levelized gas price assumption used by PSE in Phase I (\$[REDACTED] per MMBtu) was significantly higher than the levelized gas price assumption used by PSE in the 2005 Least Cost Plan (\$5.40 per MMBtu). Exhibit No. \_\_\_\_ (WJE-5C) illustrates this significant increase in gas price assumptions.

**Q. Why is the levelized gas price assumption used by PSE in Phase I significantly higher than the levelized gas price assumption used by PSE in the 2005 Least Cost Plan?**

A. The levelized gas price assumption used by PSE in Phase I is significantly higher than the levelized gas price assumption used by PSE in the 2005 Least Cost Plan because the levelized gas price assumption used by PSE in Phase I is based upon more recent data. For the 2005 Least Cost Plan, PSE used a levelized gas price derived from the December 2004 long-term natural gas price forecast from CERA "Business As Usual". For Phase I of the 2005 RFP, PSE used a levelized gas price derived from the December 2005 long-term natural gas price forecast from Global Insight. Additionally, PSE used an average forward price of natural gas for calendar years 2007 through 2010 that was derived from Kiindex forward price data for July 20, 2005 through December 19, 2005.

1 **Q. How does the Company's Phase I power price assumption compare with the**  
2 **power price assumption in the 2005 Least Cost Plan?**

3 A. Due in large part to the substantial increase in the levelized gas price assumption  
4 discussed above, the AURORA forecast of Mid-C power prices significantly  
5 increased over those from the 2005 Least Cost Plan "Business as Usual" scenario.  
6 Exhibit No. \_\_\_\_ (WJE-6C) illustrates the increase in power prices.

7 **C. Phase I Quantitative Results**

8 **Q. Please provide a summary of the levelized cost calculated in Phase I for the**  
9 **resources offered in the 2005 RFP.**

10 A. The following graph summarizes the levelized cost of resource types proposed in  
11 the 2005 RFP, compared with the similar levelized cost of resource types  
12 submitted in response to the 2003 RFP:<sup>1</sup>

13 /////

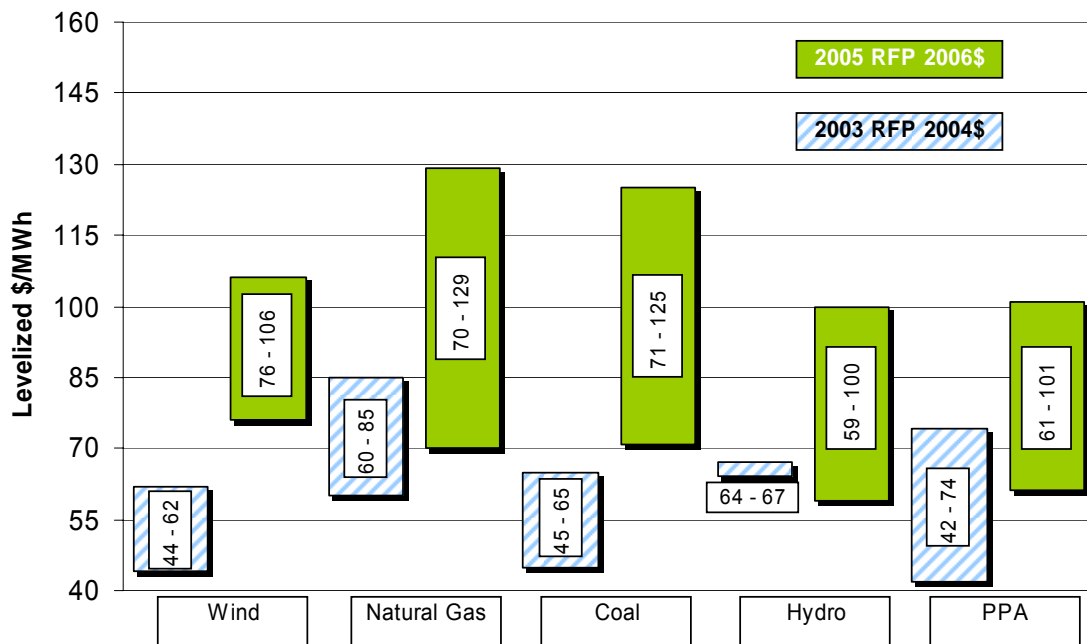
14 /////

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<sup>1</sup> The range of levelized costs associated with purchase power agreements in the above graph represents fixed price offers only and is inclusive of imputed debt but does not include credit.



It should be noted that several important differences exist between the ranges of levelized costs from 2003 RFP and the ranges of levelized costs from the 2005 RFP. First, the ranges of levelized costs associated with the 2003 RFP are presented in 2004 dollars, whereas the ranges of levelized costs associated with the 2005 RFP are presented in 2006 dollars. Second, the ranges of levelized costs associated with the 2003 RFP assumed a common delivery point at the Mid-C, whereas the ranges of levelized costs associated with the 2005 RFP assumed a common delivery point at the PSE system.

Even accounting for these differences, the levelized costs of resources proposed to PSE in the 2005 RFP were significantly higher than the the levelized costs of resources proposed to PSE in the 2003 RFP. Exhibit No. \_\_\_\_ (WJE-7HC) provides a table of results for the Phase I evaluation of resources, and Exhibit

1 No. \_\_\_\_ (WJE-8HC) provides a table of results for the Phase I evaluation of power  
2 purchase agreements not tied to specific resources.

3 **Q. What were the results of the Phase I quantitative evaluation of resources in**  
4 **the Renewable Resources category?**

5 A. The Phase I evaluation process resulted in the recommendation that six resources  
6 in the Renewable Resources category (four wind projects, a hydro project, and a  
7 geothermal purchase power agreement) be placed on the Candidate Short List.  
8 Exhibit No. \_\_\_\_ (WJE-9HC) provides the levelized cost, absolute portfolio benefit  
9 (or cost), and the benefit ratio for resources in the Renewable Resources category.

10 **Q. What were the results of the Phase I quantitative evaluation of resources in**  
11 **the Natural Gas Resources category?**

12 A. The Phase I evaluation process resulted in the recommendation that four natural  
13 gas-fired projects, ranging from ownership to tolling power purchase agreements,  
14 be placed on the Candidate Short List. Because one of the natural gas-fired plants  
15 offered four tolling options, the Company actually had seven natural gas-fired  
16 alternatives on the Candidate Short List. Of these natural gas-fired alternatives on  
17 the Candidate Short List, the Goldendale Generating Station had the lowest  
18 levelized cost. Exhibit No. \_\_\_\_ (WJE-10HC) provides the levelized cost, absolute  
19 portfolio benefit (or cost), and the benefit ratio for resources in the Natural Gas  
20 Resources category.

1 **Q. What were the results of the Phase I quantitative evaluation of resources in**  
2 **the Coal Resources category?**

3 A. The Phase I evaluation process resulted in the recommendation that two resources  
4 from the Coal Resources category (one power purchase agreement and one  
5 proposed development in Montana) be placed on the Candidate Short List. PSE's  
6 Phase I quantitative analysis revealed that all coal or integrated gasification  
7 combined cycle resources had benefit ratios below 0.14. If it were not for PSE's  
8 goal of testing resources from each fuel group in Phase II under various pricing  
9 scenarios, PSE would have not selected any coal or integrated gasification  
10 combined cycle resources for the Candidate Short List. Exhibit No. \_\_\_\_ (WJE-  
11 11HC) provides the levelized cost, absolute portfolio benefit (or cost), and the  
12 benefit ratio for resources in the Coal Resources category.

13 **Q. What were the results of the Phase I quantitative evaluation of resources in**  
14 **the Capacity Resources category?**

15 A. The Phase I evaluation process resulted in the recommendation that one resource  
16 from the Capacity Resources category be placed on the Candidate Short List.  
17 Exhibit No. \_\_\_\_ (WJE-12HC) provides the levelized cost, absolute portfolio  
18 benefit (or cost), and the benefit ratio for resources in the Capacity Resources  
19 category.

20 /////

1 **Q. What were the results of the Phase I quantitative evaluation of resources in**  
2 **the System Power Purchase Agreement category?**

3 A. The Phase I evaluation process resulted in the recommendation that power  
4 purchase agreements from three counterparties from the System Power Purchase  
5 Agreement category be placed on the Candidate Short List. Even though the  
6 analysis horizons for the KW model (through 2008) and the Portfolio Screening  
7 Model (twenty years) were different, the results indicate that the same projects  
8 should be recommended for the Candidate Short List.

9 Exhibit No. \_\_\_\_ (WJE-13HC) provides the levelized cost, absolute portfolio  
10 benefit (or cost), and the benefit ratio for resources in the system power purchase  
11 agreements category evaluated in the Portfolio Screening Model. In each chart,  
12 the first three green columns indicate the index priced offer system power  
13 purchase agreements, the next ten blue columns indicate the heat rate call option  
14 system power purchase agreements, the striped columns indicate the fixed price,  
15 and the last four columns indicate the exchange and call option system power  
16 purchase agreements. The stars in the charts indicate those system power  
17 purchase agreements recommended for the Candidate Short List by the  
18 KW model.

19 ////

20 ////

1 **Q. What is the KW Model, and why did the Company use this model to evaluate**  
2 **resources in the System Power Purchase Agreement category?**

3 A. The KW model is one of the tools described generally in the testimony of  
4 David E. Mills, Exhibit No. \_\_\_\_ (DEM-1HCT) at page 7, and is used by the  
5 operations group to manage the Company's short and long portfolio positions.  
6 PSE also used the KW model to evaluate shorter-term resources in the System  
7 Power Purchase Agreement category in addition to the Portfolio Screening  
8 Model. Although the KW model could only test power purchase agreements or  
9 financial options through calendar year 2008, the results provided insight into  
10 whether or not such arrangements benefited the portfolio risk management  
11 performed by the operations group. The results of the KW model are shown in  
12 Exhibit No. \_\_\_\_ (WJE-14HC). The horizontal X axis is similar to the portfolio  
13 benefit ratio. The vertical Y axis is a reduction in risk (a measure performed in  
14 Phase II with the Portfolio Screening Model). The circle encompasses those  
15 PPAs preferred by the operations group because they reduced power cost risk and  
16 earnings risk.

17 /////

18 /////

19 /////

20 /////

1                                   **IV.     2005 RFP PHASE II QUANTITATIVE ANALYSIS**

2   **A.     Update of Candidate Short List**

3   **Q.     Was the list of projects analyzed the same as the list that was selected for the**  
4           **Candidate Short List at the end of Phase I evaluations?**

5   A.     No. The Phase I quantitative evaluation resulted in recommendations that  
6           16 resources (13 resources and 3 power purchase agreements) be placed on the  
7           Candidate Short List.

8           PSE analyzed 16 resources in the Phase II quantitative analysis, but a few of the  
9           resources from the Candidate Short List were removed and a few other resources  
10          were added. For example, PSE removed three wind plants on the Candidate Short  
11          List for three different reasons: one wind project was sold to another utility, one  
12          wind project encountered significant permitting challenges, and one wind project  
13          was withdrawn because the developer redeployed turbines to another area of the  
14          U.S.

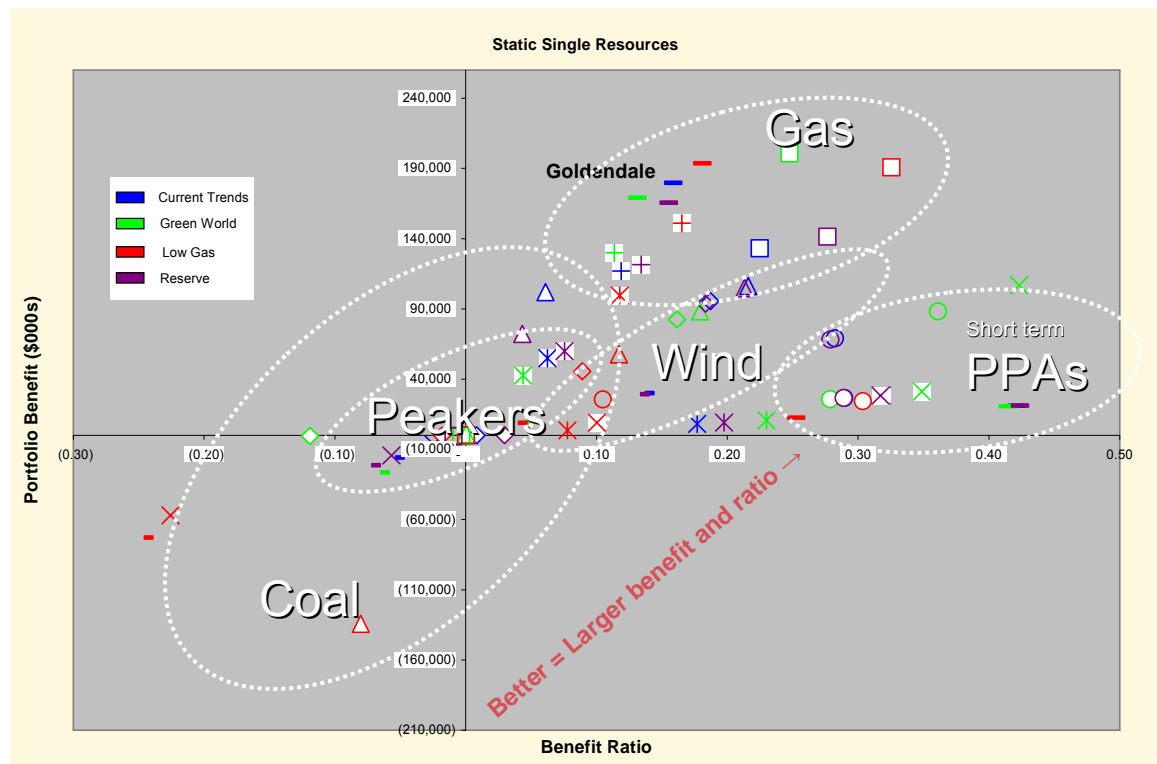
15          PSE added three projects for analysis in Phase II: one power purchase agreement  
16          associated with a wind project already on the Candidate Short List, one wind  
17          project ownership (to provide a second wind plant for comparison), and one index  
18          priced seasonal on-peak power purchase agreement. Exhibit No. \_\_\_\_ (WJE-  
19          15HC) provides a table of resources evaluated in Phase II.



**B. Phase II Analysis Overview**

**Q. Please summarize the Phase II quantitative analysis.**

A. The Phase II quantitative analysis evaluated the 16 projects from the revised Candidate Short List and seven portfolios of resource combinations. As will be discussed in more detail later, the Phase II analysis was done using four different pricing scenarios in both (i) the static, point price forecast mode and (ii) a dynamic, Monte Carlo simulation of price hydro and wind variability mode. Exhibit No. \_\_\_\_ (RG-7HC) at page 6 provides the results of the static analysis for the Candidate Short List. A redacted version of the same graph, showing only the Goldendale data label, is shown below.



1 **Q. How did the Phase II quantitative analysis differ from the Phase I**  
2 **quantitative analysis?**

3 A. Like the Phase I quantitative analysis, the Phase II quantitative analysis used the  
4 Portfolio Screening Model, but the Phase II quantitative analysis used four price  
5 scenarios instead of one. In addition, PSE also used the Portfolio Screening  
6 Model to run Monte Carlo simulations in Phase II to check the cost variability and  
7 risk as measured with the 10 worst trials. Variability of portfolio cost results  
8 from power and gas price volatility as well as hydro and wind generation  
9 volatility. Finally, the Phase II quantitative analysis includes an analysis of  
10 combinations of projects on the Candidate Short List to evaluate the portfolio  
11 interaction of resources.

12 **C. Phase II Gas Price and Power Price Assumptions**

13 **Q. What were the levelized gas price and levelized power price assumptions**  
14 **used in the Phase II quantitative analyses?**

15 A. PSE developed four different price scenarios based upon three gas price forecasts  
16 and tested the resources in the revised Candidate Short List under each of the four  
17 scenarios. PSE used gas price input from three Global Insight Forecasts of  
18 December 2005 combined with Kiindex forward marks for the scenarios. *See*  
19 Exhibit No. \_\_\_\_ (WJE-16C).

20 ////

1 The gas prices indicated in Exhibit No. \_\_\_\_ (WJE-16C), in combination with the  
2 AURORAxmp model, Version 8.0 and AURORAxmp database  
3 North\_Amer\_DB\_2005.02, resulted in scenario levelized power prices that range  
4 from a levelized power price low of \$57/MWh in the Low Gas Price Scenario to a  
5 levelized power price high of \$88/MWh in the Green World High Price Scenario.  
6 See Exhibit No. \_\_\_\_ (WJE-17C).

7 Exhibit No. \_\_\_\_ (WJE-18C) illustrates the annual calculation of heat rate,  
8 calculated as the annual power price divided by annual gas price. This annual  
9 heat rate is an indicator of the relative benefit of a natural gas fired plant in the  
10 market. The higher the market heat rate, the more likely a gas plant is being  
11 dispatched and providing value to the portfolio.

12 **D. Phase II Results of Four Price Scenarios**

13 **Q. What are the portfolio benefits of the projects on the Candidate Short List**  
14 **under the variable price scenarios analyzed in Phase II?**

15 A. As previously discussed, PSE developed four price scenarios (“Current Trends,”  
16 “Green World,” “Low Gas Price,” and “Reserve”) and tested each resource under  
17 each scenario. Exhibit No. \_\_\_\_ (WJE-19HC) provides a plot of the portfolio  
18 benefit (vertical axis) and portfolio benefit ratio (horizontal axis) for all four price  
19 scenarios. The Goldendale Generating Station has the highest portfolio benefit in  
20 all price scenarios.

1 Based upon the metrics of portfolio benefit and portfolio benefit ratio for all price  
2 scenarios, the best resources were gas, wind and power purchase agreements.

3 Although each project had a range of outcomes based on the price scenario, some  
4 types of projects have more variability than others. For example, the results for  
5 coal vary widely because coal projects do not perform as well in the Low Gas  
6 Price and Green World scenarios as they do in the Current Trends scenario.

7 Another project with wide variability was hydro. In the Green World scenario,  
8 the hydro project performs well and contributes portfolio benefit and a high  
9 benefit ratio. In a Low Gas Price scenario, however, the relatively high fixed  
10 price of hydro does not perform as well. PSE used Exhibit No. \_\_\_\_ (WJE-19HC)  
11 to understand the nature of a project across price scenarios.

12 **Q. How do the Candidate Short List projects compare on a levelized cost basis?**

13 A. Exhibit No. \_\_\_\_ (WJE-20HC) provides the levelized cost of the Candidate Short  
14 List resources. The Goldendale Generating Station has the lowest cost of the  
15 four-gas fired resources. Resources with lower levelized cost than Goldendale  
16 include wind power purchase agreements, a coal plant power purchase agreement  
17 and system power purchase agreements. Although these power purchase  
18 agreements have lower levelized costs, they do not provide the operational  
19 flexibility provided by the Goldendale Generating Station.

20 /////

1 **E. Analysis of Portfolio Combinations of Projects on the Candidate**  
2 **Short List**

3 **Q. Please describe the seven portfolios PSE examined and the basis for those**  
4 **combinations.**

5 A. PSE combined the individual resources on the Candidate Short List into portfolios  
6 to test the interaction between resources and possible incremental benefits to  
7 PSE's overall portfolio. PSE developed the seven portfolios to meet the  
8 following criteria or address a specific question:

- 9 1. Add resources to meet, or come close to meeting, the B2 Standard  
10 for energy need that is defined as resources sufficient to meet the  
11 average energy in the most deficit winter months. This standard  
12 was developed in the Company's 2003 Least Cost Plan;
- 13 2. Meet Renewable Portfolio Standard of 9% renewables by 2016 and  
14 15% renewables by 2020, as implemented by Washington  
15 Initiative 937;
- 16 3. Test portfolio cost and risk of owning new gas plant(s) versus  
17 contracting via power purchase agreements;
- 18 4. Test incremental benefit of resources on the Candidate Short List  
19 by adding and subtracting from portfolios;
- 20 5. Test portfolio cost and risk of resources on the Candidate Short  
21 List that most closely approximate the 10% wind plus  
22 approximately equal mix of coal and gas from the 2005 Least Cost  
23 Plan; and
- 24 6. Test portfolio cost and risk of choosing long lead projects with  
25 bridge power purchase agreements.

26 /////

1 **Q. What are the resources contained in the portfolios?**

2 A. Exhibit No. \_\_\_\_ (WJE-21HC) displays the resources and portfolios. (A “Y”  
3 indicates that the resource was included in the portfolio.)

4 **Q. What were the results of the portfolio analysis?**

5 A. PSE compared each of the seven portfolios against the cost of the generic  
6 portfolio as defined by the 2005 Least Cost Plan. This is the same analysis  
7 approach as used to evaluate the individual resources. Exhibit No. \_\_\_\_ (WJE-  
8 22HC) shows the seven portfolios in each of the four price scenarios.

9 **F. Use of Monte Carlo Simulation to Evaluate Risk**

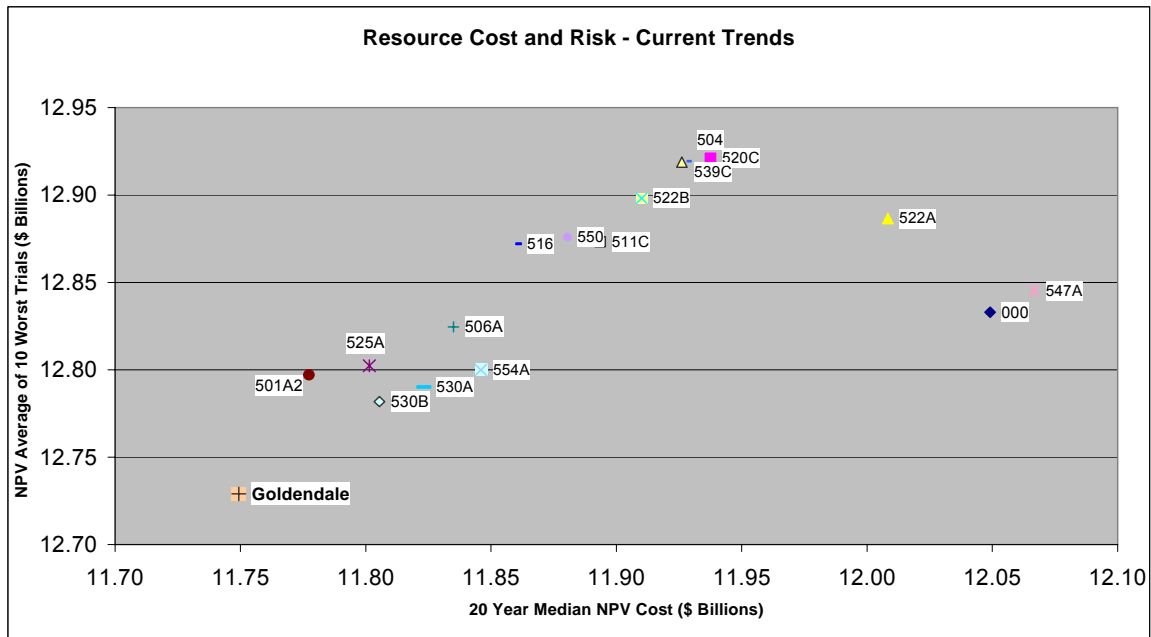
10 **Q. Please describe the Monte Carlo analysis used by PSE to judge risk.**

11 A. As part of the Phase II quantitative analysis, the Company performed a Monte  
12 Carlo analysis with the Portfolio Screening Model. In performing a Monte Carlo  
13 analysis, the Company allowed the assumptions of power prices, gas prices, hydro  
14 generation, and wind generation to vary along assumed distributions to simulate  
15 possible future conditions. The result of 100 iterations of the Portfolio Screening  
16 Model represents a distribution of portfolio cost and distribution of the benefit of  
17 the proposed resource to PSE’s portfolio. For a description of the assumed  
18 distributions and volatility, please see the Company’s 2005 Least Cost Plan,  
19 Exhibit No. \_\_\_\_ (EMM-4) at page 249. Sample results of the Monte Carlo

analysis of the Current Trends pricing scenario are provided in Exhibit No. \_\_\_\_ (WJE-23HC).

**Q. How was the portfolio risk measured?**

A. Portfolio risk is measured as the average of the incremental portfolio cost for the 10 highest cost Monte Carlo simulations. As shown in Exhibit No. \_\_\_\_ (WJE-23HC), the Goldendale Generating Station has the lowest portfolio cost and lowest risk in the Monte Carlo simulation for the Current Trends price scenario. A redacted version of Exhibit No. \_\_\_\_ (WJE-23HC) below indicates that, over the 100 Monte Carlo iterations, the Goldendale Generating Station had the lowest incremental portfolio cost (left most on horizontal axis) and lowest risk as measured by the average of the ten highest cost Monte Carlo simulations (lowest on vertical axis).



1 Similar results are observed in the other price scenarios. See for example the  
2 presentation made to the WUTC Staff at a meeting held on October 13, 2006,  
3 Exhibit No. \_\_\_\_ (RG-9HC).

4 **Q. Were the seven portfolios also tested in Monte Carlo simulation?**

5 A. Yes, Exhibit No. \_\_\_\_ (WJE-24HC) provides the results for the Current Trends,  
6 Green World and Low Gas Price scenarios. Portfolios #1, #4 and #5 consistently  
7 have slightly lower cost and lower risk than the other portfolios. Those three  
8 portfolios contain the Goldendale Generating Station or another similar sized  
9 natural gas fired resource.

10 **G. Analysis of "Self Build" Alternative**

11 **Q. Did the Company evaluate a "Self Build" alternative?**

12 A. Yes. The responses to the 2005 RFP included several self-build alternatives. The  
13 self-build proposals can be divided into two types--each requiring different levels  
14 of PSE involvement in both the development activities and the construction build-  
15 out. Under the first type of proposal, PSE would play an instrumental role in the  
16 remaining development activities and fund the cost of completing the project with  
17 the developer. Under the second type of proposal, PSE would purchase existing  
18 development assets from the developer and complete the project on its own. Each  
19 type of proposal would result in PSE owning the project. In some alternatives,  
20 the ownership of the project would be transferred to PSE early at the development



1 stage, and, in other alternatives, the transfer of ownership to PSE would occur at  
2 the completion of the project. For a further description of self-build and  
3 quantitative results, please see Exhibit No. \_\_\_\_ (RG-3HC) at pages 174-79.

4 **H. Conclusion of Phase II Quantitative Analysis**

5 **Q. Which projects were short-listed for acquisition?**

6 A. PSE placed ten resource alternatives on the Short List for further negotiations,  
7 consisting of a geothermal purchased power agreement, a hydro generation  
8 resource, a purchased power agreement and ownership option of a wind project, a  
9 natural gas tolling, two natural gas ownership alternatives, one small natural gas  
10 capacity peaking plant, and two fixed price purchased power agreements. *See*  
11 Exhibit No. \_\_\_\_ (WJE-25HC).

12 **V. QUANTITATIVE EVALUATION OF GOLDENDALE**  
13 **FACILITY SUBSEQUENT TO PHASE II**

14 **A. Updates Subsequent to the Phase II Analysis**

15 **Q. Did the Company update its analysis of the Short List projects subsequent to**  
16 **Phase II analysis for the 2005 RFP process?**

17 A. Yes. The Company updated the gas price input in its AURORA price forecast. In  
18 August 2006, the company received a new Global Insight Reference Price  
19 Update. PSE uses the Global Insight forecast for its price inputs for calendar

1 years 2012 through 2026. For near term prices (i.e., calendar years 2007 through  
2 2011), the Company used a three-month average (May 26, 2006 through August  
3 25, 2006) of Kiodex forward prices. The August update included forward marks  
4 for one additional year based on availability of extended forward marks from  
5 Kiodex. In addition to the gas price update, PSE received a new release of  
6 AURORA in July 2006. In AURORAxmp v8.2, EPIS added a feature to build to  
7 zone and pool reserve margins. In early September 2006, PSE starting including  
8 a zone reserve margin of 15% in its runs. This new release of AURORA also  
9 included a new database, North American DB 2006.01. The reduction in annual  
10 market heat rates occurred with the introduction of the new database and reserve  
11 margins. Exhibit No. \_\_\_\_ (WJE-26C) provides the August price update and  
12 impact on resource metrics.

13 **Q. How did these updated prices affect the Portfolio Screening Model metrics?**

14 A. When price forecasts or other significant assumptions have changed on Short List  
15 projects, the Company made an effort to continue to compare the resources to  
16 both generics and to other 2005 RFP projects.

17 /////

18 /////

19 /////

1 **B. Goldendale Generaing Station Analysis Summary**

2 **Q. Does the analytical analysis support the acquisition of the Goldendale**  
3 **Generating Station?**

4 A. Yes. Exhibit No. \_\_\_\_ (WJE-27HC) indicates levelized cost and portfolio benefit  
5 for the final bid price for the Goldendale Generating Station along with current  
6 assumptions regarding transmission. Page 1 of Exhibit No. \_\_\_\_ (WJE-27HC)  
7 shows the August update pricing.<sup>2</sup> Although this is a more recent gas price  
8 forecast, it should be considered yet another price scenario with which to review  
9 the performance of the Short List projects. Pages 2 and 3 of Exhibit  
10 No. \_\_\_\_ (WJE-27HC) illustrate the updated pricing for the Goldendale Generating  
11 Station in the Green World and Current Trends price scenarios.

12 The portfolio benefit and levelized cost for the Goldendale Generating Station in  
13 the August update, Green World and Current Trends price scenarios are among  
14 the most favorable of the projects on the final Short List. Under the August  
15 update scenario, the Goldendale Generating Station creates portfolio savings of  
16 \$ [REDACTED] million, and the levelized cost of \$ [REDACTED] /MWh is reasonable relative to  
17 other gas-fired generation.

**REDACTED  
VERSION**

18 The Current Trend price scenario in Phase II demonstrate that the Goldendale

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<sup>2</sup> Please note that the axes on the graphs in Exhibit No. \_\_\_\_ (WJE-27HC) are different than the axes used in previous graphs. The axes used in Exhibit No. \_\_\_\_ (WJE-27HC) illustrate both levelized cost (vertical axis) and portfolio benefit (horizontal axis).

1 Generating Station creates portfolio savings in excess of \$ [REDACTED] million with a  
2 levelized cost of \$ [REDACTED]/MWh. In the Green World scenario, the Goldendale  
3 Generating Station creates portfolio savings of \$ [REDACTED] million with a levelized cost  
4 of \$ [REDACTED]/MWh, even with significant emission cost risk associated with the natural  
5 gas-fired project. The risk of the Goldendale Generating Station, as measured by  
6 the ten Worst Trial Cost, is the lowest of the proposals reviewed. The metrics for  
7 all three price scenarios are shown in Exhibit No. \_\_\_\_ (WJE-27HC). The  
8 Goldendale metrics above reflect the final price paid to Calpine as well as revised  
9 cost estimates for electric transmission and gas transportation. With the cost  
10 updates, the levelized cost and portfolio benefit for Goldendale improved relative  
11 to the other resource alternatives shown in the memo dated November 3, 2006, to  
12 the Company's Board of Directors. *See* Exhibit No. \_\_\_\_ (EMM-5HC).

13 **C. Determination of Maximum Bid for Goldendale**

REDACTED  
VERSION

14 **Q. How did the Company analyze the maximum to bid for Goldendale at the**  
15 **bankruptcy auction?**

16 A. The Company established a Portfolio Screening Model with an input variable for  
17 the capital cost for Goldendale. PSE then ran various capital scenarios and  
18 compared the metrics of levelized cost, portfolio benefit and benefit ratio with a  
19 single alternative gas fired resource offered in the RFP analysis. The preliminary  
20 analysis of bid price is provided in Exhibit No. \_\_\_\_ (EMM-5HC) at pages 145-  
21 153. That maximum bid calculation was an "all-in" capital cost of \$ [REDACTED] million

1 or a bid to Calpine of \$[REDACTED] million.

2 PSE performed a subsequent analysis with changes in costs and target comparison  
3 plants. The operating cost of Goldendale was reduced to reflect the transmission  
4 cost reduction resulting from a redirect by the Bonneville Power Administration  
5 from Mid-C to a delivery point on PSE's system. On the target plant side, PSE  
6 included two additional combined cycle combustion turbine plant alternatives  
7 along with a hypothetical combined cycle combustion turbine assumed to be  
8 available to PSE on a "turnkey" basis in calendar year 2007. With these cost and  
9 target changes, a revised maximum bid limit for Goldendale of \$[REDACTED] million  
10 was presented to the Board of Directors on January 9, 2007. *See Exhibit*  
11 No. \_\_\_\_ (EMM-11HC).

REDACTED  
VERSION

12 **Q. How does the purchase of this plant compare to the construction of a new gas**  
13 **plant?**

14 A. PSE purchased the Goldendale Generating Station at an "all in" cost of about  
15 \$120 million, or approximately \$433 per kW. The Company estimates that this  
16 price is half of the estimated cost of a new combined cycle combustion cycle  
17 turbine, based upon offers PSE received in response to the 2005 RFP. It should  
18 be noted that PSE anticipates that new construction costs will increase. In the  
19 2007 Integrated Resource Plan due out in May 2007, PSE has assumed an "all-in"  
20 capital cost for a new combined cycle combustion turbine of \$1,050 per kW.

## VI. CONCLUSION

**Q. Please summarize your conclusions.**

A. In the Phase I analysis, the quantitative team evaluated about 120 different resource alternatives that included unsolicited proposals as well as offers from the 2005 RFP and provided cost and portfolio benefit measures to help screen these down to 16 projects on the Candidate Short List. In Phase II, the Company reviewed 16 projects and seven different portfolios comprised of these 16 projects to evaluate which resource combinations were best in providing portfolio benefits. The Candidate Short List and portfolio combinations were evaluated in four different price scenarios and were also evaluated using a Monte Carlo simulation testing power price, gas price, hydro and wind variability.

All projects on the Candidate Short List lowered PSE's portfolio cost relative to the combination of generic resources that were determined in the 2005 Least Cost Plan to be the low cost portfolio. Of the projects placed on the final Short List, the Goldendale Generating Station provides consistently high portfolio benefits in all price scenarios.

Subsequent to the Phase II analysis, PSE continued to evaluate the Goldendale Generating Station. The company tested an updated gas price scenario that assumed lower market heat rates. PSE also tested the impact of various levels of capital cost to plan for the auction bidding. These subsequent analyses continued to show that the Goldendale Generating Station provides significant benefits to

1 PSE's electric resource portfolio.

2 **Q. Does that conclude your testimony?**

3 A. Yes, it does.