EXHIBIT NO. ___(WJE-3HC)
DOCKET NO. UE-07___/UG-07___
2007 PSE GENERAL RATE CASE
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____** **Docket No. UG-07____**

SECOND EXHIBIT (HIGHLY CONFIDENTIAL) TO THE PREFILED DIRECT TESTIMONY OF W. JAMES ELSEA ON BEHALF OF PUGET SOUND ENERGY, INC.

REDACTED VERSION

DECEMBER 3, 2007

PUGET SOUND ENERGY, INC.

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I. INTRODUCTION

Q. What is the purpose of this exhibit to your prefiled direct testimony?

A. This Exhibit No. ___(WJE-3HC) describes the modeling tools and analyses the Company utilized to evaluate the various resource alternatives that were proposed in response to its 2005 Requests for Proposals (the "2005 RFP") process for additional power resources. That 2005 RFP process led to the acquisition of the Klondike III Wind PPA and the Powerex seasonal PPA, two of the resource acquisitions that are presented for recovery and prudence determination in this proceeding.

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.

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

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

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

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

A. No, the Company used the Portfolio Screening Model for both the Phase I

screening and the Phase II portfolio analysis. The Company used the Acquisition Screening Model for Phase I screening in its 2003 RFP because such model was more streamlined and required less computing power than the Portfolio Screening Model. The Acquisition Screening Model, however, screened potential new resources in isolation from the Company's existing electric resources. For the 2005 RFP, the Company determined that use of the Portfolio Screening Model provided a more thorough screen than did the Acquisition Screening Model because the Portfolio Screening Model evaluates the interaction of potential new resources with the Company's resource portfolio.

B. The AURORA Model

1. Overview

Q. Please describe the AURORA model.

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

AURORA simulates, on an hourly basis, economic dispatch of the regional fleet of generating resources to meet regional electric loads, based on fuel prices and other variable operating costs, inter-regional transmission limitations and other

factors. A primary result produced by AURORA is a long-term forecast of wholesale market prices for power (the "optimization mode") that simulates the addition of new generating resources, as needed, to maintain long-run market equilibrium. The 2005 Least Cost Plan provides a description of the AURORA electric simulation model. *See generally* Exhibit No. ___(KJH-4) at pages 641-668.

Q. Is AURORA a PSE Model?

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

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

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

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

A. Yes. In addition to the market-wide analysis described above, AURORA can simulate hourly economic dispatch of a utility's generation resource portfolio. When used in this mode, AURORA produces forecasts of variable operating costs for the utility's generating resources but does not include all fixed costs for existing or new resources. The Company used this mode of AURORA to forecast

a portion of the power costs included in this filing.

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

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

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

2. <u>Assumptions Used by the Company in AURORA</u>

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

A. For the 2005 Least Cost Plan and the 2005 RFP processes, the Company used AURORAxmp (v. 7.3.0.22), which EPIS released in 2004. For the Phase I

screening analysis, PSE used this version of AURORA to develop a single price scenario that was intended to reflect the following differences from PSE's 2005 Least Cost Plan Current Momentum Scenario:

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

See Exhibit No. ___(RG-3HC) at page 9.

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

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

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

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

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

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

1. Current Trends Price Scenario: Global Insight Reference Case (December 2005) plus Kiodex forwards for calendar years 2007-2010 (average January 12, 2006 through April 11, 2006);

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 Appendix A to this Exhibit No. ___(WJE-3HC). Charts of these gas prices are provided in Appendix B for Phase I and Appendix C for Phase II, and charts of the resulting power prices are provided in Appendix D and Appendix E, 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.

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

C. The Portfolio Screening Model

1. Overview

Q. Please describe the Portfolio Screening Model.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Q. What assumptions does the Company use in the Portfolio Screening Model ("PSM") and how do those differ from the PSM assumptions used in the

2005 Least Cost Plan?

A. The primary input assumptions to the PSM are

(i) PSE's existing portfolio,

(ii) projected gas and power prices,

(iii) costs of generic resources,

(iv) financial assumptions such as cost of capital and escalation rates,

(v) variability of prices, and

(vi) a generic resource mix that is assumed if no specific resource is added to the portfolio.

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

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

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

A. The portfolio benefit is calculated as the difference in the total portfolio cost

between (i) Portfolio Screening Model runs using the subject resource or resources under evaluation and (ii) Portfolio Screening Model runs using the mix of generic resources. The base Portfolio Screening Model contains PSE's existing fleet of resources as well as an assumed fleet of generic resources to meet the planning standard for energy and capacity. The mix of generic resources in the Portfolio Screening Model is designed to reflect the low cost scenario from the 2005 Least Cost Plan. The costs associated with the generic resources are described in Exhibit No. ___(KJH-4) at pages 660-661.

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

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

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

(i) renewable resource offers 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 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 Short List, the portfolio benefit ratio was the primary metric used to select the best resources from each fuel type. Appendix F and Appendix G to this Exhibit No. ____(WJE-3HC) provide details of the analyses of each metric in the Phase I analysis. Appendix H provides the portfolio benefit ratios for a sample of the responses to the 2005 RFP.

Q. Please explain the levelized cost metric.

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

Q. Please explain the portfolio benefit metric.

A. The portfolio benefit metric is the difference of the incremental portfolio cost with the tested resource compared with the incremental portfolio cost if the tested resource is replaced by the 2005 Least Cost Plan generic resource costs. The portfolio benefit metric provides an absolute measure of the increase or decrease in cost that a resource contributes to the Company's overall portfolio. The portfolio benefit metric alone, however, may obscure relative results. For example, a large, high cost project may produce slightly more incremental portfolio benefit than a smaller, lower cost project. Although the portfolio benefit may be larger, this measure alone obscures the results by not identifying the project with the bigger benefit to cost ratio.

Q. Please explain the portfolio benefit ratio metric.

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

Q. Please explain the ten worst trials cost metric.

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

Q. How does PSE interpret these key metrics?

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

III. 2005 RFP PHASE I QUANTITATIVE ANALYSIS

A. <u>Overview of Phase I Quantitative Evaluation Process</u>

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

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

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

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

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

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

Q. What was the Company's goal in the quantitative analysis in Phase I of the 2005 RFP?

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

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

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

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

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

1. Renewable Resources – Projects fueled with renewable resources, including but not limited to wind, hydro, geothermal and landfill gas resources;

2. Natural Gas Resources – Projects fueled with natural gas resources, whether ownership offers or tolling contracts;

3. Coal Resources – Projects fueled with coal resources, including but not limited to conventional coal and integrated gasification combined cycle resources;

4. Capacity Resources – Projects that typically have quick starting and flexible operation characteristics, and are generally less efficient than other energy resources. Capacity resources may also be heat rate call option power purchase agreements that because of the strike price terms are usually only scheduled for a few peak hours in the winter season; and

5. System Power Purchase Agreements –System power purchase agreements, including but not limited to fixed price, index priced and financial option contracts.

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

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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). Appendix A to this No. ___(WJE-3HC) 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 Kiodex forward price data for July 20, 2005 through December 19, 2005.

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

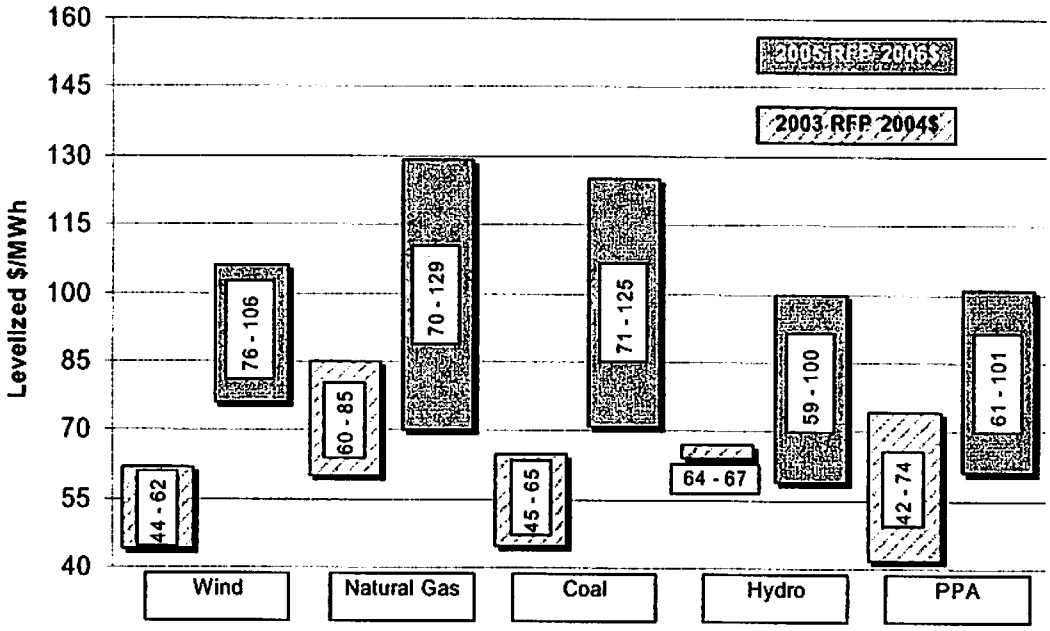
A. Due in large part to the substantial increase in the levelized gas price assumption discussed above, the AURORA forecast of Mid-C power prices significantly increased over those from the 2005 Least Cost Plan "Business as Usual" scenario. Appendix D to this Exhibit No. ___(WJE-3HC) illustrates the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

C. Phase I Quantitative Results

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

A. The following graph summarizes the levelized cost of resource types proposed in the 2005 RFP, compared with the similar levelized cost of resource types submitted in response to the 2003 RFP:[1]

[1] 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. Appendix F to this Exhibit No. ___(WJE-3HC) provides a table of results for the Phase I evaluation of resources, and Appendix G provides a table of results for the Phase I evaluation

of power purchase agreements not tied to specific resources.

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

A. The Phase I evaluation process resulted in the recommendation that six resources in the Renewable Resources category (four wind projects, a hydro project, and a geothermal purchase power agreement) be placed on the Candidate Short List. Appendix H to this Exhibit No. ___(WJE-3HC) provides the levelized cost, absolute portfolio benefit (or cost), and the benefit ratio for resources in the Renewable Resources category.

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

A. The Phase I evaluation process resulted in the recommendation that four natural gas-fired projects, ranging from ownership to tolling power purchase agreements, be placed on the Candidate Short List. Because one of the natural gas-fired plants offered four tolling options, the Company actually had seven natural gas-fired alternatives on the Candidate Short List. Of these natural gas-fired alternatives on the Candidate Short List, the Goldendale Generating Station had the lowest levelized cost. Appendix B to this Exhibit No. ___(WJE-3HC) provides the levelized cost, absolute portfolio benefit (or cost), and the benefit ratio for resources in the Natural Gas Resources category.

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

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

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

A. The Phase I evaluation process resulted in the recommendation that one resource from the Capacity Resources category be placed on the Candidate Short List. Appendix F to this Exhibit No. ___(WJE-3HC) provides the levelized cost, absolute portfolio benefit (or cost), and the benefit ratio for resources in the Capacity Resources category.

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

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

Appendix G to this Exhibit No. ___(WJE-3HC) provides the levelized cost, absolute portfolio benefit (or cost), and the benefit ratio for resources in the system power purchase agreements category evaluated in the Portfolio Screening Model. In each chart, the first three green columns indicate the index priced offer system power purchase agreements, the next ten blue columns indicate the heat rate call option system power purchase agreements, the striped columns indicate the fixed price, and the last four columns indicate the exchange and call option system power purchase agreements. The stars in the charts indicate those system power purchase agreements recommended for the Candidate Short List by the KW model.

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

A. The KW model is used by the operations group to manage the Company's short and long portfolio positions. PSE also used the KW model to evaluate shorter-term resources in the System Power Purchase Agreement category in addition to the Portfolio Screening Model. Although the KW model could only test power

purchase agreements or financial options through calendar year 2008, the results provided insight into whether or not such arrangements benefited the portfolio risk management performed by the operations group. The results of the KW model are shown in Appendix I to this Exhibit No. ___(WJE-3HC). The horizontal X axis is similar to the portfolio benefit ratio. The vertical Y axis is a reduction in risk (a measure performed in Phase II with the Portfolio Screening Model). The circle encompasses those PPAs preferred by the operations group because they reduced power cost risk and earnings risk.

IV. 2005 RFP PHASE II QUANTITATIVE ANALYSIS

A. Update of Candidate Short List

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

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

PSE analyzed 16 resources in the Phase II quantitative analysis, but a few of the resources from the Candidate Short List were removed and a few other resources were added. For example, PSE removed three wind plants on the Candidate Short List for three different reasons: one wind project was sold to another utility, one wind project encountered significant permitting challenges, and one wind project

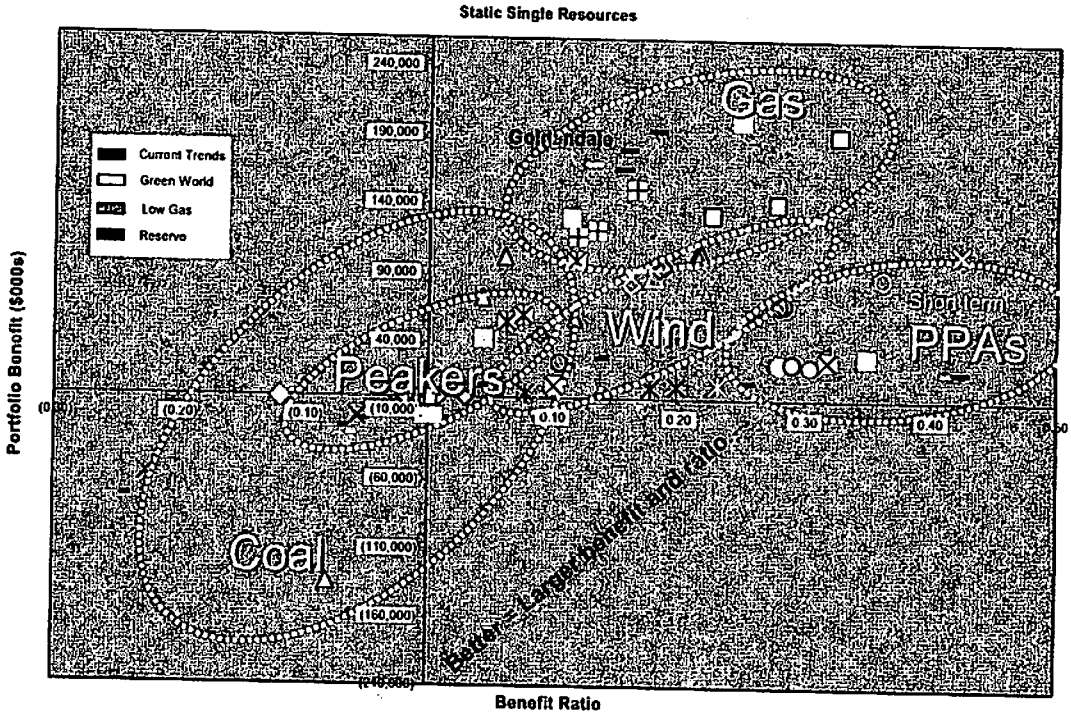
was withdrawn because the developer redeployed turbines to another area of the U.S.

PSE added three projects for analysis in Phase II: one power purchase agreement associated with a wind project already on the Candidate Short List, one wind project ownership (to provide a second wind plant for comparison), and one index priced seasonal on-peak power purchase agreement. Appendix J to this Exhibit No. ___(WJE-3HC) 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.



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

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

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

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

A. PSE developed four different price scenarios based upon three gas price forecasts and tested the resources in the revised Candidate Short List under each of the four scenarios. PSE used gas price input from three Global Insight Forecasts of December 2005 combined with Kiodex forward marks for the scenarios. *See* Appendix C to this Exhibit No. ___(WJE-3HC).

The gas prices indicated in Appendix C, in combination with the AURORAxmp model, Version 8.0 and AURORAxmp database North_Amer_DB_2005.02, resulted in scenario levelized power prices that range from a levelized power price low of $57/MWh in the Low Gas Price Scenario to a levelized power price high of $88/MWh in the Green World High Price Scenario. *See* Appendix E to this Exhibit No. ___(WJE-3HC).

Appendix K to this Exhibit No. ___(WJE-3HC) illustrates the annual calculation of heat rate, calculated as the annual power price divided by annual gas price. This annual heat rate is an indicator of the relative benefit of a natural gas fired plant in the market. The higher the market heat rate, the more likely a gas plant is being dispatched and providing value to the portfolio.

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

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

A. As previously discussed, PSE developed four price scenarios ("Current Trends," "Green World," "Low Gas Price," and "Reserve") and tested each resource under each scenario. Exhibit No. ___(WJE-9HC) provides a plot of the portfolio benefit (vertical axis) and portfolio benefit ratio (horizontal axis) for all four price scenarios. The Goldendale Generating Station has the highest portfolio benefit in all price scenarios.

Based upon the metrics of portfolio benefit and portfolio benefit ratio for all price scenarios, the best resources were gas, wind and power purchase agreements. Although each project had a range of outcomes based on the price scenario, some types of projects have more variability than others. For example, the results for coal vary widely because coal projects do not perform as well in the Low Gas Price and Green World scenarios as they do in the Current Trends scenario.

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

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

A. Exhibit No. ___(WJE-10HC) provides the levelized cost of the Candidate Short

List resources. The Goldendale Generating Station has the lowest cost of the four-gas fired resources. Resources with lower levelized cost than Goldendale include wind power purchase agreements, a coal plant power purchase agreement and system power purchase agreements. Although these power purchase agreements have lower levelized costs, they do not provide the operational flexibility provided by the Goldendale Generating Station.

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

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

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

1. Add resources to meet, or come close to meeting, the B2 Standard for energy need that is defined as resources sufficient to meet the average energy in the most deficit winter months. This standard was developed in the Company's 2003 Least Cost Plan;

2. Meet Renewable Portfolio Standard of 9% renewables by 2016 and 15% renewables by 2020, as implemented by Washington Initiative 937;

3. Test portfolio cost and risk of owning new gas plant(s) versus contracting via power purchase agreements;

4. Test incremental benefit of resources on the Candidate Short List

by adding and subtracting from portfolios;

5. Test portfolio cost and risk of resources on the Candidate Short List that most closely approximate the 10% wind plus approximately equal mix of coal and gas from the 2005 Least Cost Plan; and

6. Test portfolio cost and risk of choosing long lead projects with bridge power purchase agreements.

Q. What are the resources contained in the portfolios?

A. Appendix L to this Exhibit No. ___(WJE-3HC) displays the resources and portfolios. (A "Y" indicates that the resource was included in the portfolio.)

Q. What were the results of the portfolio analysis?

A. PSE compared each of the seven portfolios against the cost of the generic portfolio as defined by the 2005 Least Cost Plan. This is the same analysis approach as used to evaluate the individual resources. Appendix M to this Exhibit No. ___(WJE-3HC) shows the seven portfolios in each of the four price scenarios.

F. Use of Monte Carlo Simulation to Evaluate Risk

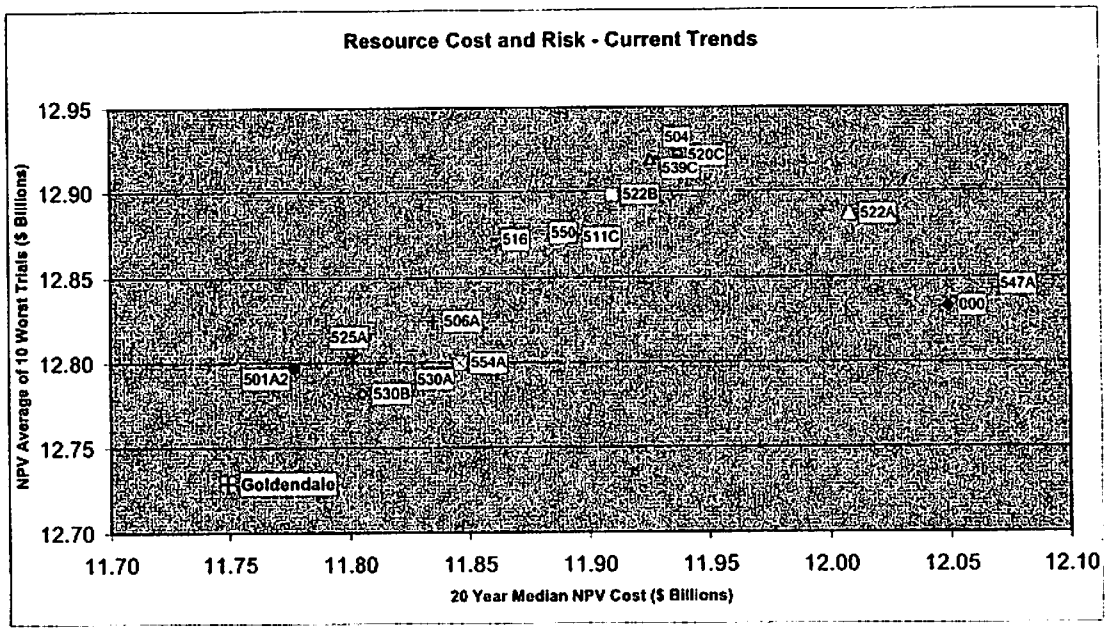
Q. Please describe the Monte Carlo analysis used by PSE to judge risk.

A. As part of the Phase II quantitative analysis, the Company performed a Monte Carlo analysis with the Portfolio Screening Model. In performing a Monte Carlo analysis, the Company allowed the assumptions of power prices, gas prices, hydro

generation, and wind generation to vary along assumed distributions to simulate possible future conditions. The result of 100 iterations of the Portfolio Screening Model represents a distribution of portfolio cost and distribution of the benefit of the proposed resource to PSE's portfolio. For a description of the assumed distributions and volatility, please see the Company's 2005 Least Cost Plan, Exhibit No. ___(KJH-4) at page 249. Sample results of the Monte Carlo analysis of the Current Trends pricing scenario are provided in Appendix N to this Exhibit No. ___(WJE-3HC).

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 Appendix N to this Exhibit No. ___(WJE-3HC), 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 Appendix N 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).



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

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

A. Yes. Appendix O to this Exhibit No. ___(WJE-3HC) provides the results for the Current Trends, Green World and Low Gas Price scenarios. Portfolios #1, #4 and #5 consistently have slightly lower cost and lower risk than the other portfolios. Those three portfolios contain the Goldendale Generating Station or another similar sized natural gas fired resource.

G. Analysis of "Self Build" Alternative

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

A. Yes. The responses to the 2005 RFP included several self-build alternatives. The self-build proposals can be divided into two types--each requiring different levels of PSE involvement in both the development activities and the construction build-out. Under the first type of proposal, PSE would play an instrumental role in the remaining development activities and fund the cost of completing the project with the developer. Under the second type of proposal, PSE would purchase existing development assets from the developer and complete the project on its own. Each type of proposal would result in PSE owning the project. In some alternatives, the ownership of the project would be transferred to PSE early at the development stage, and, in other alternatives, the transfer of ownership to PSE would occur at the completion of the project. For a further description of self-build and quantitative results, please see Exhibit No. ___(RG-3HC) at pages 174-79.

H. Conclusion of Phase II Quantitative Analysis

Q. Which projects where short-listed for acquisition?

A. PSE placed ten resource alternatives on the Short List for further negotiations, consisting of a geothermal purchased power agreement, a hydro generation resource, a purchased power agreement and ownership option of a wind project, a natural gas tolling, two natural gas ownership alternatives, one small natural gas capacity peaking plant, and two fixed price purchased power agreements. *See* Appendix P to this Exhibit No. ___(WJE-3HC).

Appendix A

Aurora and PSM Phase 2 Analysis (4/14/2006)

Gas price correction noted 7-19-06

Table 1. PSE Scenario Values Referenced on Global Insights Natural Gas Scenarios

Scenario	Reference Current Trends	Reserve/ Overbuild	High Price/Green World	Low Gas Price	Notes
WECC Demand (AURORA)	Reference (from EPIS) WECC Average Growth Rate 1.8%	Reference (from EPIS) WECC Average Growth Rate 1.8%	Low WECC Average Growth Rate 1.1%	Reference WECC Average Growth Rate 1.8%	Low Growth Rate is 60% of Reference Growth Rate for each area
Gas Price (Nominal $ Levelized for 2007-2026)	Global Insights Reference; Levelized, plus Kioderx forwards 2007 – 2010 [redacted] MMBTU	Global Insights Reference; Levelized, plus Kioderx forwards 2007 – 2010 [redacted] /MMBTU	Global Insights High Price; Levelized, plus Kiodex forwards 2007 – 2010 [redacted] MMBTU	Global Insights Low Economic Growth; Levelized; Kiodex forwards 2007 – 2008 $5.48/MMBTU	Global Insights (12/05) and Kiodex forwards (2007-2010) as of 12/19/2005
Coal Price ($2004/mmBtu)	$0.90 – PRB $1.00 – Rockies $1.10 – NW $1.25 - SW	$0.90 – PRB $1.00 – Rockies $1.10 – NW $1.25 - SW	Reference	Reference	Source: Platts 2004 Coal Market Research and M. Jones. Price increases 0.75% real per year.
PSE Demand (PSM)	Reference	Reference	Low	Reference	Most recent PSE load forecast.
Generic Resource Costs	PSE	PSE	PSE	PSE	
Carbon Costs (AURORA)	NCEP Nominal $/ton by year: 2010: $5.00 2015: $6.38 2020: $8.14	NCEP Nominal $/ton by year: 2010: $5.00 2015: $6.38 2020: $8.14	Clean Power (Jeffords) Nominal $/ton by year: 2010: $21.00 2015: $31.17 2020: $45.35	NCEP Nominal $/ton by year: 2010: $5.00 2015: $6.38 2020: $8.14	NCEP increases 2.5% real per year. Clean Power increases about 4% per year real over 20 years
SO2 (PSM)	Clear Skies Nominal $/ton by year: 2010: $978 2015: $1435 2020: $2105	Clear Skies Nominal $/ton by year: 2010: $978 2015: $1435 2020: $2105	Clean Air (Carper) Nominal $/ton by year: 2010: $1481 2015: $2175 2020: $3191	Clear Skies Nominal $/ton by year: 2010: $978 2015: $1435 2020: $2105	

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Scenario	Reference Current Trends	Reserve/ Overbuild	High Price/Green World	Low Gas Price	Notes
NOX (PSM)	Clear Skies Nominal $/ton by year: 2010: $297 2015: $436 2020: $640	Clear Skies Nominal $/ton by year: 2010: $297 2015: $436 2020: $640	Clean Air (Carper) Nominal $/ton by year: 2010: $5742 2015: $2012 2020: $1522	Clear Skies Nominal $/ton by year: 2010: $297 2015: $436 2020: $640	
RPS (AURORA)	Meet all WECC RPS by 2026. Wind 20,901 MW Solar 500 MW Geo 1014 MW Bio 375 MW Mkt. Builds Wind 2,200 MW	Meet all WECC RPS by 2026. Wind 20,901 MW Solar 500 MW Geo 1014 MW Bio 375 MW Mkt. Builds Wind 2,200 MW	Meet all non-wind RPS by 2026. Solar 500 MW Geo 1014 MW Bio 375 MW Mkt. Builds Wind 28,800 MW	Meet all RPS through 2011. Wind 7,615 MW Solar 241 MW Geo 558 MW Bio 263 MW Mkt. Builds No More	Only Wind renewables in builds.
PTC For Wind	2007-2009: $19 2010-2011: $10 2012-2026: $0	2007-2009: $19 2010-2011: $10 2012-2026: $0	2007-2009: $19 2010-2011: $10 2012-2026: $0	2007-2009: $19 2010-2011: $10 2012-2026: $0	Credit in nominal $/MWh.
Overbuild	No	Yes; Net Additions are approx. 30% greater in 2015 and 10% greater in 2025	No	No	

Table 2. Optimization Build Limits for WECC

Resource	Reference	Reserve/ Overbuild	High Price/Green World	Low Gas Price	Notes
Coal	Builds can start in 2010 and are limited to 9 areas in the WECC. Coal builds are limited to meet load growth only within each area.	Reference	Reference	Reference	See Table 3 for limits by year and by area by 2007-2026.
IGCC	Builds can start in 2014 for 10 areas in the WECC. Coal builds are limited to meet load growth only within each area.	Reference	Reference	Reference	See Table 4 for limits by year and by area by 2007-2026.
CCCT	Builds can start in 2007.	Reference	Reference	Reference	See Table 5 for limits by year and by area by 2007-2026.
SCCT	Builds can start in 2007	Reference	Reference	Reference	See Table 6 for limits by year and by area by 2007-2026.
Wind	Builds start in 2007	Reference	Reference	Reference	See Table 7 for limits by year and by area by 2007-2026.
Unretires	All	All	All Non-Coal	All	Unretire keeps uneconomic plants available for peaking capacity.
Overbuild	No	Yes Model builds 9 GW more WECC supply resources by 2015 than in the reference case.	No	No	In the reserve case, the demand in the WECC is increased approximately 1 % per year over the reference demand for 6 years. The model is optimized to this demand level and then the hourly run uses this build result with the reference demand.

Table 3. Assumptions for Scrubbed Sub-Critical Pulverized Coal

Source: R:\Acquisition\2005 RFP Prep\Quantitative Analysis Preparation\Model Assumptions\Coal\Update Coal Limits V8.xls

					Annual Build Limits by Area															
Area	Area Name	Begin Date	Annual Max	Overall Max	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
44	OR-Ea	0	0	0																	
45	PG&EN	0	0	0																	
46	SCE+	0	0	0																	
47	BC	0	0	0																	
48	ID-So	1/1/2012	0	0																	
49	MT	1/1/2012	NA	2			1				1				1						
50	WY	1/1/2013	NA	2						1			1		1						
51	CO	1/1/2010	NA	3	1			1			1			1	1						
52	NM	1/1/2010	NA	2	1						1			1	1						
53	AZ	1/1/2013	NA	3				1			1		1	1	1						
54	UT	1/1/2012	NA	2			1				1		1		1						
55	NVNo	1/1/2011	NA	1					1			1			1						
56	AB	1/1/2011	NA	2		1					1		1		1						
59	BajaN	0	0	0																	
60	NVSo	1/1/2011	NA	2		1			1			1			1						
78	IID	0	0	0																	
79	LDWP+	0	0	0																	
80	SF	0	0	0																	
81	ZP26+	0	0	0																	
82	SDGE+	0	0	0																	
83	SMUD	0	0	0																	
90	ID-Ea	0	0	0																	
91	OR-We	0	0	0																	
92	WA-Ctr	0	0	0																	
93	Oly	0	0	0																	
94	PACW	0	0	0																	
95	PSNo	0	0	0																	
96	SeaTac	0	0	0																	
97	Spok	0	0	0																	
Total	Units		10	19																	
	MW			11,400																	

Note: Plant size is 600 MW.

Table 4. Assumptions for IGCC

Source: R:\Acquisition\2005 RFP Prep\Quantitative Analysis Preparation\Model Assumptions\Coal\Update Coal Limits V8.xls

					Annual Build Limits by Area												
Area	Area Name	Begin Date	Annual Max	Overall Max	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
44	OR-Ea	0	0	0													
45	PG&EN	0	0	0													
46	SCE+	0	0	0													
47	BC	0	0	0													
48	ID-So	2014	NA	1										1			1
49	MT	2014	NA	1						1			1			1	
50	WY	2014	NA	2							1			1			1
51	CO	2014	NA	3					1			1			1		
52	NM	2014	NA	2					1			1			1		
53	AZ	2014	NA	4	1			1			1			1			
54	UT	2014	NA	2									1			1	
55	NVNo	2014	NA	1				1			1			1			1
56	AB	2014	NA	4			1			1			1			1	
59	BajaN	0	0	0													
60	NVSo	2014	NA	3		1			1			1			1		
78	IID	0	0	0													
79	LDWP+	0	0	0													
80	SF	0	0	0													
81	ZP26+	0	0	0													
82	SDGE+	0	0	0													
83	SMUD	0	0	0													
90	ID-Ea	0	0	0													
91	OR-We	0	0	0													
92	WA-Ctr	0	0	0													
93	Oly	0	0	0													
94	PACW	0	0	0													
95	PSNo	0	0	0													
96	SeaTac	0	0	0													
97	Spok	0	0	0													
Total	Units		10	23													
	MW			5,750													

Note: Plant size is 250 MW.

Table 5. Assumptions for CCCT gas/oil Adv

Source: R:\Acquisition\2005 RFP Prep\Quantitative Analysis Preparation\Model Assumptions\Coal\Update Coal Limits V8.xls

Area	Area Name	Begin Date	Annual Max	Overall Max	Notes
44	OR-Ea	2007	5	50	
45	PG&EN	2007	10	100	
46	SCE+	2007	20	150	
47	BC	2007	5	50	
48	ID-So	2007	5	50	
49	MT	2007	5	50	
50	WY	2007	5	50	
51	CO	2007	10	100	
52	NM	2007	10	100	
53	AZ	2007	10	100	
54	UT	2007	10	100	
55	NVNo	2007	5	50	
56	AB	2007	10	50	
59	BajaN	2007	5	50	
60	NVSo	2007	4	50	
78	IID	2007	10	50	
79	LDWP+	2007	10	50	
80	SF	2007	10	50	
81	ZP26+	2007	10	50	
82	SDGE+	2007	10	50	
83	SMUD	2007	10	50	
90	ID-Ea	2007	10	50	
91	OR-We	2007	10	50	
92	WA-Ctr	2007	10	50	
93	Oly	2007	10	50	
94	PACW	2007	10	50	
95	PSNo	2007	10	50	
96	SeaTac	2007	10	50	
97	Spok	2007	10	50	
Total	Units		259	1800	
	MW			990,000	Plant size is 400 MW.

Table 6. Assumptions for SCCT Adv

Source: R:\Acquisition\2005 RFP Prep\Quantitative Analysis Preparation\Model Assumptions\Coal\Update Coal Limits V8.xls

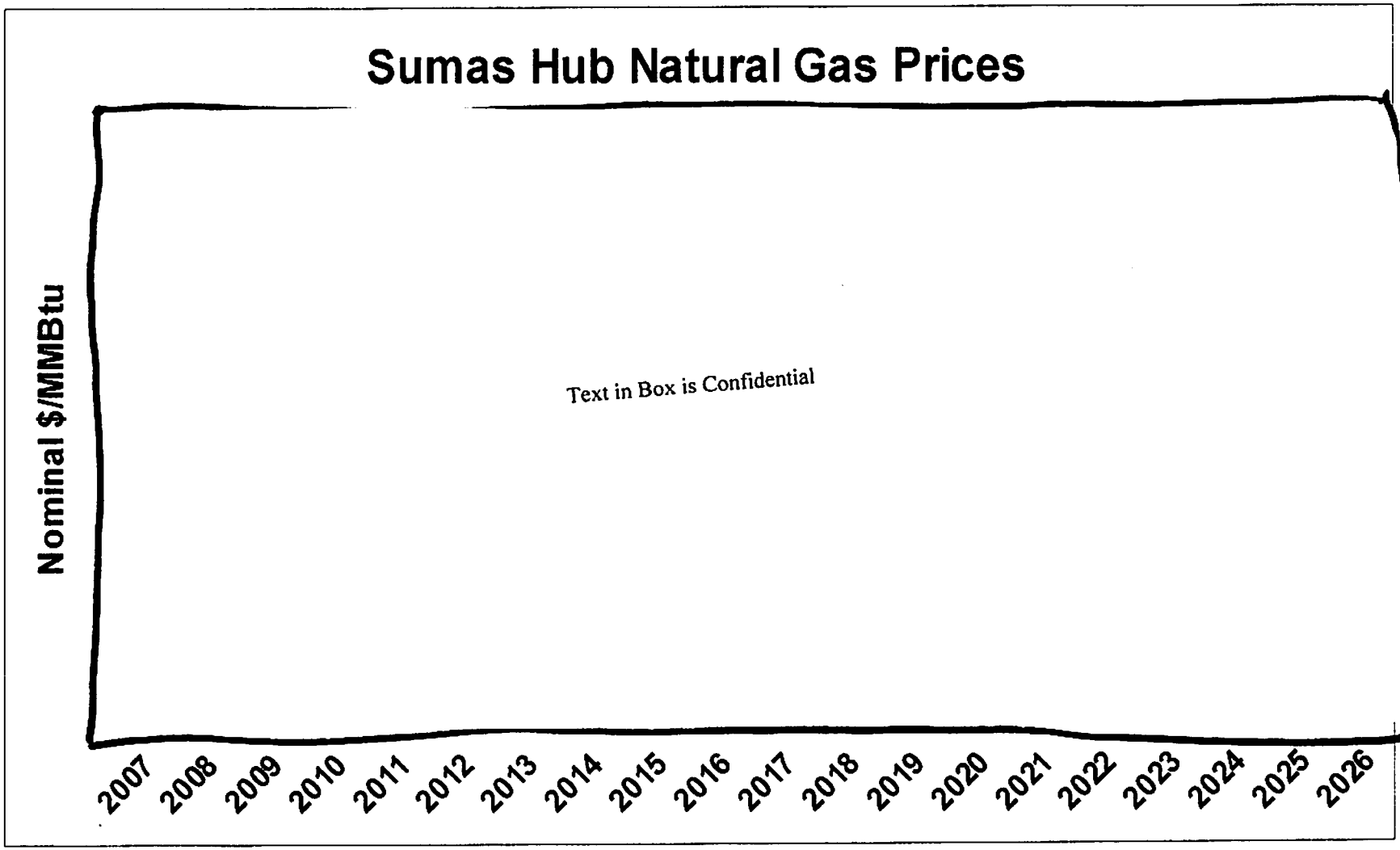
Area	Area Name	Begin Date	Annual Max	Overall Max	Notes
44	OR-Ea	2007	10	100	
45	PG&EN	2007	20	150	
46	SCE+	2007	20	150	
47	BC	2007	5	50	
48	ID-So	2007	5	50	
49	MT	2007	5	50	
50	WY	2007	5	50	
51	CO	2007	10	100	
52	NM	2007	10	100	
53	AZ	2007	20	150	
54	UT	2007	5	50	
55	NVNo	2007	10	100	
56	AB	2007	10	50	
59	BajaN	2007	5	50	
60	NVSo	2007	5	50	
78	IID	2007	10	50	
79	LDWP+	2007	10	50	
80	SF	2007	10	50	
81	ZP26+	2007	10	50	
82	SDGE+	2007	10	50	
83	SMUD	2007	10	50	
90	ID-Ea	2007	10	50	
91	OR-We	2007	10	50	
92	WA-Ctr	2007	10	50	
93	Oly	2007	10	50	
94	PACW	2007	10	50	
95	PSNo	2007	10	50	
96	SeaTac	2007	10	50	
97	Spok	2007	10	50	
Total	Units		285	1950	
	MW			448,500	Plant size is 230 MW

Table 7. Assumptions for Wind

Source: R:\Acquisition\2005 RFP Prep\Quantitative Analysis Preparation\Model Assumptions\Coal\Update Coal Limits V8.xls

Area	Area Name	Begin Date	Annual Max	Overall Max	Notes
44	OR-Ea	1/1/2007	1	20	
45	PG&EN	1/1/2007	1	20	
46	SCE+	1/1/2007	1	20	
47	BC	1/1/2007	1	10	
48	ID-So	1/1/2007	1	10	
49	MT	1/1/2007	1	20	
50	WY	1/1/2007	1	20	
51	CO	1/1/2007	1	20	
52	NM	1/1/2007	1	10	
53	AZ	1/1/2007	1	10	
54	UT	1/1/2007	1	10	
55	NVNo	1/1/2007	1	10	
56	AB	1/1/2007	1	10	
59	BajaN	1/1/2007	0	0	
60	NVSo	1/1/2007	1	10	
78	IID	1/1/2007	1	10	
79	LDWP+	1/1/2007	1	10	
80	SF	1/1/2007	0	0	
81	ZP26+	1/1/2007	0	0	
82	SDGE+	1/1/2007	0	0	
83	SMUD	1/1/2007	0	0	
90	ID-Ea	1/1/2007	1	10	
91	OR-We	1/1/2007	1	20	
92	WA-Ctr	1/1/2007	1	20	
93	Oly	1/1/2007	0	0	
94	PACW	1/1/2007	1	20	
95	PSNo	1/1/2007	0	0	
96	SeaTac	1/1/2007	0	0	
97	Spok	1/1/2007	1	20	
Total	Units		21	310	New limit of 2 plants per year.
	MW			31,000	Plant size is 100 MW.

Appendix B



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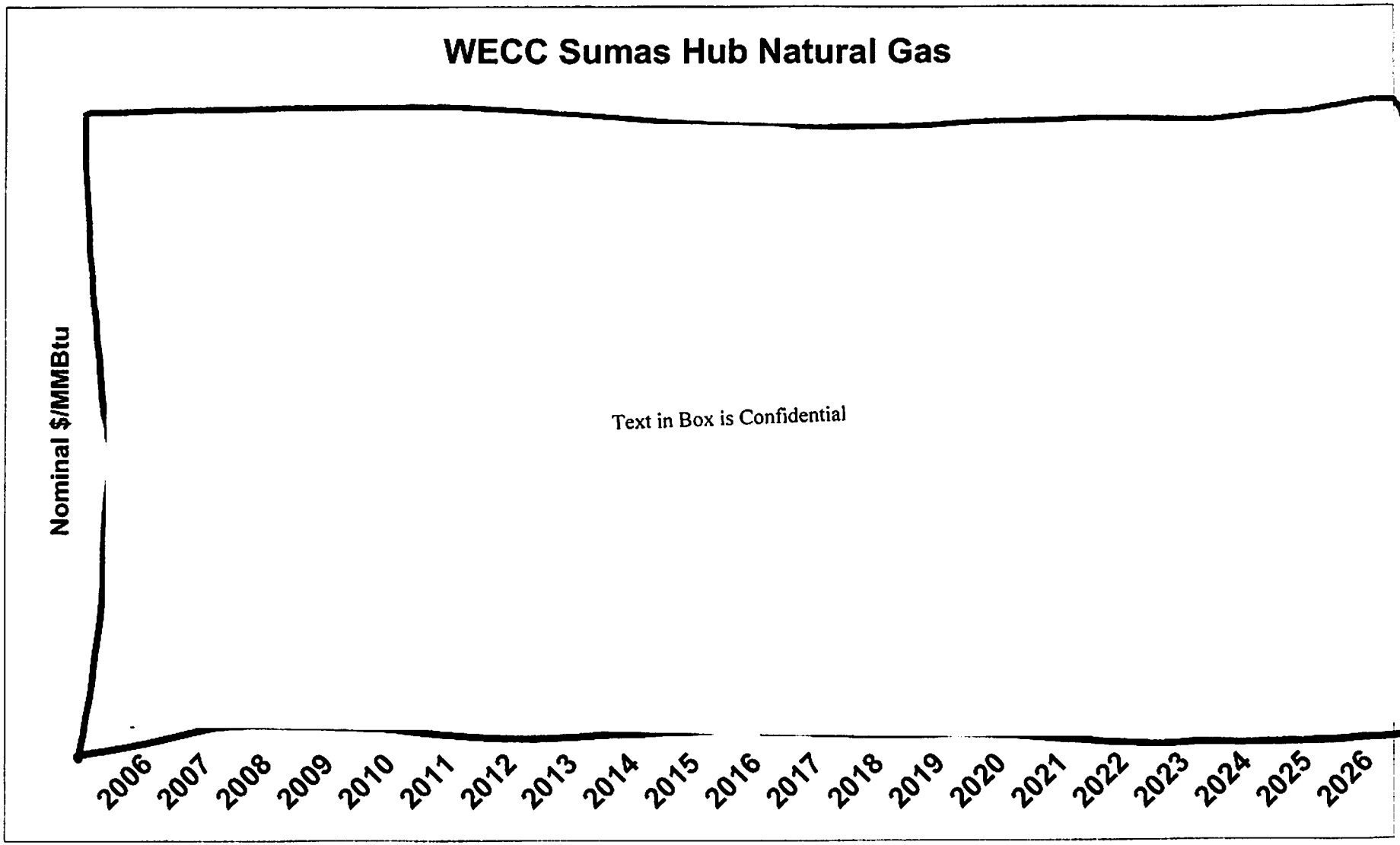
Appendix C



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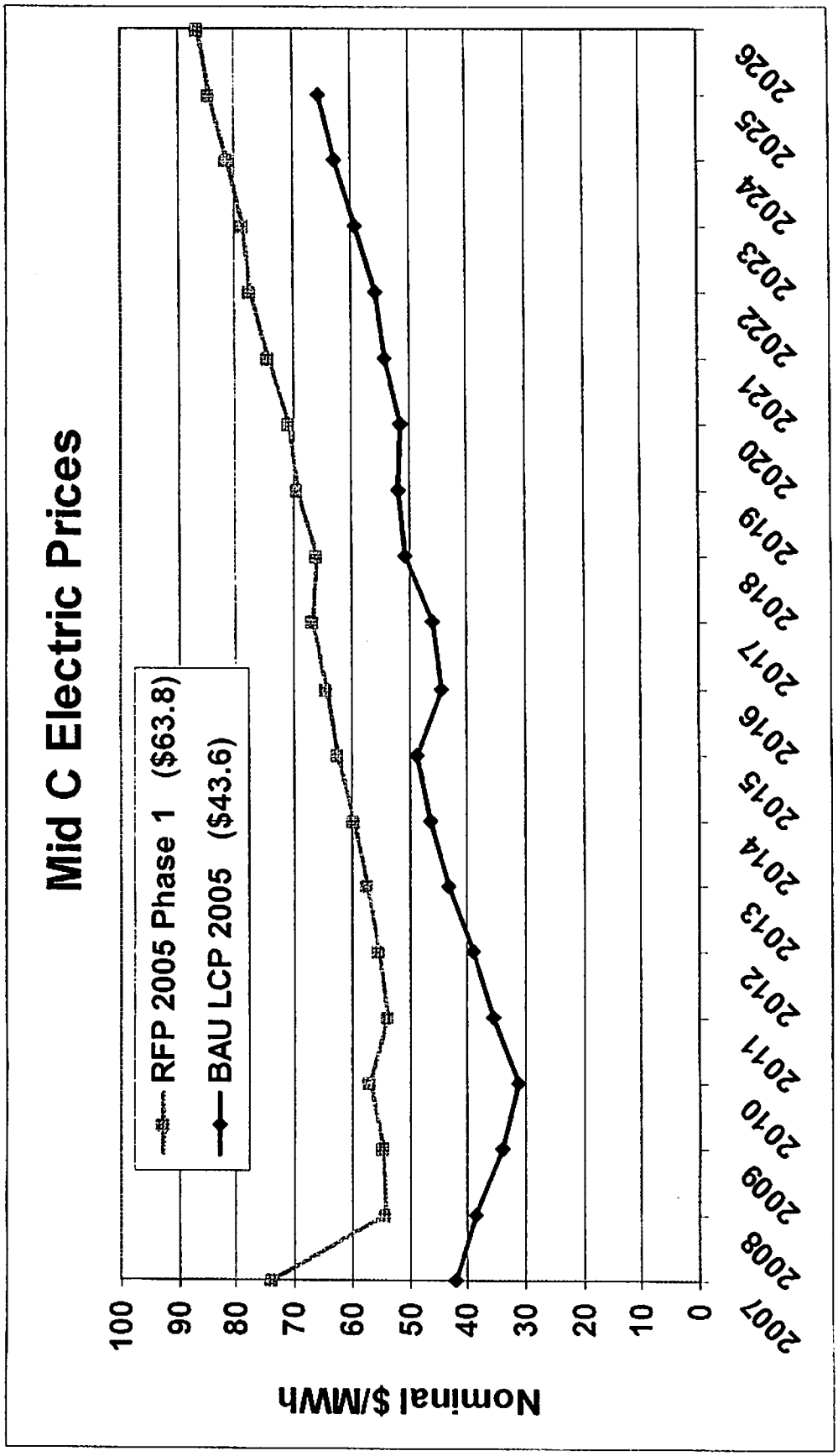
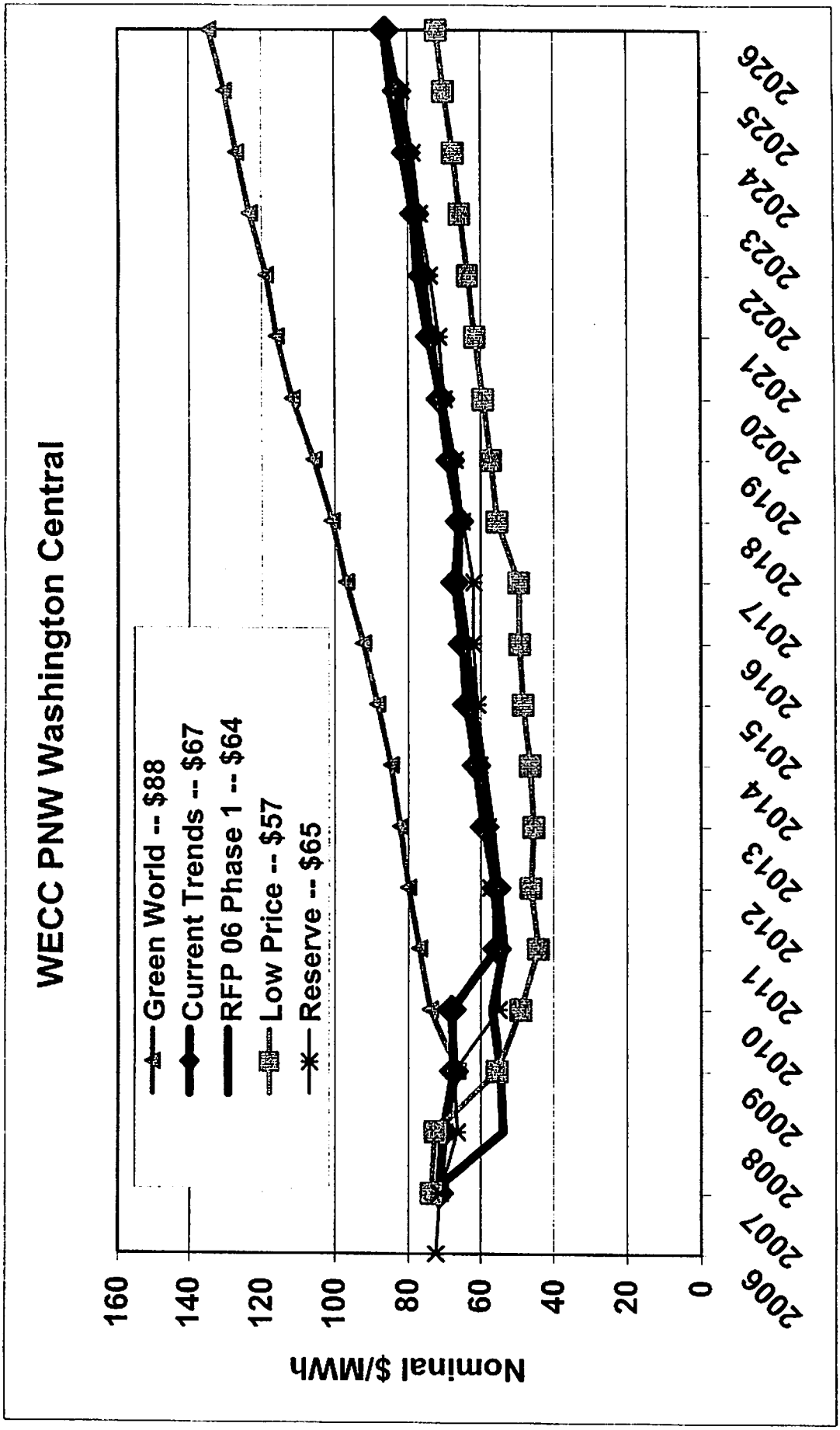
Appendix D


Mid C Electric Prices
RFP 2005 Phase 1 ($63.8)
BAU LCP 2005 ($43.6)
Nominal $/MWh
100
90
80
70
60
50
40
30
20
10
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026

Appendix E


WECC PNW Washington Central
Green World -- $88
Current Trends -- $67
RFP 06 Phase 1 -- $64
Low Price -- $57
Reserve -- $65
Nominal $/MWh
160
140
120
100
80
60
40
20
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026

Appendix F

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Code	Fuel Type	Project Name	PSM Version	Date of Analysis	Levelized Cost $/MWh	PV Cost of Acq. or PPA $000	Portfolio Cost $000	Levelized Cost w/o Transmission	Levelized Cost w/o PTC	Portfolio Cost w/o PTC	Levelized Cost w/o Imputed Debt	Portfolio Benefit (Cost)	Portfolio Benefit (Cost) per $ Project Cost
503-a	C	Text in box is Highly Confidential	PSM 8.1 v0	3/13/2006	Text in box is Confidential								
528a	C		PSM 8.1 v0	3/27/2006									
528b	C		PSM 8.1 v0	3/27/2006									
528c	C		PSM 8.1 v0	3/27/2006									
528d	C												
528e	C												
523-A	C		PSM 8.1 v0	3/27/2006									
523-B	C		PSM 8.1 v0	3/27/2006									
523-C	C		PSM 8.1 v0	3/27/2006									
506-a	C		PSM 8.1 v0	3/9/2006									
506-b	C		PSM 8.1 v0	3/9/2006									
520a	C		PSM 8.1 v0	3/28/2006									
520b	C		PSM 8.1 v0	3/28/2006									
520c	C		PSM 8.1 v0	3/28/2006									
545	DSM												
512	G		PSM 8.1 v0	3/6/2006									
547A	G		PSM 8.1 v0	4/4/2006									
547B	G		PSM 8.1 v0	4/4/2006									
547C	G		PSM 8.1 v0	4/4/2006									
547D	G		PSM 8.1 v0	4/4/2006									
547E	G		PSM 8.1 v0	4/4/2006									
547F	G		PSM 8.1 v0	4/4/2006									
536A	H												
536B	H												

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Code	Fuel Type	Project Name	PSM Version	Date of Analysis	Levelized Cost $/MWh	PV Cost of Acq or PPA $000	Portfolio Cost $000	Levelized Cost w/o Transmission	Levelized Cost w/o PTC	Portfolio Cost w/o PTC	Levelized Cost w/o Imputed Debt	Portfolio Benefit (Cost)	Portfolio Benefit (Cost) per $ Project Cost
538A	H	Text in box is Highly Confidential			Text in box is Confidential								
538B	H												
533	H		PSM 8.1 v0	3/7/2006									
532	H		PSM 8.1 v0	3/7/2006									
537A	H												
537B	H												
539A - i	H		PSM 8.1 v0	4/3/2006									
539A -ii	H		PSM 8.1 v0	4/3/2006									
539A -iii	H		PSM 8.1 v0	4/3/2006									
	H		v4	2/24/2006									
	H		v4	2/24/2006									
	H		v4	2/24/2006									
539B	H												
543-a	IGCC		PSM 8.1 v0	3/28/2006									
543-b	IGCC												
540	LFG		PSM 8.1 v0	4/21/2006									
504	NG		PSM 8.1 v0	3/28/2006									
510	NG		PSM 8.1 v0	3/15/2006									
526a	NG		PSM 8.1 v0	4/11/2006 Elsea									
526b	NG		PSM 8.1 v0	3/15/2006									
526c	NG		PSM 8.1 v0	3/7/2006									
526d	NG												
505-a	NG		PSM 8.1 v0	4/4/2006									
505-b	NG												

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Code	Fuel Type	Project Name	PSM Version	Date of Analysis	Levelized Cost $/MWh	PV Cost of Acq. or PPA $000	Portfolio Cost $000	Levelized Cost w/o Transmission	Levelized Cost w/o PTC	Portfolio Cost w/o PTC	Levelized Cost w/o Imputed Debt	Portfolio Benefit (Cost)	Portfolio Benefit (Cost) per $ Project Cost
500-a	NG	Text in box is Highly Confidential	PSM 8.1 v0	4/4/2006	Text in box is Confidential								
500-b	NG		PSM 8.1 v0	4/4/2006									
503-b	NG		PSM 8.1 v0	4/4/2006									
501a1	NG		PSM 8.1 v0	4/11/2006 Elsea									
501a2	NG		PSM 8.1 v0	4/13/2006 Elsea									
501b	NG												
501bl	NG												
501c	NG		PSM 8.1 v0	4/11/2006 Elsea									
501d	NG		PSM 8.1 v0	4/11/2006 Elsea									
515-a	NG		PSM 8.1 v0	3/7/									
515-b	NG												
509-a	NG		PSM 8.1 v0	3/15/2006									
509-b	NG		PSM 8.1 v0	3/15/2006									
521	NG		PSM 8.1 v0	3/23/2006									
525a	NG		PSM 8.1 v0	3/23/2006									
525b	NG		PSM 8.1 v0	3/7/2006									
525c	NG		PSM 8.1 v0	3/7/2006									
525d	NG		PSM 8.1 v0	3/15/2006									
552	NG		PSM 8.1 v0	3/7/2006									
552l	NG												
546A	NG		PSM 8.1 v0	3/15/2006									
546B	NG		PSM 8.1 v0	3/15/2006									
542	NG		PSM 8.1 v0	3/15/2006									
517	NG		PSM 8.1 v0	4/4/2006									

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Code	Fuel Type	Project Name	PSM Version	Date of Analysis	Levelized Cost $/MWh	PV Cost of Acq. or PPA $000	Portfolio Cost $000	Levelized Cost w/o Transmission	Levelized Cost w/o PTC	Portfolio Cost w/o PTC	Levelized Cost w/o Imputed Debt	Portfolio Benefit (Cost)	Portfolio Benefit (Cost) per $ Project Cost
519	NG	Text in box is Highly Confidential			Text in box is Confidential								
516	NG		PSM 8.1 v0	3/21/2006									
541	NG		PSM 8.1 v0	3/23/2006									
509-c	NG/ W		PSM 8-1v0	4/21/2006									
0	W		PSM 8.1 v0	3/7/2006									
503-c	W		PSM 8.1 v0	3/27/2006									
503-d	W		PSM 8.1 v0	3/27/2006									
502-b	W		PSM 8.1 v0	3/29/2006									
502-a	W		PSM 8.1 v0	3/29/2006									
514	W		PSM 8.1 v0	3/29/2006									
524-A	W		PSM 8.1 v0	3/29/2006									
524-B	W		PSM 8.1 v0	3/29/2006									
524-C	W		PSM 8.1 v0	3/29/2006									
530-A	W		PSM 8.1 v0	3/28/2006									
530-B	W		PSM 8.1 v0	3/28/2006									
518	W		N/A - Proposal is de										
550	W		PSM 8.1 v0	4/3/2006									
553-A 40%	W		PSM 8.1 v0	4/14/2006									
553-A 20%	W		PSM 8.1 v0	4/14/2006									
553-A Full	W		PSM 8.1 v0	4/14/2006									
553-B	W		PSM 8.1 v0	4/14/2006									
534	W		PSM 8.1 v0	4/3/2006									
531-A	W		PSM 8.1 v0	3/29/2006									

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Code	Fuel Type	Project Name	PSM Version	Date of Analysis	Levelized Cost $/MWh	PV Cost of Acq. or PPA $000	Portfolio Cost $000	Levelized Cost w/o Transmission	Levelized Cost w/o PTC	Portfolio Cost w/o PTC	Levelized Cost w/o Imputed Debt	Portfolio Benefit (Cost)	Portfolio Benefit (Cost) per $ Project Cost
531-B	W		PSM 8.1 v0	3/29/2006									
556	W		PSM 8.1 v0	4/3/2006									
508-B	W		PSM 8.1 v0	3/31/2006									
508a	W		PSM 8.1 v0	3/31/2006									

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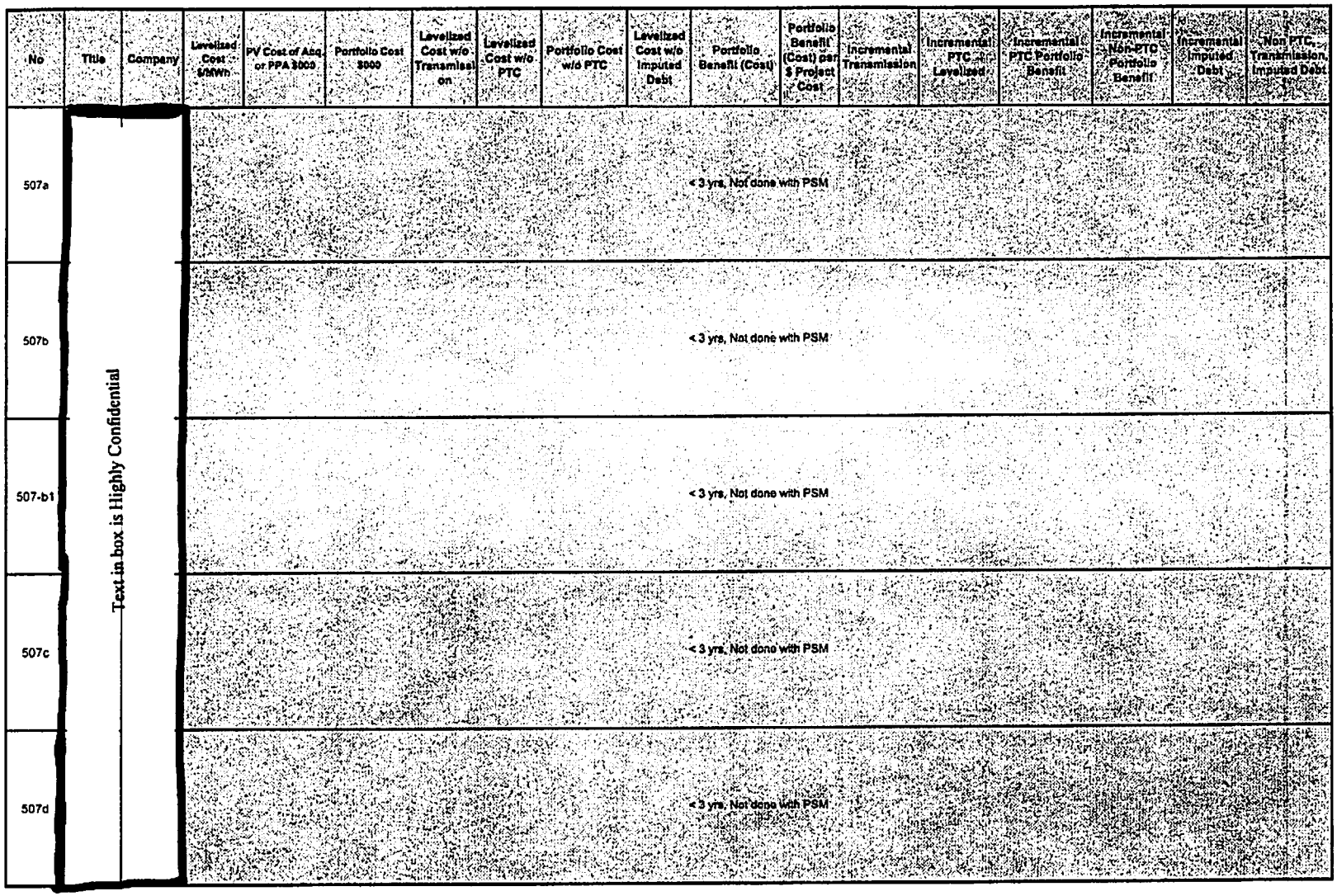
Appendix G



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507d	Text in box is Highly Confidential	< 3 yrs, Not done with PSM
507e		< 3 yrs, Not done with PSM
508b1		< 3 yrs, Not done with PSM
508b2		< 3 yrs, Not done with PSM
508b3		< 3 yrs, Not done with PSM
508b4		< 3 yrs, Not done with PSM

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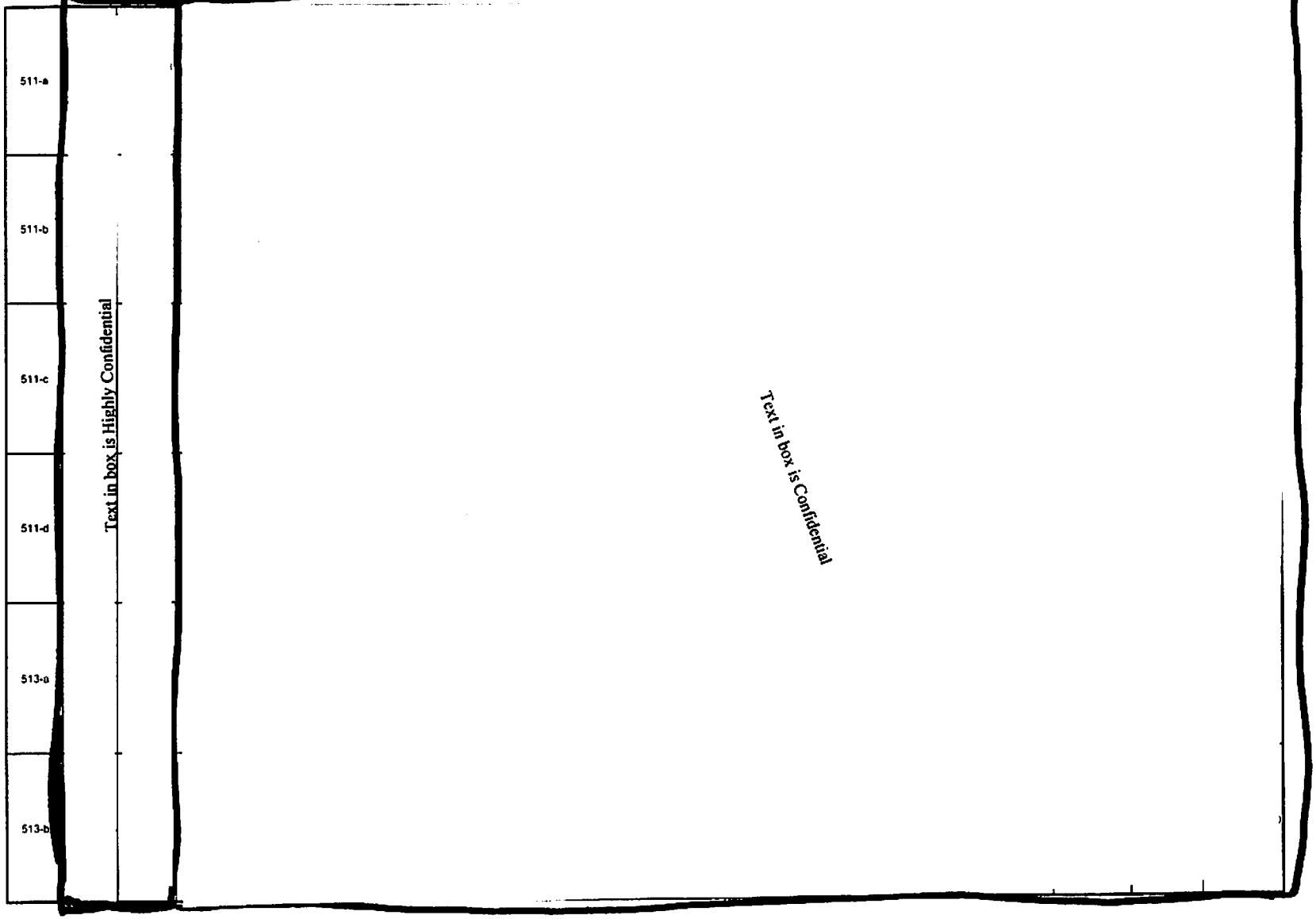

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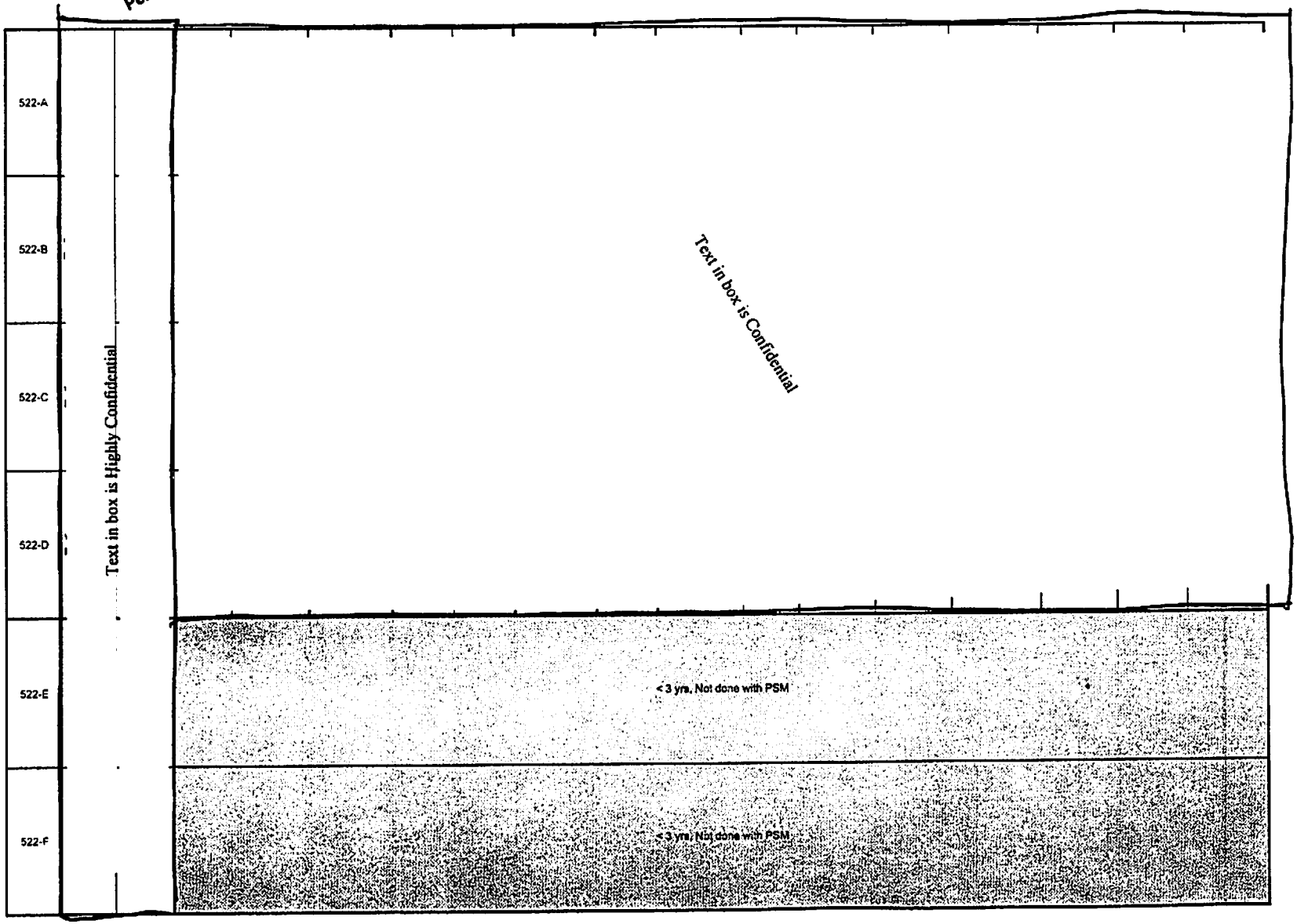
Per WAC 480-07-160

CONFIDENTIAL
Per WAC 480-07-160



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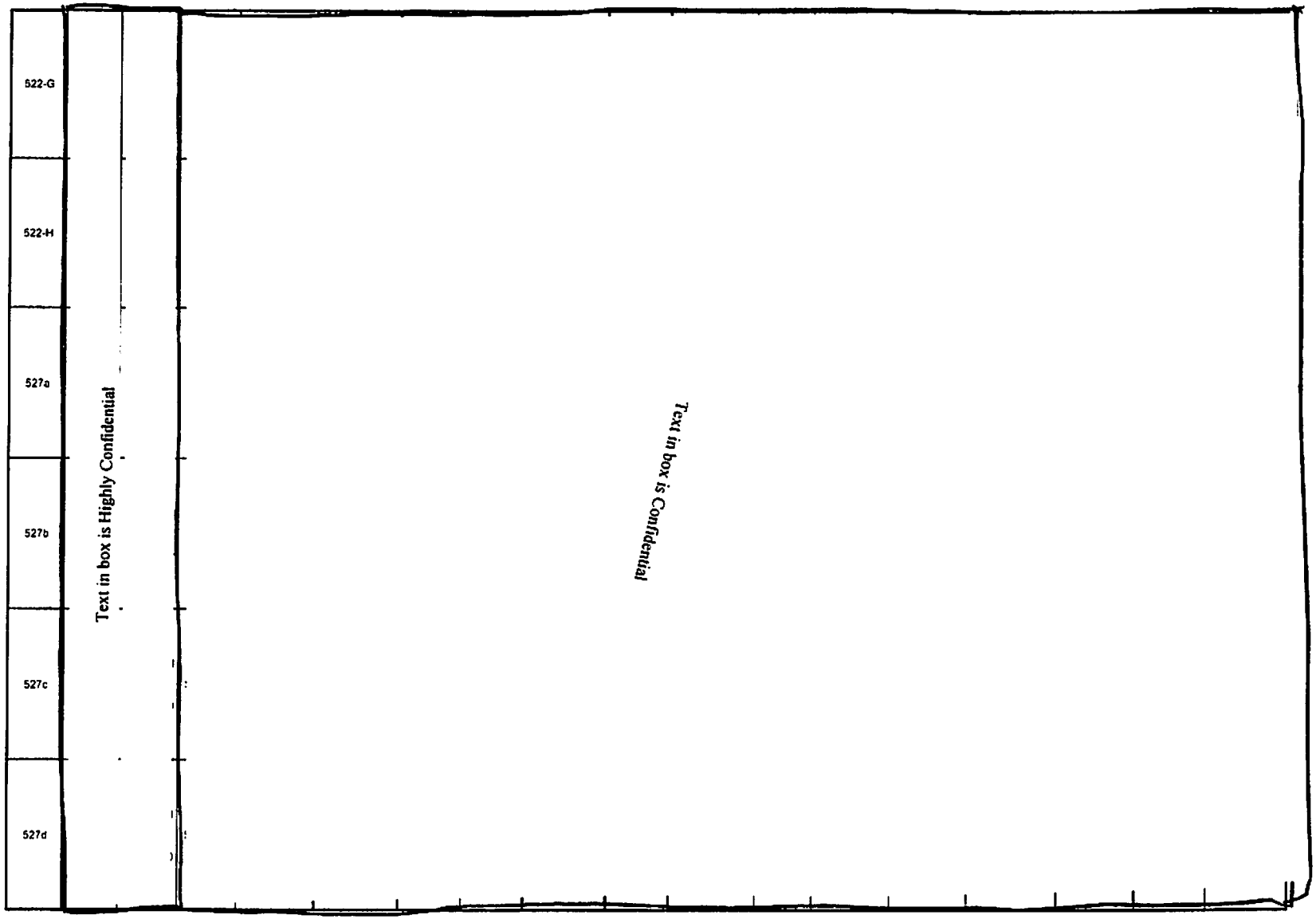
Per WAC 480-07-160



HIGHLY CONFIDENTIAL

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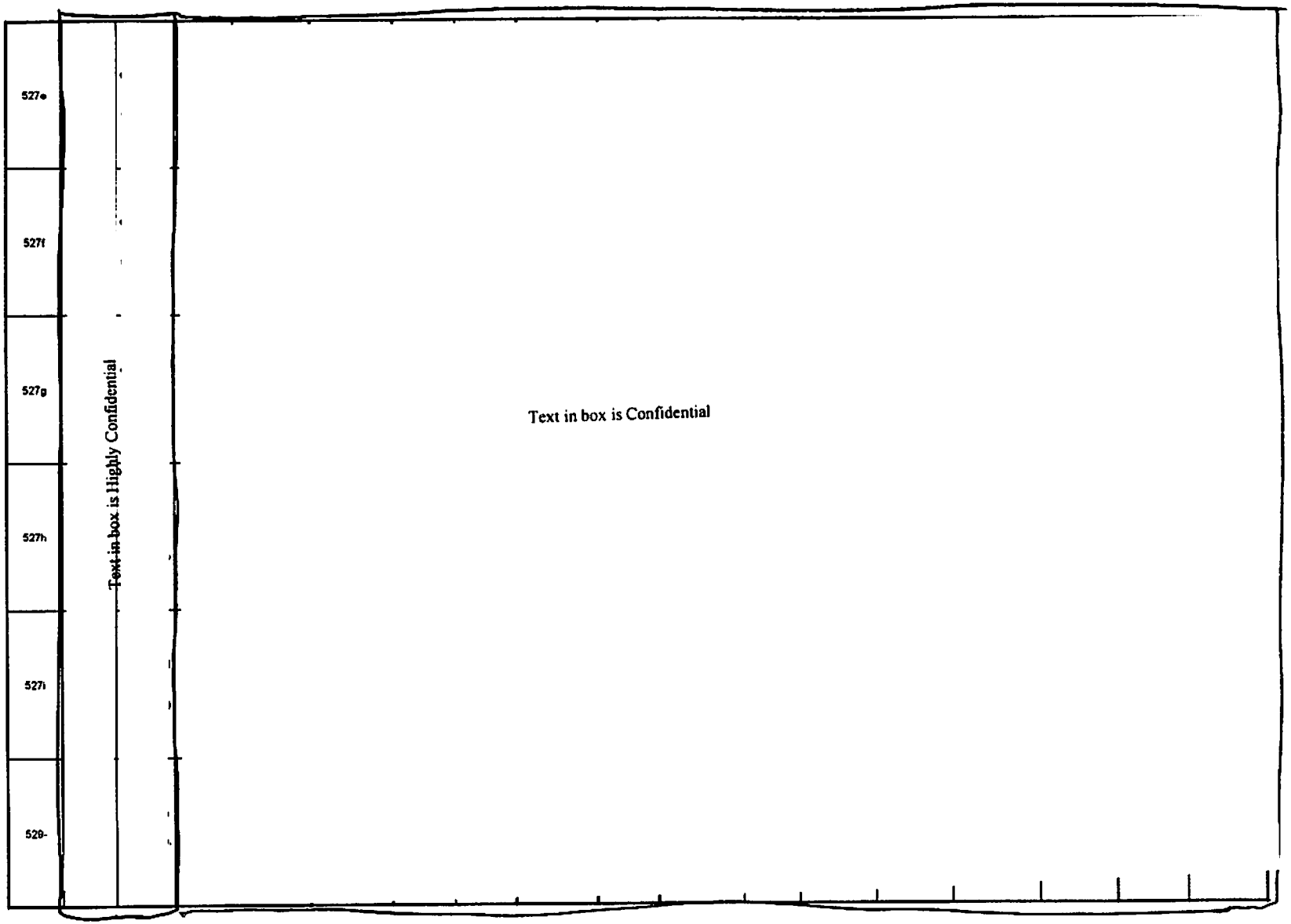

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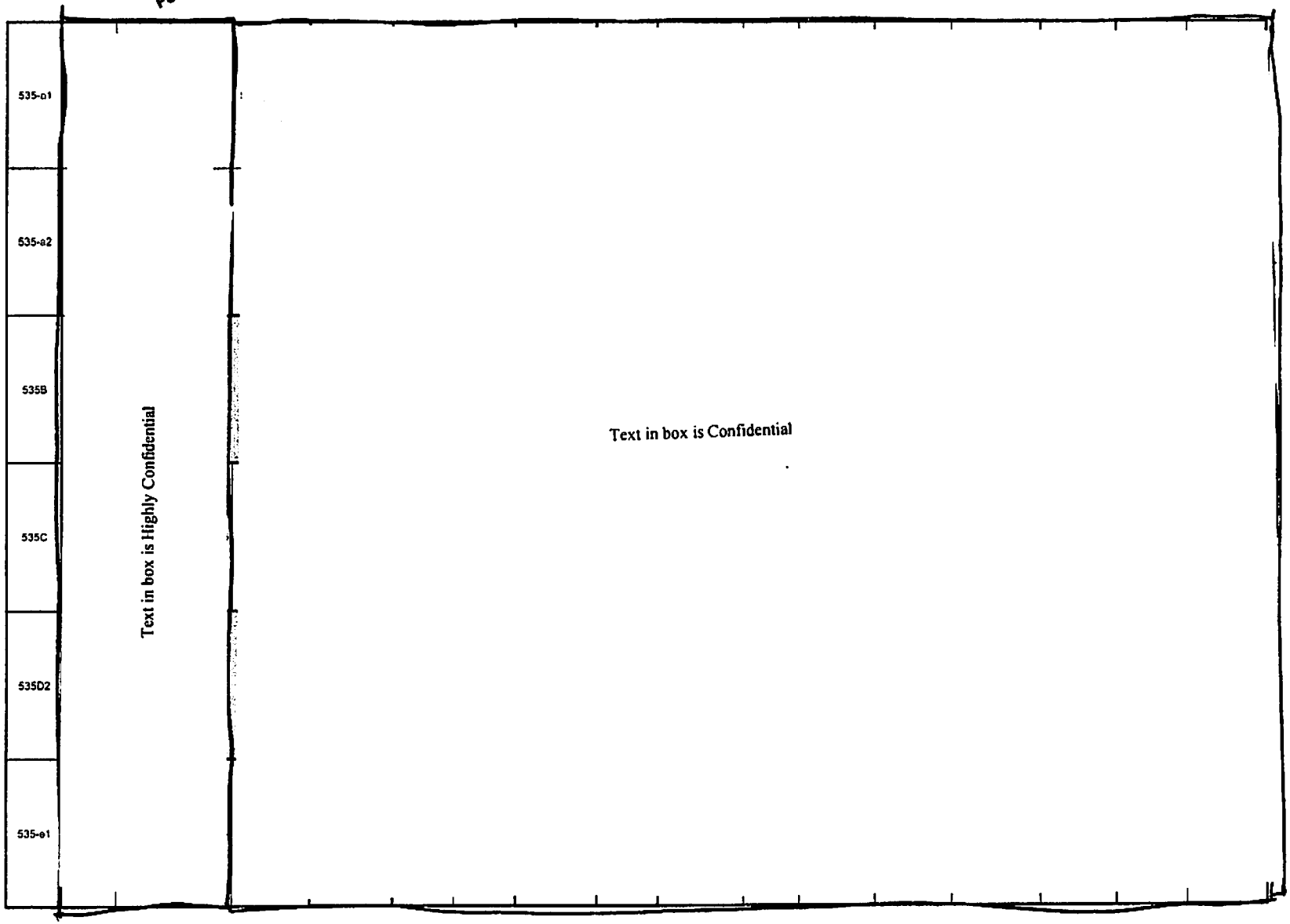
CONFIDENTIAL
Per WAC 480-07-160



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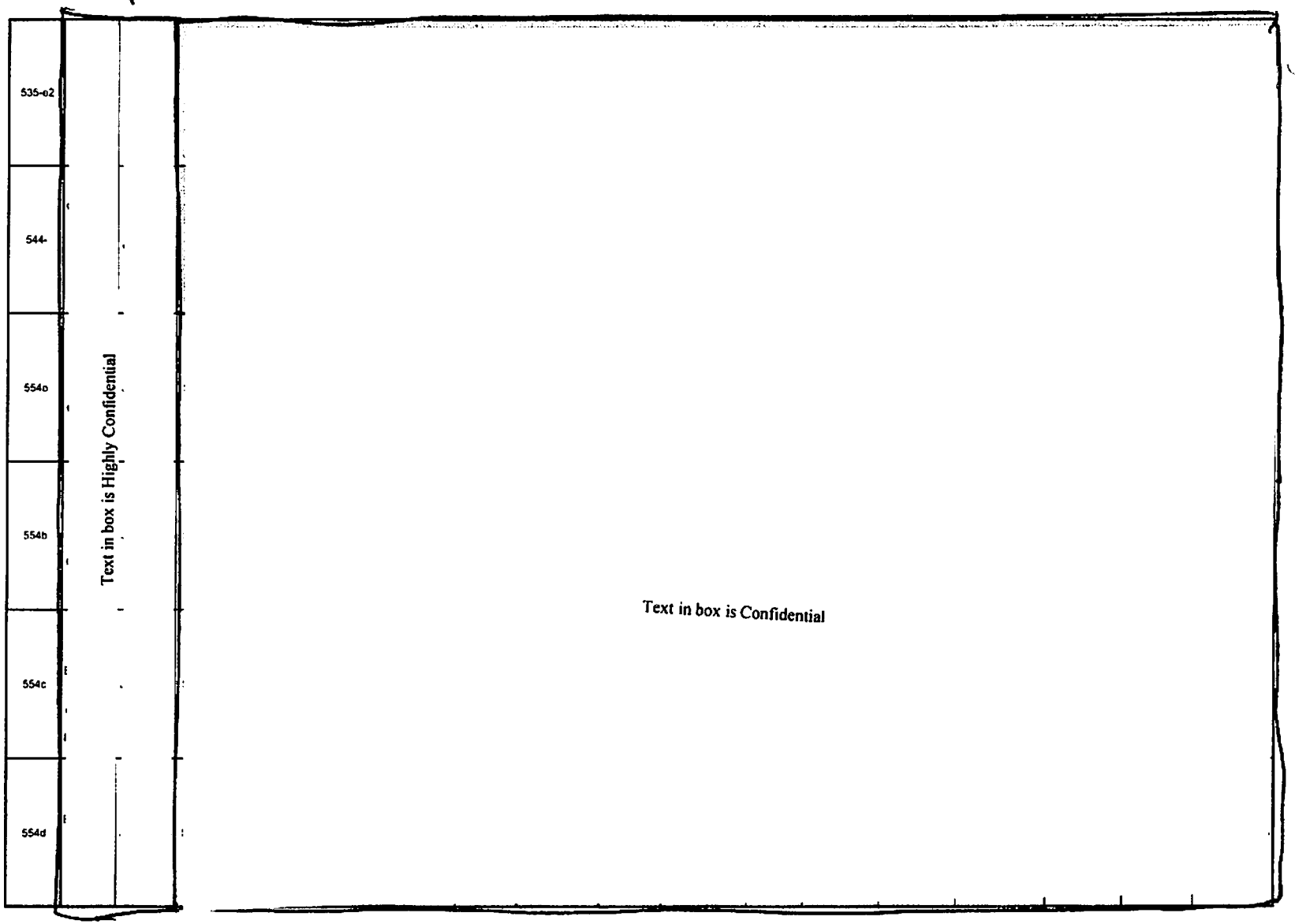
Per WAC 480-07-160



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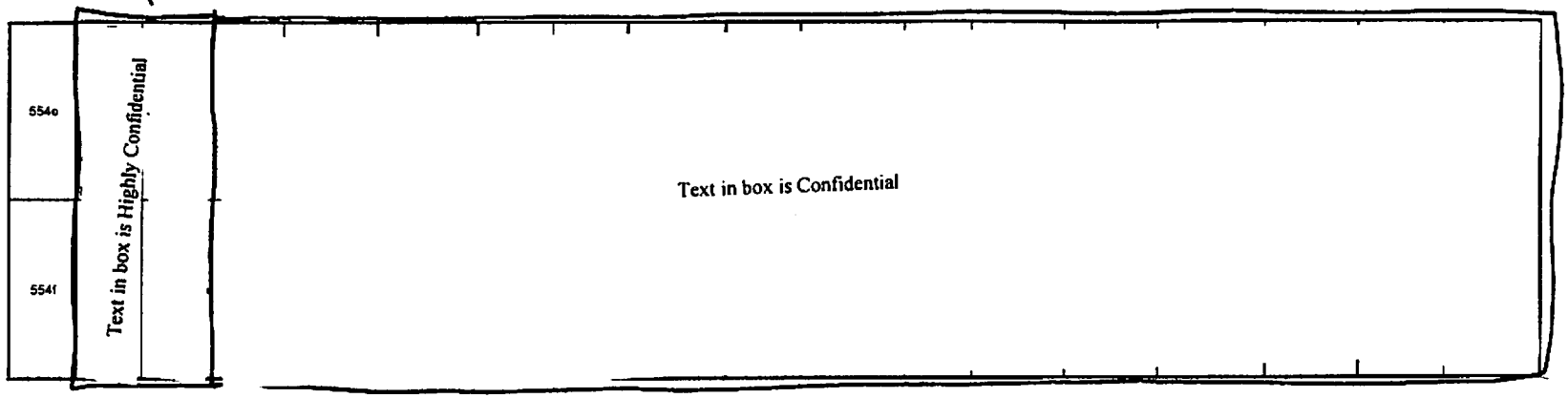
Per WAC 480-07-160



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Appendix H

Portfolio Benefit per PV of Project Revenue Requirement
(0.35)
(0.25)
(0.15)
(0.05)
0.05
0.15
0.25
0.35
0.45
0.55
0.65
COAL
0.14
0.14
0.13
0.08
0.07
0.06
0.05
GEO
0.07
0.05
0.04
HYDRO
0.31
0.16
0.02
0.06
GAS
0.31
0.27
0.25
0.24
0.24
0.24
0.23
0.17
0.16
0.15
0.15
0.14
0.12
0.11
0.11
0.10
0.04
0.07
0.24
0.06
0.05
0.02
0.01
0.10
0.27
0.12
0.10
0.06
0.04
0.04
0.04
0.01
0.00
0.01
0.02
0.02
0.02
0.10
0.14
0.16
WIND
Text in box is Highly Confidential
552 - Goldendale Energy Center
530-B - Klondike III (PPA)
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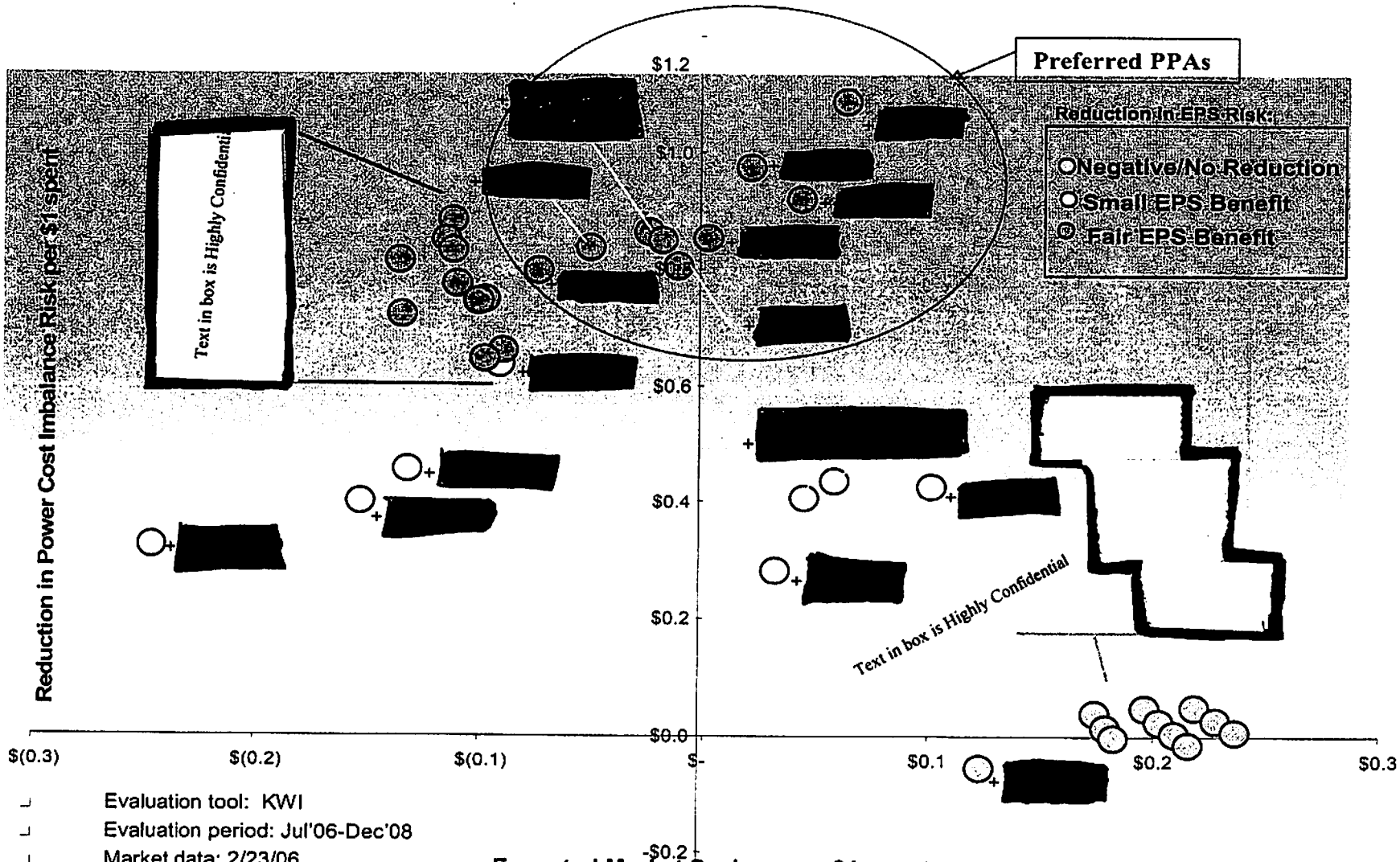
WAC 480-07-160

Appendix I



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Appendix J

RESOURCES EVALUATED IN PHASE II OF PSE'S 2005 RFP

0	000	Generic Portfolio of wind, PPA, Gas and Coal
1	501a2	
2	504	
3	506-a	
4	511C	
5	516	
6	520c	
7	522A	
8	522B	
9	525a	
10	530-A	
11	530B	
12	539C	
13	547A	
14	550	
15	552	Goldendale (Own) – 277 MW CCCT
16	554a	

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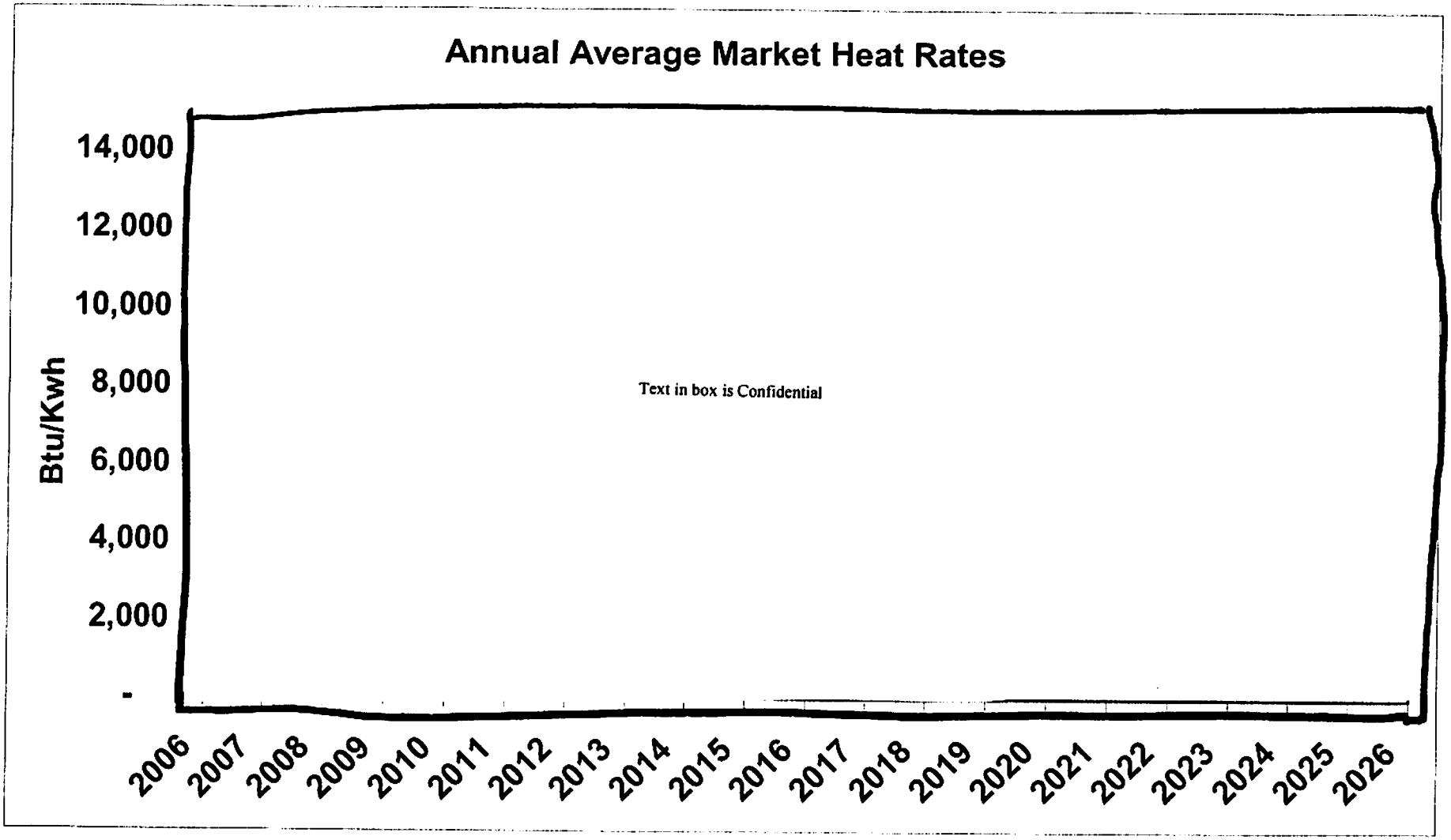
Appendix K



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Appendix L

Project/Offer	Start Year	End Year	Portfolios: Executable: Port 1	Port 2	Port 3	Longer Lead Time or Higher Risk: Port 4	Port 5	Port 6	Port 7
[redacted]	2009	2034	Y	Y	Y	Y	Y		
	2011	2031						Y	
Klondike III (Hybrid-Own)	2008	2028					Y		
Klondike III (PPA)	2008	2028	Y	Y	Y	Y		Y	Y
[redacted]									
	2012	2027	Y	Y		Y	Y		Y
Goldendale	2007	2027	Y		Y		Y		Y
[redacted]	2008	2028				Y			
	2007	2027							
	2013	2033						Y	Y
	2006	2010		Y				Y	
	2006	2011							
			Executable - Klondike [redacted] (PPA), [redacted] and Goldendale	Executable - All PPA	Executable - like Portfolio 1, but remove [redacted]	Like Portfolio 1 with substitute of [redacted] for Goldendale	Like Portfolio 1 with substitute Wind (Hybrid) for Wind (PPA)	Long Lead Hydro and Coal with bridge PPA	Similar to LCP strategy of 50:50 coal:gas future

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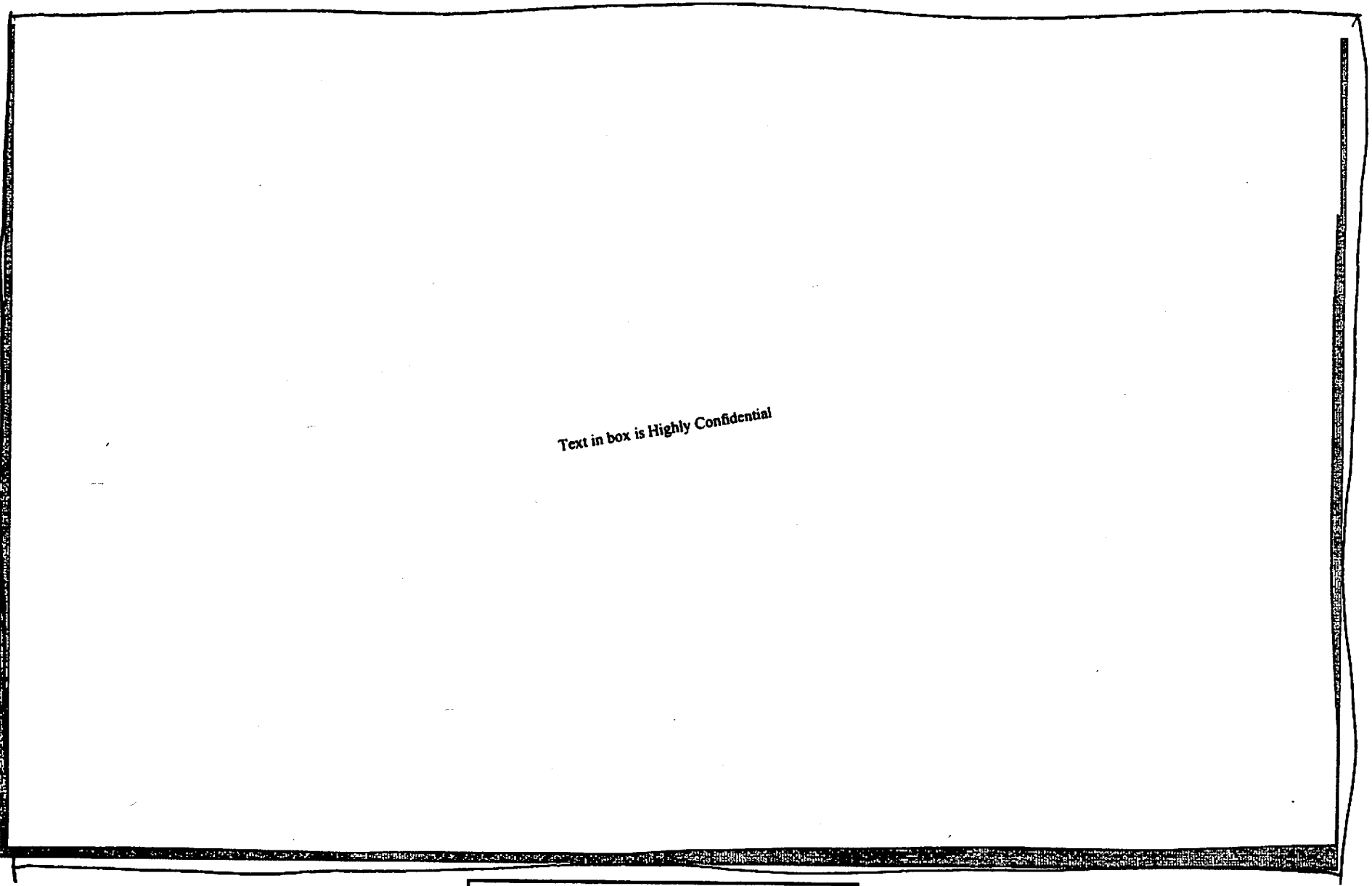
Appendix M



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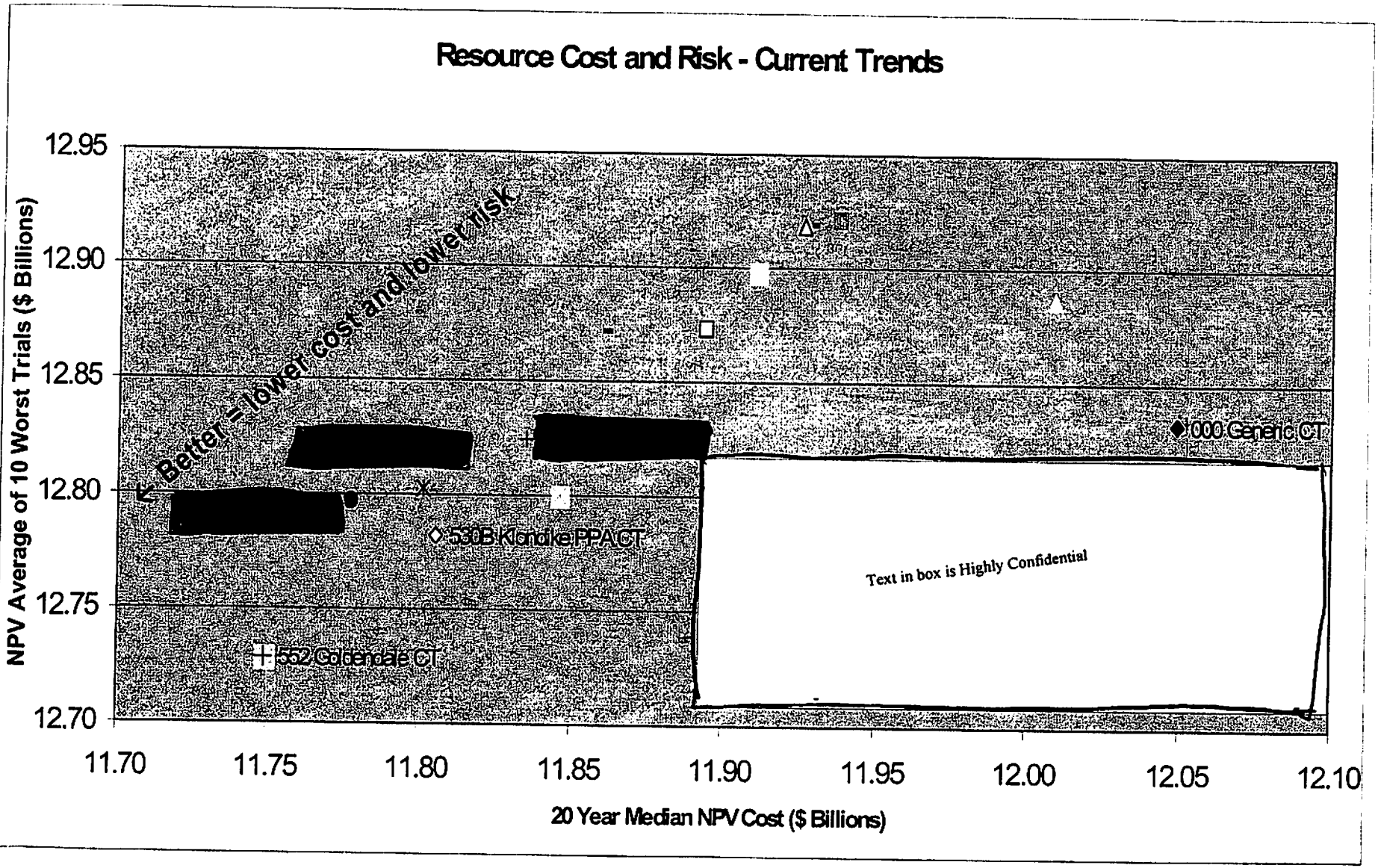
Appendix N



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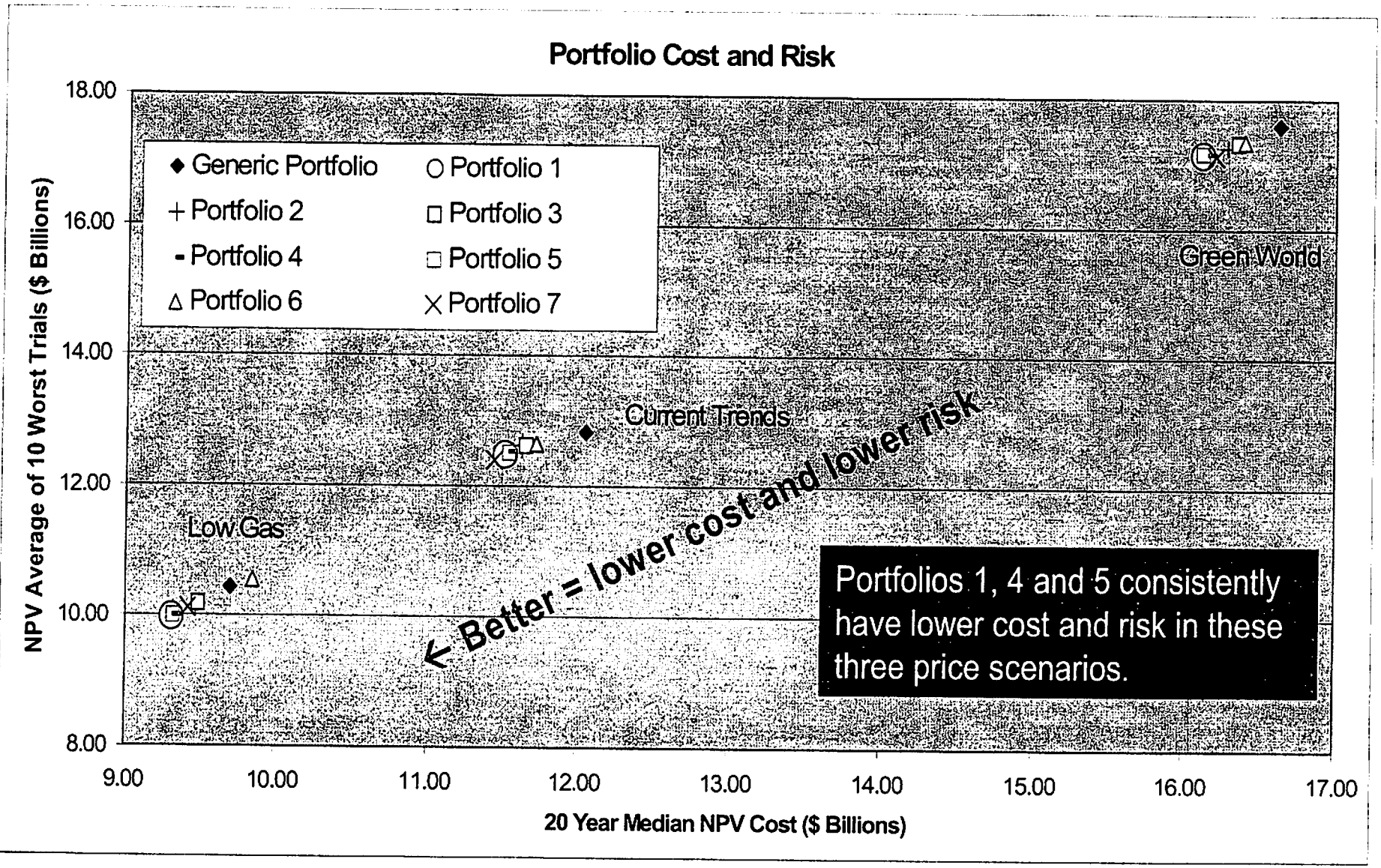
Appendix O


Portfolio Cost and Risk
NPV Average of 10 Worst Trials ($ Billions)
18.00
16.00
14.00
12.00
10.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
17.00
20 Year Median NPV Cost ($ Billions)
◆ Generic Portfolio
○ Portfolio 1
+ Portfolio 2
□ Portfolio 3
- Portfolio 4
□ Portfolio 5
△ Portfolio 6
X Portfolio 7
Green World
Current Trends
Low Gas
← Better = lower cost and lower risk
Portfolios 1, 4 and 5 consistently have lower cost and risk in these three price scenarios.

Appendix P

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Fuel	Project/Offer	MW	Benefit Ratio	Cost $/MWh	Portfolio Benefit $000
G	Text in box is Highly Confidential		0.18		8,139
H			Continuing Investigation		
W			0.19		95,499
W			0.22		106,292
NG			0.23		133,084
NG	Goldendale	277	0.16		179,820
NG			Continuing Investigation		
NG			0.01		40
PPA			0.42		21,039
PPA			0.28		69,041

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