Q. Please state your name, business address and present position with PacifiCorp (the Company).

A. My name is Chris R. Mumm, my business address is 825 N.E. Multnomah, Suite 600, Portland, Oregon 97232. My present position is Director of Structuring & Pricing, Commercial & Trading, which is part of PacifiCorp's regulated merchant function.

Q. Briefly describe your education and business experience.

A. I graduated from Eastern Washington University in 1998 with a Bachelor of Arts in Business Administration, focus in Finance & Economics and from the University of Oregon in 2001 with a Master of Business Administration in Finance. I have been employed in PacifiCorp's Commercial & Trading group since 2002. I have been in my present capacity as the Director of Structuring & Pricing since April 2004. In my current duties, I am responsible for analysis and valuation of the Company's structured wholesale contracts.

Q. What is the purpose of this testimony?

A. The purpose of my testimony is to: 1) describe the necessity of contracts that hedge exposure to uncontrollable price and volume volatility and/or contracts that provide price and volume optionality (together, "hedge" or "hedging" contracts), 2) rebut ICNU witness Falkenberg's criticism of Black-Scholes modeling as imprudent for energy resource purchase decisions by a regulated utility, 3) rebut Mr. Falkenberg's claim that customers do not benefit from hedges which provide risk reduction, and 4) rebut Mr. Falkenberg's claim that hedging contracts are different from insurance policies, and therefore should not be considered an ordinary ratemaking expense.

Necessity of Hedging Contracts that Provide Price and Volume Optionality

Q. What is the issue with respect to hedging contracts?

A. ICNU witness Falkenberg proposes to exclude the expense associated with hedging contracts because it "is not a reasonable ratemaking expense."

Q. Please describe the types of optionality or flexibility PacifiCorp's customers currently enjoy.

A. By virtue of PacifiCorp's obligation to stand ready to meet its customers' demands for electricity, PacifiCorp's regulated retail customers currently have the right to buy (call) or not buy (put) additional energy on a proactive basis (by "flipping" the switch on or off) or passively when either weather conditions and/or economic conditions deviate from planned. These regulated retail customers have this right in "real-time," that is, they are not under any obligation to notify PacifiCorp of their intention.

Q. Please explain how customers can call or put energy when weather conditions deviate from planned, and the implications to the Company's net energy position.

A. The Company's net energy position on a forward basis is based on normal weather and economic conditions. To the extent that temperatures are higher than normal during the summer, customers will use (call) more energy than planned at essentially a fixed tariff price. Under this circumstance, the Company and its customers have a short energy (volume risk) position in a volatile wholesale market that could potentially be higher than tariff (price risk). Alternatively, temperatures could be lower than normal and customers will use less energy (put) than planned. Under this circumstance, the system

has a long energy (volume risk) position in a wholesale market that could be lower than tariff (price risk). This volume risk reverses during the winter when below-normal temperatures can leave the system in a short energy (call) position. If wholesale prices rise above tariff price, then the unanticipated power purchases will result in upward pressure on net power costs. Alternatively, if temperatures are above normal during winter, customers will use less energy than planned and resources must either be adjusted downward or unanticipated power sales must be made to the market. PacifiCorp attempts to balance its loads and resources in advance by planning its generation and entering into forward wholesale transactions. When a PacifiCorp regulated retail customer does not consume energy as anticipated, for any reason (including due to economic or weather conditions), PacifiCorp may not be able to quickly adjust planned generation operations or purchase obligations and hence must either redirect this energy back to the wholesale market or make additional purchases. This results in portfolio price exposure since wholesale prices are likely to be different than those at the time the Company attempted to balance the load/resource balance. All load serving gas and electric utilities with an obligation to serve (at least those not having a full requirements supplier that bears the volume and price risk) have similar volume and price risk exposure.

Q. Please explain how a prudent utility should hedge this short option position.

A. A prudent utility would have a diverse and flexible portfolio of physical resources, physical purchases, and options (fixed price, tolling, volumetric) that permit the utility to manage its expected net energy position and resultant price and volume exposure. This

flexibility can allow the Company to better respond to unpredictable changes in regulated retail customer demand. In addition, a prudent utility would pursue additional hedge tools to help mitigate the effects due to unexpected and uncontrollable changes to the expected net energy position.

Q. Please explain how the Company manages its net energy position.

A. The Company seeks to manage the price and volume exposure for its customers by maintaining a net financial position (its exposure to wholesale market prices) as close to flat (net zero) as possible, taking into account expected levels of unit outages/derates, transmission availability, and expected weather conditions. An energy position that remains flat over a range of price and weather conditions is desirable as it is expected to result in relatively little change to the expected net portfolio cost under reasonably expected circumstances. The expected net portfolio cost is, of course, strongly related to net power costs. This means that an effective and prudent way to manage net power costs is to manage the expected energy position for the system in such a way that deviations in net power costs are mitigated by carrying a flat energy position as much as possible. The use of options is a prudent tool for managing these risks on behalf of customers.

Q. Does the Company use options to speculate on market price direction?

A. No. The Company's energy trading and risk management policies prohibit taking speculative option positions. As discussed above, the Company seeks to purchase options (purchase opportunities at a known cost to help mitigate the effects of having to make future wholesale balancing transactions at unknown prices) to mitigate the short

option position it holds as a result of its obligation to serve. The Company cannot predict what prices will be at the time unexpected balancing transactions are required, but it can hedge this price uncertainty with options. Assuming both forward block purchases and options are readily available, and assuming the risk being hedged is both price and volume risk, the risk of purchasing forward power is greater than purchasing options for the same quantity if the price being charged for those options is appropriate.

Q. Can you provide an illustrative example?

A. Yes. Exhibit No.___(CRM-2) provides such an illustration. If the forward price for power is $55/MWh, the Company could purchase either physical power forward (forward block) or a physical call option for the same quantity of power with a strike price of $55/MWh (an "at-the-money" option).

Since the Company seeks to hedge its price and volume risk on a forward basis, for any given short position, the Company will procure either a call option or a fixed price forward block. Given that one of these two products will be purchased, the benefit of the call option does not come, as Mr. Falkenberg would have you believe, from market prices increasing beyond $55/MWh, but rather from market prices *decreasing* below $55/MWh. When market prices increase beyond $55/MWh both the call option and the forward block provide similar economic benefits. When market prices *decrease* below $55/MWh, the economic loss on the option is limited to the option premium. At the same time when market prices *decrease* below $55/MWh, a fixed price forward block purchase incurs an economic loss during every hour where the market is below $55/MWh. This means, for example, that the Company, in this example, could be

forced to pay $55/MWh when the market is at $30/MWh, a $25/MWh loss. Exhibit No. (CRM-2), shows a comparison of maximum losses and maximum gains between purchasing a forward block of power and purchasing a physical call option. The maximum loss for purchasing power forward under the above scenario is ($1,144,000) and the maximum loss for purchasing the option is only the option premium ($312,500). The maximum gain for purchased forward block power is $4,056,000 while the maximum gain for the option purchase is $3,743,500 (assuming the existing FERC price cap of $250/MWh is the limiting market price constraint). Clearly, the more speculative approach to hedging is using only forward block purchases since this approach produces the greatest losses and the greatest gains. The call option allows the system of resources to meet rising demand when prices move higher, yet mitigate downside risk in the event demand decreases and prices fall. This means the option alternative is a risk mitigating approach and, as a result, benefits customers because there is less risk that net power cost will vary.

Q. How does this example relate to the issues raised by Mr. Falkenberg?

A. The Company seeks to hedge risks associated with extreme market price movements, and ***not*** to maximize its profit around expected market price outcomes as Mr. Falkenberg suggests. Further, disallowing the cost of option premiums could force the Company into riskier hedging strategies (i.e. purchasing more forward block power only when less risky and economic alternatives are made available by the market). This puts customers at greater risk because of the linkage between net power costs and the

embedded uncertainty of the system load/resource balance as a result of the Company's obligation to serve.

Black-Scholes Modeling as Applied to Energy Resource Purchase Decisions

Q. What is the issue regarding Black-Scholes modeling in this case?

A. ICNU witness Falkenberg claims that the use of Black-Scholes modeling for resource selection decisions is "unproven, novel and highly speculative," and that the Commission might "consider disallowing the costs of resources selected by the model on the basis of imprudence."

Q. What is Black-Scholes modeling?

A. Black-Scholes modeling values option contracts. Some discussion of option contracts is necessary before proceeding to discuss Black-Scholes modeling.

Option contracts give the option owner the right – but not the obligation – to do something, usually to buy or to sell a commodity at a known, fixed price (the "strike" price) at a specific point in time (the "delivery period") and at a certain location (the "delivery location"). If the contract is the right to buy it is a "call" option; if it is the right to sell it is a "put" option.

If the option contract is settled physically, the option is a physical option and the option owner takes physical delivery (calls) or delivers (puts) the commodity. If the option is settled financially, the option is a financial option and the owner receives the value, as settled against an agreed upon information source, of the commodity (for a call) or pays the value of the commodity (for a put) as if physical deliveries had taken place.

The option owner will exercise the option only if the option has value or, according to the jargon, if it is "in-the-money." The seller of the call or put has the opposite position. If the owner exercises the option, the seller has an obligation to sell (in the case of the call) or buy (in the case of the put).

Q. How does Black-Scholes modeling come into play?

A. When a prospective option owner is deciding whether or not to buy, or a prospective option seller is deciding whether or not to sell, a model must be used to estimate the option value to determine the option price. The price of an option is known as the option "premium." The Black-Scholes model helps buyers and sellers determine this premium and, later, to determine the ongoing value or "mark-to-market" value of the option. The Black-Scholes model was developed by scholars in an academic framework; as acknowledged by Mr. Falkenberg, one of the authors, Myron Scholes, won a Nobel Prize in economics in large part due to his development of the Black-Scholes option valuation model. For the purposes of option modeling, Black-Scholes is the most common and most credible model, regardless of industry.

Q. How does PacifiCorp use Black-Scholes modeling?

A. PacifiCorp uses Black-Scholes to determine what to pay for an option and, therefore, whether or not to buy the option. As a load-serving entity, it is very rare that PacifiCorp would consider selling an option during periods of expected resource inadequacy and does not buy or sell an option for speculative purposes. In fact, such speculative activity is prohibited by PacifiCorp's energy trading and risk management policies, as noted earlier in my testimony. PacifiCorp also uses Black-Scholes to value

the options (mark-to-market) that exist in its portfolio.

Q. Why does PacifiCorp believe Black-Scholes is a valuable tool and appropriate to use in the manner applied by PacifiCorp?

A. PacifiCorp uses Black-Scholes for several reasons. First, in the Company's experience, Black-Scholes has delivered useful and commercially reasonable option values for a wide variety of instruments. Back testing Black-Scholes predictions has shown the model's accuracy. Black-Scholes has validated option quotes from counterparties and has validated published quotes from widely traded option instruments such as the options traded on the New York Mercantile Exchange (NYMEX). Finally, Black-Scholes has tremendous credibility in the financial and commodity community. Many software houses and financial and engineering firms have developed standardized energy derivative valuation software packages, and the most common option valuation model is Black-Scholes.

Q. How do you respond to Mr. Falkenberg's claim that Black-Scholes modeling is "unproven, novel and highly speculative" when used for the purposes for which PacifiCorp uses it?

A. The method is entirely appropriate for the purposes for which it is used by PacifiCorp. The energy industry has used Black-Scholes models for many years in valuing options on natural gas, crude oil, diesel fuel, gasoline, and electricity. As mentioned earlier, energy options (calls and puts) traded on the NYMEX for natural gas and crude oil are valued using Black-Scholes models. Black-Scholes models and other stochastic models are valid methodologies for valuing such diverse liquid and illiquid assets as

company acquisitions, stock warrants, employee stock option grants, director level option grants, option valuations on gasoline, jet fuel, and diesel fuel.

Exhibit No. ___ (CRM-3) is a representative list of companies currently employing Black-Scholes models as disclosed in their recent 10-K filings with the Securities and Exchange Commission. In fact, most commodity markets including banks and financial institutions involved in interest rate and currency markets use Black-Scholes valuation and analysis techniques.

Q. Explain what crude oil, gasoline, diesel fuel, natural gas, and electricity all have in common.

A. They are energy commodities in which prices exhibit similar behavior, and the future and forward contracts for these commodities do not pay dividends. A basic premise of the Black-Scholes model is that prices for the underlying asset are lognormally distributed (that, is the chances of a price increasing by a given percentage are approximately equal to the price decreasing by the same percentage). Prices for energy commodities (i.e. natural gas, crude oil, electricity) in general can never be negative but have an unlimited maximum (within bounds of future storage costs for natural gas and crude oil and FERC mandated price caps for electricity). The mean or expected price is the forward price for the underlying variable. The resulting price distributions can be approximated as lognormal distributions. Crude oil, gasoline, diesel fuel, natural gas, and electricity have shown different historical price volatilities, with electricity having the highest historical price volatility. As such, the use of option purchases is especially important for load

serving entities in helping to mitigate volume and price risk associated with their obligation to serve.

Q. How do you respond to Mr. Falkenberg's claim that the benefits ascribed to resources by Black-Scholes modeling are impossible to reflect in a rate case test year?

A. Mr. Widmer addresses this issue in his rebuttal testimony.

Hedge Benefits and Comparability to Insurance Products

Q. How do you respond to Mr. Falkenberg's claim that ratepayers do not benefit from risk reducing hedges?

A. The statement that hedge premiums are "just another one-way street where ratepayers pay the costs, while PacifiCorp stands to reap the benefits" is completely false. PacifiCorp enters into hedges to help reduce the volatility of net costs associated with the system or resources required to meet our obligation to serve. It is clear that customers are affected by a utility's net expense associated with serving load. Volatility in what it costs the Company to serve load affects both PacifiCorp's credit rating and its cost of capital.

Q. How is PacifiCorp's credit rating affected?

A. High volatility of cash flows can adversely affect the Company's perceived credit quality. This, in turn, would limit the Company's ability to procure low cost resources from the forward market and/or long-term via purchased power agreements, tolling service agreements, and/or cost-based self build alternatives. PacifiCorp would be

forced either to procure energy in the volatile near-term markets (such as the balance of the month, daily, or real-time markets), or to bear an unnecessarily high embedded premium associated with long-term resources. Southern California Edison and Pacific Gas & Electric are good examples of companies whose customers have been adversely affected by exposure to daily and real-time markets. Correspondingly, through the application of prudent credit practices, the Company limits the type of transactions it is willing to enter into with certain counterparties when *their* quality is in question.

Q. How is PacifiCorp's cost of capital affected?

A. Cash flow volatility also affects the Company's cost of capital. The debt component of the Company's cost of capital is mainly a function of the Company's credit quality. Poorly perceived credit quality, via credit ratings or otherwise, typically translates into a higher cost of debt. The equity component of the Company's cost of capital is driven by the risk of cash flows made available to shareholders. High volatility associated with cash flows is likely to lead shareholders to demand a higher required rate of return, all else being equal. In summary, failure to hedge could lead to an increase in cash flow volatility, which in turn will decrease the Company's credit quality and possibly increase our cost of capital.

Q. Mr. Falkenberg believes that hedges differ from insurance, and as a result their premiums should not be viewed as an ordinary ratemaking expense. Do you agree?

A. No. Mr. Falkenberg fails to explain how PacifiCorp's hedges differ from insurance. He cites three reasons for claiming hedges to be different from insurance: 1) the

structure of the hedges that PacifiCorp has pursued do not look like insurance products with which he is familiar, 2) customers do not benefit from hedges, and 3) hedging is a risky endeavor relative to purchasing insurance policies. I discuss these points in turn below.

1. The PacifiCorp/Aquila hydro structure contains both fixed and variable payments as PacifiCorp was seeking to minimize its fixed premium, while still obtaining a product that would reduce cash flow volatility. PacifiCorp certainly could have increased the fixed premium to obtain a payout under any scenario (no variable payment to Aquila). Under such a scenario, the premium charged by Aquila would have been significantly higher than the current structure. Apparently if PacifiCorp had structured the arrangement with a single fixed payment, it would be deemed insurance by Mr. Falkenberg. To compare paying extra for storm damage insurance when less than expected damage occurs – as stated in Mr. Falkenberg's testimony – is not an accurate analogy as it fails to recognize that storm damage insurance would reflect a *reduced* premium in the situation where the customer was to pay an *additional* premium when storm damage *failed* to occur. Clearly the structure of the payments should not be used as a determinant for differing insurance from hedging.

2. As described earlier in the testimony, customers receive benefits from hedges through PacifiCorp's strong credit rating and low cost of capital. These attributes tie directly to the Company's ability to procure low cost resources on a forward basis, minimizing customer exposure to volatile markets or an

unnecessarily high long-term resource cost. In addition, it is absurd for Mr. Falkenberg to state that a product whose expected costs exceed its expected benefits could not be an insurance product. If the expected benefits of insurance products exceeded the expected cost, there would not be a single insurance company in business today. When one takes out homeowners insurance, does one expect that it will produce a payout that is greater than the premium? The fact is, insurance policies do not typically produce expected payouts that exceed the expected cost. Hedges are often no different in this regard. Accordingly, the net present value of a hedge should not be used as a determinant for differing it from insurance.

3. It is false to suggest that hedging is a higher risk endeavor than purchasing an insurance policy. The risk associated with either a hedge or an insurance product is entirely based on the product structure and the resulting premium, rather than the particular name assigned to the activity. Mr. Falkenberg makes the claim that under the hydro hedge, the Company *could* end up making very high payments to Aquila, yet receive no payments in return. This scenario sounds very similar to earthquake insurance, flood insurance, and other insurance products that are structured to pay out during the case of a catastrophe. Simply stated, insurance products and hedging products are the same in theory, application, and function. They can be structured to pay out during cases of a catastrophe, such as an earthquake, or under more routine circumstances, such as when temperatures rise above a certain level. There is

no practical difference between hedge and insurance premiums, and both should be recoverable in rates.

Q. Does this conclude your rebuttal testimony?

A. Yes.