

In the Matter of the Application of PACIFICORP for an Accounting Order Regarding Excess Net Power Costs. (UM 995)

In the Matter of PACIFICORP’s Application for Partial Authorization of Its Request to Defer Excess Net Power Costs and Approval of Its Request to Implement an Amortization in Rates of Deferred Excess Net Power Costs. (UE 121)

INDUSTRIAL CUSTOMERS OF NORTHWEST UTILITIES and CITIZENS’ UTILITY BOARD,

Complainants,

vs.

PACIFICORP,

Defendant. (UC 578)

ORDER)

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BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON

UM 995/UE 121/UC 578

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(UM 995))	
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Authorization of Its Request to Defer Excess Net Power)	
Costs and Approval of Its Request to Implement an)	
Amortization in Rates of Deferred Excess Net Power)	
Costs. (UE 121))	ORDER)
)	
INDUSTRIAL CUSTOMERS OF NORTHWEST)	
UTILITIES and CITIZENS' UTILITY BOARD,)	
)	
Complainants,)	
)	
vs.)	
)	
PACIFICORP,)	
)	
Defendant. (UC 578))	

DISPOSITION: STIPULATION ADOPTED

This order completes a series of cases addressing PacifiCorp's excess net power costs incurred between November 1, 2000 and September 9, 2001. Excess net power costs are costs PacifiCorp incurred to serve its load above the level set in UE 111, a general rate case (Order No. 00-580). These excess net power costs were incurred during a period of rapidly escalating wholesale power prices, a drought, and a thermal generation plant outage. In the course of our deliberations, we have determined excess net power costs (Order No. 01-683), developed a methodology for sharing the excess net power costs between customers and shareholders (Order No.

01-420) and, in this order, assessed the prudence of PacifiCorp's excess net power costs. The effect of these decisions is to allow PacifiCorp recovery of just over 50 percent of its excess net power costs. On an Oregon basis, PacifiCorp's excess net power costs were determined to be approximately \$259 million. After applying the sharing mechanism, costs eligible for recovery are approximately \$160 million, and this order allows recovery of approximately \$130 million, or just over 50 percent of PacifiCorp's request.¹

Our decision reflects the preponderance of evidence in the record. Throughout this process we have been assisted by the engagement of the parties, who have devoted considerable time and effort to creating a comprehensive record for our decision. We thank the parties for their vigorous and effective advocacy.

PROCEDURAL BACKGROUND

On November 1, 2000, PacifiCorp filed an application to defer excess net power costs incurred from the date of the filing forward. The application was docketed as UM 995. In that application PacifiCorp estimated that it would defer approximately \$63 million in excess net power costs. The Industrial Customers of Northwest Utilities (ICNU) and Citizens' Utility Board (CUB) challenged the application. On January 9, 2001, the Public Utility Commission of Oregon (Commission) issued Order No. 01-086, finding that PacifiCorp's application could proceed as a matter of law. Settlement conferences were held among CUB, ICNU, Commission Staff (Staff), and PacifiCorp on January 10, 16, and 31 and February 13, 2001.

On January 18, 2001, PacifiCorp filed an application, docketed as UE 121, seeking expedited permission to defer \$22.8 million in excess power costs and to enable immediate amortization of that amount, which was the statutory maximum at the time.² On January 25, 2001, ICNU and CUB filed a complaint against PacifiCorp with the Commission in UM 995 and UE 121. The Commission docketed the complaint as UC 578. The complaint requested a hearing pursuant to

¹ It could be argued that we have allowed less than 50 percent of PacifiCorp's initial request. First, we accepted Staff's proposal for a sharing mechanism, which is less generous than PacifiCorp's proposal. Second, we accepted Staff's baseline rather than PacifiCorp's proposed baseline of \$397,648,000. This figure appears nowhere in the record, because PacifiCorp's proposal included an annual power cost figure and the deferral period is nine months and nine days. The figure is derived by removing October, November, and December power cost figures for the year 2001, prorating the September power costs to reflect the nine days included in the deferral period, and calculating November and December 2000 power costs by reducing November and December 2001 power costs by 2 percent to account for assumed load growth from 2000 to 2001. In Order No. 01-683, the Commission selected a baseline of \$448,853,000. PacifiCorp's proposed baseline does not include revenues from the Wah Chang special contract, whereas Staff's baseline does include these revenues. With PacifiCorp's baseline, excess net variable power costs would have been \$837.9 million on a total company basis, or \$275.7 million on an Oregon allocated basis. Thus PacifiCorp's recovery in this order of \$130 million is less than half of full recovery of \$275.7 million.

² Under the then current version of the deferred accounting statute, ORS 757.259 (1999), the company's rate of recovery of deferred accounts was limited to 3 percent of the company's year 2000 gross revenues in Oregon of \$761.1 million. Three percent of \$761.1 million is \$22.8 million.

ORS 757.210 to determine whether the rate increase proposed in UE 121 was just and reasonable and whether the amortization of the deferred amounts satisfies the requirements of ORS 757.259.

On February 13, 2001, the ALJ consolidated UM 995, UE 121, and UC 578 for procedural purposes. That same day, in Order No. 01-171, the Commission authorized PacifiCorp's partial deferral of net power costs up to \$22.8 million. On February 21, 2001, the Commission authorized the amortization of \$22.8 million in rates, thereby increasing PacifiCorp's rates by 3 percent effective as of February 21, 2001. Order No. 01-186.

On May 11, 2001, the Commission issued Order No. 01-420 approving deferral of PacifiCorp's excess net power costs and adopting Staff's sharing mechanism for calculating the amount of the deferral. On July 31, 2001, the Commission issued Order No. 01-683 setting the baseline for PacifiCorp's power costs for use in calculating the deferral.³ On October 2, 2001, PacifiCorp appealed Orders No. 01-420 and No. 01-683 to Marion County Circuit Court. Order No. 01-683 also indicated that the UM 995 deferral would terminate on the effective date of the UE 116 rate order, which was ultimately effective on September 10, 2001. The deferral period thus runs from November 1, 2000, through September 9, 2001.

Using the baseline the Commission established in Order No. 01-683, PacifiCorp incurred approximately \$786.7 million in excess net power costs on a total company basis during the deferral period. The sharing mechanism established in Order No. 01-420 works on the total company level and set a deadband for power cost changes equivalent to +/- 250 basis points return on equity around the baseline (a band in which the utility bears all the cost and receives all the benefit); a 50/50 sharing band for power cost changes equivalent to between 250 and 400 basis points (basis point threshold established before the effect of sharing is calculated); and for power cost changes equivalent to more than 400 basis points, a sharing in which customers bear 75 percent and the company bears 25 percent. Order No. 01-420 at 5, 29. Applying the sharing mechanism to the \$786.7 million in excess power costs (of which approximately \$259 million is the Oregon share) yields approximately \$160 million at issue on an Oregon basis. Pursuant to Order No. 02-410, PacifiCorp is currently amortizing deferred power costs through August 31, 2002.⁴

The prudence review phase of this case began when PacifiCorp filed testimony and exhibits on October 16, 2001, regarding the amount of excess net power costs deferred and addressing the issues raised by Staff and Intervenors CUB and ICNU with respect to the prudence of these costs. On November 28, 2001, Staff, ICNU, and CUB circulated settlement proposals for this phase of UM 995. ICNU circulated a supplemental proposal on November 30, 2001. Settlement

³ PacifiCorp's general rate case, UE 111, resulted in a "black box" settlement, requiring the Commission to determine the baseline for deferral of net power costs by specifying the implicit level of power costs approved in UE 111.

⁴ The amount eligible for deferral is \$160,078,394, prior to consideration of prudence issues. Of this amount, carrying charges of \$9,077,537 had accrued through December 2001 and \$18,305,765 had been amortized in rates through December 2001, leaving a balance of \$150,850,166.

conferences began on December 5, 2001, and continued on December 7, 2001. PacifiCorp and Staff reached a stipulation (the Stipulation) agreeing to a disallowance of 15 percent of PacifiCorp's excess net power costs incurred during the deferral period, to resolve all prudence issues. The Stipulation, together with supporting joint testimony, was filed on December 18, 2001. ICNU and CUB filed testimony on January 11, 2002, and PacifiCorp filed its rebuttal testimony on January 30, 2002. Hearings were held in this matter on February 11 and 12, 2002, and parties submitted two rounds of briefs (Staff submitted one brief only). Appendix B attached to this order lists the positions of the parties on the various issues.

The Stipulation. The Stipulation between Staff and PacifiCorp provides for a disallowance of 15 percent of the excess net power costs incurred during the deferral period. The Stipulation presents a formula for determining prudently incurred excess net power costs. As a result of applying the formula, the amount requested for deferral in this proceeding is reduced to \$130,048,750. After taking into account carrying charges and amortization through December 2001, the remaining amount for which recovery is sought is \$119,908,152.

The Stipulation and its opposition is discussed below, after the Issues section of this order.

THE LEGAL STANDARD

As with any rate increase, PacifiCorp here bears the burden to show that the proposed rate change is just and reasonable. ORS 757.210. In a prudence review, the Commission examines the objective reasonableness of a company's actions measured at the time the company acted: "Prudence is determined by the reasonableness of the actions 'based on information that was available (or could reasonably have been available) at the time.'" *In re PGE.*, UE 102, Order No. 99-033 at 36-37.⁵ In applying this standard, the Commission does not focus on the outcome of the utility's decision, as the following passage from *In re Transition Costs*, UM 834, Order No. 98-353 at 9 shows:

[When utilities mitigate transition costs,] they must behave prudently, meaning that their decisions were reasonable, based on information that was available (or could reasonably have been available) at the time. The Commission has applied this prudence standard for many years in deciding whether to include in rate base the full amount of a utility's investment in a new resource (as opposed to a standard that, say, focuses on the outcome of the utility's decisions).

⁵ See also *In re Northwest Natural Gas*, UG 132, Order No. 99-697 at 53:

In this review, therefore, we must determine whether the NW Natural's actions and decisions, based on what it knew or should have known at the time, were prudent in light of existing circumstances.

Need for contemporaneous evidence. ICNU's Position. ICNU argues that to evaluate the prudence of PacifiCorp's decisions (with respect to Hunter 1 maintenance and operation or with respect to the wholesale contracts), the Commission must review contemporaneous evidence. ICNU cites no authority for this proposition, but contends that PacifiCorp has not met its burden of proof because it has not presented substantive evidence about: (a) what information the company had in 1992 when it extended the Hunter 1 inspection interval to seven years; and (b) PacifiCorp's decision making process in entering into the challenged wholesale sales contracts.

PacifiCorp's Position. PacifiCorp responds that contemporaneous documentation is useful in a prudence review to show the nature of the information available at the time of the challenged transactions. It is, however, not a prerequisite to establishing the prudence of a utility's actions, because prudence determinations are based on an objective standard of reasonableness.⁶ PacifiCorp argues that its evidence satisfies the prudence standard of objective reasonableness. Contrary to ICNU's suggestion, PacifiCorp argues that the standard does not require PacifiCorp to prove the factors it actually considered with respect to the decision to extend the maintenance interval. Such a showing can help demonstrate what information was available at the time, but evidence of subjective decision making is not otherwise a prerequisite to establishing prudence. According to PacifiCorp, if the record demonstrates that a challenged business decision was objectively reasonable, taking into account established historical facts and circumstances, the utility's decision must be upheld as prudent even if the record lacks detail on the utility's actual subjective decision making process.

Resolution. ICNU's position on the need for contemporaneous evidence of decision making is not supported by our previous cases or the objective standard we have established for determining prudence. We believe that PacifiCorp has correctly stated the legal standard for determining prudence. We look at the objective reasonableness of a decision at the time the decision was made.

What Must Be Proven. ICNU's Position. ICNU argues that given the size of PacifiCorp's excess net power costs on an Oregon basis alone (\$160 million), PacifiCorp submitted little direct evidence to justify the prudence of its actions or inactions. Nowhere in the record does PacifiCorp provide a comprehensive demonstration that the excess net power costs at issue here were prudently incurred. According to ICNU, PacifiCorp's entire case rests on rebutting assertions made by CUB and ICNU.

ICNU contends that PacifiCorp has overlooked a critically important part of its case. According to ICNU, PacifiCorp must first prove that every dollar spent on excess net power costs was prudently incurred. Rebutting issues identified by other parties does not establish the requisite

⁶ PacifiCorp cites to *In re PGE*, UE 88, Order No. 95-322 at 48, to show the objective standard. In UE 88, a PGE general rate case that included a prudence review, the Commission endorsed the fact that Staff's expert "applied a reasonable person standard, similar to that commonly employed in utility prudence review proceedings."

legal record to justify that such charges are fair, just, and reasonable. *Pac. Northwest Bell Tel. Co. v. Sabin*, 21 Or App 200, 213 (1975).

ICNU contends that PacifiCorp must also demonstrate that these excess net power costs provide a net benefit to customers and were not incurred for the purpose of generating a profit for shareholders. *Re Northwest Natural Gas*, UG 81/UG 84, Order No. 89-1372 at 6; *Re PacifiCorp*, UE 116, Order No. 01-787 at 15.

CUB's Position. According to CUB, PacifiCorp has taken a top down approach that starts with actual excess net power costs and excludes only costs that are determined to be imprudent. That is, the Commission should assume that everything in the deferred account is prudently incurred unless an opposing party can prove otherwise. This, CUB argues, reverses the burden of proof. In support of its position, CUB quotes from *In re PGE*, UE 115, Order No. 01-777 at 6:

We . . . affirm that, under ORS 757.210, the burden of showing that the proposed rate is just and reasonable is borne by the utility throughout the proceeding. Thus, if PGE makes a proposed change that is disputed by another party, PGE still has the burden to show, by a preponderance of evidence, that the change is just and reasonable. If it fails to meet that burden, either because the opposing party presented compelling evidence in opposition to the proposal, or because PGE failed to present compelling information in the first place, then PGE does not prevail.

PacifiCorp's Position. PacifiCorp argues that the Pacific Northwest Bell case does not stand for the proposition that rebutting issues identified by other parties is insufficient to establish the requisite legal record to justify that such charges are fair, just, and reasonable, as ICNU contends. PacifiCorp acknowledges that the case recognizes that a utility has the ultimate burden of proof in rate cases, but its holding discusses the burden of proof in the context of issues on which "conclusions, pro and con, are supported by evidence that has substance." 21 Or App 200 at 14. PacifiCorp contends that this holding is consistent with the Commission's holding in *In re PGE*, UE 47/UE 48, Order No. 87-1017 at 50, that a company need not file testimony on "every single dollar" and that the Commission will adopt a rate increase where parties do not contest an issue.

PacifiCorp also argues that ICNU is incorrect in stating a prudence review requires the utility to show that its excess net power costs provide a net benefit to customers and were not incurred merely for the benefit of shareholders. ICNU cites cases in which the Commission explicitly applied a net benefit analysis to specific types of costs. Each of those cases is inapplicable to the present proceeding, PacifiCorp contends. According to PacifiCorp, ICNU has offered no support for the proposition that the Commission applies a net benefits test in determining whether a company's

net power costs were prudently incurred. Accordingly, PacifiCorp argues that ICNU's attempt to require the Commission to undertake such an analysis here should be rejected.

Resolution. We do not agree with ICNU's reading of the Pacific Northwest Bell case. The passage ICNU cites discusses the utility's burden of proof to establish the reasonableness of its rates when it seeks to increase rates. It says nothing about the validity or invalidity of evidence offered in rebuttal. The context of this passage is a determination of the power of a reviewing court to set aside or alter Commission rate orders. In the cited passage, the Court of Appeals concludes that if a rate order is based on substantial evidence and violates neither the Oregon nor the federal Constitution, a court may not alter it. The case does not support ICNU's position.

ICNU's position seems to be that PacifiCorp has put most of its case on in rebuttal and that this is somehow invalid. ICNU is wrong. To reach a determination on whether proposed rates are just and reasonable, we look at the evidence in the record as a whole and make our determination based on the preponderance of the evidence.

We apply a net benefits standard in certain specific instances. We are not applying the net benefits test in this case.

CUB and ICNU both argue that PacifiCorp's case is flawed because PacifiCorp has not justified every dollar spent in excess net power costs. PacifiCorp responds correctly by citing to Order No. 87-1017. In that order, we discussed how a rate case develops. We reaffirm here what we said there, at 50:

When a utility proposes a change in its rates, it files testimony on the major issues for the Commission's consideration. The utility must show the proposed rates are just and reasonable. The company does not file testimony on every single revenue item, expense item, rate base item, and rate of return item in its results of operations. When the parties review the company's filings, they identify the issues with which they are concerned. If a party does not propose a change in a particular item, or if the Commission does not raise the issue, the item is adopted when the Commission issues its final order.

In other words, we review the items that parties or we ourselves have put at issue. In this case, those items are the 430 megawatt (MW) Hunter Unit No. 1 (Hunter 1) replacement power costs, the costs associated with serving wholesale contracts, and hydro replacement costs. We discuss below why the Utah load growth and the Centralia issues are not included in this list.

ISSUES

Overview of PacifiCorp's Position. PacifiCorp seeks recovery of its excess net power costs because it incurred significant costs due to a number of circumstances that it asserts were beyond its control. PacifiCorp argues that the extraordinarily high prices and volatility in the wholesale markets were compounded by the impact of the outage of a major baseload generating station, Hunter 1. The Northwest also experienced the second worst hydro conditions in the 75 year history of streamflow record keeping in the Northwest, beginning with the October 1, 2000, water year.

PacifiCorp contends that the factors driving the level of excess net power costs during the deferral period were outside its control and that it should therefore be allowed to recover its excess net power costs. PacifiCorp argues it had no control over price increases in Western wholesale electric markets that occurred during the deferral period or over the form of restructuring implemented in California that produced volatility and unpredictability of power prices throughout the West. PacifiCorp also had no control over the actions taken by the Federal Energy Regulatory Commission (FERC) on June 19, 2001, to impose price caps (which precipitated a sudden drop in wholesale market prices). Finally, PacifiCorp had no control over the type of catastrophic outage that removed its Hunter 1 plant from service for over five months.

PacifiCorp argues that the fact that a combination of events was at play makes the case for deferral more, not less, compelling. The combination of events also makes it more difficult to isolate and quantify each of the individual components driving the higher power costs. The opposing parties focus on the impossibility of accurately calculating the impact of each component and tries to use that as a basis for challenging or disregarding the undeniable: the combination of events resulted in PacifiCorp incurring power costs in Oregon \$259 million higher than the results of its last general rate case, UE 111, reflect.

Overview of ICNU's and CUB's Positions. The parties contest allowing PacifiCorp to amortize excess net power costs associated with the cost of serving some or all of PacifiCorp's long term wholesale sales contracts, the cost of replacing power lost to the Hunter 1 outage, costs associated with replacement power after the Centralia sale, and costs associated with Utah load growth.

ICNU urges us to disallow most of PacifiCorp's excess net power costs based on PacifiCorp's negligence and imprudence. ICNU proposes to disallow approximately \$84.3 million related to PacifiCorp's imprudent long term power sales contracts and approximately \$66.5 million related to PacifiCorp's imprudent maintenance, operation, and inspection of Hunter 1. In the alternative, ICNU proposes that if the Commission wants to give relief for the extraordinary hydro conditions that occurred during the deferral period, ICNU would deem approximately \$88.8 million

of PacifiCorp's deferred power costs prudent based on an adjustment to the deferral baseline to reflect poor hydro conditions.

CUB asserts that PacifiCorp intentionally and improperly used rate based resources to further the aims of shareholder interests while exposing customers to unacceptable risk. CUB argues that in the mid 1990s, PacifiCorp adopted a business plan designed to gain market share in the wholesale market and to create new highs in shareholder profits. PacifiCorp did this by committing much of the significant output of its owned generation, paid for by ratepayers, to large, long term wholesale sales. As a result, according to CUB, apart from the losses in hydro generation because of the drought and the Hunter 1 outage, PacifiCorp created a short position that became very expensive to fill during the deferral period.

CUB argues that the wholesale sales strategy also exacerbated the short position problem when PacifiCorp failed to forecast Utah load growth accurately.⁷ (As explained in the footnote, Utah load growth has been accounted for in the sharing mechanism and is not addressed further in this order.) CUB also argues that PacifiCorp failed to respond adaptively to its forecasting errors as they became known. CUB takes no position on the prudence of PacifiCorp's handling of Hunter 1, but recommends approximately \$94 million in disallowances related to PacifiCorp's imprudent excess net power costs and inflated deferral balance.

Centralia Issue. In April 1999, PacifiCorp and the six other owners of the Centralia plant entered into an agreement to sell the plant to TransAlta Energy Corporation (TransAlta). PacifiCorp requested Commission approval of the sale on August 6, 1999, and the Commission

⁷ Utah load growth was an issue the Commission considered and dealt with in designing the sharing mechanism. In Order No. 01-420, at 4-5, we said:

Staff believes that between rate cases, Oregon customers should not bear the effects of load growth in PacifiCorp's other jurisdictions, the other 67 percent of the system. This is particularly true in light of remarkable growth in Utah. This growth has increased PacifiCorp's exposure to high market prices and overall power costs the company is asking Oregon customers to pick up.

Staff contends that Oregon customers should bear their share of replacement power costs for the Hunter outage, poor hydro conditions, and power costs associated with Oregon load. Ideally, Oregon customers' responsibilities would end there. The difficulty, however, is how to isolate Oregon customers from load growth effects in other jurisdictions, since the company generation operates as an integrated system. Staff is particularly concerned that disproportionate load growth in other states could exacerbate the company's increases in power costs.

Deferral Mechanisms. Staff suggests two alternate deferral mechanisms in order to allow PacifiCorp recovery of a reasonable portion of its abnormal power cost increases and yet to partially shield Oregon customers from increased power costs caused by PacifiCorp load growth in other jurisdictions.

The deferral mechanism we chose thus already compensates for Utah load growth by excluding a percentage of power costs from recovery.

approved the sale on February 29, 2000, by Order No. 00-112 (UP 168). PacifiCorp's share in the 1340 MW coal fired plant was approximately 636.5 MW.

ICNU's Argument. ICNU argues that the Commission should remove all costs associated with PacifiCorp's decision to purchase the Centralia replacement power on the spot market. According to ICNU, PacifiCorp's imprudent power supply strategy is exemplified by PacifiCorp's decision not to secure adequate replacement power following the sale of its Centralia plant. PacifiCorp chose not to enter into long term agreements or acquire new resources, and instead replaced approximately 500 MWh of lost system generation with purchases from the short term wholesale power market.

ICNU argues that the loss of the Centralia plant represented a significant change in PacifiCorp's resource portfolio. Of the 636.5 MW lost, PacifiCorp acquired replacement resources for only about 130 to 150 MW. After PacifiCorp sold Centralia, it had insufficient resources to fulfill its contractual and retail load commitments by approximately 500 MW. PacifiCorp was thus required to find replacement power through short term purchases. ICNU contends that PacifiCorp purposely placed itself at risk with respect to fulfilling its long term contracts and retail load obligations. Only after electricity prices on the spot market began rising did PacifiCorp aggressively seek to cover its short position, according to ICNU. PacifiCorp attempted to purchase power from TransAlta and for the shortfall was forced into the market.

ICNU argues that it would constitute imprudence to ignore unreasonable risks known at the time of the transaction. PacifiCorp admits that its decision not to secure replacement power was risky. PacifiCorp voluntarily chose to sell its interest in Centralia. Combined with its sales for resale obligations, this left PacifiCorp in a significantly short position. PacifiCorp has an obligation to plan for and supply its native load customers with power at the lowest cost possible. ICNU argues that failing to replace 500 MW of generation until well after the close of the Centralia sale was imprudent.

PacifiCorp's Response. PacifiCorp characterizes ICNU's proposed denial of recovery for the Centralia replacement costs as a reexamination of the Commission's approval of the sale with hindsight. That is, according to PacifiCorp, ICNU engages in a collateral attack on the Commission's approval of the sale. In Order No. 00-112, the Commission acknowledged that after the sale, PacifiCorp intended to balance loads and resources with market purchases. In that order, the Commission further found that the costs associated with replacement power are recoverable in rates. Order No. 00-112 at 10. In view of those considerations, the Commission awarded most of the gain from the Centralia sale to customers.⁸

⁸ PacifiCorp was granted the greater of 5 percent of the final gain or \$2.2 million, whichever was greater; customers received the rest.

Second, PacifiCorp argues that ICNU's contention relies on hindsight for claiming imprudence. ICNU argues that PacifiCorp was imprudent for not securing more replacement power in addition to the power it received from TransAlta. However, the Centralia sale closed in May 2000, just as the unanticipated crisis in Western wholesale energy markets began.

Resolution. We find no imprudence related to PacifiCorp's sale of Centralia. In our Order No. 00-112, we describe the risks and benefits associated with the sale and the reasoning process by which we determined that ratepayers would not be harmed by the sale. We stated that under TransAlta's management, the plant was expected to produce about 4 million MWh annually for PacifiCorp and that PacifiCorp would balance its loads and resources with market purchases. Order at 4. We considered this to be a reasonable approach at the time. As PacifiCorp notes, we also stated in that order, at 10, that PacifiCorp's replacement power costs were recoverable in rates.

ICNU's argument revisits the conclusions of that order, reading the sale and the arrangement to purchase market power to replace lost generation from the perspective of later events. That is not the perspective from which we judge the prudence of a utility's decisions. At the time, the Centralia sale and the planning surrounding it was reasonable. We will not disallow the Centralia replacement power costs.

WHOLESALE SALES CONTRACTS

CUB and ICNU both challenge PacifiCorp's wholesale sales contracts, although each party takes a different approach to the issue.

CUB's Position. CUB argues that PacifiCorp engaged in a wholesale strategy from 1995 through 1998 that placed PacifiCorp in a short position with respect to its retail load in 2000 and 2001. CUB puts 12 contracts at issue. CUB contends that customers are paying for resources sufficient to meet their retail load including peak demand, but PacifiCorp's business strategy left the company short 1.8 million MWh during the high market prices of 2000 to 2001.

According to CUB, PacifiCorp argues that its mid 1990s activity was not a shift in business strategy but merely took advantage of market opportunities. At the same time, CUB notes, PacifiCorp's evidence shows a leap in the volume of wholesale sales between 1995 and 1998 with a drop back in 2000. According to CUB, PacifiCorp argues that the increase in sales was due almost entirely to short term sales. But the volume of long term wholesale sales rose remarkably during this time as well, CUB contends.

CUB argues that the volume of long term wholesale sales increased by 51 percent from 1995 to 2000. (These are the total special sales minus the short term firm and secondary sales, compared with the 2000 long term wholesale sales identified in Exhibit CUB 120.) The increase is even greater between 1995 and 1999. CUB maintains that the rise in long term wholesale sales

resulted from a concerted effort by PacifiCorp, to become a major player in the wholesale trading market. CUB asserts that PacifiCorp's Board of Directors' minutes from August 1994 to May 1999 show a bold new business plan to change PacifiCorp as the markets changed. The minutes include statements recognizing that with the new direction comes new risk. These minutes include two Board of Directors' resolutions implementing new risk management policies related to the wholesale trading strategy. Although PacifiCorp argues that it did not implement the plans discussed in these minutes, CUB argues that the company did implement these plans.

It is a fact, according to CUB, that the volume of wholesale sales both short and long term jumped dramatically from 1996 to 2000, after several years of flat volumes. At the level of the Board of Directors, there was extensive discussion of the risks involved in engaging in wholesale sales. When the Board of Directors discussed risk, it did not advise pulling back from the market until November 1998. By then, according to CUB, the damage was done. Up to that time, the Board of Directors discussed explanations of the increasing exposure to market risk resulting from the wholesale sales strategy. CUB notes that it had hoped to present the Commission with more detail about the Board of Directors' risk analysis, but PacifiCorp was unable to find records of its consultant who was hired to assist with managing the risks associated with wholesale trading. PacifiCorp was also unable to locate its risk management policy for the period 1996 to 1998. CUB argues that it is clear that the Board of Directors was informed about the risk of committing itself to power sales that might exceed PacifiCorp's capacity to provide power and a recognition that, contrary to the statements contained in RAMPP-4 (PacifiCorp's avoided cost filing adopted by the Commission in 1996, in Order No. 96-159), PacifiCorp's strategy was causing increased dependence on market purchases to meet peak demand.

CUB also contends that PacifiCorp was doing everything it could to avoid rate cases that might cause it to share its wholesale sales margins with customers. In September 1995, for instance, PacifiCorp filed for an alternative form of regulation plan in Oregon that would keep it out of rate cases for at least five years so that PacifiCorp could keep all the margins of the wholesale sales for shareholders. CUB argues that PacifiCorp's goal was to jockey for position with the Bonneville Power Administration as the major wholesale supplier in the West, to raise capital to fund its ambitious purchase of the Energy Group in the United Kingdom, and to raise shareholder profits to new highs. To accomplish this, according to CUB, PacifiCorp oversold its system generation and filled in its retail load requirements with low priced short term purchases. This project was designed solely to benefit shareholders, CUB maintains. By optimizing the system for shareholders, however, PacifiCorp exposed itself to market volatility and now wants retail ratepayers to protect shareholders.

According to CUB, PacifiCorp supports its argument that it was optimizing its system by saying that it was matching short and long term wholesale decisions with its available generating resources. PacifiCorp offers a chart to show that its net short term purchases are only a few percent of the system requirements. CUB argues that this is irrelevant; PacifiCorp must currently meet 10 to 15 percent of its system load requirement from short term purchases, while retail customers pay for

owned resources sufficient to supply peak demand. PacifiCorp's owned generation resources enable it to make short term sales during shoulder and off peak periods, CUB asserts. PacifiCorp wants the Commission to subtract these sales from the purchases it must make to serve load, but according to CUB, that hides the fact that PacifiCorp must buy 10 to 15 percent of its load requirements in the short term market.

CUB contends that the reason for the short term purchases is PacifiCorp's wholesale strategy of making long term wholesale sales and not backing them up with long term purchases. This strategy was designed solely to advantage shareholders, CUB maintains, and has put customers in a position where they pay for enough resources to meet load and then have to pay for significant additional purchases from the short term market. With no rate case during this period, customers see no additional benefit from the increase in wholesale sales. Further, customers bear the entire risk of the short term purchases, because PacifiCorp cannot change the price of its cheap long term wholesale sales contracts.

CUB maintains that the commitments required to meet wholesale sales added up to as much as one half of PacifiCorp's total retail and wholesale service load during the time from 1996 to 2000. Thus, CUB argues that PacifiCorp has understated the impact of short term purchases in estimating that they account for 10 to 15 percent of its load requirement. CUB gives the following example to explain its contention. If the company's overall requirements are 100 million MWh with retail load being 50 million MWh, short term purchases are expected to meet 15 percent of this, or 15 million MWh, with company owned generation meeting 50 million MWh and long term purchases accounting for 25 million MWh. As the price of short term purchases goes up, the price term on the wholesale sales contracts stays the same. Retail customers pay the entire increased costs of the 15 million MWh of short term purchases. CUB reasons that this means retail customers pay the equivalent of 30 percent of retail needs to service the long term wholesale sales contracts.

CUB does not wish to review contract by contract for prudence, but to look at how PacifiCorp was managing its overall system. CUB argues that PacifiCorp's management created unacceptable risks for ratepayers over an extended period. Moreover, CUB argues that PacifiCorp claims it acted prudently and performed proper avoided cost analysis at the time the contracts were signed, but PacifiCorp cannot demonstrate this. CUB notes that all memos and training materials for the wholesale trading business have been destroyed. Finally, CUB charges that PacifiCorp knew that the assumptions in RAMPP-4, were not valid as early as 1996. RAMPP-4 should thus not be used as the standard for avoided cost to test prudence in this case. According to CUB, as early as February 1996, the incremental resource was no longer company owned generation but the market.

According to CUB, the RAMPP-4 base case stated that PacifiCorp had enough owned resources to meet peak demand until 2004. Therefore, the avoided cost figures adopted in RAMPP-4 are based on the variable costs of PacifiCorp's own generating resources, not on market prices. As the volume of long term wholesale sales began to grow in 1996, the company's long and

short term wholesale sales became significantly greater than the figures assumed in RAMPP-4. The Board of Directors was periodically informed of the effects of this growth on the system as a whole. CUB argues that PacifiCorp can show no avoided cost or risk analysis to replace the analysis in RAMPP-4, because PacifiCorp cannot locate its risk management policy for 1996-1998.

CUB argues that PacifiCorp's strategy of entering into wholesale sales contracts meant that PacifiCorp did not have enough resources to meet peak demand. PacifiCorp's witness Mr. Watters offered a chart to show that on an average energy basis, PacifiCorp had sufficient resources to meet retail demand and service the eight wholesale contracts. CUB challenges this evidence on two grounds. First, CUB asserts that average energy is not peak demand, and PacifiCorp has not addressed CUB's point about a shortfall at peak demand. Second, PacifiCorp compares system resources against RAMPP-4 system load (which assumed significantly less wholesale sales than actually took place) plus eight wholesale sales and says this is its resource/load balance. But CUB points out that PacifiCorp engaged in other wholesale contracts. When CUB asked PacifiCorp to factor in those other contracts signed between 1996 and 1998 that were still in effect from 2000 to 2001, the surplus on an average energy basis dropped significantly. But this surplus on average energy basis still says nothing about how exposed PacifiCorp was during peak load periods, when market prices were highest.

CUB contends that apart from considerations of prudence, the law of deferred accounts in Oregon should not allow recovery of any costs incurred by PacifiCorp's wholesale strategy. ORS 757.259(2)(e) allows the Commission to grant recovery of utility expenses to "match appropriately the costs borne by and benefits received by ratepayers." Here PacifiCorp tries to make ratepayers bear the costs for a strategy that was designed to benefit shareholders.

As far as a prudence review goes, CUB argues that the Commission should find that the costs associated with PacifiCorp's wholesale sales activity were imprudently incurred and should be disallowed. CUB presents two ways to calculate the losses due to wholesale contracts. First, one could identify the cost of each contract by comparing the price of the contract to current short term market prices. By this method, the losses accumulated during the deferral period for the long term wholesale sales contracts entered into between 1995 and 1998 total over \$390 million on a total company basis. Second, one could count losses from the contracts only to the extent that PacifiCorp's wholesale activities left PacifiCorp short. This, according to CUB, is a preferable method because it recognizes that the real problem is PacifiCorp's overall wholesale strategy and the risk to which it exposed ratepayers. During the deferral period, PacifiCorp was short 1.8 million MWh due to its wholesale strategy. This power deficit cost \$277 million on a total company basis, with \$92 million allocated to Oregon. The Commission should consider this amount imprudently incurred and place the burden of bearing the costs on PacifiCorp.

ICNU's Position. *PacifiCorp's Power Supply Strategy.* ICNU argues that PacifiCorp tries to show that its purchasing strategies during this deferral period were prudent because

the power it purchased was \$51 million less than if it had purchased it on a daily basis based on the Dow Jones Mid Columbia (Mid Columbia) or California Oregon Border (COB) index prices. According to ICNU, this comparison is ridiculous. No utility relies on the daily spot market to purchase significant amounts of power to serve its native load customers.

Wholesale Sales Growth/Shift in Business Strategy. ICNU's basic position is that it was unreasonably risky for PacifiCorp to enter into low margin long term wholesale power sale contracts with no escalator clauses. ICNU argues that PacifiCorp had no need to be in the wholesale market, because it had sufficient resources and long term power purchases to serve its native load. Less than 1 percent of the MWh purchased by the company on the short term market during the deferral period was necessary to meet its retail load obligations, according to ICNU.⁹

According to ICNU, PacifiCorp found itself short during the deferral period because of a shift in corporate strategy that occurred in the mid 1990s. In 1995, following the arrival of Fred Buckman as PacifiCorp's new CEO, ICNU contends that PacifiCorp embarked on a strategy to become a dominant global energy player pursuing the goal of expanding its market share without consideration of the potential risk to customers. ICNU cites marketing plans that discuss PacifiCorp emerging as a "national presence in marketing, brokering, and trading" and selling both electricity commodities and services.

PacifiCorp argues that when its wholesale transactions increased at the same time its Board of Directors was holding discussions in 1995, the company was merely reacting to the market but was not executing any larger scheme to increase market share. ICNU argues that PacifiCorp implemented a strategy and executed it according to plan. PacifiCorp's volume of wholesale power transactions increased dramatically after 1995, far beyond any amount required to serve load growth and beyond any response to the market. A review of PacifiCorp's historic resource portfolio and wholesale sales demonstrates this increase, ICNU contends.

ICNU argues that in the early 1990s, wholesale sales constituted about 25 percent of PacifiCorp's total system sales. Purchased power represented approximately 15 percent of PacifiCorp's total system energy. However, after 1995, PacifiCorp's wholesale transactions increased dramatically. By 1997, wholesale sales comprised about 55 percent of total sales and purchased power constituted 50 percent of PacifiCorp's total system resources. Similarly, although PacifiCorp sold just 16 million MWh on the wholesale market in 1995, wholesale sales topped out at roughly 59 million MWh in 1997. These increases correspond directly to the time frame in which PacifiCorp intended to implement its new wholesale strategy. In addition, long term contracts such as

⁹ ICNU argues about how several other states in which PacifiCorp operates have dealt with the excess power cost issue. Because our decision is based on Oregon statutes and on the situation and evidence presented in this case, we do not examine the results of other proceedings in other PacifiCorp jurisdictions. We note that in Utah, the jurisdiction to which ICNU gives most space, the criteria for decision were different from Oregon's, which is strictly a prudence review.

those challenged by ICNU increased by 57 percent during this period, despite PacifiCorp's claims that this increase was limited to only short term transactions. The drastic increase in the volume of wholesale transactions indicates a company that purposefully sought to increase its market share, not a company that was merely continuing to serve customers while discretely taking advantage of market conditions, according to ICNU.

The Challenged Wholesale Contracts. As part of its new strategy, ICNU asserts, PacifiCorp entered into a series of long term power sales agreements that were unrelated to serving native load customers. However, instead of backing up the sales with market purchases or financial hedges, PacifiCorp relied on purchases in the short term spot market, with the hope that the opportunity for arbitrage would generate immense revenues for shareholders. This strategy was misguided. ICNU argues that this is not surprising, because PacifiCorp conducted very little analysis at the time it implemented its strategy.

ICNU has identified eight long term power sales agreements that it believes typify PacifiCorp's risky business tactics during this era. These contracts, which were entered into between 1996 and 1998, were in effect from November 2000 through September 2001 (the deferral period) and PacifiCorp lost approximately \$342 million (total company losses) in serving these contracts during the deferral period. ICNU argues that customers should not be responsible for these losses and that the costs associated with these contracts should be disallowed. On an Oregon basis, the disallowance equates to an \$84.3 million reduction in PacifiCorp's \$160.1 million deferral balance. According to ICNU, this reduction reflects the risk that PacifiCorp exposed both itself and customers to in pursuing this aggressive strategy and the lack of any benefit that ratepayers would have derived from that strategy had it been successful.

The eight contracts that ICNU witness Dr. Anderson challenges are:

Contract	Execution Date
PNGC	June 1996
Clark PUD	August 1996
Okanogan	September 1996
Cowlitz – BHP	April 1997
Springfield II	March 1997
Clark WaferTech	December 1997
San Diego Gas & Electric (SDGE)	March 1997
Hinson – Columbia Falls	March 1996

ICNU argues that it was PacifiCorp's intent to serve its new wholesale sales obligations through purchases in the short term market. PacifiCorp's power marketing strategy never contemplated that PacifiCorp's existing generation resources and purchase contracts would fully serve these new wholesale sales obligations. Although PacifiCorp's existing generation was sufficient to

serve PacifiCorp's retail load, the addition of the high volume sales contracts caused PacifiCorp to dramatically exceed its overall resource capacity. PacifiCorp's power marketing strategy necessarily involved recognizing the increasing volume of wholesale transactions and relying on the wholesale market to meet those needs.

ICNU contends that the disputed contracts were low margin transactions that did not justify the risk associated with serving them. The fixed prices in the disputed contracts were at or below market price at the time PacifiCorp entered into them and throughout the contract terms. Furthermore, the prices in the contracts fell below PacifiCorp's own cost of generation and PacifiCorp's cost of securing new generation. Thus, at best, the disputed contracts would have provided PacifiCorp with minimal profit.

According to ICNU, the PNGC, Clark, Okanogan, Springfield II, Clark WaferTech, and SDGE contracts included fixed prices that were below the average monthly price in each of the Mid Columbia, the COB, and the Palo Verde indices at their inception and stayed below those indices during the contract terms. As a result, PacifiCorp's cost of supplying these contracts was consistently more than the revenue generated by the sales. Furthermore, even if PacifiCorp had served its wholesale sales through other means, the majority of the contract prices also fell below the cost of PacifiCorp's other relevant power supply sources.

ICNU asserts that the average annual cost of power for PacifiCorp's new generation resources in 1996, 1997, and 1998 was higher than seven of the eight disputed contracts. For instance, in 1996, the Clark, Okanogan, and PNGC contracts included prices lower than PacifiCorp's least expensive new resource. Furthermore, all the disputed contracts except Hinson were priced significantly lower than the average cost of power from PacifiCorp owned generation (average power cost from 1995-1998 ranged from \$22.01/MWh to \$22.75/MWh). According to ICNU, these prices demonstrate that PacifiCorp did not enter into the contracts to achieve significant or even modest profits, but rather it formed the contracts out of the desire to obtain a significant share of the wholesale power market.

ICNU asserts that regardless of the basis on which the Commission evaluates the disputed contracts, the minimal opportunity for profit in the contracts did not justify the immense risk that PacifiCorp assumed in serving these sales through the short term market. The disputed contracts were risky, low margin deals that have no relation to the cost that PacifiCorp incurred in fulfilling its obligations. Thus, the cost of these contracts is not properly included in rates.

ICNU contends that PacifiCorp's failure to hedge the cost of the disputed contracts or include price escalators in the contracts exacerbated the risk PacifiCorp ran. ICNU alleges that PacifiCorp was imprudent in failing to hedge the risk associated with these eight contracts. PacifiCorp's approach toward hedging the risk of its long term power sales has differed significantly from 1995 to the present. PacifiCorp witness Mr. Watters claimed that other hedges were

unnecessary because the contracts “were hedged by the cost of our resource base.” ICNU asserts that such a position is imprudent.

PacifiCorp claims it did not need to secure financial hedges because its avoided costs established that it had “energy to meet all of the commitments under these contracts.” According to ICNU, this statement is untrue. PacifiCorp’s load resource balance at the time indicates that the wholesale sales requirements overwhelmed any load resource balance that PacifiCorp may have previously established. Even PacifiCorp’s witness Mr. Watters admits that with sale of its interest in Centralia, PacifiCorp could not back those contracts with system power.

ICNU argues that PacifiCorp also failed to include any meaningful price escalators in the disputed contracts to account for market changes. PacifiCorp included an escalator only in the Springfield Contract, and PacifiCorp’s witness Mr. Watters admitted that this protective measure for Springfield was “fairly small.” When market prices rose, PacifiCorp was left with no protection from the short term market. As a result, PacifiCorp incurred substantial excess net power costs due to its own imprudence and lack of foresight. ICNU maintains that the costs related to this imprudence are not properly included in rates.

In response to a challenge by PacifiCorp, ICNU argues that Dr. Anderson did not exaggerate the price and quantity data in the contracts to calculate ICNU’s proposed disallowance. He used the values PacifiCorp provided to derive the excess cost that PacifiCorp incurred in serving these contracts during the deferral period. First he calculated the total costs of serving contracts by multiplying short term firm prices during the deferral period by total requirements of the eight contracts (2.6 million MWh). ICNU argues that Dr. Anderson’s use of the short term market price was consistent with PacifiCorp’s intent to serve these contracts with short term purchases. Using this method, Dr. Anderson calculated the cost of serving the contracts during the deferral period at \$389 million. He offset this cost with the revenue PacifiCorp received from the contracts during the deferral period. To calculate revenue, Dr. Anderson multiplied the monthly prices for the contracts (including all relevant price components such as the capacity charge) by the 2.6 million MWh delivered under the contracts. Dr. Anderson calculated that PacifiCorp received \$52 million in revenue from the contracts during the deferral period. Based on these values, Dr. Anderson concluded that PacifiCorp incurred \$342 million in excess power costs in serving these contracts and recommended a disallowance of \$84 million on an Oregon basis.

Finally, PacifiCorp claims that Dr. Anderson’s testimony is flawed because he did not have all necessary information to make the calculations based on these contracts. ICNU contends that Dr. Anderson’s testimony and his proposed disallowance was based on the best information available from PacifiCorp after extensive discovery in two proceedings, and the company is responsible for any shortcomings in the data Dr. Anderson received. PacifiCorp repeatedly told ICNU that it had destroyed or could not locate information. PacifiCorp provided no forward price curve or other information that the company used in deciding to pursue these contracts, much less any

specific data for Dr. Anderson to use. PacifiCorp indicated later that it does not know if it used forward price curves. Thus, Dr. Anderson's analysis reflects all the information PacifiCorp provided on the contracts, and ICNU contends that his recommended disallowance is sound.

ICNU next argues that PacifiCorp offers inconsistent views of its load resource balance. ICNU maintains that PacifiCorp's strategy was to rely on market purchases, not its own system, to serve wholesale sales. A letter from PacifiCorp Manager of Integrated Resource Planning dated August 1, 1997, states that the company's goal is to match wholesale sales with sufficient megawatts of wholesale purchases over the next few years.

According to ICNU, PacifiCorp offered no consistent evidence to refute the statements its officials made about the wholesale contracts during the deferral period. ICNU argues that PacifiCorp now generally claims that it did not need to enter into additional wholesale transactions to serve wholesale sales, because it was in a surplus power position. But ICNU contends that when confronted with data reflecting its wholesale transaction volumes during this period, PacifiCorp acknowledged that there was a surge in short term purchases and sales. Still, according to ICNU, PacifiCorp maintains that despite this surge, its short term purchases remained a relatively constant percentage of overall system requirements. ICNU contends that PacifiCorp does not attempt to reconcile these contradictions but claims that its increased sales and purchase volumes resulted from unregulated activity.

ICNU contends that the data PacifiCorp puts forth on load resource balance is not consistent with its data in other proceedings. PacifiCorp's brief includes a chart showing short term purchases were 1.1% of total system requirements in 1996, 1.6% in 1997, 2.4% in 1998, 2.0% in 1999, and 5.4% in 2000. In PacifiCorp's recent petition for a deferral in Washington, ICNU asserts, PacifiCorp includes the same chart with different numbers: 1.4 % in 1996, 2.5% in 1997, 3.4 % in 1998, 2.5% in 1999, and 6.6% in 2000.

Dr. Anderson noted that long term firm wholesale sales constituted between 54 and 57 percent of PacifiCorp's total load by 1997. PacifiCorp's load resource balance during this period shows that its resources were sufficient to serve firm retail load, but insufficient to serve the aggregate of firm retail load and the long term wholesale sales. These findings contradict PacifiCorp's litany of alternative arguments that its loads and resources were in balance. As a result, ICNU argues, the Commission should disregard PacifiCorp's claims about load balance.

PacifiCorp's Response. PacifiCorp argues in general that its power supply strategy was prudent and did not expose the company's customers to unnecessary risks associated with wholesale market purchases. According to PacifiCorp, the company successfully matched long term wholesale sales decisions with long term resources and the proportion of net short term purchases on the market was constant and relatively low.

PacifiCorp's Power Supply Strategy. PacifiCorp argues that its power supply strategy during the deferral period was prudent, based on information known at the time. Beginning late spring 2000, wholesale energy markets changed unexpectedly. Prices and price volatility surged to unprecedented levels and the supply became more constrained. The daily average on peak wholesale market price for January 2000 at the COB was \$31.62 per MWh compared to \$180.82 per MWh in June 2000, \$129.96 per MWh in July 2000 and \$213.73 per MWh in August 2000. This significant increase in price volatility was evident in the changes in market spreads between peak and off peak prices. The COB average market spread between peak and off peak prices changed from \$6.62 per MWh in January to \$117.94 per MWh in August. Market price forecasts also varied by a large amount from May 2000 through the deferral period. In late May 2000, for instance, the forecast for August 2001 was \$80 per MWh, and in April 2001 the forecast for August 2001 was \$598 per MWh, which unexpectedly dropped to \$67 per MWh in July 2001.

In PacifiCorp's view, it was likely that market prices would stay higher than historical averages for the foreseeable future. PacifiCorp identified two options for meeting near term resource requirements in the face of these unforeseen price levels and volatility: buying forward to cover the bulk of resource requirements or leaving most of the balancing to the volatile day ahead and real time markets. PacifiCorp rejected reliance on the day ahead and real time markets to balance its system, based in part on the experience gained from the failed California deregulation attempt. The company chose instead to buy resources forward, well in advance of deferral period load requirements, to hedge risk.

PacifiCorp maintains that it began purchasing energy during June 2000 to meet expected energy requirements during the deferral period. PacifiCorp also undertook a series of nontraditional transactions to deal with the unexpected risks PacifiCorp was experiencing under the conditions occurring in the wholesale energy market. These included (1) purchasing incremental generation; (2) purchasing displaced generation (3) purchasing operating reserves; (4) implementing the 10/10 and 20/20 challenge programs (customer buyback programs designed to reduce consumption); (5) advertising to promote the challenge programs; (6) leasing 100 MW of gas peakers at the company's Gadsby Power Plant from May 15, 2001, through November 15, 2001; (7) implementing a daily demand exchange program for retail customers who can bid in verifiable load reductions; (8) continuing and expanding existing conservation programs; (9) implementing load reduction measures; and (10) acquiring incremental transmission rights to improve PacifiCorp's ability to deliver power to its customers.

Taking these actions together, PacifiCorp asserts that it was successful in reducing its exposure to the wholesale market during the deferral period. Based on PacifiCorp's load and resource position and the average cost of that position on March 6, 2001, if PacifiCorp had been able to close all its forward purchases on that date at the then current forward price curve prices, net power costs would have been approximately \$700 million lower than had the company not previously

engaged in forward purchases. Therefore, the company argues that it prudently met its objective of reducing market price risk.

PacifiCorp maintains that FERC's unexpected price mitigation order effective June 19, 2001, capped market prices and the market experienced fundamental shifts as a result of two other rules contained in the order. FERC required generators in California to exclude emission costs from their incremental generation costs. This lowered the fundamental dispatch curve in the Western Systems Coordinating Council (WSCC) region by the level of these emission costs, which at times were approximately \$130 per MWh.

Second, PacifiCorp argues, FERC required each generator in California to offer power into the market unless its units were legitimately down for maintenance, so generation could not be withheld to keep prices high. These two unexpected changes along with lower retail loads than expected and lower gas prices, significantly lowered the price of power in the WSCC region. Unfortunately, PacifiCorp had hedged against potential market price risk at higher prices than the historical norm but less than the then current forward price curve to cover the high resource requirements of the summer peak period, also taking into account the impact of the poor hydro year. Loads were less than expected because of a cool summer, customer conservation, and a slowing economy. As a result, the once valuable long shoulder period position, created through PacifiCorp's forward purchases, became a liability because the average price of the long shoulder period position was substantially above then existing wholesale market prices. This contributed to the magnitude of the deferrals during the latter portion of the deferral period.

PacifiCorp argues that it responded reasonably to the conditions in the wholesale markets since May 2000, by engaging in forward purchases to minimize availability and price risks to customers. Based on then existing circumstances and expected future conditions at the time, it claims its strategy to balance its system during the deferral period was prudent.

Wholesale Sales Growth/Shift in Business Strategy. PacifiCorp asserts that it has traditionally used its wholesale activities to optimize its resource system, minimize the need for rate increases, stabilize costs to retail customers, and achieve a reasonable rate of return for shareholders. PacifiCorp's wholesale strategy has produced and will continue to produce significant benefits for customers. Revenues from wholesale transactions provide revenue credits that reduce net power costs borne by customers. Wholesale sales increase the resource efficiency of generating and transmission resources. PacifiCorp notes that it is hard to time the acquisition of resources to match retail load requirements. The availability of wholesale sales allows purchases of resources ahead of retail requirements to take advantage of opportunities to acquire resources. Such acquisitions were made in the early to mid 1990s, when the company was able to acquire substantial new resources on favorable terms.

During the 1990s PacifiCorp asserts that it acquired over 1,300 MW of resources that were determined to be prudent acquisitions. Given the capacity available from those resources until they were fully needed to meet retail load, PacifiCorp had a number of options: it could make a combination of short term firm and non firm wholesale sales with lower revenues and lower benefits to customers or make longer term sales with correspondingly higher revenues and benefits to customers. PacifiCorp chose the latter course of action and claims that the incremental revenue associated with this course of action versus disposition through short term sales was \$1.4 billion.

Under PacifiCorp's power supply strategy, the company's objective was to match its long term wholesale sales decisions with its available long term resources and thereby avoid undue reliance on short term wholesale market purchases. PacifiCorp maintains that Table 1, below, shows that the company successfully matched long term sales with long term resources, as net short term purchases comprised of a relatively constant percentage of the overall system requirements in the five year period ending December 31, 2000. This shows, according to PacifiCorp, that the company was not being overly aggressive in the wholesale market.

Table 1
PacifiCorp 1996-2000
Net Short-Term Purchases as a Percentage of System Requirements

Year	System (MWh)	Net	
		Short Term Purchases (MWh)	% of System Requirements
1996	79.0	0.9	1.1
1997	109.5	1.8	1.6
1998	97.4	2.3	2.4
1999	87.1	1.7	2.0
2000	82.7	4.5	5.4

Table 1 shows a slight increase in reliance on short term purchases in 2000. PacifiCorp explains that several events occurred in the year 2000 to account for the increase. The Centralia plant was sold to TransAlta in May 2000 (approved by the Commission in Order No. 00-112). This sale, net of associated replacement power contract with TransAlta, eliminated approximately 3.1 million MWh from PacifiCorp's long term resource portfolio in 2000. The Hunter 1 outage contributed approximately another 330,000 MWh of short term purchase requirements in 2000, and the hydro shortfall added another 500,000 MWh of short term purchase requirement. Finally PacifiCorp's retail load growth in 2000 resulted in additional short term purchasing requirements. Without these effects, PacifiCorp's net market purchases would have been less than 2 percent. Even with all these impacts such purchases are only 5.4 percent of PacifiCorp's system requirements.

PacifiCorp contends that CUB and ICNU misread the Board of Directors minutes and PacifiCorp's market transactions in their assertion that PacifiCorp engaged in an overly risky wholesale sales strategy. The increase in wholesale sales activity during the period from 1996 to 1998, PacifiCorp contends, resulted from new opportunities in the wholesale markets rather than from a shift in business strategy. According to PacifiCorp, depending on circumstances in the wholesale market, the company has expanded or contracted the level of its wholesale sales to maximize benefits for customers. Volumes of sales and purchases climbed during the period from 1996 to 1998, as PacifiCorp had generating resources available that were not fully used in serving retail load. After 1998, sales declined as PacifiCorp's long term and intermediate term contracts began terminating to correspond with when the resources were expected to be needed to serve retail loads.

CUB and ICNU claim that the increase in wholesale activities in the time from 1996 to 1998 shows a shift in wholesale sales strategy designed to benefit shareholders but that imposed unwarranted risks on customers. As discussed below, these parties propose to disallow certain long term contracts signed by PacifiCorp during this period as being a component of this imprudent strategy. PacifiCorp argues that the record nowhere shows a shift in strategy or that the challenged contracts had to do with this alleged shift.

PacifiCorp argues that the increase in wholesale sales and purchases in the 1996 to 1998 period shows not a shift in strategy but PacifiCorp taking advantage of favorable market conditions and liquidity in the wholesale market during that time. With the new entrants into the wholesale markets, the expansion of new markets, and the establishment of new trading hubs, there were many participants in the market, and market prices declined to the lowest levels in history. The resulting margins on sales became extremely narrow. In an increasingly competitive market, PacifiCorp was able to take advantage of its expansive transmission system to buy and sell power at multiple points on the system. According to PacifiCorp, these transactions demonstrate a greater focus on the existing strategy of minimizing net power costs and optimizing the system to that end rather than a shift in strategy.

PacifiCorp argues further that there is no link between the shift in strategy that CUB and ICNU allege and the long term wholesale sales agreements ICNU and CUB challenge. The surge in wholesale sales and purchase volumes between 1996 and 1998 was created predominantly by short term transactions and has nothing to do with the long term contracts challenged by these parties. Whether or not there was a shift in business strategy and whether or not it placed unwarranted risks on customers, there is no connection between the claimed imprudent actions and the contracts being challenged in this proceeding, PacifiCorp claims. Dr. Anderson's Exhibits ICNU 203 and 204 are cited for the proposition that wholesale sales more than doubled between 1993 and 1997 as part of shift in strategy. But ICNU's response to PacifiCorp's data request No. 175 indicates that in preparing these graphs, Dr. Anderson did not take into account whether the transactions were short or long term.

Short term firm sales, according to PacifiCorp, nearly tripled between 1996 and 1998, going from 9.6 million MWh in 1996 to 25.7 million MWh in 1998. Long term sales grew only 6.5 percent in the same period, from 18.5 million MWh in 1996 to 19.7 MWh in 1998. A comparison between sales levels in 1995 and 1998 yields similar results. Short term firm sales were about nine times higher in 1998 than in 1995, 25.7 million MWh versus 3.0 million, and long term sales grew by about 60 percent, from 12.1 million MWh to 19.7 million.

The surge in sales during the 1996 to 1998 period reflects an increase in short term sales, according to PacifiCorp. PacifiCorp argues that the eight challenged contracts are long term transactions so there is no connection between this claimed shift in business strategy, whether or not the Commission determines that such a shift occurred, and the disallowance being proposed in this proceeding.

As to the alleged shift in business strategy, PacifiCorp makes two arguments in support of its position. First, PacifiCorp argues that the documents on which CUB and ICNU rely were planning documents that were not necessarily implemented. For instance, PacifiCorp's 1996 marketing plan estimated that long term firm wholesale sales would grow from 9.9 million MWh in 1995 to 26.9 million in 2000. Had it occurred that would have been a substantial level of growth. However, PacifiCorp points out that long term firm wholesale sales volumes grew by only approximately 2 million MWh during the period from 1995 through the 12 months ending August 2001, or only about one eighth of the sales increase in PacifiCorp's planning documents.

According to PacifiCorp, another example of a plan not implemented is the May 23, 1995 Board of Directors presentation entitled "Electric Industry Restructuring: Considerations for PacifiCorp," which both CUB and ICNU cite as evidence in support of their theories. This presentation addressed the dramatic changes in the industry structure that were imposed on PacifiCorp as well as possible PacifiCorp responses. The Board was presented with some possible response strategies to a competitive energy industry. In fact, many of the changes thought to be imminent in May 1995 have been delayed. The fact that the Board engaged in a planning exercise should not be cited as evidence when strategies were never implemented, PacifiCorp contends. PacifiCorp maintains that in any case, the strategic objectives and the transactions that offered greater profits presented to the Board have virtually nothing to do with the wholesale contracts that ICNU and CUB criticize. ICNU in particular highlights this presentation, because the presentation acknowledges PacifiCorp's objective of making money and keeping it for shareholders. PacifiCorp responds that the presentation examined strategies that involve both regulated and nonregulated operations, so that mention of a profit objective is not noteworthy in that context.

Second, with respect to a shift in strategy, PacifiCorp argues that CUB and ICNU fail to distinguish between the actions and plans of PacifiCorp's regulated operations and those of PacifiCorp's unregulated subsidiaries. The discussion in the marketing plans cited by Dr. Anderson about PacifiCorp emerging as a "national presence in marketing, brokering, and trading" and selling

both electricity commodities and services refers to PacifiCorp's unregulated wholesale operations. It is therefore irrelevant to issues in this case, PacifiCorp maintains. PacifiCorp's regulated wholesale operations were not part of the growth strategy CUB and ICNU describe, to expand to other regions of the country and internationally. Any planned expansion outside the WSCC region would have been unregulated. Most of the Board of Directors' presentations CUB cites involved unregulated PacifiCorp activities, as described in PacifiCorp's response to CUB's Data Request No. 47, included as CUB's Exhibit CUB 156. For instance, on page 41 of Mr. Jenks's testimony, he discusses Exhibits CUB 116, CUB 144, and CUB 146, which include risks associated with nonregulated activities. Also, on page 42 of Mr. Jenks's testimony, he discusses Exhibit CUB 147, which concerns risks associated with nonregulated activities, and Exhibit CUB 148, which concerns risks associated with PacifiCorp's Power Marketing activities.

Based on an excerpt from the February 1997 Board of Directors meeting, CUB argues that the company relaxed its risk management policies. PacifiCorp responds that the minutes show that the risks considered were for the entire company, including the unregulated global operations.

Both CUB and ICNU refer to the August 8, 1995, presentation to PacifiCorp Audit Committee as indicating PacifiCorp's knowing intention to go short and expose itself to market price fluctuations. PacifiCorp responds that the document indicates that the transactions PacifiCorp was considering were shorter term arrangements, seasonal or single year contracts, because wholesale buyers were less interested in traditional long term obligations. The document therefore provides no nexus with the long term contracts at issue here. PacifiCorp does not dispute that short term transactions increased dramatically.

CUB witness Mr. Jenks does not propose a disallowance based on any particular contracts executed during the 1996 to 1998 period, but argues that PacifiCorp's wholesale strategy should be deemed imprudent "to the degree that it forced PacifiCorp into the short term market." Mr. Jenks calculates his proposed disallowance based on the volume for each month of the deferral period by which PacifiCorp was short, producing a disallowance of \$84 million.

PacifiCorp argues at the outset that it is flawed to suggest that one particular component of PacifiCorp's power supply strategy can be isolated as causing PacifiCorp to be short. Even if that premise is accepted, PacifiCorp was not short during the deferral period because of the wholesale sales contracts but due to a combination of unrelated events discussed above: the sale of Centralia, the Hunter 1 outage, abnormally poor hydro, higher than expected retail load growth. Without these events, PacifiCorp argues that it would not have been left short at all. Under CUB's own criteria, PacifiCorp contends, no disallowance for the contracts would be warranted.

PacifiCorp argues that CUB's analysis comparing generation resources to retail load fails to recognize events during the deferral period and the complexities associated with managing

PacifiCorp's power supply portfolio. See the section below dealing with PacifiCorp's Power Supply. PacifiCorp maintains that CUB's assertion about customer exposure ignores the events that caused higher exposure: the Hunter 1 outage, the poor water year, and the impacts of the Centralia sale. PacifiCorp argues that the Hunter 1 outage caused it to purchase 330,000 MWh of short term power requirements in 2000. The hydro year was responsible for another 500,000 MWh of short term purchase requirements. Finally, the sale of the Centralia net of the associated replacement power contract with TransAlta eliminated approximately 3.1 million MWh from PacifiCorp's long term resource portfolio in 2000. Without these events, PacifiCorp contends, there would have been sufficient resources during the deferral period to cover PacifiCorp's total retail and wholesale obligations.

PacifiCorp argues that resource acquisitions are lumpy. That is, they are not easily divided up or individuated. Thus it is difficult to time the acquisition of resources to match retail load requirements precisely. Wholesale sales allow PacifiCorp to purchase resources before they are needed, to take advantage of chances to acquire resources on favorable terms. PacifiCorp argues that this was its strategy in the early 1990s. It used wholesale sales to increase the resource efficiency of its own generating and transmission assets.

Moreover, PacifiCorp notes that it does not deploy its generation and other resources for the exclusive purpose of serving retail load. This would be an inefficient way of operating and would have denied customers the revenue credits that held rates down during the last decade. PacifiCorp manages its system to optimize the use of its assets. At times, PacifiCorp argues, this has involved disposing of occasional power surpluses in short term markets. PacifiCorp contends that it has prudently matched long term commitments with long term resources and produced substantial benefits for customers while limiting exposure to wholesale price risk.

The Challenged Wholesale Contracts. Between 1996 and 1998, PacifiCorp entered into number of intermediate term sales timed to end in the years that the resources were likely needed by retail customers (three to five years in length, with expiration in the 2000 to 2002 period). These system sales were backed by PacifiCorp's overall portfolio of resources, including market purchases, according to PacifiCorp. ICNU challenges the eight contracts listed above and wants to remove them from rates, producing a disallowance of \$89.2 million. PacifiCorp contends that it acted prudently in entering into the wholesale power sales contracts challenged by CUB and ICNU. PacifiCorp argues that the contracts were prudent based on circumstances known at time they were signed.

PacifiCorp argues that it performed the proper analysis at the time the contracts were executed, by comparing the prices under these contracts with estimated avoided costs over the term of the contracts. In each case, the benefits to be received by PacifiCorp under the contracts were greater than then current avoided cost estimates over the applicable time period. According to PacifiCorp, the applicable avoided costs during the period in question were based on the RAMPP-4

update, which was filed with the Commission in June 1996. These were the avoided cost estimates PacifiCorp used to evaluate wholesale power sales contracts during this period.

PacifiCorp contends that for each of the challenged contracts, a comparison of the price under the contract with PacifiCorp's estimate of avoided costs at the time shows that total revenue generated by the contract prices PacifiCorp obtained in these sales exceeded PacifiCorp's then current estimate of avoided costs through the contract period.

PacifiCorp argues that each of the contracts in question was expected to provide a positive benefit to ratepayers and the total benefit from these contracts, had actual costs been in line with avoided cost estimates, was expected to be \$96.2 million. When PacifiCorp entered into the contracts, it anticipated an energy surplus sufficient to enable the contracts to be served from PacifiCorp resources. To demonstrate this, PacifiCorp adjusted its RAMPP-4 load and resource balance included in its 1996 avoided cost filing to reflect the execution of the challenged contracts. PacifiCorp maintains that even after the contracts are taken into account, the projections gave PacifiCorp ample resources to meet load requirements.

PacifiCorp argues that ICNU's analysis of the contracts is flawed. First, ICNU exaggerates the problem by presenting inaccurate information regarding the terms of the contracts. PacifiCorp argues that both ICNU's megawatt information and its price information is misleading. According to PacifiCorp, ICNU also ignores the capacity charges under several of the contracts, which brings additional revenue to the company.

PacifiCorp argues that it is unclear why Dr. Anderson chose the contracts he did for disallowance. Dr. Anderson purportedly divided PacifiCorp's wholesale transactions into those undertaken to meet retail load, which would be recoverable in rates, and those not necessary to meet retail load. He admitted, however, he was unable to gauge PacifiCorp's intent for any one contract. When PacifiCorp asked Dr. Anderson why he picked these eight contracts and not four other, similar ones, he responded that there was enough dollars being questioned on the eight contracts that they didn't need "to add on to that."

Moreover, PacifiCorp contends that Dr. Anderson did not apply any risk or avoided cost analysis with respect to these contracts, and the cost information from which he argued is historical information that became available well after the contracts were signed. PacifiCorp maintains that such an approach is inappropriate for a prudence determination, which does not use hindsight. *In re Juniper Utility Co.*, UW 65/68, Order No. 00-543 at 8.

CUB and ICNU assert that PacifiCorp has not shown that it analyzed the wholesale contracts at the time they were entered into to determine whether they were prudent. We have discussed and decided the issue with respect to contemporaneous documentation above, at p. 4. PacifiCorp argues in any case that it has submitted enough historical information (on the resource

planning process and the formal procedures for filing and obtaining approval of estimates of avoided costs, information available at the time; *see In re PGE*, UE 102, Order No. 99-033) for the Commission to determine that the challenged contract decisions were objectively reasonable. According to PacifiCorp, it has also established that under an objective measure—the Commission approved estimates of avoided costs over the term of the contracts—the contracts provided net benefits.

Resolution. *PacifiCorp's Power Supply Strategy.* CUB and ICNU challenge PacifiCorp's claim that its power supply strategy saved ratepayers \$51 million compared to the daily spot market. We need not decide here whether PacifiCorp's argument about the \$51 million is well taken. We do find that PacifiCorp's power supply strategy, as the company has outlined it above, was prudent. PacifiCorp took reasonable steps to keep its cost of replacement power low in purchasing power to meet its shortfall.

Wholesale Sales Growth/Shift in Business Strategy. CUB argues that growth in wholesale sales between 1995 and 2000 is evidence of the shift in business strategy which caused PacifiCorp customers to be exposed to the power markets. PacifiCorp argues that this growth was mostly in short term sales (one year or less). The record supports PacifiCorp's contention on this issue. Short term firm sales increased ninefold between 1995 and 1998, going from 3.0 million MWh in 1996 to 25.7 million MWh in 1998. Long term sales grew about 60 percent in the same period, from 12.1 million MWh to 19.7 million MWh. Most of that growth was between 1995 and 1996, however. Between 1996 and 2000, long term sales grew by only 6.5 percent. As PacifiCorp points out, ICNU's figures on growth in wholesale sales do not distinguish between short and long term sales. Short term sales have no impact on the deferral period.

PacifiCorp goes on to argue that because most of the growth in wholesale sales was in short term sales, there is no nexus between the alleged shift in business strategy and the long term contracts that CUB and ICNU challenge. We believe that PacifiCorp's argument has merit. However, we do address the customer groups' arguments about a shift in business strategy.

CUB and ICNU mount an attack on PacifiCorp's overall business strategy which, these parties assert, led to its overly risky long term contracts. We have reviewed the Board of Directors minutes and presentations to the Board and to other PacifiCorp committees and groups. We find PacifiCorp's explanations of these documents credible. PacifiCorp claims that these documents represent plans that were not necessarily implemented, or that they represent determinations having to do with PacifiCorp's nonregulated operations. We do not find evidence in these documents that PacifiCorp decided to engage in risky behavior in its regulated operations to maximize returns to shareholders.

PacifiCorp explains the growth in wholesale sales in terms of market opportunities. PacifiCorp also notes that its objective was to match its long term wholesale sales decisions with its

available long term resources and thereby avoid undue reliance on short term wholesale market purchases. PacifiCorp provides Table 1, above, to show that net short term purchases comprised a relatively constant percentage of the overall system requirements in the five year period ending December 31, 2000. This shows, according to PacifiCorp, the company successfully matched long term sales with long term resources, so that the company was not being overly aggressive in the wholesale market.

We accept PacifiCorp's contention that its growth in wholesale sales was in response to market opportunities. The record shows that in the 1996 to 1998 period, power markets exhibited strong competition. Hydro conditions were normal to heavy, and a futures market had been established for the California Oregon Border and Palo Verde markets. Industrial customers, such as those represented by ICNU, were working for direct access to energy suppliers. According to PacifiCorp's 1996 RAMPP-4, PacifiCorp would not need new resources for three years. PacifiCorp reasonably decided to take advantage of the low cost power market to meet its requirements. Under a medium growth load scenario, RAMPP-4 shows that PacifiCorp would not need peaking capacity until 2004.

CUB argues that PacifiCorp experienced a growth in short term purchases to meet system shortfalls due to imprudently entering into long term wholesale contracts. According to CUB, the data in Table 1 above mask the true extent of PacifiCorp's reliance on short term purchases. CUB contends that PacifiCorp must currently meet 10 to 15 percent of its system load requirement from short term purchases. PacifiCorp's owned generation resources enable it to make short term sales during shoulder and off peak periods, CUB asserts. PacifiCorp wants the Commission to subtract these sales from the purchases it must make to serve load, but according to CUB, that hides the fact that PacifiCorp must buy 10 to 15 percent of its load requirements in the short term market.

We believe that it is appropriate to subtract PacifiCorp's short term sales from short term purchases, in keeping with PacifiCorp's strategy of matching sales and purchases. The net figures in Table 1 (or for that matter, the figures from Washington that ICNU cites) show that even under the extraordinary conditions of late 2000, PacifiCorp's purchases in the short term market were a small percentage of its overall system requirements. We do not find that PacifiCorp's short term purchases represent any imprudence. Nor do we find that PacifiCorp was overly aggressive in the wholesale market.

Based on the record, we find that in response to market opportunities, PacifiCorp entered into a number of intermediate term sales timed to terminate when PacifiCorp's resources were likely to be needed by its customers. These were contracts of three to five years. PacifiCorp was also purchasing in the short term market during this period. PacifiCorp used short term firm purchases to fill in resource deficiencies at times of peak usage. Short term firm power was a cheaper alternative to adding generating capacity at this time. PacifiCorp also hedged its wholesale contracts with intermediate term acquisitions.

The Challenged Wholesale Contracts. CUB asserts that RAMPP-4, PacifiCorp's 1996 avoided cost filing with the Commission, is not the proper source for the measure of avoided cost, but that avoided cost is better measured against the market. Avoided cost, or the cost PacifiCorp would incur to produce the next unit of generation, is one measure to use in determining whether PacifiCorp's wholesale contracts were reasonable. If avoided cost is less than the sales price of the contracts, the sale provides a benefit and is reasonable. PacifiCorp has shown that for the eight challenged contracts, avoided cost is less than the sales price of the contracts at the time the contracts were entered into. The question CUB raises is whether the RAMPP-4 avoided cost measure is accurate.

We conclude that the RAMPP-4 avoided costs are an appropriate measure to use in evaluating the prudence of PacifiCorp's wholesale contracts in 1996 and 1997. Those are the costs filed with and approved by the Commission, and those are the costs PacifiCorp used to evaluate the contracts at the time of signing. They are an objective measure of what was thought to be the cost of the next unit of generation.

CUB challenges not the eight contracts that ICNU puts at issue but PacifiCorp's overall management strategy reflected in its wholesale contracts, which, CUB argues, should be deemed imprudent "to the degree that it forced PacifiCorp into the short term market." CUB calculates its proposed disallowance based on the volume for each month of the deferral period by which PacifiCorp was short, producing a disallowance of \$84 million. The flaw with CUB's argument, as we see it, is that it was not the wholesale contracts that forced PacifiCorp into the short term market. Rather, it was the concatenation of factors that PacifiCorp has cited throughout the case: the poor hydro year, the sale of Centralia, retail load growth, and the loss of Hunter 1 power. Absent those factors, PacifiCorp has persuaded us that it would not have been in a short position. As PacifiCorp's testimony indicates, even taking the eight contracts into account, it had sufficient generation to serve its retail load.

CUB raises the issue that PacifiCorp's resources were not in balance with its load. PacifiCorp's 1996 avoided cost filing indicates that system loads for 2000 were projected to be 7,089 average MW (AMW), while resources were projected to be 7,708 AMW. Adjusted for the eight contracts, the balance surplus was projected to be 216 AMW. While it is true that these figures do not address peak demand, we judge that they show resources sufficient to serve PacifiCorp's retail load.

CUB and ICNU both argue that PacifiCorp has provided no evidence of its decision making process with respect to the disputed contracts. PacifiCorp argues that it performed the proper analysis at the time the contracts were executed, by comparing the prices under these contracts with estimated avoided costs over the term of the contracts.

Between 1996 and 1998 the record shows that PacifiCorp entered into 12 intermediate term contracts, the eight contracts challenged by ICNU plus Cheyenne Sale, Deseret Supplemental, Citizens Power, and Clark Fiber Web. Based on the RAMPP-4 avoided costs, PacifiCorp Exhibits 107 and 112 show that revenue expected from each contract exceeded avoided cost. PacifiCorp also anticipated an energy surplus sufficient to enable the contracts to be served from PacifiCorp resources. But there was an unprecedented increase in market prices beginning in May 2000, as well as an increase in retail load growth well beyond what PacifiCorp had planned for. Thus, serving these contracts became costly to PacifiCorp. However, the proper measure for prudence is what PacifiCorp knew or should have known at the time it entered into the contracts. Based on the avoided costs on file with the Commission, these contracts were prudent.

We find no imprudence on PacifiCorp's part with respect to the long term wholesale contracts at issue in this case.

HYDRO REPLACEMENT POWER

ICNU's Position. ICNU argues that the Commission may allow PacifiCorp to recover reasonable costs associated with poor hydro conditions. ICNU proposed an alternative theory for recovery of a portion of deferred amounts that would allow PacifiCorp to recover approximately \$88.8 million. The ICNU hydro proposal would allow for a more generous recovery of deferred costs than if the Commission simply reduced the deferral balance by the costs associated with the Hunter 1 outage and the wholesale contracts. In addition, the ICNU hydro proposal would eliminate the need for the Commission to make a precise calculation of the cost of the Hunter 1 outage and the imprudent wholesale contracts.

The ICNU hydro proposal starts with the normalized deferral baseline for net power costs that the Commission established in Order No. 01-683. Instead of removing imprudent costs from PacifiCorp's actual net power costs, the hydro proposal shifts the deferral baseline upward to reflect the higher net power costs stemming from the poor hydro conditions. According to ICNU, it is not necessary to adjust the deferral balance for the costs associated with Hunter 1 or wholesale sales because the normalized deferral baseline already accounts for these adjustments. The difference between hydro energy under normal and actual conditions would be approximately \$88.8 million.

PacifiCorp identified two potential modifications to the ICNU hydro proposal. First, PacifiCorp disagrees with ICNU's use of normalized hydro generation from PacifiCorp's recent rate case, UE 116. PacifiCorp proposes that the Commission use the normalized hydro generation from UE 111. According to ICNU, use of normalized hydro generation in either UE 116 or UE 111

would be reasonable. Second, PacifiCorp challenges ICNU's market price assumptions.¹⁰ ICNU also supports CUB's approach to calculating the hydro adjustment.

CUB's Position. According to CUB, PacifiCorp offered no arguments as to why its response to the loss of hydro output was prudent. Parties have offered three possible hydro adjustments: CUB's, ICNU's, or PacifiCorp's corrections to CUB's and ICNU's adjustments.

CUB's review focused on PacifiCorp's own hydro generation assets. CUB believed that PacifiCorp acted prudently in replacing the lost hydro generation. Before the drought PacifiCorp forecast a shortfall 4.3 million MWh of hydro from PacifiCorp owned hydroelectric dams during the deferral period. The cost of replacing that lost generation amounted to \$297 million on a total company basis, or \$99 million allocated to Oregon. After applying the sharing mechanism to this number, CUB argues that Oregon customers should pay \$42 million for hydro lost to the drought during the deferral period.

ICNU's testimony also supported recovery of lost hydro generation, but its adjustment includes not only PacifiCorp owned hydro but also hydro lost due to the drought from PacifiCorp's purchased power contracts. CUB did not propose to include the Mid Columbia hydro contracts in the hydro adjustment because the wholesale contract adjustment was based on PacifiCorp's net short position (long term wholesale sales minus long term wholesale purchases) from long term contracts including Mid Columbia. CUB is allowing PacifiCorp to use the Mid Columbia contracts to serve long term wholesale customers rather than using them to serve retail load. Had CUB applied the Mid Columbia contracts to retail load, it would have further increased PacifiCorp's net short position from its wholesale strategy.

PacifiCorp's adjustment to CUB and ICNU was based on those parties not using the UE 111 hydro levels as the baseline. According to CUB, PacifiCorp fails to recognize that CUB and ICNU were only saying that PacifiCorp was prudent with respect to the drought, not with respect to changes in hydro conditions since the UE 111 test year. To understand how much power was lost to the drought, CUB argues, one has to look at the company's forecast of hydro for the period just prior to the drought versus the level of hydro that was actually available.

CUB contends that PacifiCorp's suggestion that UE 111 provides the proper baseline, is an attempt to hide PacifiCorp's response or lack thereof to the 1998 Federal Biological Opinion of the National Marine Fisheries Service, which reduced output from PacifiCorp's Mid Columbia contracts well before the drought. The output from the Mid Columbia contracts was reduced 19 percent as a result of the 1998 Biological Opinion. PacifiCorp tries to include these

¹⁰ ICNU proposed an adder for hydro based on the Mid Columbia and COB indices. Which ICNU assumed were the source of the replacement power. PacifiCorp opposed the adder on the ground that it was impossible to identify the source of the replacement power. Because we decide the case in favor of PacifiCorp, we need not determine whether this adjustment is valid.

losses in an adjustment for their response to the drought. According to CUB, no one argues that PacifiCorp was imprudent in response to the drought, but this docket has no evidence to support a claim that PacifiCorp was prudent with respect to the 1998 Biological Opinion. The record does not show what PacifiCorp's response was to the hydro loss and thus the Commission cannot evaluate it for prudence.

PacifiCorp's Response. PacifiCorp argues that it has adequately substantiated the basis for its recovery of hydro related impacts. Moreover, PacifiCorp points out that in its testimony, CUB characterized as prudent the costs associated with replacing the difference between the hydropower PacifiCorp expected before the drought and the amount of power the company actually produced. CUB supported recovery of the share of hydro related costs contemplated by the deferral mechanism. In its brief, however, CUB argued that PacifiCorp never proved its prudence with respect to hydro operations. Finally, PacifiCorp points out that CUB's argument about the 1998 Biological Opinion was not raised on the preliminary issues list or in testimony.

PacifiCorp argues that there is adequate basis in the record to allow it recovery of its hydro related expenses. According to PacifiCorp, the Commission has ruled that uncontroverted evidence showing that a particular cost is just and reasonable is adequate basis for recovery; *see* UE 72, Order No. 88-898 at 6; UE 47, UE 48, Order No. 87-1017 at 50 (holding that a utility must show that rates are just and reasonable but not necessarily file testimony on every single revenue item). PacifiCorp argues that it presented testimony on the impact of poor hydro conditions on generation levels during the deferral period and the steps it took to purchase power to replace lost generation. PacifiCorp argues that there is enough in the record to conclude that its actions were prudent. PacifiCorp also points out that water conditions are a factor over which a utility has no control. This Commission has found that a utility should not bear the consequences of such circumstances; *see* UM 673, Order No. 94-1111 and UE 91, Order No. 95-690 (allowing deferral and recovery of nearly 100 percent of the utility's drought related excess power supply costs attributable to Oregon).

Resolution. We agree with PacifiCorp that it has put sufficient evidence in the record to establish that its conduct regarding the poor hydro year and the costs it incurred to replace power lost to poor water conditions was prudent. PacifiCorp's testimony on the steps it took to replace generation lost to the drought and the other factors operative during the deferral period is extensive and persuasive.

We cannot tell from CUB's argument what precise import it attaches to the 1998 Biological Opinion. On review of CUB's exhibits, CUB appears to argue that the UE 111 baseline precedes the effect of the 1998 Biological Opinion, which restricted the release of water at each of the Mid Columbia hydro projects during the summer season. CUB argues that PacifiCorp masks hydro lost to the effect of the 1998 Biological Opinion by referring to the UE 111 baseline. Further,

CUB asserts that PacifiCorp may not have responded properly to the hydro loss from the Biological Opinion and was, therefore, imprudent.

CUB raises this issue too late in the process for evidence to be developed on it. However, in its testimony, PacifiCorp lists the 1998 Biological Opinion along with other factors as circumstances that contributed to its recourse to short term markets during the deferral period. We find the record on the hydro issue sufficient to conclude that PacifiCorp was prudent in replacing hydro generation lost to the drought (which no party contests) and the Biological Opinion. We have no grounds on this record for separating out the 1998 Biological Opinion effect from the rest of PacifiCorp's hydro replacement.

THE HUNTER 1 OUTAGE AND ASSOCIATED REPLACEMENT POWER COSTS

Thermal Generation Costs. *CUB's Position.* CUB argues that in addition to deciding whether PacifiCorp prudently maintained and operated Hunter 1, the Commission must determine the appropriate replacement costs after Hunter 1 went down. CUB challenges PacifiCorp's numbers as overstating the impact Hunter 1 had on the thermal system and hiding the fact that PacifiCorp's short position was due to its previously imprudent wholesale sales strategy.

First, according to CUB, PacifiCorp asserts that it saved \$51 million as compared to the alternative as a result of its replacement strategy, without identifying the volume of purchases.¹¹ However, CUB asserts that PacifiCorp cannot support its claim that it reviewed available alternatives and then determined the best strategy to cover the energy lost by the Hunter 1 outage. In response to an inquiry from CUB, PacifiCorp stated that it performed no specific analysis and had nothing in writing.

Second, CUB believes that PacifiCorp overstates its losses from Hunter 1 and the benefit of its strategy. PacifiCorp Exhibit 103 showing purchases made to replace generation from the Hunter 1 outage fails to show the volume of each purchase. PacifiCorp's calculation of a \$51 million benefit is based on the purchase of 4.5 million MWh of power. CUB argues that this is more than the normal output of both Hunter 1 and Hunter 2 during this period, although Hunter 2 continued to operate. Four and a half million MWh is approximately twice the combined losses PacifiCorp sustained on its thermal and its hydro system during this period, according to CUB.

CUB arrived at what it believes to be the real loss to the thermal system caused by the Hunter 1 outage by comparing PacifiCorp's pre Hunter 1 outage thermal output forecasts with the actual thermal outputs. On this calculation, the total loss to the thermal system from the Hunter 1

¹¹ Another aspect of the argument regarding the \$51 million is addressed under Wholesale Sales, in the Resolution section, subsection PacifiCorp's Power Supply Strategy.

outage was 269,000 MWh, not 4.5 million MWh. CUB reminds the Commission that customers are paying enough in rates to create an energy system sufficient to cover peak loads and flexible enough to adjust to the unexpected.

After the Hunter 1 outage, CUB believes that PacifiCorp did operate its thermal system in ways that were expected of it, so as to minimize the effects of the outage by maximizing the output and changing the maintenance schedules of the other thermal plants. Now, however, PacifiCorp wants customers to pay for the thermal system that helped minimize the Hunter 1 outage and pay for the exposure to the short term market caused by PacifiCorp's wholesale sales strategy that the company is trying to cover up by exaggerating the effects of the Hunter 1 outage. CUB argues that customers should pay for either the existing thermal system or the exposure to the short term market, but not both.

CUB argues that even if the Commission were to find the operation and maintenance of Hunter 1 to be completely prudent, the actual cost of the Hunter 1 outage to Oregon customers is the \$21 million it cost the company to increase the production at its other thermal plants and the \$15 million the company spent replacing the lost thermal production that could not be made up at other facilities. This amounts to \$36 million on an Oregon allocated basis, CUB contends.

PacifiCorp's Response. PacifiCorp argues that its actions in response to the Hunter 1 outage were reasonable and minimized the costs imposed on customers for replacement power costs. The outage occurred, according to PacifiCorp, at a time when the entire Western States region was experiencing very high market prices coupled with high price volatility. The Pacific Northwest was experiencing poor hydro conditions, a large number of generating units in the region were down for maintenance, and natural gas prices had skyrocketed to record levels. All these events tightened the market and contributed to high wholesale energy prices. Wholesale market prices doubled between November and December 2000, and remained high until Hunter 1 came back on line on May 8, 2001.

When Hunter 1 went down, PacifiCorp's Wholesale Energy Services group reviewed alternatives available for reoptimizing the system. These alternatives were energy purchases in the daily market, in the monthly forward market, in the balance of the month market, in the quarterly forward market, and an even longer term power purchase. Because the outage was expected to last a few months but not less than a year, long term power purchases were not considered cost effective alternatives. PacifiCorp also concluded that purchasing energy solely from the daily market when the market was already tight and exhibiting high volatility would expose PacifiCorp and its customers to unacceptably high levels of price risk. PacifiCorp was concerned that relying solely on daily purchases would expose it and its customers to energy shortfalls and possible blackouts due to a possibly illiquid daily market during severe weather events, such as a very cold winter.

PacifiCorp therefore selected a strategy of using a combination of daily, balance of month, monthly forward, and next quarter wholesale transactions. PacifiCorp also intensified its existing efforts to encourage customers to reduce consumption.

PacifiCorp's strategy for replacing the lost Hunter 1 generation was successful. According to PacifiCorp, a detailed analysis of all purchase transactions during outage shows that over 9,900 transactions negotiated after November 23, 2000, and delivered before May 8, 2001 saved customers approximately \$51 million compared to general market prices that existed during the Hunter 1 outage.

Resolution. CUB takes issue with PacifiCorp's claim that it saved ratepayers \$51 million, compared to the alternative, as a result of its replacement strategy. CUB asserts that this figure is based on purchases of 4.5 million MWh of power, while the output of Hunter 1 is much less than that. To replace Hunter 1 output, CUB argues, would require only .27 million MWh.

As we read the record, PacifiCorp does not claim that the 4.5 million MWh in short term purchases it made in 2000 were due only to the Hunter 1 outage, although the purchases were made during the outage. The purchases were to cover PacifiCorp's short position due to the confluence of events that has been mentioned throughout this order: the Centralia sale, retail load growth, the poor hydro year, high wholesale power costs, and the Hunter 1 outage. As we noted in discussing the wholesale sales above, we do not need to determine the accuracy of the \$51 million figure, because we decide that PacifiCorp was not imprudent and that we do not need this figure in calculating a disallowance.

CUB argues that customers should not pay for both the cost of a thermal generation system and PacifiCorp's power shortfall due to its wholesale sales strategy. This position is more fully discussed under the Wholesale Sales section of this order, but in brief it resolves to CUB's belief that costs associated with serving PacifiCorp's wholesale contracts should be disallowed. We have decided that these contracts were not imprudent and that it was not PacifiCorp's actions that caused its power shortfall.

Because each element, or subissue, of the Hunter 1 issue is complex, we present the parties' positions on each subissue and resolve it before discussing the next.

Hunter 1 Outage: Operation and Maintenance of the Plant. In brief, ICNU argues that PacifiCorp's imprudent maintenance and operation directly caused the Hunter 1 outage and influenced its duration and severity.

Background. Hunter is a three unit coal fired steam-electric plant near Castle Dale, Utah. Hunter 1, with a net output rating of 430 MW, went into commercial operation on June 1, 1978. From that time until November 24, 2000, Hunter 1 operated without significant problems.

PacifiCorp operated Hunter 1 as a base load unit, which means that the generator produced constant rather than variable MW output. Under base loading, a generator's components are subjected to minimal thermal expansion and contraction stresses because output remains constant.

Hunter 1 consists of a generator frame designed to contain the stator core and a hydrogen cooling system; a hollow, cylindrical stator core built within the frame, and a rotor turning inside the stator core. The stator core is a large, hollow steel cylinder 104 inches wide and 225 inches long with a bore of 42 inches in diameter. Twenty seven slots in the bore hold the insulated stator windings, also known as stator bars, in which electricity flows. The portion of the stator core between each slot is referred to as a tooth. The stator windings at the ends of the core are referred to as end windings or winding end turns. Windings are secured in the slots by a system of filler strips, ripple springs, and slot wedges.

The stator core is fabricated from thin pie slice shaped segments of insulated sheet steel called laminations. The Hunter 1 laminations are .018 inch thick and coated on both sides with an insulating material. Each layer consists of nine circumferential, laminated segments that are held to the stator frame by interlocking tabs that engage the building bolts at the back of the core. The laminations are stacked in three inch thick packs with a space of 0.125 inch between the packs to permit the radial flow of hydrogen cooling gas. The core has 27 through bolts, which are insulated steel rods that pass from one end of the core to the other. In addition to supporting the end winding brackets, the through bolts maintain a clamping force on the stator core laminations to prevent them from moving against one another radially, which could result in wear to the lamination insulation and, ultimately, metal to metal contact that could cause a short circuit.

The Hunter 1 laminations were coated with Alkophos insulation. Alkophos insulation has a high coefficient of friction that helps prevent relative movement between laminations. Only in cases of low clamping pressure and abnormally high vibration is Alkophos subject to wear.

In 1999, the Hunter 1 Generator Core Monitor (GCM) suddenly experienced twelve alarms with no apparent cause. In December 1999, PacifiCorp removed the GCM. PacifiCorp did not replace the GCM and operated Hunter 1 without a core monitor until its failure. A GCM functions as follows: When the core overheats, overheated paint releases particles into the hydrogen cooling gas in the generator. The monitor observes hydrogen cooling gas and will sound an alarm when overheated paint particulates are found in the hydrogen gas. There are few areas that are not in direct contact with the hydrogen cooling gas, and the painted stator bore and the building bolts at the back of the core could have released particulates directly into the hydrogen gas.

Hunter 1 was operating near full load at approximately 415 MW when it suffered a catastrophic failure on November 24, 2000. The failure originated deep in the generator core, four to five inches below the bottom of slot 21, approximately five feet from the exciter end of the core. That

is the area with the most extensive damage, indicating that it suffered the longest duration of overheating and melting.

Shorting between laminations caused the failure. The first phase of the failure involved a breakdown of insulation on a few laminations in the area where the failure originated. The root cause of shorting remains unknown (the evidence was destroyed in the fire).

The initial failure involved fewer than 10 laminations in a confined area, two tenths of an inch in length axially and less than an inch or two in diameter radially. This phase of the failure, which began sometime after the 1999 inspection, was completely hidden. A possible warning, heating on the core surface, was undetectable because the hydrogen cooling system and thermal characteristics of the laminated core provided a steep thermal gradient away from the area of the failure's origin. That is, temperatures at the failure site were very high and dropped greatly with increased distance from the site.

The second phase occurred during the final 75 minutes of operation, beginning with a kernel of molten stator core metal in the area of the failure's origin and ending with tripping the unit at 12:44 p.m. on November 24, 2000. At the second phase, the initiating fault reached critical measure, resulting in irreparable melting and propagation of the melt area to each end of the core. For the first 30 minutes of phase two, high temperatures remained localized to the laminations that initially shorted. While some of the laminations in the vicinity of the failure origin began to melt approximately one hour into the second phase, most of the steel melting occurred in the last five to six minutes before the unit tripped. This is consistent with the fact that the first alarm sounded at 12:38 p.m., five to six minutes before the unit tripped.

The Hunter 1 core suffered extensive damage and needed a complete rebuild. The repair effort began immediately as PacifiCorp explored the possibility of acquiring a replacement generator with an eye toward bringing Hunter 1 back on line as soon as possible. Ultimately, PacifiCorp decided that rebuilding was the best option. PacifiCorp decided to rebuild the core at the site, to eliminate the four week delay involved in transporting the core to the Siemens Westinghouse repair facility in North Carolina. Hunter 1 came back on line on May 8, 2001.

PacifiCorp undertook a comprehensive post failure analysis. The company assembled a team of experts with diverse technical expertise. The experts reviewed every possible lead and source of information on possible causes of the failure. The experts conducted on site inspections, interviewed plant personnel and original equipment manufacturer (OEM) personnel, reviewed plant records, conducted on site testing, constructed various failure models, and collaborated on their findings. The goal was to learn whether steps could be taken to prevent such failure in the future. The investigation was as thorough as any in which these experts have been involved.

Hunter 1 is insured by a consortium with Hartford Steam Boiler Insurance Company (Hartford) acting as lead insurer. After investigating the Hunter 1 failure, Hartford agreed to pay PacifiCorp's claim for generator repair costs, which amounted to approximately \$15 million. In this proceeding, PacifiCorp seeks recovery only of its replacement power costs related to the Hunter 1 outage. PacifiCorp argues that the outage resulted in a total company net increase in power costs of \$270 million, or approximately \$84 million on an Oregon basis.

ICNU believes that PacifiCorp has inflated the impact of the Hunter 1 outage on the company's net power costs in an effort to increase its overall recovery. ICNU does not provide a calculation of the Hunter 1 costs. CUB also argues that the impact of the Hunter 1 outage cost is exaggerated.

ICNU challenges PacifiCorp's operation and management of the Hunter 1 plant, arguing that the cost of replacing power lost when Hunter 1 went down should be disallowed. ICNU figures this cost at \$66 million. ICNU argues that PacifiCorp's operation and maintenance of the Hunter 1 generator was imprudent for the following reasons. First, PacifiCorp removed the generator monitoring warning device that was designed to provide advance warning of the type of failure that occurred at Hunter 1, because the device was sending a number of alarms. PacifiCorp also ignored the warning of its own employee and failed to replace the monitor. Second, PacifiCorp disregarded the manufacturer's recommendation and extended the three-year recommended inspection interval to seven years. Third, PacifiCorp failed to acknowledge or take remedial steps based on the history of problems with Hunter 1 type generators. Fourth, PacifiCorp failed to perform necessary repairs and inspections on Hunter 1. The evidence shows, ICNU argues, that PacifiCorp continued to operate Hunter 1 in disregard of the risk of a major catastrophe.

Cause of the Outage. ICNU's Position. ICNU contends that the outage was caused by electrical shorting likely resulting from PacifiCorp running the unit with a loose core. The direct cause of the Hunter 1 failure was a shorting of the protective electrical insulation that covers the steel laminations that comprise the generator stator core. According to ICNU, the steel lamination within the stator core of Hunter 1 and similar Westinghouse manufactured generators can melt from high electrical currents. Insulation coating the steel laminations protects the stator core from heating produced by electrical currents.

The steel laminations in the stator core are held together by through bolts. For continued long term operation, both the through bolts and the steel laminations must be properly insulated. If the through bolts are too loose, the insulation coating can be damaged. On Hunter 1, ICNU contends that the insulation coating on the steel laminations broke down and the generator was exposed to excessive electrical current. The electrical current caused localized overheating that eventually melted the steel laminations and through bolts and severely damaged the stator core.

According to ICNU, PacifiCorp's testifying witnesses refused to identify potential causes of the Hunter 1 failure. However, PacifiCorp's nontestifying consultants (Maughan, Ward, and Harrington) identified a number of potential root causes of the failure. All three consultants identified deficient lamination insulation, core loosening, burr pressure or grinding (where the laminations rise to sharp ridges or are not stacked uniformly), overfluxing (overvolting the core past rated magnetic flux), and defective through bolts as potential root causes. ICNU notes that the history of similar Westinghouse generators and the evidence in PacifiCorp's Hunter 1 outage reports also provide a number of potential root causes of the Hunter 1 failure.

ICNU argues that the record here shows that the most likely cause of damaged insulation was an incorrect amount of pressure, destroying the insulation on the steel laminations. Low core pressure or a loose core, potentially caused by loose through bolts, would have allowed the insulation to wear off the steel laminations and through bolts. On the other hand, high pressure could also have contributed to the problem by crushing or penetrating the damaged insulation. ICNU contends that high pressure could have been caused by the core tightening in 1999, which would have resulted in sharp steel parts on the laminations causing electrical shorts by penetrating the damaged or depleted insulation.

ICNU maintains that most of the damage to the insulation likely occurred between the 1992 and 1999 Hunter 1 inspections. During the 1992 inspection, PacifiCorp delayed necessary repairs, did a poor job on other repairs, performed inadequate tests, and failed to adequately investigate problem warning signs, ICNU contends. ICNU identifies PacifiCorp's failure during the 1992 inspection to tighten the through bolts adequately as the most important oversight. This failure allowed the core to be operated in a loose condition for the next seven years. According to ICNU, PacifiCorp's consultant Harrington identified the evidence of this loose core in the 1999 inspection, pointing out that the average through bolt torque was 54 percent of the recommended value (or an average of 594 ft.-lbs.), with minimum values even lower. ICNU notes that PacifiCorp's witness has also admitted that PacifiCorp should be concerned when the through bolt torque is lower than 550 ft.-lbs., a level that probably existed before the 1999 inspection. In addition to the loose core damaging the insulation, ICNU contends that there is some indication that burrs could further have damaged the core.

ICNU contends that during the seven year interval between inspections, a loose core would have worn the insulation off the steel laminations and through bolts to the point that the core should have been replaced or restacked. Instead of replacing or restacking the core, PacifiCorp tightened the loose through bolts, compressing the already uninsulated laminations together and allowing conducting paths for the electrical current. According to ICNU, this approach is cheaper than replacing or restacking the core. PacifiCorp consultant Harrington confirmed that "the tightening of the through bolts . . . may even have pressed together steel that had been worn bare." While the loose core tightening alone could have caused the core failure, the insulation could have suffered

additional damage from burrs or the occasional overfluxing of the core that occurred between the start up after the 1999 inspection and the November 2000 outage.

ICNU contends that PacifiCorp is selective in its presentation of evidence on the cause of failure. According to ICNU, PacifiCorp ignores the conclusions of four of PacifiCorp's nontestifying experts who were retained to investigate the Hunter 1 outage. Mr. Maughan concluded that a loose core, combined with damaged insulation, was most likely the root cause of the Hunter 1 outage. Similarly, Mr. Ward stated that the electrical shorting could have occurred from core looseness, which causes wear. Mr. Harrington stated that the core was loose and could have caused the failure. In addition, PacifiCorp employee Huynh identified core looseness as a potential root cause when he compared the Hunter 1 outage to similar cores that had failed and had "all developed progressive problems of mechanical looseness and require core tightening as the machine aged." According to ICNU, PacifiCorp chose not to sponsor these individuals as witnesses because they could not rule out core looseness as cause of the outage.

ICNU contends that PacifiCorp ignores and mischaracterizes the factual evidence of core looseness underlying the conclusions of PacifiCorp witnesses Maughan, Ward, Harrington, Huyhn and ICNU witnesses Oliver and Nippes. PacifiCorp argues that there is no mention of common signs of looseness in the 1992 or 1999 inspection reports. ICNU replies that not all characteristics of a loose core will be present in every case. Also, according to ICNU, the 1992 and 1999 inspections did not thoroughly examine the core for potential signs of looseness. Since PacifiCorp failed to present any witnesses who were familiar with the 1992 or 1999 inspections of Hunter 1, ICNU argues that it is impossible to verify the thoroughness of those inspections.

PacifiCorp also claims that while it tightened the core in 1999, the core was not "loose" in the sense of being susceptible to core damage. ICNU contests this statement, based on the average through bolt torque of 54 percent in Mr. Harrington's report.

ICNU also argues that PacifiCorp fails to mention some signs of a loose core that were present on Hunter 1. First, the 1992 and 1999 ELCID (Electromagnetic Core Imperfection Detector) tests produced peculiar results that did not show patterns for a healthy stator core. PacifiCorp did not investigate these results to determine if they were related to a loose core. Next, the 1992 inspection did not investigate the as found condition of 23 of the 27 through bolts and the remaining four were incorrectly measured. Due to the poor investigation, ICNU argues that it is impossible to verify whether the core was loose in 1992. In addition, according to ICNU, PacifiCorp ignores the undisputed fact that the building bolts were found to be below specification and were tightened in the 1999 inspection. Finally, in the 1999 inspection, PacifiCorp included examples of odd unpursued findings that suggest that it was not a thorough investigation. Specifically, ICNU's expert Mr. Nippes points out that the inspection report noted an oily black substance about 12 inches from the exciter end.

PacifiCorp's Position. PacifiCorp argues that it has established its prudence here through comprehensive evidence showing that the Hunter 1 outage was not linked to any unreasonable act or omission on its part. Further, PacifiCorp contends that it has provided significant testimony and evidence explaining the direct cause of the failure. PacifiCorp's experts agree that the cause of the failure was a short between stator core laminations and resultant severe core material melting. What is unknown is the root cause of this event. The root cause remains unknown, according to PacifiCorp, because all obvious, potential root causes, such as those identified by ICNU's experts and some of PacifiCorp's experts in preliminary reports, have been eliminated. The second reason that the root cause remains unknown is the extensive melting in the Hunter 1 core, which destroyed the evidence needed to determine what precipitated the failure.

ICNU advances the theory that a loose core is the root cause for the failure. PacifiCorp contends that ICNU's argument concerning the through bolts provides no basis for a finding of imprudence. ICNU relies on the initial report by PacifiCorp expert Dean Harrington, stating that the average through bolt torque was at 54 percent of recommended values, or 594 ft-lbs, in the 1999 inspection. PacifiCorp asserts that the 54 percent figure was corrected in Mr. Harrington's report addendum, where he correctly notes that the through bolt torque was in the 65 percent range, not the 54 percent range. In discovery, ICNU witness Mr. Nippes conceded that the through bolt torque in 1999 was 64 percent, or 710 ft-lbs.¹² On cross examination, Mr. Nippes admitted that he did not know what torque number was correct.

PacifiCorp also notes that the average pressure on the core would have to fall below 550 ft-lb for movement and damage between laminations to occur. Siemens Westinghouse recommends that the through bolts be torqued to 1100 ft-lbs but reports that relative movement between laminations is not possible as long as the torque does not fall below 550 to 275 ft-lbs. This fact is uncontroverted, PacifiCorp states. ICNU witness Mr. Nippes agreed to accept this proposition about the pressure at which movement among laminations becomes possible, and agreed that at the 64 percent level, the pressure on the core was well above this threshold.

As reflected in Hunter 1's inspection and maintenance reports, the torque on the unit's through bolts never fell to within this level. No evidence of relative motion between the laminations was found in either of the two inspections that preceded the Hunter 1 failure or in the post failure inspection. There was no evidence of bar or wedge vibration.

ICNU also advances the theory that the root cause of the failure was tightening the through bolts in the 1999 inspection. ICNU contends that PacifiCorp should have replaced or restacked the core in 1999 instead of tightening the through bolts. Again, PacifiCorp points out, ICNU cites Mr. Harrington's initial expert report as its sole support for this root cause theory; ICNU

¹² We note that the Harrington report addendum actually gives the average torque of the through bolts at 722 ft-lb, 66 percent of the rated pressure of 1100.

fails to cite the addendum to the report, which does not state this as a potential root cause. ICNU also omits to mention that Siemens Westinghouse tested the core both before and after the tightening process and detected no sign of metal to metal contact. This fact is stated in the discussion of core tightening in the Harrington addendum.

PacifiCorp argues that the Hunter 1 core was not loose in the sense of becoming susceptible to core damage. The as found through bolt torque at Hunter 1 does not support the contention that interlaminar movement caused insulation degradation.

ICNU witness Mr. Nippes contended that the core must have been loosened between 1992 and 1999 because the core compacted when bolts were retorqued. In 1999, the core iron, approximately 19 feet in length, compacted one sixteenth of an inch at the building bolts and one eighth of an inch at the through bolts when the nuts were retorqued. The laminations each compressed by an additional .00001 inch, about the thickness of the Alkophos coating. This level of compaction does not indicate a loss of core compression, according to PacifiCorp. It is within the expected accuracy levels that might be achieved in measuring the length of the core.

ICNU witness Mr. Nippes also theorized that a vibrating through bolt could have caused the generator to fail. Mr. Nippes say that a vibrating through bolt could have abraded the insulation of the bolt and surrounding laminations and caused or contributed to the generator failure. PacifiCorp asserts that it has provided evidence that this is not the case.

An analysis of the vibration modes of the through bolt shows that it is highly unlikely that the frequencies of the operating generator excite the bolt. The relevant resonant mode would result in radial movements of the bolt (that is, the bolt would move in the through bolt hole) that would likely be too small to damage the laminations or to wear off any through bolt insulation, PacifiCorp contends. According to PacifiCorp, this modeling is confirmed by the fact that there has never been a reported incident of a broken through bolt or a through bolt having caused a generator stator core failure. Mr. Nippes concedes that this is the first generator failure he has seen in which through bolts melted.

Further, PacifiCorp points out that its expert Mr. Edmonds' modeling of the failure shows that melting is inconsistent with a fault origin at the edge of the lamination, contiguous to the through bolt hole. Comparison of the analysis simulation with the actual observations of melt patterns demonstrates that the failure originated between the bottom of the stator slot and the through bolt hole and not at the edge of the through bolt hole, as Mr. Nippes opined.

The post failure reports noted dust in the generator. Mr. Nippes argues that the only logical explanation for the dust in the generator after the failure is degraded through bolt insulation. PacifiCorp maintains that the physical evidence is inconsistent with this theory. PacifiCorp contends that the dust most likely resulted from stator insulation being worn away during the final stages of the

failure by the violent movement of the stator bar in the slot when the extraordinarily strong magnetic field resulting from the flow of current in the stator bar interacted with the magnetic field from the fault zone. Mr. Nippes concedes that, when abraded, the insulation system on the windings will produce a dust similar to what was observed at the time of the Hunter 1 failure and that electromagnetic forces imposed on the windings during the Hunter 1 failure were abnormal.

PacifiCorp maintains that Hunter 1 never showed any sign of core looseness. Core looseness means either axial looseness, in which numbers of individual stator teeth break off, or radial looseness, which is exhibited by a relative sliding motion between stator laminations. When there is relative motion between core laminations, there is a wear pattern on the insulating coatings on the individual lamination sheets. The signs of such looseness are greasing, which results from the relative movement and working of adjacent components when they are loose, and broken stator teeth. In addition, PacifiCorp argues that one would expect to see visual characteristics of a loose core during an inspection if the condition existed. According to PacifiCorp, it paid careful attention to the identifying signs of distress during inspections of stator core before and after failure. No such signs were found. The 1992 inspection report noted that there were no signs of relative movement between the stator wedges and the slots, and no signs in the visible portions of the core of distress, dusting or greasing, or broken stator teeth. The 1999 inspection report noted that all core tightening hardware was tight; that the wedges were not loose; that there were no signs in the visible portions of the tops of the laminations of distress, dusting or greasing or mechanical damage that might have electrically shorted two or more laminations; and that there was no sign of distress, dusting, or greasing in the visible portions of the core.

After the failure, no signs of distress were noted on the lamination coatings. There were no signs of scrubbing distress (from laminations rubbing and moving against each other), so there was no physical evidence that interlaminar movement and a loose core contributed to the failure. Further, the back of the core was inspected to the extent possible and also found in good conditions, with no signs in the visible portions of the core of distress, dusting, or greasing.

PacifiCorp argues that ICNU's allegations about PacifiCorp's imprudent plant operation are unfounded and/or irrelevant to the Hunter 1 failure. First, PacifiCorp maintains that the failure was not caused by overexcitation, as ICNU witness Mr. Oliver opined. Overexcitation (overfluxing or overvoltage) can overheat the stator core iron and damage the lamination insulation. Mr. Oliver concedes that he bases his assertion in part on PacifiCorp's expert Mr. Ward's statement that shorting in the laminations may have related to the unproven possibility of overfluxing. Mr. Ward concluded, however, that PacifiCorp's operation of Hunter 1 did not contribute to the failure. Mr. Oliver also cited the failure report of PacifiCorp witness Dean Harrington on this issue. PacifiCorp points out that Mr. Harrington concluded that overexcitation incidents did not contribute to the failure: "While several instances of overvoltage were identified prior to the failure, none were of high enough voltage to be of concern."

PacifiCorp notes that all the experts who discuss the overvoltage issue except Mr. Oliver agree that overexcitation was almost certainly not a contributor to the Hunter 1 failure. Mr. Maughan notes that overfluxing is “no longer considered possible” as a cause of the failure. Mr. Halpern writes that “After a diligent search of all operational records by PacifiCorp and upon further review of that information and deliberation by [Generator Consulting Services], it is felt that any operationally caused sources for the failure, or contributions to it, are highly unlikely.” PacifiCorp asserts that Mr. Oliver conceded that he reviewed none of the relevant data to determine whether overexcitation in fact occurred at Hunter 1. PacifiCorp argues that ICNU’s allegation of overexcitation is groundless.

PacifiCorp concludes with the general statement that none of its expert witness reports support the key contentions ICNU makes regarding the cause of Hunter 1’s failure. PacifiCorp also points out that Mr. Nippes did not conduct field tests at the site, discuss the failure analysis with engineers at the plant, or confer with the independent experts retained by PacifiCorp or the insurance company about the failure analysis. Neither ICNU expert conferred with the OEM, Siemens Westinghouse, about the failure. Neither conferred with Environment One, the manufacturer of the GCM, or Adwel, the manufacturer of the ELCID device. Neither has personally conducted an ELCID test or done a thermographic analysis of the laminations in the Hunter 1 unit. Mr. Oliver did not conduct any modeling or simulations of the failure and Mr. Nippes did not review the analysis underlying the modeling of Edmonds and Glover, just the results. Both experts assert that such modeling is unnecessary to understand aspects of the failure.

According to PacifiCorp, the scientific evidence, analysis, and modeling in the record demonstrate that the Hunter 1 failure resulted from an undetected and undetectable deep seated core fault, not from PacifiCorp’s imprudence.

Resolution. To judge by Mr. Harrington’s addendum to his initial report, which ICNU fails to cite, the through bolt torque in the 1999 inspection does not indicate a core problem. The pressure is well above the level at which laminations can move relative to each other. The record indicates that Siemens Westinghouse designates the threshold level for relative movement between laminations and the potential for core damage at 550 ft-lbs to 275 ft-lbs. We note that Mr. Nippes’s response to a discovery request indicates that he knew of the addendum and that the correct figure for the through bolt torque was 64 percent (or 66 percent, as the Harrington addendum actually reads). Nonetheless, ICNU advanced this argument at hearing and in its briefs. This position does nothing to substantiate ICNU’s argument that the Hunter 1 generator had a loose core. We find that the through bolt torque in the record does not indicate a loose core.

We find that PacifiCorp has successfully rebutted Mr. Nippes’ theory about a vibrating through bolt as well, as it has Mr. Oliver’s overvoltage issue.

In discussing other alleged evidence of a loose core, ICNU relies on preliminary reports by PacifiCorp consultants Maughan, Ward, and Harrington. These reports were all superceded or amended by later addenda, which ICNU fails to mention. The addenda of these three consultants conclude that there was no evidence of a loose core at Hunter 1.

As to the issue of core compaction in the 1999 inspection, PacifiCorp has convincingly explained that the level of compaction involved does not indicate a loss of core compression.

ICNU asserts that PacifiCorp failed to follow up on suspicious findings in the ELCID test. That issue is addressed in greater detail below, in the section PacifiCorp Failed to Perform Adequate Testing. ICNU relies largely on a report by former PacifiCorp employee Dan Huynh, which is discussed and rebutted in the section just mentioned. ICNU also asserts that in the 1999 inspection report, PacifiCorp included examples of odd unpursued findings that suggest that it was not a thorough investigation. The only example ICNU gives of such findings was Mr. Nippes' observation that the inspection report noted an oily black substance about 12 inches from the exciter end. We have examined the report and find that the sentence immediately following this "odd finding" explains that the substance is worn rubber from the air gap baffle. The finding is thus neither odd nor unpursued, and does not indicate that the investigation was less than thorough.

We find that PacifiCorp's investigation of the Hunter 1 failure has been thorough and comprehensive. We find no evidence that the failure was due to a loose core, and no evidence that PacifiCorp overlooked signs of a loose core in its 1992 and 1999 inspections or at any other point. We find ICNU's other proffered explanations of the failure inconsistent with the preponderance of evidence in the record. On this record, we must agree with PacifiCorp that the cause of the Hunter 1 failure is undetermined.

In the sections below, we examine ICNU's contentions about ways in which PacifiCorp may have contributed to the Hunter 1 failure.

The Generator Core Monitor (GCM) Issues: Operating Hunter 1 without a GCM. ICNU's Position. ICNU contends that PacifiCorp was reckless in operating Hunter 1 without a GCM. Eventually, ICNU asserts, the electrical current running through the uninsulated steel laminations shorted and caused the core to fail. ICNU argues that PacifiCorp could have prevented the Hunter 1 outage if the company had continuously monitored the core. Monitors detect secondary effects of core failures. According to ICNU, the Hunter 1 GCM would have been the primary detector for the type of core failure experienced at Hunter 1. ICNU witness James Oliver helped develop the original GCMs and provided detailed testimony regarding how the monitor could have given advance warning of the impending core failure had it been in service.

PacifiCorp removed the GCM in December 1999, after it had gone off a dozen times with no apparent cause. PacifiCorp did not replace, repair, or reinstall the old GCM or take any other specific precautionary steps to monitor the core. When PacifiCorp removed the monitor, it did not know whether the alarms had a cause it had not determined or whether the GCM was faulty. PacifiCorp admits that it could have replaced the GCM at a cost of less than \$25,000, an insignificant amount of money compared to the risk associated with an outage.

ICNU's witnesses, some of PacifiCorp's line employees, and some of PacifiCorp's non testifying experts agree that it was very risky and imprudent for PacifiCorp to run Hunter 1 without a GCM. For instance, on February 15, 2000, PacifiCorp employee Gary Kloepfer sent an email regarding the "gen core monitor" asking "where is our H2 core monitor . . . are we going to fix old one or buy new one . . . risky running without any." In addition, PacifiCorp consultants Maughan and Ward concluded that, to avoid future core failures, PacifiCorp should use effective core monitoring devices, including a GCM. ICNU witness Mr. Nippes concludes that "by not having a core condition monitoring device working, PacifiCorp operated the generator in a vulnerable state, which is especially troubling given the problems experienced by such generators and the warning signals of core related problems at Hunter 1."

ICNU argues that the imprudence of PacifiCorp's decision to fail to continuously monitor the core is further illustrated by the fact that the generator condition monitor on Hunter 2, the sister plant of Hunter 1, indicated a potential core problem as this proceeding was pending. The Hunter 2 generator is the same type of generator and is similar in age and rating to Hunter 1. After the generator condition monitor signaled an alarm, PacifiCorp shut down Hunter 2, and identified and repaired the problem within one month. Hunter 2, unlike Hunter 1, did not suffer a catastrophic failure and was returned to service in a reasonable period of time. ICNU contends that only now that Hunter 1 has experienced a failure and a monitor has prevented a Hunter 2 failure, does PacifiCorp intend to continuously use a GCM on Hunter 1.

PacifiCorp's Response. PacifiCorp argues that its decision to remove the GCM from Hunter 1 for a short time was reasonable. According to PacifiCorp, GCMs have a history of reliability problems. PacifiCorp plant personnel knew that the GCM in place at Hunter 1 was damaged when PacifiCorp removed it. That is why PacifiCorp sent it to the manufacturer, Environment One, for a repair estimate. The Hunter 1 GCM had experienced a series of unvalidated false alarms. Ultimately, when Environment One examined the GCM after the failure, it confirmed the damage to the GCM.

A PacifiCorp line employee responded to the internal email that ICNU cites above asking about the risks associated with running the generator without a monitor (response dated February 15, 2000):

Gary,

The unit 1 core monitor has been sent to Environment for a repair estimate. We will decide whether to buy a new one or repair when we get the estimates back. As of the 1999 overhaul inspection the unit 1 winding was in very good condition, we installed the module upgrade, the RTD's [temperature measuring instrumentation] are working good and we have the vibration monitoring system on the windings. I think the short term risk is minimal. Thanks, Larry [Bruno]

Besides the fact that GCMs have reliability problems and the fact that the Hunter 1 GCM was damaged, PacifiCorp points out that Hunter 1 had just passed its 1999 inspection with good marks, which placed it in the high reliability range of generators of its type. Because of these considerations, PacifiCorp did not expedite the purchase of a new GCM, but planned it instead for 2001. Hunter 1 is now operating with an upgraded GCM.

PacifiCorp notes that industry experience with GCMs shows that they are much more effective in detecting winding failures than core failures, because the overheated particulate on the windings, which are nearer to the flowing hydrogen cooling gas, can more easily enter the flowing hydrogen gas stream. This industry experience was confirmed by PacifiCorp's operating experience with its fleet of GCMs.

PacifiCorp also rebuts ICNU's assertion that the incident at Hunter 2, which occurred after the Hunter 1 failure, shows that PacifiCorp knew or should have known that a GCM can detect a deep seated core failure like the one at Hunter 1. According to PacifiCorp, ICNU's assertion that the Hunter 2 GCM alarm indicated a potential core problem is incorrect. The Hunter 2 problem that caused the GCM there to sound an alarm involved a winding, not a core, problem.

Resolution. We conclude that PacifiCorp acted prudently in operating the Hunter 1 unit for a time without a GCM. We find that PacifiCorp's GCM was faulty and in need of repair, since it had sent twelve false alarms in the period before it was removed. We also conclude that since the 1999 inspection gave the Hunter 1 unit high marks for reliability, and since Hunter 1 had a 22 year history of reliable operation, PacifiCorp could assume that operating the unit without a GCM for the time of repair or replacement of the monitor was a low risk undertaking. We note also that the record shows a number of other monitoring devices on Hunter 1 when the GCM was removed. The generator was guarded by the standard protective relays, which included overcurrent, overvoltage, differential currents, Volt/Hz, over/underfrequency, overexcitation, loss of excitation, phase to ground, and neutral ground relays. These were mostly the original electromechanical protective relays recommended by IEEE and Westinghouse in the 1970s.

Further, GCMs are more reliable in identifying winding than core problems. The email from Larry Bruno that PacifiCorp cites indicates that there was a vibration monitoring system in place on the windings.

Could a GCM Have Prevented the Failure or Reduced Time and Cost of Repair? ICNU's Position. According to ICNU, a functioning GCM could have avoided the catastrophic failure and reduced the cost and time of the Hunter 1 repair. ICNU argues that a functioning GCM is the only mechanism designed to detect the secondary effects of a core failure and prevent it from developing into a catastrophic failure like the Hunter 1 outage.

ICNU attacks PacifiCorp's claim that a functioning GCM could not have detected the Hunter 1 outage in time to prevent the catastrophic failure, because the failure originated so far from the hydrogen cooling gas. According to ICNU, this conclusion is based on after the fact simulations that did not accurately mimic core conditions or all potential failure origin points. In addition, the exact origin point of the failure is unknown, and could have occurred at a location in direct contact with the hydrogen cooling gas. ICNU contends that PacifiCorp cannot know whether the monitor would have detected any particles, because the monitor was removed.

According to ICNU, even if the failure originated deep in the core, the overheated paint at the tooth tips or at the back of the core would have caused the core monitor alarm to sound well before the core started to melt, perhaps even months before the failure. In the hours, days, weeks, or months before the eventual failure of Hunter 1, as many as eight steel laminations could have shorted. As few as three or four shorted laminations could have caused a temperature rise of 190° C to 240° C above a core temperature of 90° C, and eight shorted laminations could have caused a temperature rise of 490° C. ICNU argues that the painted tooth tips and stator core are only a few inches from PacifiCorp's alleged starting point and can overheat and release particulates into the hydrogen gas at temperatures as low as 200° C. Temperatures of 190° C to 490° C at the alleged starting point would have easily caused temperatures to exceed 200° C a few inches away on the tooth tips or stator core. The melted paint particulates could then have directly entered the hydrogen cooling gas and provided an early warning of the core problem.

ICNU argues that an early GCM alarm would not have prevented the initial shorting of the steel laminations but could have prevented the catastrophic failure and could have reduced the damage of the core failure and the cost of the repair. PacifiCorp consultant Mr. Ward agrees that with a core condition monitor in place, the damage may have been repairable. Therefore, ICNU contends, PacifiCorp's imprudent action in failing to continuously monitor Hunter 1 directly increased the damage, duration, and cost of the Hunter 1 repair.

PacifiCorp's Response. According to PacifiCorp, every expert who conducted post failure analysis (Harrington, Halpern, Ward, Maughan, Schafer, Edmonds, and Glover) concluded that a working GCM would not have provided early warning or prevented the failure. As to early

warning, a GCM continuously monitors a small sample of the generator's hydrogen cooling gas, sensing for particulates produced by thermal decomposition of organic materials in the generator. In a generator, if a component is sufficiently overheated and the component has sufficient surface area in contact with the hydrogen cooling gas, the quantity of the particulates created by the overheating and released into the circulating hydrogen will cause the GCM to send an alarm signal.

PacifiCorp contends that whether a GCM will produce an alarm in time to alter the scope or duration of a failure depends on (1) the location of the failure (only matter that is picked up by the hydrogen cooling gas and circulated through the detection chamber inside the GCM can cause a GCM alarm); and (2) the production of overheated, organic particulate (because the GCM responds to overheated, organic particulate).

According to PacifiCorp, ICNU has acknowledged this dependent relationship between the fault location and the possibility of a GCM alarm. ICNU has also acknowledged that there are some areas in the core that are isolated from the hydrogen cooling gas and that the GCM might be less likely to sound an alarm in response to a deep seated core problem (rather than a winding failure) based on the inability of overheated particulate to enter into the hydrogen gas and be detected by the monitor. ICNU's witness Mr. Oliver admits he has no "specific experience with GCM failure detection for various types of GCM alarms." ICNU also admits that it does not know where the fault originated in the generator and has done no independent analysis or modeling of the failure or the thermal gradient of the core to assess the ability of the fault to generate overheated particulate that would be picked up by the hydrogen gas stream. ICNU has also acknowledged that the core generally would not overheat and produce particulates until after a number of laminations shorted together. Nonetheless, ICNU asserts that the GCM could have provided early warning or prevented the Hunter 1 failure. PacifiCorp contends that ICNU's argument is only speculative.

All PacifiCorp's experts agree that the origin of the failure is a localized fault with consequent core material melting at roughly 60 inches in from the exciter end of the stator core, at a radial location between the bottom of slot 21 and through bolt 7. To confirm the fault origin, the experts modeled two different scenarios: one with the failure initiating at the midpoint between the bottom of slot 21 and the through bolt hole 7 approximately 5 ½ inches behind slot 21, and one with the failure initiating at the through bolt hole. A comparison of the analysis simulation with the actual observations of the melt patterns at Hunter 1 confirms that the failure origin is approximately midway between the bottom of the slot and the through bolt.

As to the production of overheated, organic particulate, PacifiCorp contends that its modeling has confirmed what the evidence indicates: the initiating melting event began in a part of the stator core where there was no organic material, such as bolt insulation or tooth top paint, to degrade and where there was no hydrogen cooling gas in contact with the incident initiating fault in the stator core. Finally, as to the ability of overheated particulate to reach the hydrogen gas flow, modeling of the failure event also demonstrates that there is a very steep thermal gradient from the zone of melting

to the external features of the stator core. This gradient is so steep that it provides a nearly zero temperature rise just a few inches from the melt zone. PacifiCorp argues that the location of the Hunter 1 stator core fault and melt zone and the thermal gradient of the core could not have caused paint overheating at the tooth tops or back of the bore until the melting process was well advanced (a few minutes before the unit tripped, at best).

PacifiCorp argues that it is therefore impossible for any byproducts of severe overheating at the fault origin to be transported to the GCM. Only after the melting had progressed to a location exposed to hydrogen cooling gas and where organic material was present could a GCM have detected the failure in progress. At that point, the fate of the Hunter 1 generator was already sealed. According to PacifiCorp, electromagnetic and thermal modeling has shown that the incident initiating the fault reached the critical stage, a state of increasing temperature and circulating short circuit currents resulting in irreparable melting and propagation, when it was relatively small, not much more than a tenth of an inch in diameter. Thus, factoring in the steep thermal gradient, by the time the fault had progressed to an area in contact with the GCM, significant core damage had occurred. According to PacifiCorp, this modeling and analysis specifically rebut the notion that a GCM would have prevented failure.

As to ICNU's argument that a GCM would have affected the severity of the failure, the PSpice analysis (flexible modeling of both electrical and thermal aspects of the Hunter 1 core failure) supervised by Dr. Glover confirms that a GCM would not have had much influence. The failure originated deep in the core, and was confined to a localized area isolated from hydrogen cooling gas. A GCM could not have detected the first phase of core failure. PacifiCorp points out that the Hunter 1 GCM was in service for six months following the May 1999, maintenance outage with no validated alarm.

PacifiCorp maintains that the second phase of the failure occurred very quickly, during the last hour and 15 minutes of operation on the day of the failure, with most of the melting confined to the failure origin until the last five to six minutes of operation. PSpice modeling shows that a GCM could not have sent an alarm until approximately 45 minutes before Hunter 1 tripped, when byproducts of overheating were transported to a location exposed to hydrogen cooling gas and circulated through the GCM, and most probably not until the last half hour. By then, the stator core would have been irreversibly damaged.

PacifiCorp contends that the actual physical evidence confirms this modeling, thermal gradient, and other analysis. Melting damage occurred in axial direction and was confined in a radial direction to a localized area surrounding the failure origin, approximately four to five inches below the bottom of slot 21. Away from the failure origin in a radial direction, for instance halfway into the slots and near building bolts, laminations remained intact and unmelted.

ICNU's expert Mr. Nippes asserts that there are no protective relays or monitors applied at Hunter 1 that are designed to react to the direct cause of this type of failure. PacifiCorp responds that a protective relay that can sense a direct cause is not available to the industry. A GCM does not sense the direct cause of this type of failure but detects a core problem only after failure begins. A GCM is a passive device only capable of providing warning signals.

PacifiCorp further argues that ICNU is wrong to assert that a working GCM would have made a material difference in the length or timing of the outage. Had a working GCM sent an alarm and the generator been disassembled, a visual inspection may not have revealed melting deep in the core. If there was no outward sign, but ELCID testing or loop testing indicated a possible problem, PacifiCorp would have removed a large number of upper stator bars to reach one or two bottom bars to gain access to the bottom of the slot for a visual inspection of the overheating location. All this inspection would have been added to the repair time that was actually incurred, since the generator core would have required restacking once the initial failure occurred.

The length of the outage was dictated by the amount of time required to restack the core, reinstall all the stator bars, and reassemble the generator. By the time the shorted laminations had produced sufficient overheated particulate to have caused a GCM alarm, the core was sufficiently damaged to require restacking. At that point, the integrity of the core was compromised. Thus the duration of the repair would have been the same regardless of whether a GCM alarm occurred.

By the time any monitored activity could have detected an abnormal condition in the generator, PacifiCorp argues, it was too late to continue operating the generator and defer repairs until a more convenient time. The core was irreversibly damaged and could not have been reenergized. The nature of the situation precluded scheduling an outage at a convenient time to repair the core. The timing of the outage could not have been changed regardless of whether a GCM alarm had occurred.

PacifiCorp argues that ICNU misled the Commission by citing only the initial failure report by PacifiCorp's expert Ward to support ICNU's assertion that the GCM would have sounded an alarm early enough to prevent or mitigate the failure. In its argument, ICNU omits Mr. Ward's later addendum: "by the time an operator would have gone to the unit and confirmed the alarm, the entire core would have a melted hole from end to end. An immediate shut down after confirming the alarm would have resulted in the same work scope."

Resolution. We find that even had a working GCM been on the Hunter 1 unit at the time of the failure, the GCM would not have sent an alarm in time to prevent or mitigate the damage to the core, or to affect the duration of the outage. We base this conclusion on the preponderance of evidence in the record. This evidence includes PacifiCorp's testing and modeling, which indicates that the failure began deep in the core and the thermal gradient did not permit paint particulates to enter the

hydrogen cooling gas. It also includes the conclusion that GCMs better indicate winding failures than deep core failures. We do not find ICNU's attacks on PacifiCorp's modeling and testing persuasive.

Extended Inspection Period. Background. The original equipment manufacturer (OEM) of Hunter 1, Siemens Westinghouse, with whom PacifiCorp contracted to perform inspections on the generator, recommended that comprehensive, rotor out inspections take place every three to four years and no later than every five years. PacifiCorp and its predecessor, Utah Power & Light, had originally adhered to a four to five year inspection period.

ICNU's Arguments. ICNU argues that PacifiCorp imprudently extended the inspection period on Hunter 1 without considering all relevant risks. According to ICNU, proper testing, evaluating, and tightening of the core in 1995 or 1996 may have prevented the Hunter 1 outage by identifying problems and allowing PacifiCorp to repair the core before it was permanently damaged. Therefore, the extension of the inspection period likely contributed to the eventual core failure in November 2000.

ICNU points out that the original Westinghouse generator instruction book for Hunter 1 recommends making major inspections at intervals of not less than two years or more than five years. Westinghouse has generally recommended approximately three-year intervals to coincide with turbine outages. Consistent with the original recommendation, following the 1992 inspection, Westinghouse recommended the next inspection be in three to four years.

ICNU asserts that PacifiCorp discounts the manufacturer's recommendation because the original manufacturer's recommendation was made twenty years ago. ICNU contends that this explanation is inconsistent with the fact that Westinghouse recommended a three to four year inspection interval after it performed regular maintenance and inspected Hunter 1 in 1992. Thus the recommended three to four year inspection period is based on both the original manufacturer's recommendation and empirical data regarding the condition of Hunter 1 in 1992.

According to ICNU, PacifiCorp extended the inspection period to seven years without any special effort to determine whether the Hunter 1 generator core could tolerate an increase in the interval between inspections. PacifiCorp identifies a number of factors the company should take into account in deciding to extend the inspection period, but ICNU argues that PacifiCorp presented no witness and sponsored no evidence that identifies what the company actually did consider when it chose to extend the inspection interval to seven years. However, ICNU contends that PacifiCorp clearly did not survey the inspection periods for similar generators before it extended the inspection period. PacifiCorp conducted a survey of other operators of similar generators in 2000, but PacifiCorp had extended the inspection interval to seven years between 1992 and 1999. ICNU contends that PacifiCorp also failed to confer with Westinghouse, which advised inspecting Hunter 1 in three to four years, about the advisability of extending the interval after 1992.

PacifiCorp's Response. PacifiCorp contends that its maintenance of Hunter 1 was prudent and conservative. According to PacifiCorp, it performed testing, calibration, and setting of crucial generator protective relays; conducted operator equipment and awareness training; and entered into comprehensive contracts with Siemens Westinghouse to carry out reliability based maintenance.

PacifiCorp asserts that it has always relied on Siemens Westinghouse, the OEM, to provide technical direction for generator inspections at Hunter 1. PacifiCorp used Siemens Westinghouse to perform the inspection and maintenance of Hunter 1 in 1992 and 1999. Hunter 1 underwent comprehensive inspection and maintenance twice in the eight and a half years before its failure. The first overhaul was in July 1992, with uniformly positive results. The inspection revealed no signs of core looseness or degraded lamination insulation. The inspection report notes "The stator iron was visually inspected and found to be in good condition."

Siemens Westinghouse performed a series of core integrity tests (ELCID tests) before and after tightening the core as part of the generator maintenance. PacifiCorp argues that Siemens Westinghouse is an industry leader in the use of ELCID tests and the tests were performed by an engineer who is one of the most experienced users of the test. The ELCID tests showed that no areas of the core exceeded the recommended, generally accepted 100 milliamperes (mA) threshold. The tests, in other words, confirmed the good condition of the core. Based on these positive test results, Siemens Westinghouse found it unnecessary to conduct a loop test.

During the 1992 overhaul, PacifiCorp proactively implemented a number of OEM technical advisories to increase generator reliability, including Operations and Maintenance Memorandum 099 (OMM-099), which it had received in 1989. The 1992 Inspection Report notes that the "generator core tightening program was performed in accordance with OMM 099."

According to PacifiCorp, the 1992 inspection turned up only one specific problem involving some loose slot wedges, but there was no evidence that the condition of the wedges influenced the integrity of the windings. This issue is discussed in greater detail below.

The 1992 inspection report recommended that PacifiCorp schedule the next regular maintenance of the unit in three or four years, to coincide with the next turbine outage. PacifiCorp, however, decided to continue with the planned maintenance interval of seven years. In setting the maintenance interval, PacifiCorp argues that the OEM recommendations are just one factor. PacifiCorp's independent experts have substantial experience in setting intervals and concur that a unit by unit determination is appropriate. Other factors to consider are previous inspection reports, the history and day to day operation of the generator, the monitoring systems, the implementation of OEM related technical advisories, past outage frequency, age of the generator, the utility's experience with the generator, and industry information on similar generators and known problems.

In the case of Hunter 1, PacifiCorp considered: (1) The track record of Hunter 1 was excellent and it had a clean bill of health in 1992; (2) The boiler and the balance of Hunter 1 were scheduled for overhauls in 1995 and 1999, presenting a choice of a three year or seven year maintenance interval; (3) PacifiCorp had been gradually increasing the maintenance intervals at Hunter 1 as it gained more experience with the generator, and PacifiCorp already had had good experience with a five year interval; (4) Generator reliability had been improved by implementing technical advisories; (5) The industry trend, of which PacifiCorp was aware, was to extend generator maintenance intervals; and (6) There is risk of damage to the generator in rotor out inspections. PacifiCorp notes that in a 2000 Electric Power Research Institute (EPRI) study, 50 percent of operators surveyed reported consequential damage to the generator caused by a rotor out inspection.

In determining that the maintenance interval should be seven years, PacifiCorp considered that Hunter 1 is a base loaded unit, running at a nearly constant MW output without numerous start ups and shutdowns or a fluctuating load. According to PacifiCorp, it is undisputed that base loaded units are subject to less stress on generator components and can generally run at longer maintenance intervals. PacifiCorp also took into account the fact that there were no negative trends or developments in the 1992 inspection report.

PacifiCorp points out that the Hunter 1 generator was not new. Maintenance is typically performed more often on a new generator so the owner/operator can identify reliability and availability issues specific to the generator or generic problems with the fleet. Later in a generator's life maintenance intervals tend to stretch out further. By 1992, Hunter 1 had operated for 14 years with an unblemished record. PacifiCorp's experience with four and five year intervals identified no issues with the Hunter 1 generator. PacifiCorp argues that it was consistent with the life cycle curve to extend Hunter 1 maintenance to seven years.

In July 2000, PacifiCorp surveyed other owners of this size and class of generator and determined that the current average maintenance interval was 6.6 years, with some units on an eight to ten year maintenance interval schedule.

According to PacifiCorp, the results of the 1999 inspection and maintenance confirm that Hunter 1 did not suffer from deferred maintenance. Like the 1992 overhaul, the results from the 1999 overhaul were uniformly positive. The inspection report states: "All tests show this machine to be in good operating condition. The modifications made to this machine have put it into the high reliability range."

As in the 1992 overhaul, in 1999 Siemens Westinghouse tested core integrity by a visual inspection and an ELCID test. The visual inspection did not reveal any signs of lamination degradation. This conclusion was confirmed by ELCID testing: "All slots and step iron [were] scanned with no out of tolerance indications found. All readings were acceptable per specification." Again, PacifiCorp contends that these results rendered loop testing of the core unnecessary.

PacifiCorp responds to ICNU witness Mr. Oliver's contention that PacifiCorp extended its maintenance intervals without determining whether the core could tolerate the increase in time between inspections. According to PacifiCorp, its actions between 1992 and 1999 refute this contention. PacifiCorp based its maintenance interval decision on the positive results of the 1992 inspection. PacifiCorp then conducted a Doble test of the generator (which checks the integrity of the generator windings) during the 1995 planned boiler outage. PacifiCorp conducted another Doble test of the generator during a forced outage in 1997. The Doble test would have indicated any degradation in winding insulation that could be caused by core or wedge problems such as vibration. PacifiCorp notes that Hartford, the insurer that routinely tests customers' generators, also performed tests. Hartford is well qualified to evaluate the results of such tests and indicated no problem.

Resolution. We conclude that PacifiCorp's choice of a seven year maintenance interval was well reasoned and prudent. The factors it lists in addition to the OEM recommendations convince us that a seven year interval was appropriate. In any case, we note that the 1999 inspection was only 17 months before the failure of Hunter 1, well within the shortest recommended maintenance period.

ICNU contends that a shorter interval between the 1992 and 1999 inspections could have revealed signs of the impending failure. Because we reject ICNU's theory of the cause of Hunter 1's failure, and accept the theory of PacifiCorp's witnesses, this argument fails. The cause of the failure would not have been evident in an inspection before 1999, just as it was not evident in 1999. *See* discussion of Cause of the Failure, above.

Did PacifiCorp Ignore Problems with Other Generators? ICNU's Position. ICNU makes three arguments directed at proving that PacifiCorp's imprudent maintenance and operation directly caused the Hunter 1 outage. First, according to ICNU, PacifiCorp extended the inspection interval during a time when it was known in the industry that these Westinghouse generators had a potential to experience stator core failure. ICNU contends that since the 1950s, there have been 21 generators requiring core replacements. At least three of these failures were similar to the core failure Hunter 1 experienced. Also, ICNU argues, as early as 1988 it was known that this particular generator came from a line of hydrogen cooled generators that has a history of failures. In August 2001, PacifiCorp issued a statement that it "is not aware of any operational, design or maintenance problems developing with Siemens Westinghouse generators at other locations." According to ICNU, this statement indicates PacifiCorp's failure to investigate the problems with similar Westinghouse units.

According to ICNU, PacifiCorp does not dispute that it failed to account for the history of loose core problems at generators similar to Hunter 1. Instead, PacifiCorp emphasizes its claim that there are no generic loose core problems at similar Westinghouse generators and argues that past Westinghouse generator failures did not involve units exactly like Hunter 1. ICNU contends

that PacifiCorp's own experts, Westinghouse documents, and the history of Westinghouse generators contradicts this.

According to ICNU, PacifiCorp witnesses Maughan and Huynh both recognized that Westinghouse generators are known for having loose core problems. Mr. Maughan wrote after the failure that Westinghouse is "very concerned about [core] loosening." PacifiCorp employee Huynh was also aware of similar problems at Florida Power & Light's Martin County Plant and Tampa Electric's Gannon Station. ICNU also cites the failure of Consumer Energy's Campbell Station generator as illustrating a generic problem with the Siemens Westinghouse generators.

ICNU also contends that the confidential Westinghouse technical advisory OMM-099, issued prior to the 1992 inspection, should have alerted PacifiCorp to generic core problems in Hunter 1 type generators.

PacifiCorp's Response. PacifiCorp contends that for over 30 years Siemens Westinghouse has manufactured generators of the same basic design and construction as those at Hunter 1. According to PacifiCorp, these have a good overall track record, with no generic problems associated with the stator core. Dean Harrington, one of the experts PacifiCorp retained to investigate the Hunter 1 failure, said: "[T]here is a large fleet of generators of design similar to that of the Hunter #1 generator, which has had a reliable record of operation. Core failures have been exceedingly rare." Similarly, PacifiCorp expert Bob Ward's report on the Hunter 1 core failure notes that "In the history of hundreds of similar generators in size and construction with greater than 10,000 operating years, there has not been a similar failure."

The only generic reliability issue ever presented on these generators, according to PacifiCorp, was an end winding vibration problem. Hunter 1 never had any significant winding problems and it is undisputed that the Hunter 1 failure was not caused by windings.

PacifiCorp contends that there is no industry discussion of generic Siemens Westinghouse core problems. PacifiCorp had representatives attending Edison Electric Institute meetings, EPRI generator workshops, Doble Engineering conferences, Rocky Mountain Electric League meetings, and various annual power conferences. PacifiCorp personnel also subscribe to various utility and industry periodicals to stay abreast of developments in the industry. PacifiCorp also sponsors internal workshops for its maintenance and engineering personnel. According to PacifiCorp, experts confirm that there is no industry consensus on generic core problems in Westinghouse generators. At an industry conference held in November 2001, designed specifically to discuss generator core issues, in fact, there was no mention of a generic Siemens Westinghouse core problem.

PacifiCorp addresses each of the Siemens Westinghouse generator failures that ICNU mentions. Of the generator failures ICNU originally mentioned, only three were manufactured by Westinghouse: Gannon, Martin, and Campbell. As to the Gannon plant failure, PacifiCorp notes

that there was no published information on the failure but what is generally known within the industry would not have altered PacifiCorp's maintenance decisions. Gannon, PacifiCorp argues, had visible signs of a very loose core and failed on start up following repair work to tighten the core. The Gannon failure occurred in the tooth area of the laminations in the core. Hunter 1 by contrast never had visible or other symptoms of a loose core, did not fail in the tooth area, and did not fail on start up.

PacifiCorp contends that little is known on the Martin failure either, because there is no published information on the failure. The Martin unit was only seven years old when it failed. It was twice as large as Hunter 1. It failed in the tooth area of the core during start up, due to vibrating laminations in the tooth area (vent fingers) next to the vent spaces. The vibration caused the laminations to break off and the broken pieces of lamination caused the core to melt. Moreover, the Martin core showed signs of a core problem during an ELCID test. Hunter is half Martin's size, had operated for 22 years without problems, did not have signs of a loose core, did not have broken vent fingers or laminations, did not fail on stator ground, did not fail in the tooth area, and showed no signs of a core problem during ELCID testing.

Finally, ICNU asserts that the Campbell failure was like the Hunter failure and should have put PacifiCorp on notice of a generic Siemens Westinghouse core problem. ICNU witness Mr. Nippes was involved to some extent in investigating that core failure but does not know whether the laminations were ever unstacked. His observations on the core at Campbell are based on inspecting the core's surface. PacifiCorp points out that there are significant, material difference between Campbell's failure and the Hunter 1 failure. Campbell had a long term stator frame vibrator problem that was serious enough to affect external components mounted on the generator frame. Hunter 1 had had no internal or external indication of vibration. Second, Campbell had a lifelong history of loose wedges. The wedges were so loose that there was evidence of bar movement in the heavy greasing in the slots. ICNU has conceded that Hunter 1 had no indication of movement in the slots or the wedges and that Siemens Westinghouse merely indicated that the ripple springs, beneath the wedges, were out of tolerance and needed to be tightened. ICNU has also conceded that the wedges did not contribute to the failure at Hunter 1.

Campbell, according to PacifiCorp, had also shown significant winding vibration in one of the slots. There is no evidence of a winding problem at Hunter 1. Multiple ELCID readings also showed evidence of core problems at Campbell, which were confirmed by follow up loop tests. There were no ELCID readings at Hunter 1 that indicated core problems.

Finally, ICNU asserts that a technical bulletin, OMM-099, should have alerted PacifiCorp to a generic core looseness problem with Siemens Westinghouse generators. Evidence on this issue is confidential, but PacifiCorp argues that there is no connection between OMM-099 and a generic core looseness problem.

Resolution. We find no evidence of a generic problem with Siemens Westinghouse generators. PacifiCorp has successfully distinguished each generator failure on which ICNU relies to make this point from the Hunter 1 core failure.

We have reviewed the record on the confidential technical advisory OMM-099 and are satisfied that it was an if-then hardware installation recommendation. If PacifiCorp were to perform a certain maintenance act, then it should also install new hardware. There is no indication that OMM-099 was urgent or mandatory. Further, the OEM that issued the advisory, Siemens Westinghouse, also inspected the generator in 1992, noted no deficiencies associated with implementation of OMM-099 in its 1992 inspection report.

Did PacifiCorp Fail to Perform Recommended and Necessary Repairs?

ICNU's Position. ICNU's second argument about PacifiCorp's imprudent maintenance and operation of Hunter 1 is based on what ICNU sees as PacifiCorp's unwillingness to make necessary and recommended repairs to the generator. ICNU argues that PacifiCorp did not fully implement the OEM technical advisory OMM-099 during the 1992 inspection and did not perform a manufacturer's recommended generator rewedge.

ICNU also argues that the 1992 inspection turned up information on through bolts that should have been investigated. PacifiCorp failed to look into the "as found" conditions of the through bolts. This failure along with the partial implementation of OMM-099 resulted in an inadequate retrofit and core tightening. ICNU contends that these shortcomings compromised the effectiveness of the recommended fix in OMM-099 and contributed to the later damage to the core.

PacifiCorp's Response. PacifiCorp notes, first, that it is undisputed that the loose slot wedges are unrelated to the Hunter 1 failure. Nonetheless, ICNU points to the detection of loose wedges in the 1992 inspection and the decision to defer rewedging as evidence of PacifiCorp's imprudent maintenance at Hunter 1.

The wedges are part of a system designed to keep the windings securely in the core slots. "Loose" here, according to PacifiCorp, meant that the amount of compression on some of the wedge ripple springs was outside the tolerable range. But there was no evidence that the condition of the wedges affected the integrity of the windings. The 1992 inspection report states that there was no movement of slot wedges or filler strips under the wedges. There were no signs of dusting or greasing, thus indicating that although the compression of some ripple springs was below specification, there was no significant or problematic looseness or movement.

Rather than perform a partial rewedging in the 1992 inspection, PacifiCorp decided to perform a complete rewedging during the next overhaul, in 1999. The OEM recommended rewedging for only approximately 15 percent of the generator in 1992. The quantity and location of

the below specification wedges combined with the fact that there were no other reported signs of bar movement or vibration indicates that the situation did not demand immediate action, PacifiCorp contends. Moreover, the wedges contained asbestos. Therefore, rewedging would have involved an asbestos abatement event, and PacifiCorp chose to deal with that problem only once by deferring rewedging until 1999.

PacifiCorp's expert Mr. Halpern inspected the Hunter 1 wedges after the failure, as ICNU's experts did not. Mr. Halpern concluded that PacifiCorp was prudent in operating until 1999 with the few out of specification wedge ripple springs. PacifiCorp's expert Mr. Ward reviewed prior maintenance at Hunter 1 as part of his on site inspection and failure analysis. Mr. Ward concluded also that the decision to defer rewedging to 1999 was prudent.

ICNU also asserts that PacifiCorp did not fully implement OMM-099 during the 1992 inspection. PacifiCorp asserts that it has confirmed with Siemens Westinghouse that OMM-099 was a bulletin, not a mandate. ICNU's witness Mr. Oliver believes that the transmittal letter accompanying OMM-099 seemed urgent, but he admits that he has not seen other technical bulletins from Siemens Westinghouse.

PacifiCorp notes that it chose to implement OMM-099 at its next available outage after receipt of the advisory, even with no indication of problems during the 1987 generator inspection.

Mr. Oliver also claims that PacifiCorp allowed Siemens Westinghouse to perform an inadequate partial hardware retrofit and core tightening in 1992. The details of OMM-099 are confidential, but PacifiCorp explains that the effect of its maintenance was the same as if it had done a more complete tightening. It is difficult to change the hardware on the exciter end, due to the configuration of windings and parallel rings, and change requires the removal of some of the winding end turn support system. Since OMM-099 was an enhancement to the generator and not a required change, and given the additional work required to change the hardware on the exciter end, PacifiCorp elected to change hardware only on the turbine end of the generator. This procedure, PacifiCorp argues, results in the same amount of compression on the stator core.

In addition, PacifiCorp points out that the OEM, Siemens Westinghouse, itself performed the maintenance in 1992 and implemented OMM-099. The inspection report indicates that the work was performed in accordance with OMM-099, with no mention of a negative issue. There were no reported signs of a problem with Hunter 1 from implementing OMM-099 only on one end of the through bolts in 1992. There was no mention of hardware problem in the 1999 inspection report. Instead, the report states, "All core tightening hardware appeared to be tight."

Finally, PacifiCorp argues that the evidence shows that the hardware at the end of the Hunter 1 generator on which the OMM-099 hardware change had not been implemented was in

good condition in 1999, further confirming that the implementation of OMM-099 in 1992 had no negative impact on the Hunter 1 core.

As to the “as found” condition of the through bolts in the 1992 inspection, PacifiCorp contends that there was no reason to investigate the condition. All of the readings were well above the minimum specifications and well above the area of concern for core issues described in the Siemens Westinghouse paper, “Case History of Stator Core Issues, an OEM Perspective.”

Resolution. We conclude that PacifiCorp in conjunction with Siemens Westinghouse properly and effectively implemented the advisory OMM-099. We note that Siemens Westinghouse issued the advisory and implemented OMM-099 itself in the 1992 inspection. We also note that the 1999 inspection report confirms that OMM-099 was properly implemented.

As to the rewedging, we conclude that PacifiCorp acted prudently in deferring the work noted in the 1992 inspection report to 1999, when a total rewedging could be performed. Since the loose wedging noted in the 1992 report had no effect on the Hunter 1 failure, or any other negative consequence, we find no imprudence on PacifiCorp’s part in deferring the rewedging to 1999.

We agree with PacifiCorp that the readings on the through bolts in the 1992 inspection did not require further investigation on PacifiCorp’s part.

Did PacifiCorp Fail To Perform Adequate Testing and To Act on Test

Results? Background. An Electromagnetic Core Imperfection Detector, or ELCID, test is used to detect insulation failures between laminations of generator stator cores and large motors. Adwel manufactures both standard (analog) and digital ELCID instrumentation. The recorded ELCID traces show the approximate position and amplitude of any fault currents, measured in milliamperes (mA). The principle underlying this method is that measurable currents will flow through failed or severely deteriorated interlaminar insulation when a flux of only a few percent of the rated value is induced in the core.

To aid judgment in interpreting ELCID test results, a practical threshold level corresponding to 100 mA (using 4 percent of rated excitation) has been established from working experience. A higher measurement would warrant further investigation and indicate that a repair of the stator core might be required. Adwel, manufacturer of ELCID, uses the same criteria. Its Digital ELCID Operators Manual states: “It is . . . considered that responses of greater than 100 mA (at the standard excitation level of 4 percent) should be regarded as significant and should be investigated further.”

PacifiCorp performed ELCID tests on Hunter 1 in 1992 and 1999, both before and after the core tightening during each outage. All results were below the 100 mA threshold. Siemens

Westinghouse reported that the Hunter 1 ELCID reports were satisfactory. Nor was there significant variation in the ELCID data recorded in 1992 and 1999. Siemens Westinghouse again conducted tests on the Hunter 1 stator core in April 2001, after the core was restacked and tightened subsequent to the failure. All results were acceptable; the 2001 test results were comparable to the 1992 and 1999 results.

The other test procedure at issue in this section is the loop test. A loop test (sometimes called a ring test) also looks for imperfections in the stator core, but is a high energy test depending on application of a power frequency magnetic flux in the stator core iron that is near (80 percent) or above operating flux levels. To perform this test, single phase high current winds through the bore and around the outside of the stator, after the rotor is removed. The current flow in the test loop produces magnetic flux in the stator core similar in level to that flowing in the core when the generator operates. In theory, this level of test flux will produce hot spots and temperature rises similar to those during operation, though test conditions like inoperative cooling could result in differences. Hot spots are detected using an infrared camera to scan the bore. PacifiCorp did not perform a loop test on Hunter 1 in either the 1992 or 1999 inspections.

ICNU's Position. ICNU's third argument about PacifiCorp's imprudent maintenance and operation of Hunter 1 is that PacifiCorp did not conduct adequate tests regarding the state of the generator core and failed to act on the symptoms of core deterioration that the tests identified. According to ICNU, appropriate testing on Hunter 1 in 1992 or 1999 could have prevented the outage. PacifiCorp relies on the ELCID test as the sole indicator of stator core problems, arguing that performing a loop test is not prudent, and that a loop test would also not have prevented the outage. ICNU contends that PacifiCorp should have conducted a loop test on Hunter 1 and that such a test could have prevented the outage.

ICNU argues both that PacifiCorp ignores evidence that the ELCID tests produced unacceptable results at Hunter 1 in 1992 and 1999 and that ELCID tests are not accurate and have failed to detect previous deep core problems like the problem with Hunter 1. For instance, ICNU contends that an engineer from Adwel, the ELCID manufacturer who reviewed the ELCID test results, and a PacifiCorp employee who investigated the Hunter 1 outage concluded that the 1992 and 1999 ELCID test results did not show a consistent pattern of a healthy core and warranted follow up loop tests.

PacifiCorp claims that a loop test would not have found the problems with the Hunter 1 generator. If there had been a problem the loop test could have identified, PacifiCorp contends that the problem would have been so severe that the distressed region would shortly have evolved into a core failure. But ICNU argues that loop tests detect both core problems that lead to immediate failure and those that escalate gradually, like the problem at Hunter 1. If repairs had occurred in 1999, ICNU maintains that it is likely no excess power costs would have been incurred.

According to ICNU, Hunter 1 type generators should be inspected by both the loop test and the ELCID test. ICNU maintains that the loop test is a high power test that has been used for over 50 years and is effective in detecting deep core lamination shorting. The ELCID test, according to ICNU, is a new and inexpensive low power stator core test that is useful in locating obvious core lamination shorts.

ICNU argues that it was imprudent for PacifiCorp to rely on the ELCID test as the sole indicator of stator core problems, because the loop test more accurately identifies actual core conditions. In ICNU's view, loop tests are better at detecting problems because they are operated at conditions that are close to that of the operating machine. Electrical shorted lamination circuits that do not exist at lower temperatures will occur at a higher operating temperature because the increased temperature compresses laminations together. This makes detection of the shorted lamination circuits possible with the loop test, but not detectable with the ELCID test.¹³

ICNU argues that the ELCID test has failed to detect loose core problems at the outages at the Martin County Plant of Florida Power and Light, the Campbell Station of Consumers Energy, and the Gannon Station of Tampa Electric. Therefore, according to ICNU, the Hunter 1 unit comes from a line of generators with stator deep core problems that have not been accurately located with the ELCID test.

ICNU asserts that there are other limitations with the ELCID test that are not present with the loop test. The ELCID test is susceptible to trace shifts and discontinuities "caused by the testing methods and equipment." Finally, the ELCID test may be performed with a digital or an analog tester. The Hunter 1 inspections used the analog tester although the digital tester is more sensitive and accurate than an analog ELCID tester.

PacifiCorp claims that the ELCID and loop tests produce comparable results, and that loop tests should only be performed if the ELCID test produces unacceptable results. ICNU contends that this is an after the fact rationalization because PacifiCorp could not identify the considerations in deciding not to perform a loop test.

ICNU further argues that while the loop test should have been performed on Hunter 1 regardless of the ELCID results, the 1992 and 1999 analog ELCID tests do not appear to have

¹³ ICNU argues that while the Institute of Electrical and Electronics Engineers (IEEE) has not yet finalized its draft standards on the ELCID test, the draft IEEE standard cautions that if damage "is deep in the core it is much more difficult to detect" with the ELCID test." We do not include this in ICNU's argument because ICNU has implied that the term of comparison ("more difficult to detect" with the ELCID test than with what?) is the loop test. In context, however, the term of comparison is damage at the tooth tip: "[I]f damage is at the tooth tip it is relatively easy to detect; if it is deep in the core it is much more difficult to detect." In the excerpt submitted into evidence, the IEEE draft standard does not directly compare results of loop testing and ELCID testing. ICNU also states that the draft IEEE standard notes that ELCID testing produces questionable results on segmented cores, and applies this to Hunter 1, but Hunter 1 is not a segmented core generator.

produced acceptable results. PacifiCorp employee Dan Huyhn filed an internal report on the Hunter 1 failure on February 14, 2001. In his report, Mr. Huyhn stated that the 1992 and 1999 analog ELCID tests produced “suspicious” and “peculiar” results, and “did not show consistent patterns for a healthy stator core.” According to ICNU, this was particularly true for the 1999 test, which found “symptoms of core deterioration since 1992 when the ELCID tests were first conducted.” According to Mr. Huyhn, a loop test should have been performed “to verify the peculiar test results encountered at the Hunter 1 generator in 1992 and 1999.” Mr. Huyhn also concluded that “the severity of the core damage could have been reduced if certain preventive actions were recommended and taken.” Mr. Huyhn’s conclusions are supported by an engineer from the ELCID manufacturer, cited in the same Huyhn report, who reviewed the Hunter 1 tests and concluded “that the test results from the past two maintenance outages warranted further testing and some preventive actions.”

ICNU argues that it was imprudent for PacifiCorp to ignore and fail to investigate important generic industry wide and Hunter 1 specific warning signs regarding core problems. A loop test in either 1992 or 1999 might have detected a sufficient temperature rise to show the possibility of a deep core shorted lamination condition. Because PacifiCorp did not investigate the analog ELCID test results or conduct a loop test, the company missed an opportunity to obtain additional information that could have prevented the generator failure, ICNU contends.

PacifiCorp’s Response. ELCID is widely used within the industry to detect damage to stator cores during generator overhauls. Used by many companies that perform generator maintenance and repairs, including Siemens Westinghouse, General Electric, General Electric of Canada, National Electric Coil (NEC), and American Electric Power (AEP). ICNU’s witness Mr. Nippes concedes that ELCID is an “economical and very effective way of checking hard shorts.”

PacifiCorp maintains that loop tests are more risky than ELCID tests. The core can be overexcited during loop tests, causing overheating and burning damage to stator laminations. This risk is one reason that utilities rely on the ELCID tests results as long as they are within the acceptable range to test stator core health. Because the loop test creates hot spots and is conducted without hydrogen gas circulating to cool the generator, it is potentially damaging to the core. PacifiCorp maintains that the ELCID test was developed in part to avoid the loop test’s inherent risks of damaging the core.

PacifiCorp argues that studies have shown that ELCID and loop tests provide comparable results in establishing core integrity. Some studies show that ELCID tests may be better at detecting deep seated core defects than loop tests. PacifiCorp points out that neither ICNU expert could cite an example when an ELCID test gave a satisfactory result but a follow-up loop test indicated a problem. According to PacifiCorp, the industry standard directs follow-up loop test only when an ELCID test indicates problem. PacifiCorp contends that this sequence of testing is standard practice at Siemens Westinghouse, General Electric, General Electric of Canada, NEC, and AEP. PacifiCorp argues that a short detectable as a temperature anomaly

during a loop test would be so severe that the distressed region would have quickly evolved into a core failure shortly after start up after the 1992 or 1999 overhaul.

According to PacifiCorp, ICNU has provided no evidence that suggests loop tests were required at Hunter 1 or that loop tests would have indicated any problems that the ELCID test did not turn up. PacifiCorp argues that ICNU has pointed to no industry guideline, standard, or article or the conduct of any utility to show that running both tests is accepted generator maintenance practice. PacifiCorp also contends that there is no evidence that a loop test would reveal additional information about Hunter 1 core in 1992 or 1999.

ICNU argues that because loop tests are conducted at 80 percent of rated flux and are therefore closer to actual operating conditions, they can detect faults undetectable by ELCID. According to PacifiCorp, this argument is wrong. ELCID and loop tests detect core problems in different ways. The loop test relies on the generation of heat and detects the resulting hot spots created by laminations shorting together. The ELCID test does not rely on heat to detect core problems. Instead, it uses only 4 percent of rated excitation to generate fault currents, which are then detected by a pickup coil. ELCID operates at 4 percent because that is all that is needed to detect fault currents and core problems, not, as ICNU implies, because it is a less powerful test with limited ability to detect core problems.

ICNU claims that the ELCID test results from Martin, Gannon, and Campbell plants show that ELCID cannot accurately detect deep seated core problems. PacifiCorp asserts that this is misleading, because ICNU admits that the ELCID tests at Martin and Campbell did detect the core problem at each unit. Moreover, the Martin and Gannon failures were not deep seated core problems. These units failed in the tooth area. It is unknown where the Campbell failure occurred. In short, according to PacifiCorp, ICNU has pointed to no evidence that supports the proposition that ELCID does not accurately identify core problems or that supports its assertion that ELCID and loop tests do not provide comparable results.

ICNU also asserts that PacifiCorp unreasonably used an analog ELCID tester, which is less sensitive and accurate than a digital tester. ICNU has provided no evidence that digital ELCID testing was available when the ELCID tests were run at Hunter 1 in 1992 and 1999. Adwel, the manufacturer of ELCID testing equipment, has confirmed that the analog ELCID tester used at Hunter 1 during the 1992 and 1999 outages was set up and calibrated properly and has confirmed that the Siemens Westinghouse engineer who performed some of the ELCID tests at Hunter 1, Jim Shelton, is one of the most experienced users of ELCID instrumentation in the field.

In addition, PacifiCorp contends that ICNU has provided nothing to rebut PacifiCorp's evidence that loop tests are not commonly performed within the industry as a whole when the ELCID tests provide acceptable results. Instead of rebutting this evidence, ICNU argues that PacifiCorp's evidence is an after the fact rationalization for PacifiCorp's decision not to perform a

loop test in 1992 and 1999. PacifiCorp takes issue with this statement. The results of the 1992 and 1999 inspections expressly state that the ELCID test results all met Siemens Westinghouse and industry accepted specifications (i.e., were below 100 mA). When that is the case, no decision regarding the performance of a loop test was necessary, because the precondition to performing one had not been satisfied.

ICNU asserts that the ELCID test results at Hunter 1 do not appear to have produced acceptable results. According to PacifiCorp, the basis for this assertion is not readily apparent because ICNU's experts admitted that they never reviewed the ELCID test results on the Hunter 1 core. Siemens Westinghouse, who conducted the ELCID tests; Adwel, the manufacturer of the ELCID equipment; and PacifiCorp's experts agree that the ELCID test results were in fact within the industry accepted, Siemens Westinghouse accepted and Adwel accepted guideline of less than 100 mA. Moreover, PacifiCorp points out that ICNU has conceded that 100 mA is the industry accepted threshold for acceptable ELCID test results and that Siemens Westinghouse reported that all ELCID test results were satisfactory.

According to PacifiCorp, there is no significant difference between the ELCID test results conducted in 1992 and 1999 and those conducted after the core was restacked in 2001. This restacked core successfully passed several loop tests (conducted, consistent with industry practice, only because new windings and a new core were installed). PacifiCorp believes that this further confirms the soundness of the 1992 and 1999 ELCID test results and that loop tests in 1992 and 1999 were unwarranted and would have provided no additional information.

ICNU cites the report by Dan Huynh, formerly of PacifiCorp's hydro engineering group, for support of the principle that the ELCID results do not appear to have been acceptable, but Mr. Huynh in fact agrees that the results in 1992 and 1999 were all below 100 mA. Even though Mr. Huynh points to areas in the ELCID test results that gave him pause about the Hunter 1 core, PacifiCorp argues that his analysis was after the failure with benefit of hindsight. Moreover, PacifiCorp notes that his report was written early in the failure analysis and has been superseded by the experts' addenda and testimony that take into account the additional analysis, discussion, and modeling that happened as the failure analysis progressed. For example, Mr. Huynh based his opinion about the ELCID testing at Hunter 1 on a telephone conversation he had with an employee at Adwel, Mr. Brad McNamara. Mr. McNamara subsequently reviewed the test results in greater detail and in person with the PacifiCorp witness, Dr. Duncan Glover. At this later meeting Mr. McNamara agreed that all ELCID test results at Hunter 1 were less than 100 mA, that the results do not substantiate a significant core problem at Hunter 1, and that there were no specific locations of significant concern within the core. The foundation of Mr. Huynh's opinion, on which ICNU relies for its assertion that test results appear unacceptable, has thus been superseded, PacifiCorp contends.

Moreover, Mr. Huynh admitted in his report that none of his areas of concern were in the area where the core actually failed. Although he asserts and ICNU argues that further testing,

such as RTDs (temperature measuring instrumentation), of that area should have been conducted, this monitoring would not have been useful in detecting the fault at Hunter 1, which originated in a different part of the core.

In any event, ICNU does not assert that a loop test would have given PacifiCorp additional information about the Hunter 1 core that would have altered the planned maintenance at Hunter 1 or preempted the Hunter 1 failure. The most ICNU is willing to say is that a loop test might have provided additional information about the Hunter 1 core. PacifiCorp has shown that loop tests would not have provided information not already provided by the ELCID tests. Because loop tests are risky and because the ELCID test results for Hunter 1 were all within the industry accepted threshold for a healthy core, PacifiCorp argues that it was reasonable for PacifiCorp not to conduct unnecessary follow up loop tests.

Resolution. After reviewing the record, we agree with PacifiCorp that the standard in a significant part of the industry is to perform ELCID tests and to perform loop tests only if the ELCID test results are not acceptable or if, as with the rebuilt Hunter 1, new windings and a new core are installed. The risks associated with performing a high voltage flux test militate against performing the loop test where it is not needed. We conclude that PacifiCorp appropriately performed only ELCID tests on its Hunter 1 generator in 1992 and 1999. The results from those tests did not indicate a problem with the core that a loop test could have detected.

ICNU raises the issue that the ELCID test is subject to trace shifts and discontinuities “caused by the testing methods and equipment.” ICNU gives us no context to evaluate the seriousness of this contention, but the record shows that Mr. Shelton, who performed much of the testing, is very experienced and that the analog testing equipment was properly calibrated and functioned properly. We conclude that the testing methods and equipment were appropriate.

We have reviewed Mr. Huynh’s report as well, and conclude that the concerns it raises are addressed and put to rest in the testimony of Dr. Glover, who consulted with the Adwel engineer after Mr. Huynh’s report. We conclude that PacifiCorp’s use of ELCID testing in 1992 and 1999 was appropriate, and that it was prudent to rely on the results of the ELCID tests and not perform loop tests in addition to the ELCID test.

Theories of (Non)Recovery. ICNU’s Position. ICNU argues that PacifiCorp should be responsible for all costs associated with the Hunter 1 failure. While the root cause of the failure has not been positively identified, ICNU contends that the list of potential causes suggests negligence by PacifiCorp. *See* section above on Cause of Outage for ICNU’s theory of the failure.

Res Ipsa Loquitur. ICNU believes that the evidence demonstrates that the most likely cause of the failure and the extensive damage is PacifiCorp’s negligence. However, ICNU argues that even if the Commission determines that the direct cause of the failure is unknown,

PacifiCorp should be liable for the outage. ICNU argues that the doctrine of *res ipsa loquitur* (the thing speaks for itself) applies to this case because PacifiCorp had complete control over Hunter 1 and should therefore be liable for all costs associated with its failure.

Res ipsa loquitur creates a permissible inference of negligence even without evidence proving the specific manner in which the defendant was negligent. *Centennial Mills, Inc. v. Benson*, 234 Or 512, 515-20 (1963). The doctrine of *res ipsa loquitur* can be invoked when an incident occurs that would not normally occur absent negligence and when the negligence causing the incident is probably that of the defendant. *Pattle v. Wildish Construction Co et al.*, 270 Or 792, 298 (1974). In *Mayor v. Dorsett*, 240 Or 196, 214 (1965), the court applied a three part test to determine when the doctrine will apply:

(1) the accident must be of a kind which ordinarily does not occur in the absence of someone's negligence; (2) it must be caused by an agency or instrumentality within the exclusive control of the defendant; (3) it must not have been due to any voluntary action or contribution on the part of the plaintiff.

According to ICNU, the Hunter 1 failure satisfies this test. First, ICNU argues that catastrophic failure of a generator such as Hunter 1 does not normally occur but for negligence in maintaining, operating, and monitoring the machinery. Second, PacifiCorp maintained exclusive control and was solely responsible for maintaining and operating the generator. Finally, complainants, ICNU and CUB, as well as customers in general, have in no way contributed to the generator's failure. According to ICNU, PacifiCorp cannot hide behind the uncertainty of causation under this doctrine to avoid liability.

Strict Liability. ICNU also contends that PacifiCorp should be responsible for all costs related to a potential manufacturer's defect or negligence because it is better situated than ratepayers to pursue remedies against the manufacturer. PacifiCorp should be held strictly liable for Hunter 1's failure. The meltdown of the generator may have been caused by a manufacturer's defect. Relying on the doctrine of strict liability, the Commission has recognized that the utility is better situated than rate payers to prevent a failure due to defective products and should not be permitted to pass on costs related to a potential manufacturer's defect. *In re PGE*, UE 88, Order No. 95-322 at 61, referring to *Pennsylvania Pub. Utility. Comm'n v. Philadelphia Elec. Co.*, 522 Pa. 338 (1989). As a result, the Commission may impose liability on the utility regardless of its negligence. *Id.*; *Pennsylvania PowerCo. v. Pennsylvania Pub. Utility Comm'n*, 155 Pa. Commw. 477 (1993); Restatement (Second) of Torts, 402A.

ICNU asserts that there is evidence in this proceeding that the Hunter 1 failure may have been, at least in part, caused by a manufacturer's defect or negligence. According to ICNU, it is well known in the industry that this type of Westinghouse generator is not reliable and can experience

loose core problems similar to the Hunter 1 failure. Finally, ICNU asserts that Westinghouse withheld from PacifiCorp important information regarding the failure of its generators. Despite Westinghouse's role as the manufacturer and the party with whom PacifiCorp contracted to perform all relevant inspections and repairs on Hunter 1, Westinghouse is not a party to this proceeding.

ICNU argues that PacifiCorp is better situated than its ratepayers to pursue aggressively claims against Westinghouse for potential liability and therefore should bear the burden of the Hunter 1 failure. According to ICNU, PacifiCorp chose the manufacturer and repair company, negotiated the contracts, including liability provisions, and can pursue the manufacturer for any damage caused by the defective product. *In re PGE*, UE 88, Order No. 95-322 at 61; *Pennsylvania Pub. Util. Comm'n v. Philadelphia Elec. Co.*, 522 Pa. at 346-47; *Entergy Gulf States, Inc. v. Louisiana Pub. Serv. Comm'n et al.*, 726 So.2d 870, 883 (La. 1999). The Commission should not allow PacifiCorp to pass the costs of the Hunter 1 failure on to ratepayers in the form of a rate increase. *In re PGE*, UE 88, Order No. 95-322 at 61; Restatement (Second) of Torts, §402A.

Finally, ICNU contends that even if the direct cause of the Hunter 1 outage is unknown, the Commission should not protect PacifiCorp from the repercussions of its overall poor inspection, maintenance, and operation. Failure to impose significant liability on PacifiCorp will encourage PacifiCorp and other utilities to negligently maintain and operate their facilities and then obfuscate the underlying cause of the problem in an effort to shift liability to ratepayers.

PacifiCorp's Response. As a matter of law, PacifiCorp contends that failure to identify a root cause of the Hunter 1 failure should not lead to a finding of imprudence. PacifiCorp argues that other state public utility commissions have uniformly rejected arguments like ICNU's.¹⁴

¹⁴ PacifiCorp cites *Barasch v. Philadelphia Elec. Co.*, Docket No. C-860693, C-860703, 67 Pa PUC 591, 622, 95 PUR 4th 50 (July 18, 1988) (“[t]he fact that [Pennsylvania Electric Company (PECO)] was unable to determine the root cause for the pressure drop after a reasonable investigation is not sufficient ground to support a finding of imprudence by PECO”); *In re Baltimore Gas and Elec. Co.*, Order No. 63838, 70 Md PSC at 206 (burden of proof to permit recovery of replacement purchase costs “does not require the company to establish beyond a reasonable doubt the absolutely certain cause of the outage; * * * while the specific circumstances which induced the excessive vibratory stress have not been identified, it appears, based upon the record in this proceeding, that the cause of the cracking cannot be attributed to either improper maintenance or abnormal operation of Unit No. 1. Finally, the nature of the cracking leads us to conclude that the cause of the turbine blade failure could not have been reasonably detected prior to the occurrence of the outage and that, consequently, BG&E could not have avoided this outage through preventive action. Accordingly, the commission concludes that the company has presented substantial evidence [regarding the outage]” to find that the utility “has met its burden of proof.”); *In re Nantucket Electric Co.* DPU 95-7C-1, 1996 Wholesale 524270 at *9 (Mass DPUC Jan. 17, 1996) (“According to the record, there are many possible reasons for the gasket failure. Further, such a gasket failure is not an unusual event. There is no evidence that would directly link the Company’s actions to the gasket’s failure.”); *In re Salem Nuclear Generating Station*, 60 Pa PUC 249, 312, 314-15, 70 PUR 4th 568 (Oct. 24, 1985), overruled on other grounds by *Pennsylvania Public Utility Comm’n v. Philadelphia Elec. Co.*, 561 A2d, 1224 P-830453 (Pa 1989) (allowing recovery although utility had not explained root cause of generator field ground that caused outage and had asserted that it was unable to establish precise cause of failure “because of the extensive burning and melting of copper which

PacifiCorp also contends that the Commission should reject ICNU's invocation of inapplicable tort theories to change the prudence standard usually applied in plant outage cases.

occurs as a result of the tremendous heat released by the aging associated with the ground"); In re Consumer Power Company, 84 PUR 4th at 408 (Expert witness's testimony "clearly establishes that Campbell No. 1 was taken out of service due to a forced outage caused by a cracked rotor shaft. The evidence shows that Campbell No. 1 was properly maintained and monitored by Consumers. In addition, Consumers' inability to explain the development of the cracks in the rotor shaft does not require the Commission to impute negligence or mismanagement as a cause for the outage.").

Res Ipsa Loquitur. PacifiCorp argues that *res ipsa loquitur* is a doctrine of circumstantial evidence that can permit a plaintiff to withstand a directed verdict. *Res ipsa loquitur* is not a burden shifting device or substantive rule of negligence. PacifiCorp bears the burden of establishing prudence, so ICNU is not an injured plaintiff needing *res ipsa loquitur*'s inference to overcome the absence of direct evidence to meet its burden. ICNU wants the Commission to hold that if the cause of Hunter 1's failure cannot be explained fully, the failure must be the result of PacifiCorp's negligence. According to PacifiCorp, ICNU's position is not supported by this nonsubstantive doctrine of circumstantial evidence.

In any event, PacifiCorp argues, the inference of negligence is unwarranted. Such an inference is appropriate only when an injury more probably due to a defendant's negligence than to some other cause. *Pattle v. Wildish Const. Co.* 270 Or 792 (1974). PacifiCorp argues that expert scientific evidence, analysis, and modeling in this record demonstrate that the Hunter 1 failure resulted from a deep seated core fault, undetected and undetectable, and not a result of PacifiCorp's imprudence. PacifiCorp contends that there is no reasonable indication that PacifiCorp's conduct could have caused the injury. *Res ipsa loquitur* cannot be applied to infer that PacifiCorp's conduct probably did cause it.

Strict Liability. ICNU cites *In re PGE*, UE 88, Order No. 95-322 and *Philadelphia Elec. Co.*, 561 A2d at 1228, in support of its position that the Commission should hold PacifiCorp strictly liable for replacement power costs associated with the Hunter 1 outage. These decisions presume a third party tortfeasor, the manufacturer, from whom the utility can recoup costs. See Order No. 95-322 at 62-63. In UE 88, PacifiCorp argues that the Commission had evidence in the record that PGE was engaged in a civil suit against Westinghouse at the time the decision issued. PacifiCorp points out that there is no evidence in this case of a credible claim against Westinghouse, the manufacturer of Hunter 1, and the parties' contract bars recovery of replacement power costs.

According to PacifiCorp, ICNU also improperly cites the decision in UE 88 for the proposition that the Commission has previously imposed liability on a utility without a finding of imprudence. That case involved a net benefits analysis, and in any event the Commission allowed recovery of 87 percent of the costs PGE sought. The Commission recently reaffirmed that it must allow a utility the opportunity to recover increased operating expenses that are prudently incurred. *In re PGE*, UE 115, Order No. 01-988 at 5.

Resolution. We find that ICNU's theories of *res ipsa loquitur* and strict liability are inapplicable in the present case. As PacifiCorp points out, *res ipsa loquitur* is a theory designed to allow a plaintiff to survive a motion for a directed verdict. It has no procedural function in a case such as the present one. Even if *res ipsa loquitur* were applicable in this case, the record before us does not support a finding that Hunter 1's failure is more likely due to PacifiCorp's negligence than to any other cause.

As to the theory of strict liability, we agree with PacifiCorp that the cases ICNU cites in support of its position were distinguishable from the present case. There was a third party in those cases from whom costs were recoverable. No such party is present in this case. Finally, this is not a net benefits case, and the argument in docket UE 88 is unavailing here.

THE STIPULATION

The Stipulation between Staff and PacifiCorp provides that PacifiCorp be allowed to recover 85 percent of its excess net power costs after applying the sharing mechanism to these costs. The sharing mechanism reduces PacifiCorp's excess net power costs on an Oregon basis from \$259 million to approximately \$160 million. The Stipulation reduces PacifiCorp's recovery to roughly \$130 million.

In their testimony supporting the Stipulation, Staff and PacifiCorp indicated that they arrived at the proposed 15 percent disallowance by considering "the range of outcomes possible under a Commission decision on prudence issues, including, but not limited to, those issues raised by Staff in its preliminary issues list related to the Hunter 1 generator outage and the company's wholesale market strategy." In addition, they "considered the factual complexity of these issues, the difficult of precisely quantifying dollar amounts associated with these issues, the burden of proof in prudence reviews, and the likelihood of success on each of these issues." After taking these factors into account, Staff and PacifiCorp determined that the 15 percent reduction in excess net power costs "is a reasonable method to resolve the prudence issues in this docket."

CUB and ICNU oppose the Stipulation. ICNU wants to disallow the costs related to the Hunter 1 outage and excess net power costs associated with serving eight wholesale contracts. ICNU's proposal would allow PacifiCorp to amortize approximately \$9.3 million (the deferral figures throughout are calculated before amortization and carrying charges). To reflect the fact that excess power costs related to serving PacifiCorp's long term wholesale power sales should not be recovered in rates, ICNU proposes to disallow \$84 million; ICNU also proposes to disallow \$66 million, the cost of replacing power lost due to the Hunter 1 outage. In the alternative, ICNU proposes to allow PacifiCorp to recover \$88.8 million in prudently incurred costs related to replacing generation lost to poor hydro conditions.

CUB takes no position on whether to allow the replacement power costs associated with the Hunter 1 outage. CUB proposes to allow PacifiCorp to recover between \$42 and \$67 million.¹⁵ The lower figure allows recovery only for hydro power lost to the drought during the

¹⁵ CUB would allow, before application of the sharing mechanism, \$99 million for hydro loss, \$15 million for thermal loss purchases, and \$21 million for increased thermal production, the thermal related items to be allowed if and only if PacifiCorp was found to have operated and maintained Hunter 1 prudently. CUB thus derives a range of \$99 to

deferral period; the higher number includes the amount it cost PacifiCorp to increase production at its other thermal plants due to the Hunter 1 outage and the amount the company spent to replace the lost thermal production that could not be made up at other facilities.

CUB argues that there is little to support the Stipulation in the record. CUB argues that the Commission cannot accept the Stipulation unless the weight of the evidence shows that PacifiCorp is entitled to receive at least \$131 million from ratepayers.

ICNU also argues that the Stipulation should be rejected, because it is not based on evidence related to whether PacifiCorp's excess net power costs were prudently incurred. Therefore, the Commission should independently review the factual record and make its own conclusions regarding PacifiCorp's wholesale power sales and supply strategy and PacifiCorp's operation, maintenance, and inspection of Hunter 1.

ICNU contends that even when parties reach a stipulation, "the Commission must makes its own independent inquiry into the facts and draw its own conclusions." *In re PGE*, UE 47, UE 48, Order No. 87-1017 at 6. The Commission will adopt a stipulation only if it "is based on sound evidence and analysis." *In re U S WEST*, UM 773, Order No. 96-284 at 26. The Commission has rejected or modified stipulations, even those that were unopposed, after independently reviewing the facts, law, and public policy considerations. *See, e.g., In re PGE*, UE 115, Order No. 01-777 at 17; *In re NNG*, UG 132, Order No. 99-697 at 33; *In re Electric Lightwave*, CP 1, 14, 15, Order No. 96-021 at 6; *In re PGE*, UE 82/UM 445, Order No. 93-257 at 11.

ICNU argues that these principles require that the Stipulation be rejected in this case because it is not based on the factual record. Several facts show this point. First, the Stipulation was entered into prior to the submission of the rebuttal testimony of ICNU, CUB, and Staff. Staff settled with the company even before they had the results from their own consultant regarding Hunter 1. Second, ICNU contends that PacifiCorp and Staff present no analysis, testimony, or exhibits tied to the record in this proceeding that support the recovery of \$131 million of excess net power costs. PacifiCorp witness Paul Wrigley testified that the Stipulation is supported by evidence in PacifiCorp's direct and rebuttal cases, and that the 15 percent disallowance is justified by the "factual complexity, the difficulty of precisely quantifying dollar amounts associated with the issues, the burden of proof in prudence review, and the likelihood of success." PPL 202, Wrigley 3. Staff witness Bill Wordley stated that in Staff's view, PacifiCorp was partly imprudent regarding its power sales and Hunter 1, but that Staff settled with PacifiCorp because of the complexity of the proceeding and litigation difficulties. However, Staff has stated that there is "no particular set of analyses that arrives at the 15 percent figure.

\$135 million which, once the sharing mechanism is applied, becomes \$42 to 67 million. Before sharing, CUB attributes \$92 million to PacifiCorp's wholesale strategy and \$41 million to Utah load growth.

ICNU maintains that the Stipulation and the supporting testimony of Staff and PacifiCorp demonstrate that the stipulation results in an arbitrary reduction based on the parties' estimates of their chance of success, not on the actual amount of net power costs that should be disallowed because of PacifiCorp's imprudent actions. The reasoning Staff and PacifiCorp offered to support the Stipulation does not constitute substantial evidence on which the Commission can conclude that \$131 million in excess net power costs were prudently incurred.

According to ICNU, PacifiCorp and Staff also overestimate the impact of the Stipulation. Because of PacifiCorp's appeals, the company is actually requesting approval of amounts far in excess of \$131 million. The Commission will likely issue its decision in this docket prior to a court ruling on the legality of the power cost baseline number and the sharing mechanism under appeal. Thus if PacifiCorp's appeals are successful, the Stipulation would allow the company to recover over \$220 million, less 15 percent.

ICNU notes that Staff and PacifiCorp cite the Commission's UM 773 order for the proposition that a stipulation that is the product of a compromise must only fall within a range of reasonable outcomes to be valid. Order No. 96-284 at 31. According to ICNU, Staff and PacifiCorp ignore the primary thesis of this order, which is that a stipulation falls within such a range if the agreement is based on sound evidence and analysis. *Id.* at 26. In UM 773, the Commission found that a stipulation regarding numerous complex issues was appropriate because of the ample evidence in the record supporting the stipulation. *Id.* at 22. In contrast, the Stipulation in this case does not support by sound evidence and analysis that PacifiCorp's level of imprudence is anywhere near 15 percent.

Further, ICNU contends that the Commission rejected the challenge to the stipulation in UM 773 because the opponents did not provide evidence as to the appropriate outcome. Order No. 96-284 at 22. In this proceeding, ICNU asserts that it and CUB have provided voluminous evidence regarding PacifiCorp's imprudence in causing the Hunter 1 outage and in managing its wholesale power sales.

Resolution. We have reviewed the record in this case and make our decision on the Stipulation based on the record. We have weighed each issue that the customer groups have presented and on each issue have concluded that PacifiCorp was not imprudent. We have found PacifiCorp's overall power supply strategy during the deferral period prudent as well.

In support of the Stipulation, Staff testified that its investigation led it to believe there was some imprudence on PacifiCorp's part regarding the wholesale contracts and maintenance and operation of Hunter 1. However, Staff chose not to present evidence on these issues. Therefore, Staff's unsupported assertion of imprudence does not change our view. On the record before us, we do not find PacifiCorp to have been imprudent.

CUB and ICNU are correct in arguing that a stipulation must be reasonable for us to adopt it. Where some parties oppose a stipulation, as here, we will adopt a stipulation only if competent evidence supports it. In this case, there is no evidence in the record to support the Stipulation's proposed 15 percent disallowance. Staff and PacifiCorp assert only that the disallowance is within the range of reasonable outcomes.

Because the record before us supports full recovery of PacifiCorp's excess net power costs less the effect of the sharing mechanism, *a fortiori* it supports less than full recovery. PacifiCorp is, however, willing to accept less than that recovery. Parties negotiate settlements for their own reasons. We need not inquire into those reasons if the outcome is reasonable. The outcome of the Stipulation is reasonable, and we adopt it.

ORDER

IT IS ORDERED that the Stipulation between Commission Staff and PacifiCorp, attached to this Order as Appendix A and incorporated herein, is adopted.

Made, entered, and effective _____.

Roy Hemmingway
Chairman

Lee Beyer
Commissioner

Joan H. Smith
Commissioner

A party may request rehearing or reconsideration of this order pursuant to ORS 756.561. A request for rehearing or reconsideration must be filed with the Commission within 60 days of the date of service of this order. The request must comply with the requirements in OAR 860-014-0095. A copy of any such request must also be served on each party to the proceeding as provided by OAR 860-013-0070(2). A party may appeal this order to a court pursuant to applicable law.

Concurring Opinion of Chairman Roy Hemmingway

In reaching the conclusions in this docket, the Commission has made implicit judgments about PacifiCorp's resource strategy that merit further discussion, particularly regarding regulatory expectations about the treatment of risk and its allocation between the company and its customers.

Resource planning is a matter of balancing costs and risks. A utility could always avoid shortages and changes in resource costs if it built or bought generation well in excess of any predicted load. However, such a strategy would necessarily be high cost in most circumstances and could not be justified. Similarly, a strategy which assumed no generation breakdowns nor other adverse conditions would be too high risk.

It has always been more difficult for utilities in the Pacific Northwest to do resource planning because of the uncertainty of power output from hydroelectric resources. Historically, Northwest utilities planned resources so that there would be no shortage of electricity in very poor water conditions. In most years, of course, that strategy resulted in surplus resources. In those years when the utility would have surplus generation, a utility would recover its fixed plant costs through "rate base" treatment of plant costs and recover its variable costs through power sales outside of its service territory. Absent a power cost adjustment clause (a cost and benefit sharing mechanism with customers), the company could keep any excess revenue above costs predicted for average conditions.

Even during poor water years under this strategy, the utility would have sufficient resources without additional purchases. It would lose money only to the extent it had lower out-of-system power sales than predicted or the running costs of generation were greater. The risks of loss to utilities due to poor water conditions were expected to balance the rewards available during good water.

The old resource strategy model also allowed for a utility to recover plant costs for generation held in reserve. If a base-load plant went down, then the utility would have generation available to meet load. If the reserve were not needed, then the utility could sell its output in the market.

As utilities have moved to buy and sell more power in the wholesale market, what constitutes "prudent" utility resource planning has become cloudy. Many utilities have abandoned the strategy of always having sufficient resources, contracted for or owned, to deal with contingencies like low hydro output or generator breakdown. Instead, these companies chose to rely on purchases in the short-term market to deal with these possibilities. This strategy appears to be the one that PacifiCorp adopted with some acquiescence of this Commission. In the end, it had profound effects for PacifiCorp and its customers.

Underlying the issues of PacifiCorp's power sales contracts and the breakdown of the Hunter 1 generation plant is whether a resource strategy that relies on being able to make economical short-term purchases in the event of unforeseen circumstances constitutes

imprudence. If inexpensive spot purchases could be made at any time, then it would not matter whether there was a resources shortage of whatever kind, because it could be covered by the utility going to the market.

As has been discussed in the body of this order, prudence is measured from the point of time of the decision at issue, not with the advantage of hindsight. Surely, for example, everyone would like to sell their investments at the top of the market and buy at the bottom, and with hindsight we often feel foolish that we did not see the signs coming that the market was going to turn. However, we must take the position of a reasonable person at the time the decisions had to be made that resulted in the issues presented to us in this case.

There certainly were warning signs on the horizon as PacifiCorp entered the period under discussion in this case. For instance, the Northwest Power Planning Council (Council Paper #2000-4) in March 2000 wrote that the Pacific Northwest risked power shortages in a drought condition, because construction of new generation had not kept up with load.

However, the prudency question revolves around whether it was predictable that a shortage of generation in the Pacific Northwest would necessarily have resulted in extraordinary costs in the short-term market. The extraordinary escalation of power prices in the wholesale market in the year 2000 was unprecedented. No one has argued that wholesale prices that regularly hit levels over \$1.00 per kilowatt hour could have been envisioned by a prudent utility before the crisis of 2000-2001. All experience previously was to the contrary. Even after the high western wholesale prices in the summer of 2000, it was widely assumed that the Northwest would remain immune from high costs, because of the load diversity between the Northwest and the rest of the western market. Since the Pacific Northwest is a winter peaking region and California is summer peaking, generation had consistently been available over the years for purchase at reasonable prices during the winter months.

Although I have concerns about PacifiCorp's resource planning strategy, I cannot hold that the company acted imprudently. The prices of the 2000-2001 western power crisis were simply beyond prudent prediction.

In the future, however, I do expect that electric utilities regulated by this commission will undertake an analysis of risk in their resource planning exercises that they bring before this commission. Uncertainties regarding loads, fuel costs, weather, generator output, hydro relicensing, and environmental constraints, among others, need to be explicitly examined. Goals for a risk mitigation strategy need to be set, and options for meeting those goals evaluated.

A fundamental role of this Commission is to work with regulated companies to agree upon strategies to balance costs and risks, so that the consequences for companies and customers from unpredictable events will be known in advance. If we and the companies perform this role well, this kind of case can be largely avoided in the future.