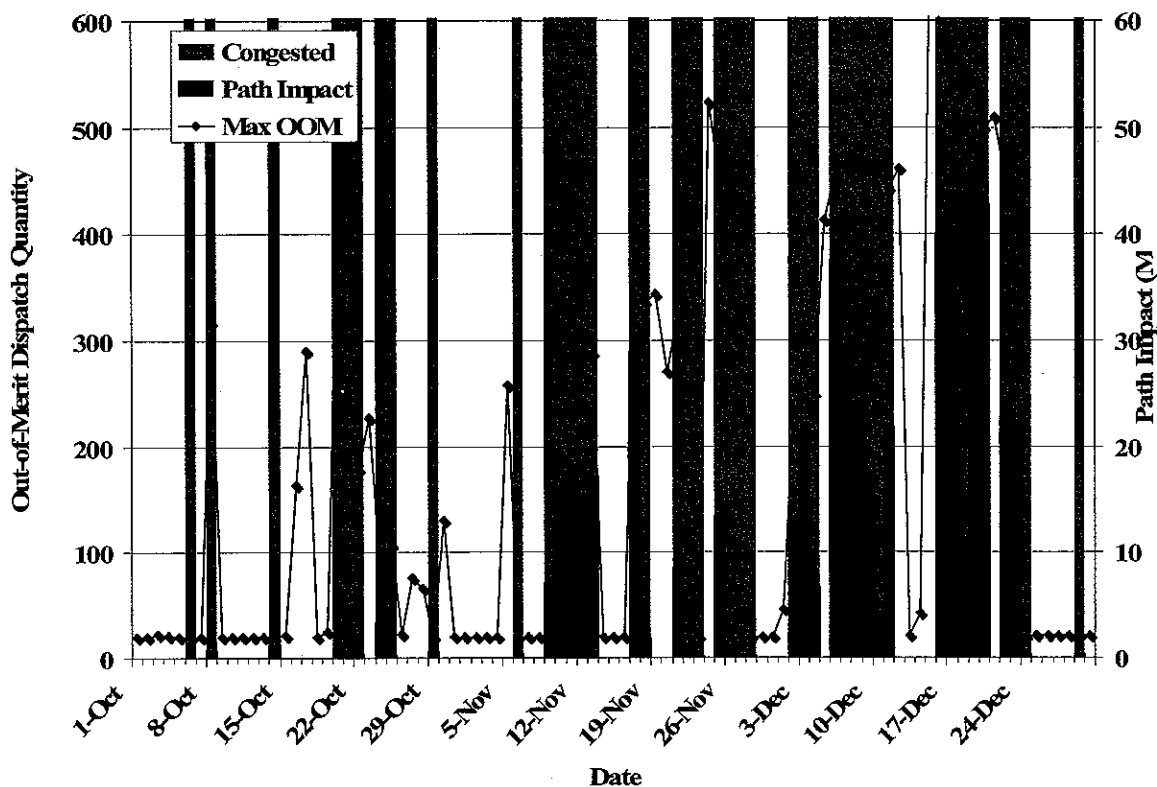


Figure 6: Out-of-Merit Dispatch and Congestion Events



As the figure shows, there were seven days (November 17, December 6, December 7, December 16, December 17, December 19 and December 20) when out-of-merit dispatch contributed at least 25 MW of increased flow over congested paths during the study period. We also include the two days that were identified in the sales and purchases analysis for further evaluation (October 12 and November 27). We examined these days in more detail and found the following events:

- October 12:** This day was selected for review in the “max effect” analysis of Sales and Purchases presented above. The out-of-merit was minimal at 20 MW, and there was no congestion that was electrically closes to the MEC area.
- November 17:** [REDACTED] was derated due to a primary air fan bearing failure forcing a mill out of service. The reduced output from [REDACTED] increased flows on flowgate [REDACTED],<sup>8</sup> which was subject to a TLR event during the deration.

<sup>8</sup> Flowgate [REDACTED]

- **November 27:** This day was selected for review in the “max effect” analysis of Sales and Purchases presented above. The out-of-merit was minimal at 20 MW. This out-of-merit generation dispatch did not contribute to the congestion in the region.
- **December 6 and 7:** [REDACTED] was in unplanned outage to replace a leaking flue gas vent line expansion joint, and [REDACTED] was at part load because control problems with a primary air fan damper made it necessary to take a mill out of service. The reduced output from the [REDACTED] station increased flows on [REDACTED], which was subject to a TLR event during the time.
- **December 16 and 17:** [REDACTED] tripped on high drum level and [REDACTED] was at part-load due to a mill being out of service. The reduced output from the [REDACTED] station increased flows on [REDACTED], which was subject to a TLR event during the time.
- **December 19 and 20:** [REDACTED] was in an unplanned outage to repair a tube leak in the finishing superheater, and [REDACTED] was in unplanned outage to clear the slag tap at the bottom of the boiler. The reduced output from the [REDACTED] station increased flows on flowgate [REDACTED], which was subject to a TLR event during the time.

Our review of the documentation associated with these operational events indicated that all of the out-of-merit dispatch during the study period that had significant effects on transmission constraints was justified. Hence, we do not find evidence of anticompetitive conduct.

### C. Transmission Outages

We evaluate MEC transmission outages in order to determine whether outages may have led to the congestion events experienced during the time period of our report. We reviewed entries in the Midwest ISO Outage Scheduler that indicate the date, duration, and nature of the transmission system outages. There were 125 transmission outage entries for the MEC area during the study period. Of the 125 outages, 42 were concurrent with congestion events, lasted at least two hours, and were requested less than two weeks in advance. We examined these outages in more detail to determine the Line Outage Distribution Factor (LODF)<sup>9</sup> of the transmission element that was in outage relative to the monitored element of each flowgate that was subject to a TLR event of level 3a or higher. The LODF indicates how much the outage

<sup>9</sup> Line Outage Distribution Factors (LODFs) are a sensitivity measure of how a change in a line’s status affects the flows on other lines in the system. On an energized line, the LODF calculation determines the percentage of the present line flow that will be transferred to other transmission lines after the outage of the line.

affects the monitored element. Hence, an outage with a large LODF indicates an outage that potentially had a significant contribution to the need for a TLR event. We found two outages that had a significant impact<sup>10</sup> on the monitored elements, which we evaluated in more detail.

The [REDACTED] was forced out of service for three days [REDACTED]. The outage was taken to repair a bad switch. One phase of the switch was arcing because it would not close completely and it had a bad interrupter. The LODF was significant to flowgate [REDACTED]<sup>11</sup> which had a TLR event during the outage.

The [REDACTED] were forced out of service together for 32 hours starting on [REDACTED]. The Lehigh line is the source for the Webster transformer. The outage was needed to replace cracked post insulators on the [REDACTED]. The LODF was significant to flowgate [REDACTED]<sup>12</sup> and flowgate [REDACTED]<sup>13</sup> which had TLR events during the outage.

These outages did not occur on the days identified above when MEC had purchases and sales positions that could have potentially benefited. Based on our review of outages, we find that the line outages were justified, and find no other issues that would raise potential competitive concerns.

#### D. Conclusions

Based on our overall analysis of MEC's conduct and the market outcomes, we find no evidence of anticompetitive conduct during the period of study.

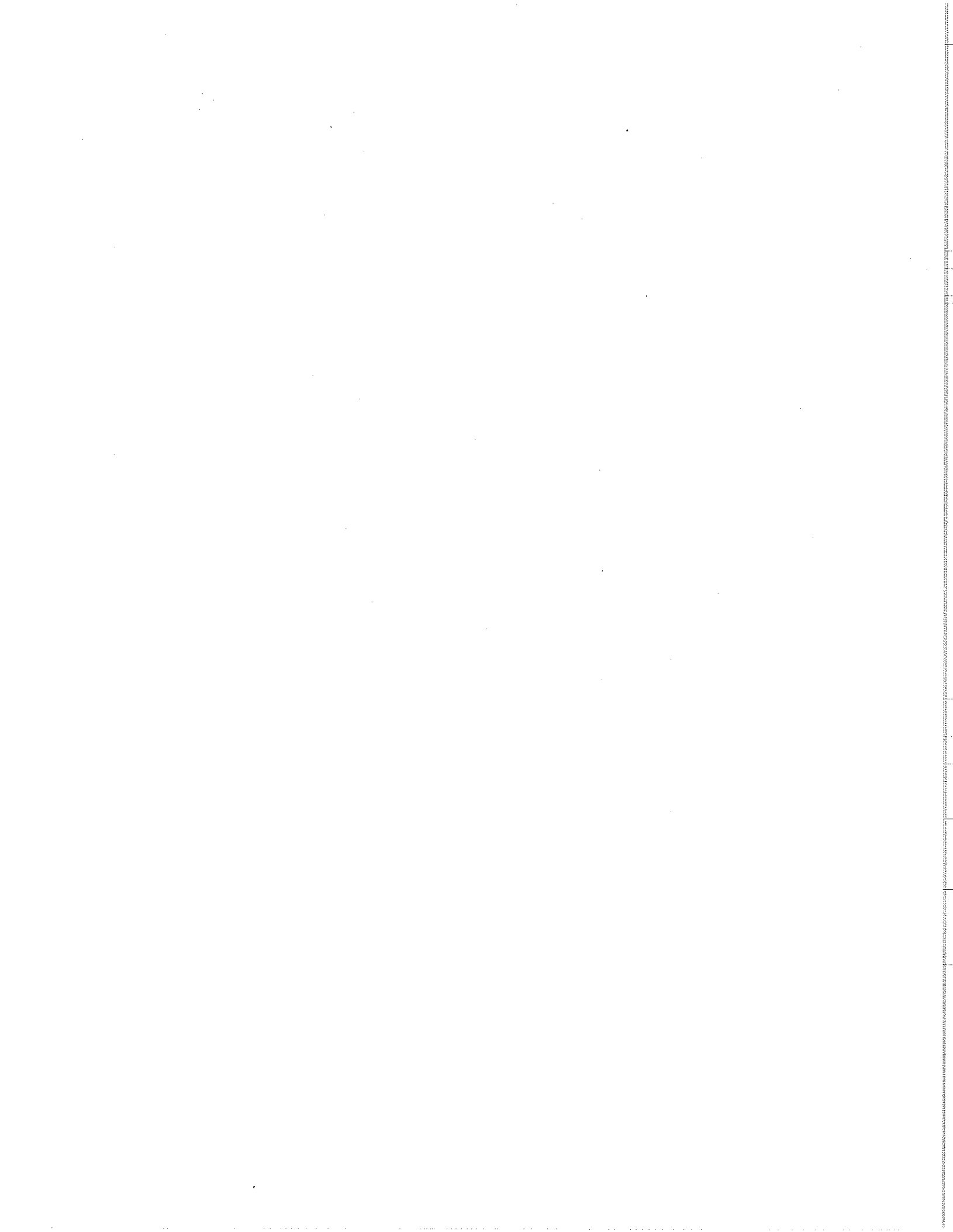
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<sup>10</sup> A transmission outage is considered significant if over 3.5 percent of the pre-outage flow on the outaged line is transferred to the monitored element (pre-contingent) of the constraint (line outage distribution factor > 3.5 percent).

<sup>11</sup> Flowgate [REDACTED]

<sup>12</sup> Flowgate [REDACTED]

<sup>13</sup> Flowgate [REDACTED]



**QUARTERLY MARKET MONITORING REPORT  
ON  
PACIFICORP**

**Fourth Quarter of 2008**

**Issued by:**

**Potomac Economics, Ltd.  
Independent Market Monitor**

**CONFIDENTIAL MATERIAL REDACTED**

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## I. OVERVIEW

In connection with MidAmerican Energy Holdings Company's ("MEHC's") acquisition of PacifiCorp ("PAC" or the "Company") in Federal Energy Regulatory Commission ("Commission") Docket No. EC05-110-000, the Commission accepted market monitoring plans for PAC and MidAmerican Energy Company ("MEC") and Potomac Economics was retained as the independent market monitor for both companies. The plans established that separate quarterly reports be produced for each company. This is the market monitoring report for the fourth quarter of 2008 for PAC.

The market monitoring plan for PAC is designed to detect any anticompetitive conduct from operation of the company's transmission system, including any transmission effects from the company's generation dispatch. As stated in the plan:

The Market Monitor shall provide independent and impartial monitoring and reporting on: (i) generation dispatch of PacifiCorp, and scheduled loadings on constrained transmission facilities; (ii) details on binding transmission constraints, such as transmission refusals, or other relevant information; (iii) operating guides and other procedures designed to relieve transmission constraints and the effectiveness of these guides or procedures in relieving constraints; (iv) information concerning the volume of transactions and prices charged by PacifiCorp in the electricity markets affected by these companies before and after the companies implement redispatch or other congestion management actions; (v) PacifiCorp's calculation of Available Transmission Capability ("ATC") and Total Transfer Capability ("TTC") over transmission lines owned or controlled, in whole or in part, by PacifiCorp; and (vi) plans for construction by PacifiCorp of expansions to its transmission facilities.

To execute the monitoring plan, Potomac Economics routinely receives data from PAC that allows us to monitor generation dispatch, transmission system congestion, and the Company's operational and commercial activity during periods of congestion. We also collect certain key data ourselves, including OASIS data and market pricing data.

The purpose of this report is to provide the results of our monitoring activities and significant events on the PAC system<sup>1</sup> during the fourth quarter of 2008.

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<sup>1</sup> As specified in the monitoring plan, a draft of the findings has been submitted to PAC prior to submission to the Commission. PAC had no substantive comments.



## A. Market Monitoring

Potomac Economics performs the market monitoring function on a regular basis, as well as performing periodic reviews and special investigations. Our primary market monitoring is conducted by way of regular analysis of market data relating to transmission outages, congestion, and transmission access. This involves data on transmission outages, transmission reservation requests, Available Transfer Capability (“ATC”), and curtailments or other actions taken by PAC to manage congestion. Analyses of these data aid in detecting congestion and determining whether market participants have full access to transmission service.

In addition to the regular monitoring of outages and reservations, we also remain alert to other significant events, such as price spikes, major generation outages, and extreme weather events that could adversely affect transmission system capability and give rise to the opportunity for anticompetitive conduct.

Our periodic review of market conditions and operations is based on operating data PAC provides us, as well as other data that we collect on a routine basis. Our review consists of four parts. First, we evaluate regional prices and transactions to provide an assessment of overall market conditions. Second, we summarize transmission congestion in order to detect potential competitive problems. Congestion is identified by schedule curtailments on the PAC transmission system. Third, we evaluate the disposition of transmission service requests to analyze transmission access and to detect whether there are circumstances on the PAC system that require closer analysis. Finally, to monitor for anticompetitive conduct, we examine periods of congestion and evaluate whether PAC operating activities raise concerns that PAC appears to be behaving anti-competitively. The operating activities that we evaluate are wholesale purchases and sales, generation dispatch, transmission security events, and the curtailment and reduction of schedules.

In addition to our periodic reviews, we may from time-to-time be asked to or deem it necessary to undertake a special investigation in response to specific circumstances or events. No such events occurred this quarter.

## B. Summary of Quarterly Report

### 1. Wholesale Prices and Transactions

*Prices.* We evaluate regional wholesale electricity prices to provide an overview of general market conditions. Over the course of the quarter, Northwest and Southwest electricity prices were fairly constant relative to other quarters. Prices remained correlated with load and natural gas prices. Overall, the pattern did not indicate a particular time period of competitive concern.

*Sales and Purchases.* PAC engages in wholesale purchases and sales of power on both a short-term and long-term basis. PAC short-term [REDACTED]

[REDACTED] Thus, we examine periods that may raise competitive concerns in Section V.A.

### 2. Transmission Congestion

We studied congestion on the PAC system by examining schedule curtailments and reductions. In the period of study, PAC implemented 439 curtailments and schedule reductions totaling 27,601 MWh across 15 paths. We utilize curtailments as an indication of congestion. In addition, we analyze the accuracy of curtailments because unjustified curtailments can be used to foreclose competition.

### 3. Transmission Access

We evaluate the patterns of transmission requests and their disposition to determine whether market participants have had difficulty accessing the PAC transmission network. If requests for transmission service are frequently denied, this may indicate an attempt to exercise local market power. The volume of approved requests was higher than the levels observed in the third quarter of 2008 and the fourth quarter of 2007. The volume of refusals was lower and thus the approval rate was higher than it was in the prior quarter.

### 4. Potential Anticompetitive Conduct

*Wholesale Sales and Purchases.* We examined the transactions that PAC executed during the period of study. We focus on real-time transactions because these best represent the spot price of electricity and will most closely reflect power prices that might arise on the PAC system under

conditions most conducive to market power. Under a hypothesis of market power, we would expect high sales prices or lower purchase prices during times when transmission congestion arises. Real-time daily average transaction prices ranged between \$■/MWh and \$■/MWh. We focused our evaluation of PAC's generation and transmission on days with congestion that may have benefited PAC's net sales position. Our analysis indicated that PAC did not act anti-competitively to create the congestion.

*Dispatch.* To further evaluate competitive issues, we examine PAC's generation dispatch to determine the extent to which congestion may be caused or exacerbated by uneconomic dispatch. Congestion can result naturally when PAC or any utility attempts to dispatch its units in a least-cost manner. Such congestion does not raise competitive concerns. If an unjustified departure from least-cost dispatch ("out-of-merit" dispatch) occurs, causing congestion, competitive concerns arise. Our investigation found that out-of-merit dispatch during the study period that had significant effects on transmission constraints was justified. Hence, this analysis did not reveal evidence of anticompetitive conduct.

*Transmission Outages.* We evaluate PAC transmission security events and transmission outages in order to determine whether these events may have unduly impacted market outcomes. We focused our analysis on seven outage events that were associated with curtailments. We investigated these events and found no evidence of anticompetitive conduct.

*Curtailments.* We analyze PAC curtailments to determine whether curtailments are being properly implemented. PAC manages congestion, prioritization of schedules, and low voltage events with schedule curtailments. We scrutinized 40 curtailments that were at least 75 MW above what we estimate to be justified by net schedules and TTC. We were able to justify all but fourteen of the curtailment deviations. We do not find that PAC could have benefited from these curtailments because they did not fall on the six days when PAC was actively buying and selling in constrained areas. Moreover, given that 439 curtailments were implemented over the quarter, we do not find the fourteen curtailments that are not fully justified to be evidence of anticompetitive conduct.

**C. Complaints and Special Investigations**

We have not been contacted by the Commission or other entities regarding PAC's market behavior. We also have not detected any conduct or market conditions that would warrant a special investigation. There were no complaints lodged against PAC regarding transmission access during the study period.

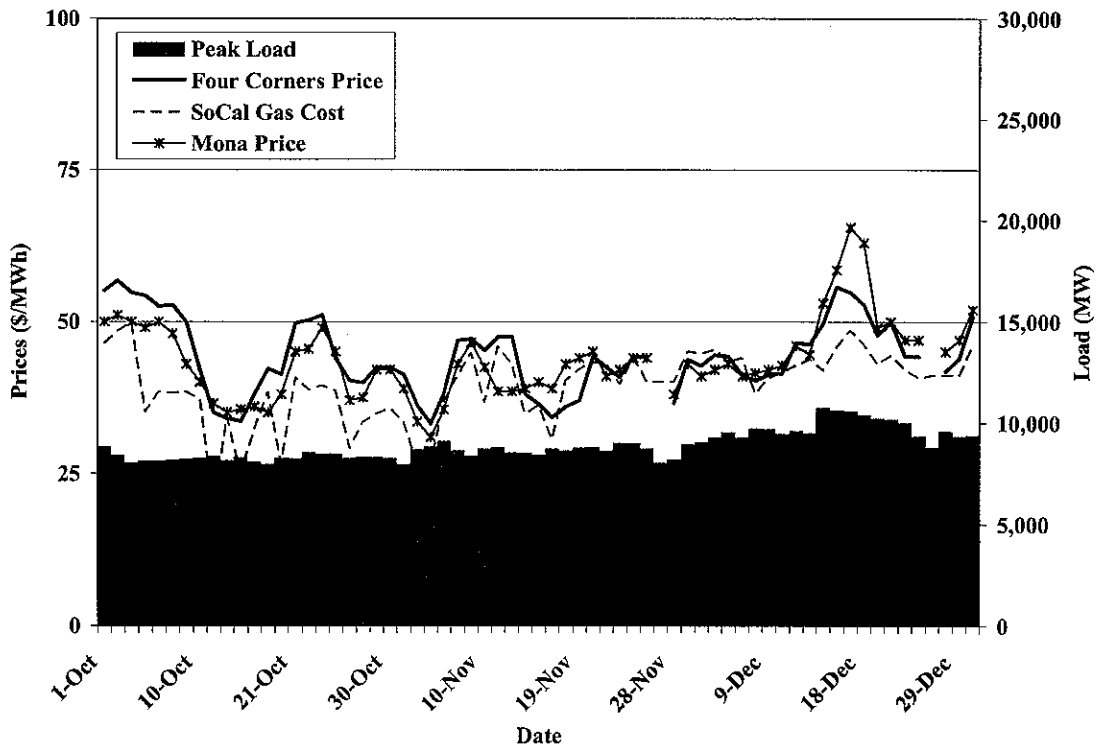
II. WHOLESALE PRICES AND TRANSACTIONS

A. Prices

We evaluate wholesale electricity prices in the PAC region in order to provide an overview of general market conditions. Examining price movements can provide insight into specific time periods that may merit further investigation, although they are not definitive indicators of the presence or absence of anticompetitive conduct.

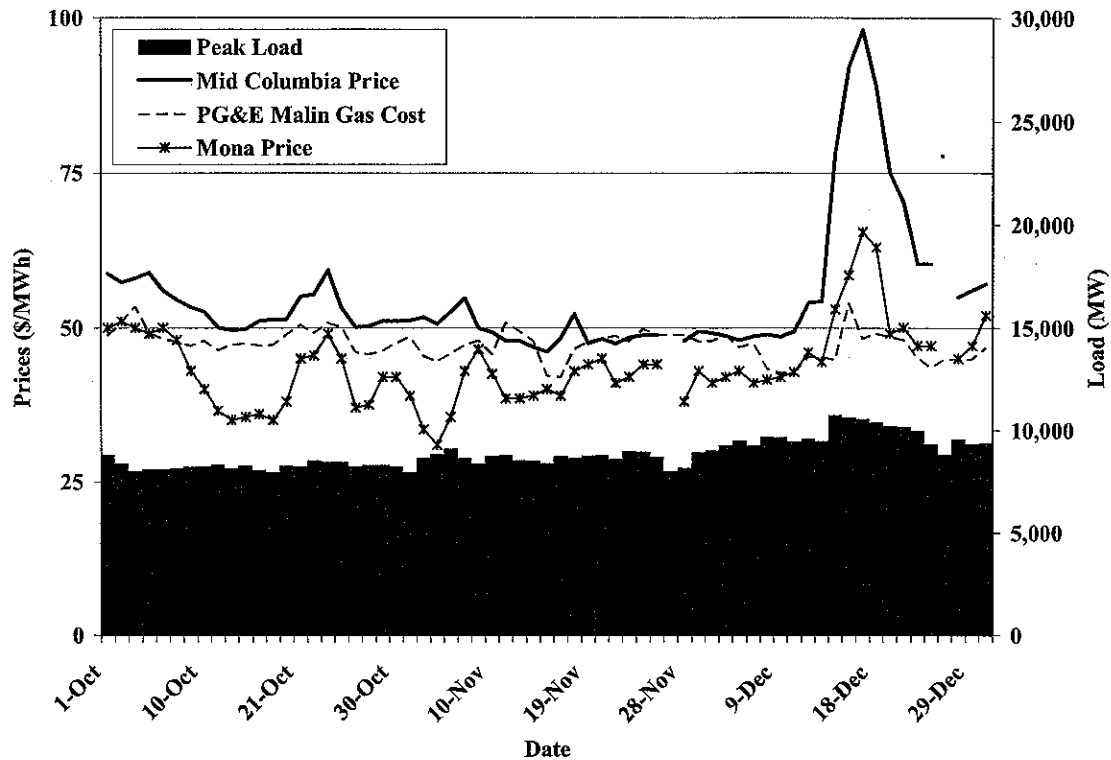
PAC is not part of a centralized wholesale market where spot prices are produced transparently in real time. Wholesale trading in the areas where PAC operates is conducted under bilateral contracts. Because of its geographic expanse, we consider two sets of pricing points to represent the Northwest and Southwest portions of PAC’s system. Figure 1 shows the bilateral contract prices for Four Corners and Mona (representing the Southwest) and Figure 2 shows the bilateral contract prices for Mid Columbia and Mona<sup>2</sup> (representing the Northwest).

Figure 1: Southwest Wholesale Prices and Peak Load  
Fourth Quarter of 2008



<sup>2</sup> Mona is a relatively illiquid and lightly traded market point in central Utah. It is included in both figures to provide a baseline for comparison between them.

**Figure 2: Northwest Wholesale Prices and Peak Load  
Fourth Quarter of 2008**



System load data is also shown because of the expected correlation with power prices. Natural gas prices are also shown because natural-gas-fired units are most often the marginal unit supplying the grid, and because fuel costs comprise the vast portion of a generating unit's costs. For the Northwest analysis we use the daily price of natural gas deliveries at PG&E Malin (at the Northern California Border) translated to a power cost assuming an 8,000 btu/kWh heat rate. This number roughly corresponds to the fuel cost portion of the operating cost of a natural gas combined cycle power plant. For the Southwest comparison, we use SoCal Border Gas (at the Southern California Border) price and apply the same power-cost conversion.

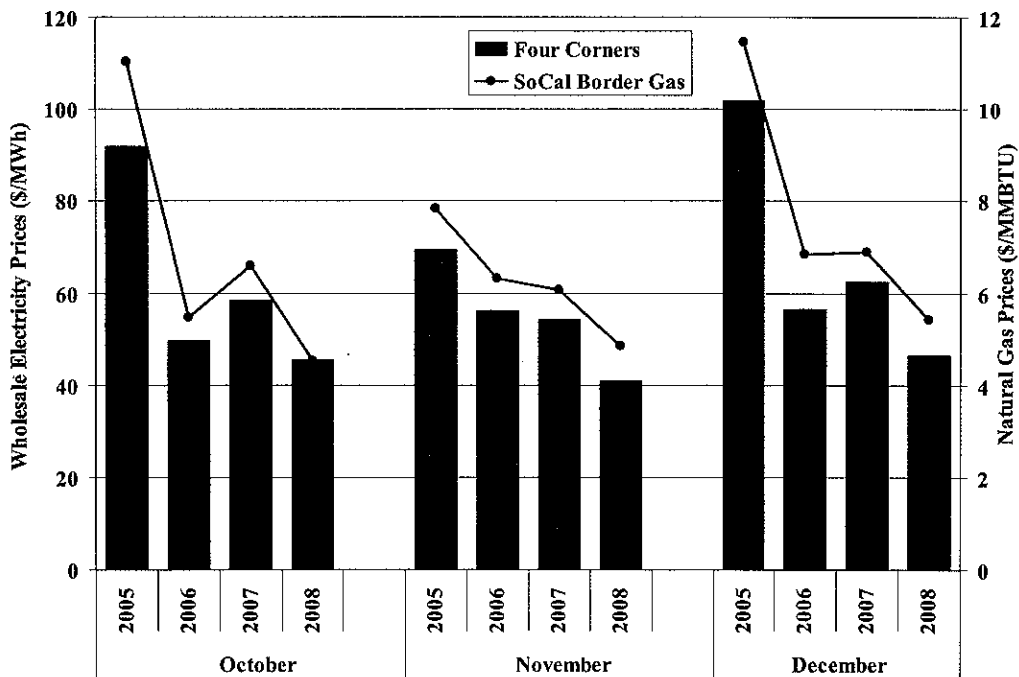
Prices for bilateral contract transactions are compiled and published by commercial pricing surveys. The bilateral pricing data shown in the figure above is published by Platts. The Mid Columbia pricing location includes a collection of hydroelectric units along the Columbia River in Oregon and Washington, and represents the value of electricity in the Pacific Northwest. The Four Corners location is at the southern end of the PAC transmission system where New Mexico,

Colorado, Arizona, and Utah meet. Prices at Four Corners represent the value of electricity in the Desert Southwest.

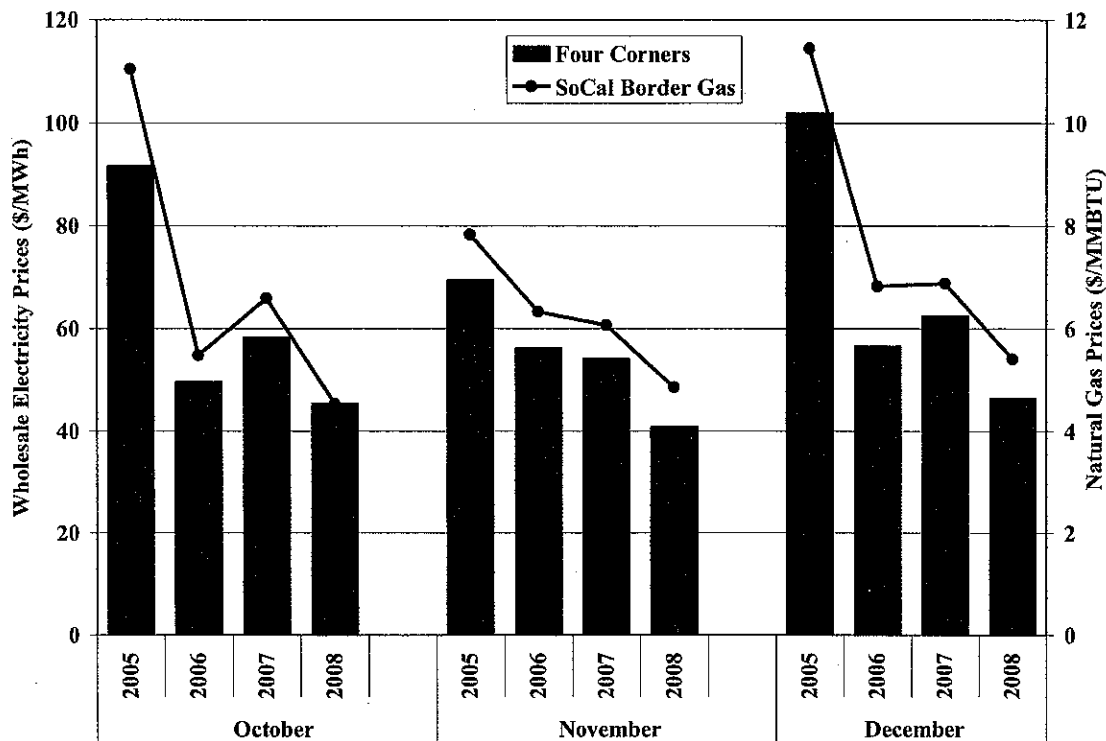
Figure 2 shows that power prices at both Mid Columbia and Four Corners are generally correlated with fluctuations in natural gas prices and load. The power prices for Mid Columbia did increase in mid December due to both natural gas prices and load. The load shown in the figures is the total of the Eastern and Western portions of PAC. However, the increase is driven by the Western region. Mid Columbia is located in the Western region and thus had a larger price increase than Mona or Four Corners.

The next analysis compares the average Four Corners and Mid Columbia power prices for the period from October through December 2008 with average prices during the same period over the past three years. These results are shown together with the average Platts SoCal Border and PG&E Malin natural gas prices discussed above. As the figures show, electricity prices have generally been correlated with natural gas prices over time.

**Figure 3: Southwest Trends in Monthly Electricity and Natural Gas Prices Fourth Quarter, 2005–2008**



**Figure 4: Northwest Trends in Monthly Electricity and Natural Gas Prices  
Fourth Quarter, 2005–2008**



Overall, our evaluation of wholesale electricity prices in the PAC region did not indicate a time period that merits further investigation solely by virtue of price patterns.

**B. Sales and Purchases**

PAC engages in wholesale purchases and sales of power, both firm and non-firm transactions. Figure 5 summarizes PAC’s sales and purchase activity for trades that delivered during the fourth quarter of 2008. We consider only short-term trades because we are interested in transactions made by PAC where they could have benefited from any potential market abuse during this time period. Short-term transactions include all transactions that are less than one month in duration. Longer-term transactions generally occur at predetermined prices that would not be directly affected by transitory periods of congestion. Additionally, short-term transaction prices are good indicators of wholesale market conditions during periods of congestion.



**Figure 5: Summary of PAC Sales and Purchases  
Fourth Quarter of 2008**

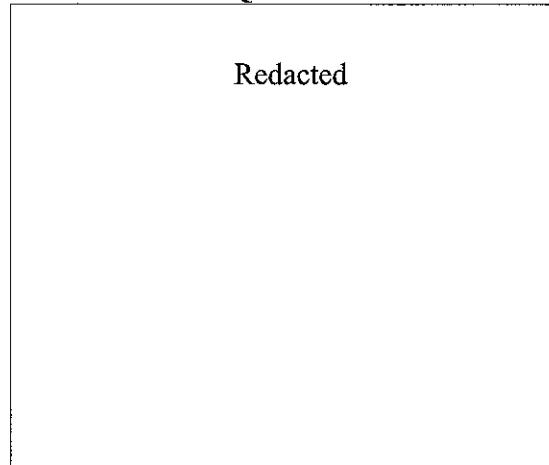


Figure 5 shows that PAC's short-term [REDACTED]  
[REDACTED] At a broad level [REDACTED]  
[REDACTED]. In general, a market participant exercising market power would be a net seller, taking advantage of periods of transmission congestion to [REDACTED]. Accordingly, in Section V.A, we evaluate the real-time sales prices during congested periods to detect potential anticompetitive conduct.

### III. TRANSMISSION CONGESTION

#### A. Overview

PAC is a member of the Western Electricity Coordinating Council (WECC). In WECC, regional congestion is primarily managed by ensuring that the scheduled flows do not exceed flow limits on specified paths.<sup>3</sup> However, because actual flows sometimes exceed scheduled flows due to loop flow (or parallel path flow), additional congestion management procedures are employed.

Power flows in the WECC follow a relatively predictable pattern. Most of the flows over the network occur on the high-voltage facilities that roughly correspond to the geographic perimeter of WECC. The transmission system in the interior of the WECC boundaries operates at a lower voltage and carries less power. The topology of the transmission network causes power to circulate around the perimeter of the system. Typically, power transfers from the Pacific Northwest are scheduled south to California. However, sometimes this north-to-south power flow results in unscheduled increases in flow around the perimeter of the WECC system in the clockwise direction, passing through the PAC system and then on to California from the west through Arizona.

The PAC system consists of two control areas: PACW in Northern California, Western and Central Oregon and Southeast Washington, and PACE which is in Wyoming, Southeast Idaho, and Utah. PAC extends across a broad geographical area, having a presence in six states. It has 15,800 miles of transmission lines and approximately 10,000 MW of owned or controlled net generation capacity. PAC operates a significant portion of the transmission facilities that provide north-to-south flow along the eastern perimeter of WECC.<sup>4</sup> These flows pass through a key interface that is operated by PAC known as Path 20 (sometimes referred to as Path C). Path 20 was a “qualified path” in the north-to-south direction under the UFRPs used by WECC.<sup>5</sup>

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<sup>3</sup> This is in contrast to how congestion is managed in the Eastern Interconnect where congestion management generally is focused on actual flows on flowgates as opposed to scheduled flows on contract paths.

<sup>4</sup> While north-to-south flow is common, patterns of schedules and generation dispatch sometimes cause south-to-north flow.

<sup>5</sup> WECC uses UFRPs when actual flow exceeds scheduled flow on a “qualified path”. There are a limited number of qualified paths identified based on certain criteria that include the path having a history of unscheduled flow. The UFRP consists of a series of nine steps that are intended to relieve the congestion through the operation of equipment and, ultimately, the curtailment of schedules.

However, effective September 15, 2008, the path was disqualified by the WECC operating committee.

In this section we investigate congestion on the PAC system by examining curtailments and transmission service request refusals. We also examine plans for construction of expansions to transmission facilities and found cases where the planned expansions may reduce congestion in constrained areas. Our review of PAC's planned expansions does not raise competitive concerns.

### **B. Transmission Operating Procedures**

During the period of study, PAC did not invoke any UFRPs. However, it did implement 439 curtailments (including cases when curtailments were reversed) and schedule reductions totaling 27,601 MWh across twelve paths.

Curtailments can be initiated when one of four conditions occurs: (1) the path is overscheduled (due to conditions on the transmission system causing a reduction in TTC); (2) a schedule with a higher priority reservation displaces a schedule with a lower priority reservation; (3) a low-voltage constraint is binding; or (4) actual flows exceed the capability of the path. The accuracy of these curtailments and schedule reductions are evaluated in Section V.

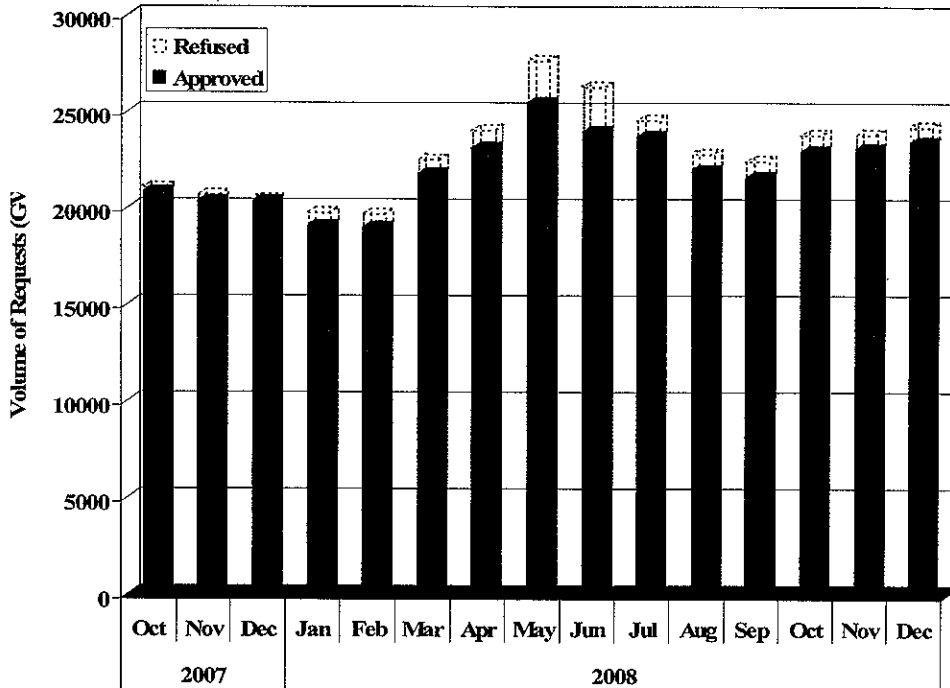
IV. TRANSMISSION ACCESS

A main component of the market monitoring function is to evaluate transmission availability on the PAC system. In this section, we evaluate access to the transmission network by analyzing the disposition of transmission requests. The patterns of transmission requests and their disposition are helpful in determining whether market participants have had difficulty accessing the PAC transmission network.

In order to make this evaluation, we calculate the volume of requested capacity that spanned the time period under study. For example, if a request was approved in January for service in June, we categorize that as an approval for June. Because requests vary in magnitude and duration, we assign a total monthly volume (GWh) associated with a request, which provides a common measure for all types of requests. Hence, a yearly request for 100 MW has rights for every hour of the month for which the request spans, just a like a monthly request. A request covering less than the entire month is assigned the hours between its start and stop time.

Figure 6 shows the breakdown of transmission service requests in each month from October 2007 through December 2008 and summarizes the disposition of the requests.

Figure 6: Disposition of Requests for Transmission Service on the PAC System  
October 2007 - December 2008



The figure shows that the total volume of approved requests during the fourth quarter of 2008 was slightly higher than the third quarter of 2008 and the fourth quarter of 2007. The volume of refused service requests during the quarter was lower than the preceding quarter, averaging 833 GWhr. Hence, the approval rate increased from 96 percent for the third quarter of 2008 to 96.5 percent for the fourth quarter 2008. Investigating further, we found that 71 percent of the total refusal volume over the quarter was refused because the customer failed to return the system impact study and/or otherwise complete the application process. As such, we accept these refusals as legitimate. This indicates that PAC has not unreasonably restricted access to its transmission system.

To evaluate the disposition of transmission requests further, we compare the volume of transmission requests over the study period by increment of service to the requests from the corresponding period twelve months prior. This comparison is shown in Figure 7.

**Figure 7: Disposition of Transmission by Duration of Service**

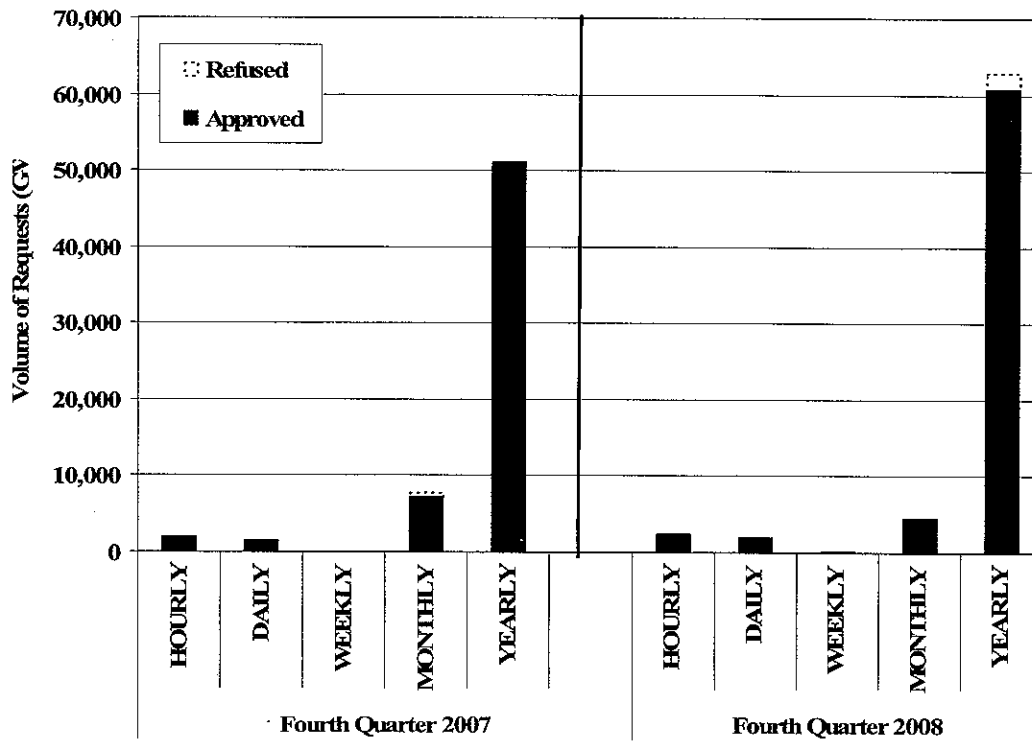


Figure 7 indicates an increase in the volume of approvals for all categories of service. There was a substantial increase in the volume of refused yearly requests. However, 76 percent of the volume of refused yearly requests is accounted for by the customer not continuing with the process as noted above. As a result, our review of the disposition of transmission requests does not raise any anticompetitive concerns.

## V. MONITORING FOR ANTICOMPETITIVE CONDUCT

In this section, we evaluate the available market and operating data to identify any evidence of anticompetitive conduct or market manipulation. The market monitoring plan calls for identifying anticompetitive conduct, which includes conduct associated with the operation of either PAC's generation assets or its transmission assets that can create transmission congestion or erect barriers to rival suppliers, thereby raising electricity prices. To identify potential concerns, we analyze PAC's wholesale sales in the first subsection below, its dispatch of generation assets in the second subsection, operation of transmission assets in the third subsection, and PAC's transmission flows and congestion in the fourth subsection.

### A. Wholesale Sales and Purchases

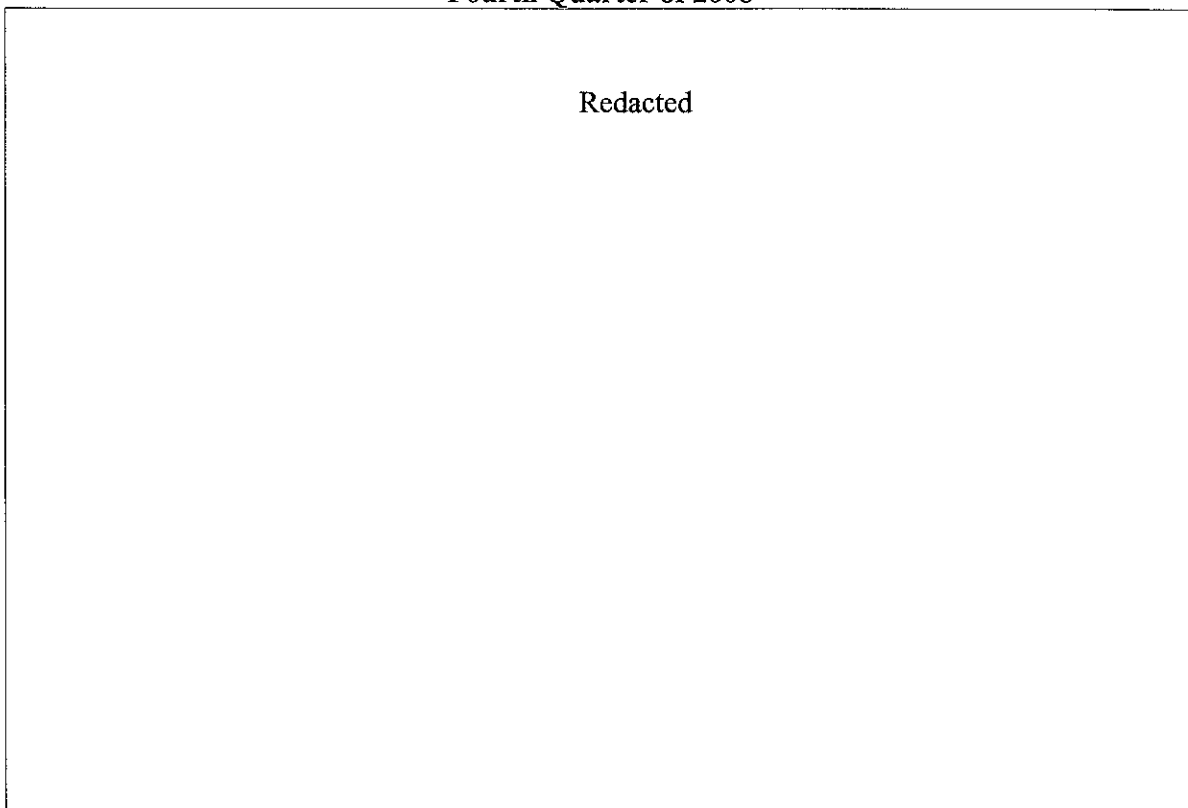
We examine sales and purchase data to determine whether the prices at which PAC transacted power may raise concerns regarding anticompetitive conduct that would warrant further investigation. We are particularly interested in periods when transmission congestion arises. If PAC were engaging in anticompetitive conduct to create the congestion, it could potentially benefit by making sales at higher prices in constrained areas or purchases at lower prices adjacent to constrained areas. We examined the real-time bilateral transactions made by PAC using PAC internal records. We focus on real-time transactions because they best represent the spot price of electricity.

Competition is facilitated by the ability of rivals to reserve and schedule transmission service. This ability will be limited if ATC is unavailable, transmission requests are refused, or schedules are curtailed. Curtailments are also an indicator of congestion because they can be made when a path is over scheduled. If PAC's ability to curtail schedules is being abused, we would expect to see systematically higher prices for sales or lower prices for purchases coincident with curtailments.

Figure 8 shows the daily average prices received by PAC for real-time bilateral sales and purchases. The figure also indicates days when curtailments occurred that could have potentially benefited PAC's position in the real-time bilateral markets. A curtailment may impact system

flows at market delivery points to the benefit of PAC's net position at those delivery points.<sup>6</sup> The maximum daily effective market position (labeled as "Max Effect" in the figure) is also displayed. This is the impact of PAC's sales and purchase transactions on the congested paths, calculated as the sum of the products of the volume of each market position and the shift factor of the delivery point to the curtailed path. "Max Effect" identifies periods when PAC is actively buying or selling in constrained areas and, therefore, could benefit itself by restricting other suppliers' access. The figure displays this value for the path and hour that has the maximum value for each day.

**Figure 8: Prices Received for PAC Sales and Purchases  
Fourth Quarter of 2008**



The volume weighted average daily sales prices ranged from \$■/MWh to \$■/MWh and average \$■/MWh. We say a day has a "beneficial curtailment" if PAC is a net seller at a delivery point

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<sup>6</sup> The relationship between constrained paths and market delivery points is determined through shift factors, which are the portion of power injected at the market delivery point that flows over the constrained transmission path.

where the curtailment restricts supply or PAC is a net purchaser where the curtailment increases supply. On days when potentially beneficial curtailments occurred, the weighted average daily sales prices average \$■/MWh. The volume weighted average daily purchases prices ranged from -\$■/MWh to \$■/MWh and the average was \$■/MWh. On days with potentially beneficial curtailments, the weighted average purchase price was \$■/MWh. These prices do not show a pattern of PAC benefiting from curtailments.

Though the overall price patterns do not raise concerns, we selected October 5, October 13, October 14, December 8, December 18 and December 25 for closer examination. We chose these days because they had maximum daily effective market positions greater than or equal to 40 MW and volume-weighted average daily sales prices greater than \$■/MWh or volume-weighted average daily purchase prices less than \$■/MWh. Our primary concern is whether PAC anticompetitively created the congestion through generation and transmission operations. Accordingly, we focus particular attention on these days when we evaluate PAC's generation dispatch and transmission outages in the remainder of this section. We also review the accuracy of all curtailments in Section D below.

## **B. Generation Dispatch**

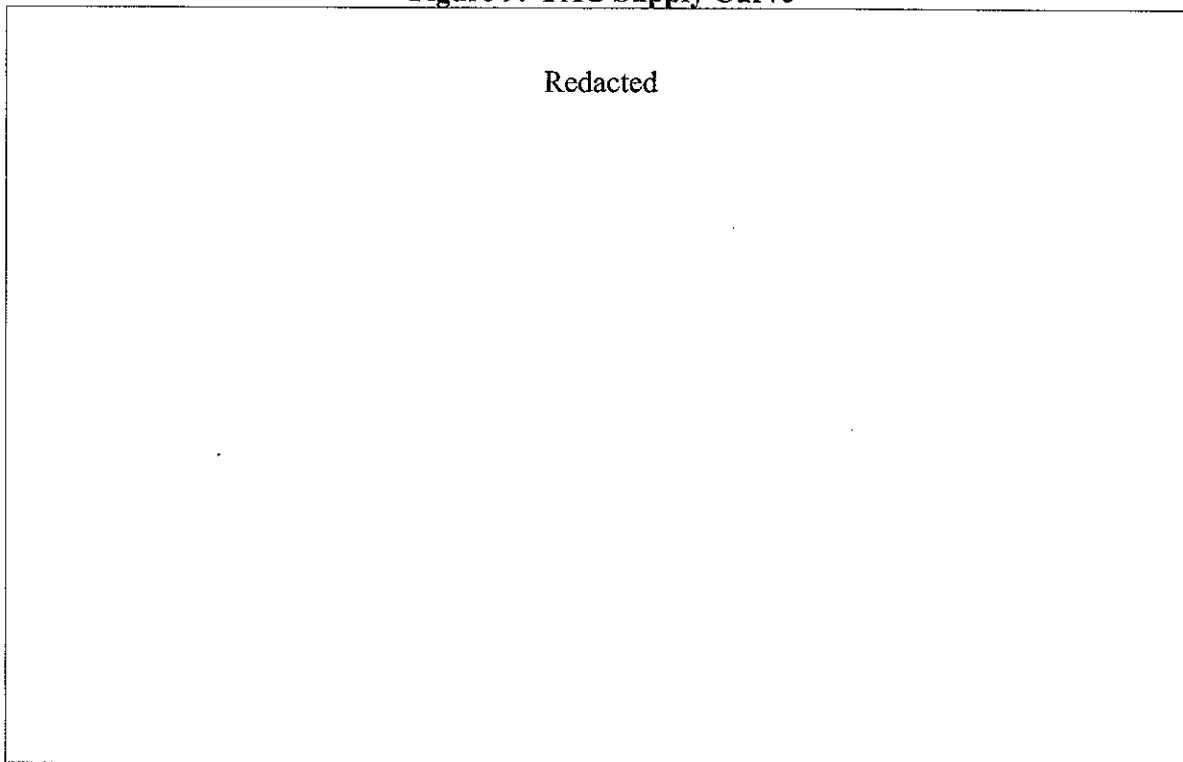
To further evaluate whether PAC's conduct raises any anticompetitive concerns, we examine the company's generation dispatch to determine the extent to which congestion may have been the result of uneconomic dispatch of generation by PAC. Therefore, we first examine PAC's dispatch during the study period to determine whether it was consistent with the least-cost use of its resources. Congestion can result naturally when PAC or any utility dispatches its units in a least-cost manner, and does not raise competitive concerns in such circumstances. If a departure from least-cost dispatch ("out-of-merit" dispatch) occurs unjustifiably and it causes congestion, this effect can raise potential competitive concerns. We consider a unit to be out-of-merit when it is dispatched, but could have been replaced by lower-cost generation that was not dispatched.



To identify out-of-merit dispatch, we first estimate PAC's marginal cost curve or "supply curve".<sup>7</sup> We used incremental heat rate curves, fuel costs, and other variable operations and maintenance cost data provided by PAC to estimate marginal costs. This allowed us to calculate marginal costs for PAC's units. We ordered the marginal cost segments for each of the units from lowest cost to highest cost to represent the cost of meeting various levels of demand in a least-cost manner. For our analysis, the curve is re-calculated daily to account for fuel price changes, planned maintenance outages, and planned deratings.

Figure 9 shows the estimated supply curve for a representative day during the time period studied. As the figure shows, the marginal cost of supply increases as more units are required to meet demand, as expected.

**Figure 9: PAC Supply Curve**



We used each day's estimated marginal cost curve as the basis for estimating PAC's least-cost dispatch for each hour in the quarter. In general, this will not be the exact level of least-cost

<sup>7</sup> We use the term marginal cost loosely in this context. The value we calculate is actually the incremental production cost and does not include opportunity costs, risks, and other factors not reflected in the incremental production cost.

dispatch because we do not consider all operating constraints that may require PAC to depart from our estimate of the least-cost dispatch. The analysis is limited to peak hours to avoid times of ramping and commitment issues which prevent achievement of the theoretical least-cost dispatch.

This analysis does not model generator commitments, assuming instead that all available generators are online. While market monitoring resources could have been expended refining the estimated generator commitment and dispatch to make it correspond more closely to actual operating parameters (i.e., start costs, run-time and down-time constraints, etc.), we believe this simplified incremental-operating-cost approach is adequate to detect instances of significant out-of-merit dispatch that would have a material effect on the market.

When a unit with relatively low running costs is justifiably not committed, our least-cost dispatch will overstate the out-of-merit quantities because it will identify the more expensive unit being dispatched in its place as out-of-merit. This may result in higher levels of out-of-merit dispatch during low-load periods when it is not economic to commit certain units.

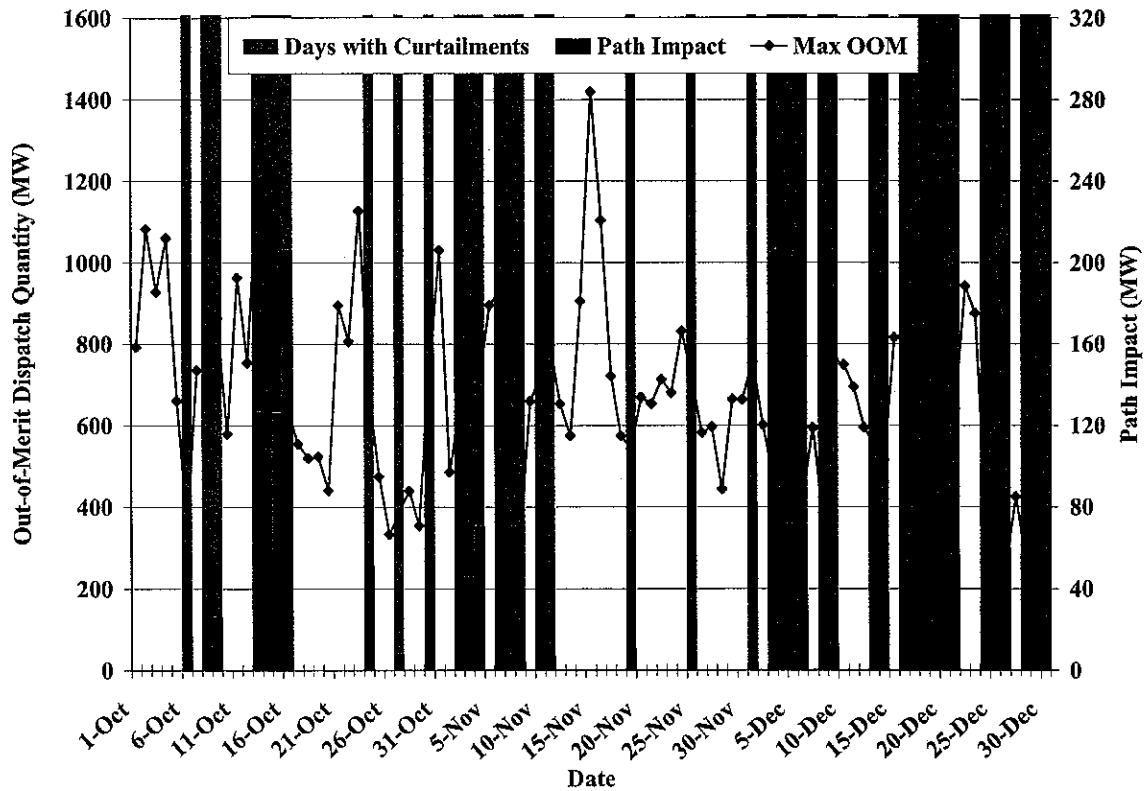
Other justifiable operating factors that cause the out-of-merit dispatch to be overstated are energy limitations and ancillary services. An example of an energy limitation is a governmental regulation limiting the number of hours a plant may run in a year. Since the unit is physically capable of producing, the limitation does not result in a planned outage or derating. The necessity to limit the hours of plant operation can cause the out-of-merit values to be overstated.

Ancillary services requirements such as spinning reserves, system ramp rate limitations, and AGC control requirements can make it operationally necessary to dispatch a number of units at part load rather than having the least expensive unit fully-loaded. These operational requirements can cause the out-of-merit values to be overstated.

The out-of-merit quantities include units on unplanned outage since a sudden unplanned outage may be an attempt to uneconomically withhold generation from the market. Hence, it will tend to overstate the quantity of generation that is truly out-of-merit. For our analysis, the accuracy of a single point is not as important as the trend and any substantial departures from the typical levels.

Figure 10 shows the daily maximum “out-of-merit” dispatch for the peak hours of each day in the study period. Also shown in the figure are days when PAC curtailments were made on paths that were loaded by out-of-merit dispatch. These days are represented as blue bars. For these days when potential generation-induced curtailments occurred, the out-of-merit dispatch displayed corresponds to the hour when the impact of the out-of-merit dispatch on the congested path was at its daily maximum. The figure also shows “Path Impact” (red bars). This is a calculation of the power flow change on the curtailed paths as a result of the out-of-merit dispatch. In other words, if dispatch had been “in-merit”, flow on the curtailed path would have been lower by the amount shown. The impact of out-of-merit dispatch was determined using generation shift factors<sup>8</sup>.

**Figure 10: Out-of-Merit Dispatch and Congestion Events  
Fourth Quarter of 2008**



<sup>8</sup> Generation Shift Factors are defined as the incremental increase or decrease in flow on a flowgate divided by an incremental increase or decrease in a Generation Resource’s output.

As the figure shows, there were fourteen days when out-of-merit dispatch was at least 500 MW and contributed at least 70 MW of increased flow over congested paths during the study period. We inquired further into these days and the days noted above based on PACs market positions and found the following.

- *October 5:* This day was selected for review in the Sales and Purchases analysis above. There was congestion on [REDACTED] in hour ending 21, but the 471 MW out-of-merit generation dispatch during this hour did not contribute to the congestion.
- *October 13 and 14:* [REDACTED] had an 18 hour unplanned derating due to a bad bearing on a boiler feed pump drive turbine. Also, [REDACTED] had a two-day unplanned outage to repair a boiler tube leak in the economizer. This contributed to high flows and curtailments on the [REDACTED].
- *October 15 and 16:* [REDACTED] was off-line for 34 hours due to the outage of the [REDACTED]. At the same time, [REDACTED] was off-line on the last day of a 57-hour outage to repair the bottom ash removal system drive chain. This capacity was replaced with combined cycle generation in [REDACTED] which caused high loadings and curtailments on [REDACTED].
- *October 30:* [REDACTED] extended a maintenance outage by a week to repair the bottom ash hopper. This capacity was replaced by combined cycle generation in [REDACTED], which caused high loadings and curtailments on [REDACTED].
- *November 4:* [REDACTED] initially tripped off-line on automatic action from the trip of the [REDACTED]. However, the unit stayed down through [REDACTED] to repair a feedwater pump leak and a boiler tube leak in the water wall section of the boiler. Also, [REDACTED] came off-line to repair a tube leak in the water wall section of the boiler. This capacity was replaced by [REDACTED], which contributed to congestion and curtailments on the "[REDACTED]" path.
- *November 6:* [REDACTED] was at part load returning from the outage described on October 30. This capacity was replaced by combined-cycle generation in [REDACTED], which caused high loadings and curtailments on [REDACTED].
- *November 10:* [REDACTED] had an unplanned outage to repair a tube lead in the water wall section of the boiler. This capacity was replaced with combined-cycle generation in [REDACTED], which caused high loadings and curtailments on [REDACTED].
- *December 1:* [REDACTED] was at part-load because it was being used for regulation and was positioned for the afternoon pickup in demand.
- *December 8:* This day was selected for review in the Sales and Purchases analysis above. There was congestion on [REDACTED] in hour ending 21, but the 366 MW out-

of-merit generation dispatch during this hour made only a small contribution (31 MW) to the congestion. [REDACTED] was showing out-of-merit up, but it was at its dispatch minimum.

- *December 17:* [REDACTED] tripped off-line because of a failure of the main transformer. Also on that same day, the [REDACTED] unit was in an unplanned outage following a trip on [REDACTED] caused by bad contacts in the generator field breaker. This contributed to congestion and curtailments on the “[REDACTED]” [REDACTED]
- *December 18:* This day was selected for review in the Sales and Purchases analysis above. There was congestion on “[REDACTED]” in hour ending [REDACTED], but the 744 MW out-of-merit generation dispatch during this hour made only a small contribution (28 MW) to the congestion. Most of the out-of-merit dispatch indicated was comparing dispatch of units in the PACE control area and with a unit in the PACW control area. However, Path C limitations prevent a merit order dispatch across the combined areas.
- *December 25:* [REDACTED] was at part-load because it was being used for regulation and was propositioned for the afternoon pickup in demand. [REDACTED] was at part load due to condenser freezing. Much of the out-of-merit dispatch indicated was comparing dispatch of a unit in the PACE control area and with another unit in the PACW control area. However, Path C limitations prevent a merit order dispatch across the combined areas.

Based on our review of the outage information in the disturbance reports, the outage logs, and information garnered from discussions with PAC personnel, we conclude that the aforementioned outages were justified and did not constitute attempts to engage in anticompetitive behavior.

### C. Transmission Outages

We evaluate PAC security events<sup>9</sup> to determine whether PAC’s operation of transmission assets may have contributed to the congestion events that occurred during the study period of the report. We also evaluate transmission outages recorded in PAC’s “Compass” system, its transmission outage logging system. Between the two systems we found seven transmission outage events that were associated with schedule curtailments that had curtailment deviations as presented in the next section below. We did not find any additional transmission outage that coincided with a time when PAC had purchase and sales positions that may have benefited from congestion as presented above. We reviewed these seven outages and found the following:

<sup>9</sup> Security events are defined as transmission security/reliability events that may impact the Provider’s ability to schedule transactions.

- [REDACTED] This seventeen-hour planned outage occurred on [REDACTED]. The purpose of the outage was to replace guy wire insulators on one of the structures. The outage reduced the transfer capability across [REDACTED], which led to schedule curtailments.
- [REDACTED]: This ten-hour forced outage affected [REDACTED]. The outage was taken to replace a damaged structure, to isolate a series capacitor, and to install some instrumentation. The outage contributed to [REDACTED] loadings and associated schedule curtailments.
- [REDACTED]: This fourteen-minute planned outage occurred on [REDACTED] causing schedule curtailment on the “[REDACTED]” path in both directions. The outage was taken to remove a reactor from service.
- [REDACTED]: This twelve-day outage started on [REDACTED]. The outage was taken to replace structures. The outage reduced the transfer capability across [REDACTED], which led to schedule curtailments.
- [REDACTED]: This six-day outage started on [REDACTED]. The purpose was to replace sleeves used to connect transmission cables. The outage reduced the transfer capability across [REDACTED], which led to schedule curtailments.
- [REDACTED]: This twelve-hour emergency outage occurred on [REDACTED], causing schedule curtailment on the “[REDACTED]” path. The outage was taken because two high speed transfer trip relay packages were out of service due to equipment failure. The repair work included replacing structures and insulators.
- [REDACTED]: This thirteen-day planned outage started on [REDACTED]. It was taken to install a line tap in and out of a new substation. During of this outage, transmission operating limits for [REDACTED] [REDACTED]. However, the difference between these curves is minimal.

Through our review of the records, and conference calls with PAC staff, we find that the outages were justified and did not find evidence that the events were part of a strategy to engage in anticompetitive behavior.

#### D. Analysis of Curtailments

Under PAC operating procedures, path flows can be managed by curtailing transactions scheduled over the path. This can provide the opportunity for anticompetitive conduct by initiating curtailments when they are not necessary. By selectively initiating these procedures, PAC may have the ability to influence power prices in the region to its benefit.

Accordingly, we analyze the transmission schedules to determine whether curtailments are being initiated properly. PAC initiates curtailments when one of four conditions occurs: (1) the path is overscheduled (due to conditions on the transmission system causing a reduction in TTC); (2) a schedule with a higher priority reservation displaces a schedule with a lower priority reservation; (3) a low voltage constraint is binding, or (4) actual flows exceed the capability of the path.

To be over-scheduled, the net schedules (the sum of firm and non-firm schedules minus the sum of schedules that provide counter-flow) must exceed the TTC (less the scheduled amount of capacity reservations where applicable).<sup>10</sup>

We analyzed the 15 paths where curtailments were initiated by PAC. We compare aggregated ex post net schedules to TTC. Ex post net schedules are the net schedules actually realized at the end of the operating hour. PAC makes the curtailment decision twenty minutes prior to the operating hour. However, NERC standards also allow schedules (referred to as “etags”) to be submitted up until twenty minutes prior to the hour. Because it takes ten minutes to evaluate a submitted schedule, the resulting net schedule can change from what it was when PAC initially made the curtailment decision. There may also be emergency etags submitted later than twenty minutes prior to the hour. Yet, this ex ante data is not available. Thus, utilizing ex post data provides only an approximation.

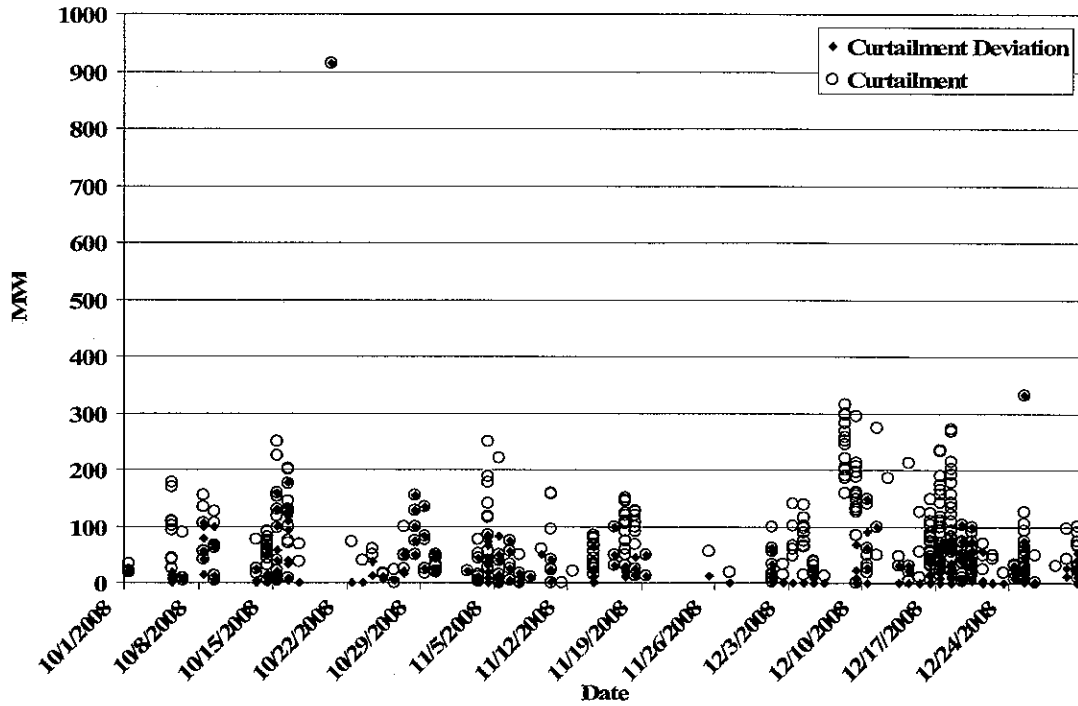
The curtailment deviations calculated and reported in the analysis below equal the TTC value minus the aggregated ex post net schedules. The curtailment deviations are limited to a ceiling equal to the curtailment amount and a floor of zero, since we are less concerned with under curtailments. In the absence of emergency tags or tags otherwise submitted after PAC makes its curtailment decision, if a path is over-scheduled and the curtailments are accurate, this value should be close to zero.<sup>11</sup> Figure 11 shows the results of this analysis.

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<sup>10</sup> Effective April 28, 2008, PAC utilizes forecasted values for Path C capacity when making its curtailment decisions. Accordingly, when evaluating curtailments on the path “PACE to Path C”, we utilize the forecasted capacity value rather than TTC.

<sup>11</sup> The other reasons for curtailments aside from the path being over scheduled will not necessarily result in a curtailment deviation close to zero.

Figure 11: Curtailment and Curtailment Deviation Fourth Quarter 2008



We reviewed additional documentation on curtailments when the curtailment deviations were at least 75 MW. There were 40 such cases that affected eight paths. We requested additional information regarding these cases and found legitimate reasons for all but fourteen of them. These reasons include security events, transmission outages, and events where actual flow exceeds line limits.

Of the 40 curtailment deviations that were at least 75 MW, 25 of these were for “[REDACTED]”. Although the reason logged for these curtailments was usually “overscheduled”, we reviewed all of these against actual flows and eliminated 15 where the flows were within 50 MW of the limit. We cannot determine that the remaining ten were legitimate based on the data provided. In general, there were a series of line outages that reduced the capacity on Path C. The logs show that Path C was requiring near constant attention from the operators as it frequently went in and out of alarm. The operators were frequently adjusting transformer taps and, in some cases, redispatching generation to manage Path C flows. However, we find that schedule curtailments were overused. These ten curtailment deviations occurred on six days of the quarter and averaged 128 MW.



On October 8 and 9, 2008, there were [REDACTED]  
[REDACTED] These events were due to operators failing to implement revised tools and procedures. PacifiCorp management identified these events and reminded the operators of the revised procedures on December 18, 2008.

In summary, 439 curtailments were implemented over the quarter. We were able to justify all but fourteen of the curtailment deviations. We do not find that PAC could have benefited from these curtailments because they did not fall on the six days when PAC was actively trading in the constrained areas. Hence, we do not find the fourteen curtailments that are not fully justified to be evidence of anticompetitive conduct.

**E. Conclusions on Monitoring for Anticompetitive Conduct**

Based on our analysis of PAC's conduct and the market outcomes, we find no conduct by PAC that raise potential competitive conduct during the period of study.

