



January 6, 2005

The Honorable Magalie Roman Salas  
Secretary  
Federal Energy Regulatory Commission  
888 First Street, N.E.  
Washington, D.C. 20426

Re: California Independent System Operator Corporation, ER02-1656

Dear Secretary Salas,

The California Independent System Operator Corporation ("ISO") hereby respectfully submits for filing an original and fourteen copies of three reports on the performance of the Automated Mitigation Procedures, one for the three months ended March 31, 2004 (the "Fifth Automated Mitigation Procedure Report"), one for the three months ended June 30, 2004 (the "Sixth Automated Mitigation Procedure Report") and one for the three months ended September 30, 2004 (the "Seventh Automated Mitigation Procedure Report"), as directed by Commission's July 17, 2002 Order, *California Independent System Operator Corporation*, 100 FERC ¶ 61,060 (2002). Please return one file-stamped copy of each report to the messenger.

These reports also will be posted on the ISO's web site (<http://www.caiso.com>).

Thank you for your assistance in this matter.

Respectfully submitted,

Anthony J. Ivancovich  
Senior Regulatory Counsel  
California Independent System Operator Corporation  
151 Blue Ravine Road  
Folsom, CA 95630  
(916) 608-7135

Fifth Automated Mitigation Procedure Report  
 January 1, 2004 through March 31, 2004  
 California Independent System Operator Corporation  
 January 6, 2005

As directed by the Federal Energy Regulatory Commission ("Commission") in its July 17, 2002 Order,<sup>1</sup> the ISO has prepared this fifth Quarterly Report on the Performance of the Automated Mitigation Procedure (AMP). AMP, proposed by the ISO in its May 1, 2002 Market Redesign 2002 filing, was approved by the Commission with modifications in the July 17 Order. This report provides observations and analysis of trends pertaining to the effectiveness of AMP mitigation for the period covering January 1, 2004, through March 31, 2004.

**Effectiveness of the AMP Price Screen and Conduct Test.** As described in the Fourth AMP Quarterly Report, filed June 29, 2004, the ISO partitions dispatched bids into the categories *Potential Conduct Test Failure*, depicted in blue in the following chart; *Bona Fide Conduct Test Failure*, depicted in purple in the following chart; and *Non-Conduct Test Failure*, depicted in green in the following chart. As in the Fourth AMP Quarterly Report, this analysis examines hours in which markup exceeds the minimum of \$20,000 or 40 percent of cost using both "liberal" and "conservative" markup indices.<sup>2</sup>

**Figure 1. Volumes of Dispatched Bids, Within and in Excess of Conduct Test Thresholds Whenever Price Exceeds \$100/MWh, January-March 2004**



<sup>1</sup> California Independent System Operator Corporation, 100 FERC ¶ 61,060 (2002) ("July 17 Order").

<sup>2</sup> The California ISO Department of Market Analysis estimates price-to-cost markup in two ways. The "conservative" index assumes that suppliers bid their true marginal costs. This creates a relatively high estimate of the competitive price, and thus a low estimate of markup. Thus, a marginal cost relatively close to the actual market price indicates a relatively low markup. The "liberal" index assumes some economic withholding. The liberal index reconstructs the supply curve so that high bids are replaced with estimated marginal costs, potentially causing some bids that were actually extramarginal in the dispatch to become inframarginal. This creates a lower estimate of the competitive price, and thus a high estimate of markup. Both indices skip units that were also skipped in the actual dispatch sequence due to constraints.

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As markets were fairly competitive in the first quarter of 2004, there were nine hours in which hourly markup exceeded the minimum of \$20,000 and 40 percent of incremental cost. Of these nine hours, five occurred during a price spike on March 29, when temperatures were approximately 10 degrees above forecasts, and the ISO declared a Stage 1 Emergency. During those five hours, no unit bid in a manner that could have failed the Conduct Test. The three highest hours of markup in the quarter, all in excess of \$80,000, and five of the six highest hours of markup, occurred during this spike.

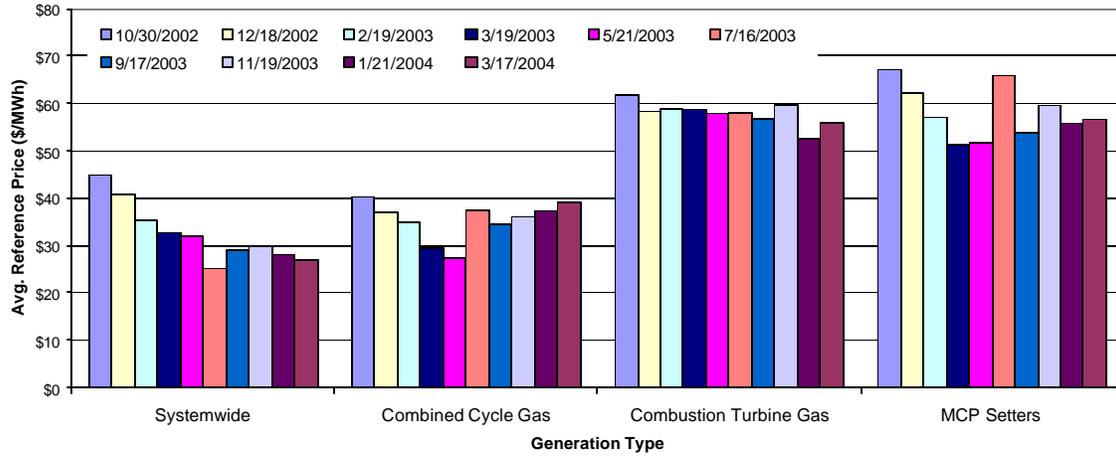
However, units that received dispatches did bid in a manner that would have failed the Conduct Test in three of the five hours with significant calculated markup. On January 6, hour ending 19:00 (between 6:00 and 7:00 p.m.), the thermal steam turbine unit whose bid set the market-clearing price at \$155/MWh had a reference price of \$47.40/MWh. While this bid was sufficiently high to fail the Conduct Test, it did not do so because the maximum predicted interval price was \$45.25/MWh, well below the \$91.87/MWh threshold that enables the application of the AMP.

On January 11, hour ending 6:00 (between 5:00 and 6:00 a.m.), three hydroelectric units bid in a manner that would have failed the Conduct Test. However, all of those units were inframarginal, that is, they bid below the interval market-clearing price of \$133.36/MWh in the intervals in which they were dispatched. At any rate, the maximum predicted interval price was \$47.06/MWh, well below the \$91.87/MWh level that triggers the application of the AMP.

On March 9, hour ending 17:00 (between 4:00 and 5:00 p.m.), a combined-cycle unit bid in a manner such that an extramarginal portion of the bid was in excess of its Conduct Test threshold. However, a different portion of the bid curve received a dispatch; the awarded portion was not in excess of its Conduct Test threshold. The price-setting unit, a thermal peaker, did not bid in excess of its Conduct Test Threshold for any portion of its bid curve. At any rate, the maximum predicted interval price was \$56.01/MWh, well short of the \$91.87/MWh level.

**Reference Level Trends.** When adjusting for changes in the price of natural gas, reference levels have been relatively stable for the market as a whole since the deployment of AMP on October 30, 2002. Reference levels for the bulk of gas-fired thermal units that predominantly participate in the real-time market have varied less than \$10/MWh since Fall 2002 on average, when normalized for changes in the price of natural gas, and less than \$20/MWh among a rotating portfolio of units that set the market-clearing price (MCP) most frequently each month. There has been a modest upward trend among the MCP-setting units since March 2003. The following chart shows indices of reference level trends for several generation groups on a bi-monthly basis through December 2003.

**Figure 2. Index of Reference Level Trends by Generation Group, Normalized to Oct-02 Gas Prices, through Dec-03<sup>3</sup>**



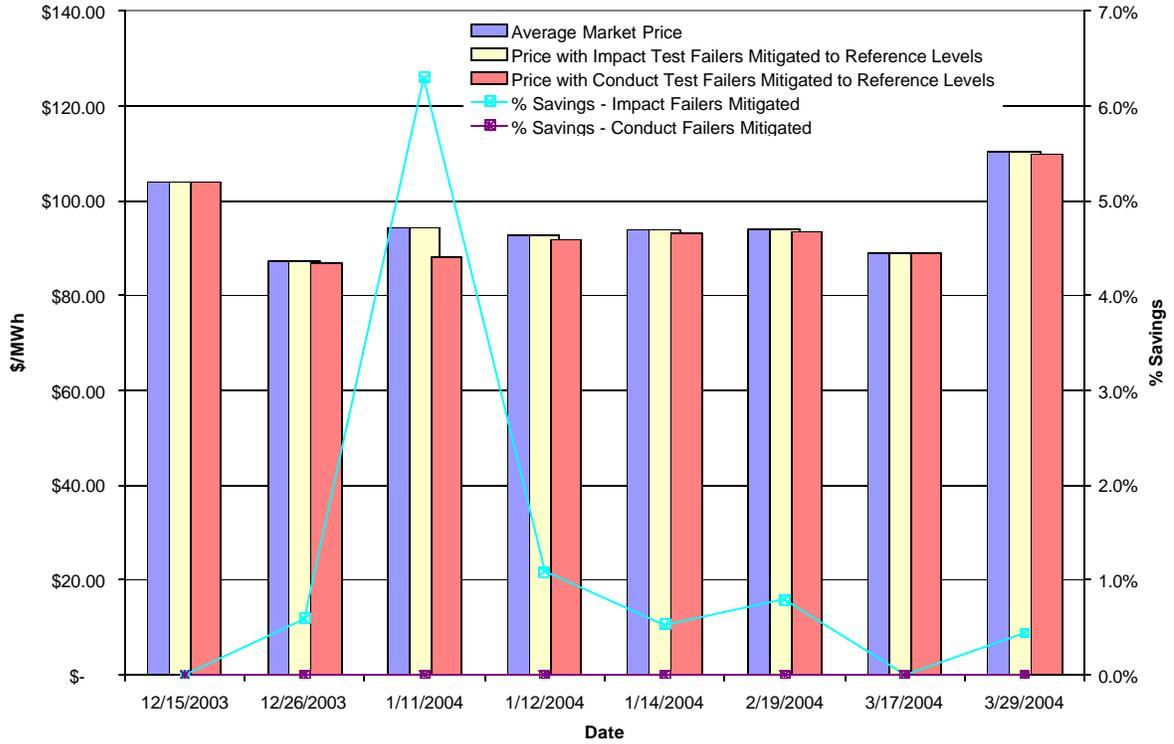
**Estimates of market savings due to mitigation.** To review the effects of the price screen and impact test thresholds on the overall market impact of AMP, the ISO has developed estimates of real-time market prices under the scenarios in which units that failed the Conduct Test are mitigated to their reference levels and then re-dispatched. When these units' bids are mitigated, the set of awarded bids changes. This is due to the fact that high and out-of-merit bids, which otherwise would have been in excess of their corresponding Conduct Test thresholds, may become in-merit when reference levels are substituted for the original bids.

The chart below compares daily average actual prices on days in which the daily average price exceeded \$85/MWh (denoted in blue) to average prices that would have occurred had the price screen not been required (denoted in yellow). Also shown are prices that would have occurred had the price screen and impact test not been required for mitigation; that is, if all bids from units that failed the Conduct Test had been mitigated (denoted in orange).

<sup>3</sup> The index deflates reference levels to the October 2002 gas price index of \$3.34/MMBtu. Actual reference level trends during the subject quarter were at least 32.4 percent higher due to higher gas prices, indexed at \$4.43/MMBtu (October 2003) and \$4.62/MMBtu (December 2003). The rolling portfolio of MCP-setting units consists of units that have set the real-time incremental market-clearing price at least eight times between 60 days before the beginning of the subject quarter and the end of the subject quarter.

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**Figure 3. Average Prices and Percent Savings if Conduct and Impact Test-Failing Bids Were Mitigated to Reference Levels**



AMP mitigation, in which Impact Test-failing bids are mitigated to reference levels, would not have been effective in any day in the subject quarter at all. A stricter mitigation scheme, in which Conduct Test-failing bids are mitigated to reference levels, would have been more than nominally effective only during the price spike of January 11, 2004. In this case, the savings would have been approximately \$15,315, or between 24.2 and 27.6 percent of the markup for hour ending 6:00 (depending on the markup index used).

To date, AMP has yet to mitigate a single bid. Once again, this claim is with the understanding that markets have not yet been subject to the levels of stress seen in 2000 and 2001 that AMP was intended to prevent in the future.

As directed by the Federal Energy Regulatory Commission ("Commission") in its July 17, 2002 Order,<sup>1</sup> the ISO has prepared this sixth Quarterly Report on the Performance of the Automated Mitigation Procedure (AMP). AMP, proposed by the ISO in its May 1, 2002 Market Redesign 2002 filing, was approved by the Commission with modifications in the July 17 Order. This report provides observations and analysis of trends pertaining to the effectiveness of AMP mitigation for the period covering April 1, 2004, through June 30, 2004.

## Executive Summary

The real-time incremental balancing market was relatively competitive among in-sequence dispatches during the quarter, so there were few events of market stress that could test the effectiveness of AMP. That said, the current structure of AMP, which includes the forecasted \$91.87/MWh price screen, the Conduct Test, and the Impact Test, continues to be of questionable merit as a tool to inhibit the exercise of market power. Because no unit has yet failed the Impact Test, AMP has yet to mitigate a single bid. In addition, because the ISO estimates the real-time imbalance energy dispatch and corresponding market clearing price prior to the operating hour for the purposes of determining whether the predicted prices exceed the price screen and AMP should be applied, such estimates are often inaccurate, and the ISO cannot possibly estimate real-time price excursions that result from real-time contingencies. In most circumstances, units that have been able to set high incremental market prices are bidding well within their AMP reference level thresholds. In addition, the Conduct Test is failed most often in hours without price spikes or with no incremental market dispatches at all. In a few instances, units bid at or in excess of their Conduct Test thresholds during spike periods. The overlap between price spikes and Conduct Test failures is so occasional that it almost appears to be coincidental. The ISO has examined the effects of each of the threshold tests separately to see what impact the price screen and impact test thresholds have had on potential price mitigation. At any rate, discussion of AMP as a mitigation method was somewhat theoretical during this quarter, because the demand for real-time incremental balancing energy was small, especially when compared to (1) dispatches used to manage intrazonal congestion (must-offer commitment and out-of-sequence dispatch activity), and (2) the resultant overwhelming need for real-time balancing energy in the decremental direction.

**Effectiveness of the AMP Price Screen.** The \$91.87/MWh price screen prevented AMP from being enabled in any hours during the quarter in which price spikes occurred. While it predicted prices in excess of \$91.87/MWh in 57 hours, none had incremental dispatches with prices above \$91.87/MWh. Many did not have incremental dispatches at all. As described below, the pre-operating hour prediction "nearly" predicted the spike on May 3. The algorithm apparently predicted a spike in the hour prior to the beginning of the actual spike, but not during the spike itself.

**Effectiveness of the AMP Conduct Test.** If a bid exceeds its Reference Level for the same capacity segment from the same unit by at least \$100/MWh or 200 percent, it is considered to have failed the Conduct Test. As described in the third AMP Quarterly Report, filed June 29, 2004, the ISO partitions **dispatched** bids into the categories *Potential Conduct Test Failure*, depicted in blue

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<sup>1</sup> California Independent System Operator Corporation, 100 FERC ¶ 61,060 (2002) ("July 17 Order").

in the following chart; *Bona Fide Conduct Test Failure*, depicted in purple in the following chart; and *Non-Conduct Test Failure*, depicted in green in the following chart. As in the Fourth and Fifth Quarterly Reports, this analysis examines hours in which the real-time price exceeds \$100 per megawatt-hour (MWh), but goes beyond those reports by considering hours regardless of the price-to-cost markup.<sup>2</sup> Markup was relatively low this quarter, as previously noted.<sup>3</sup>

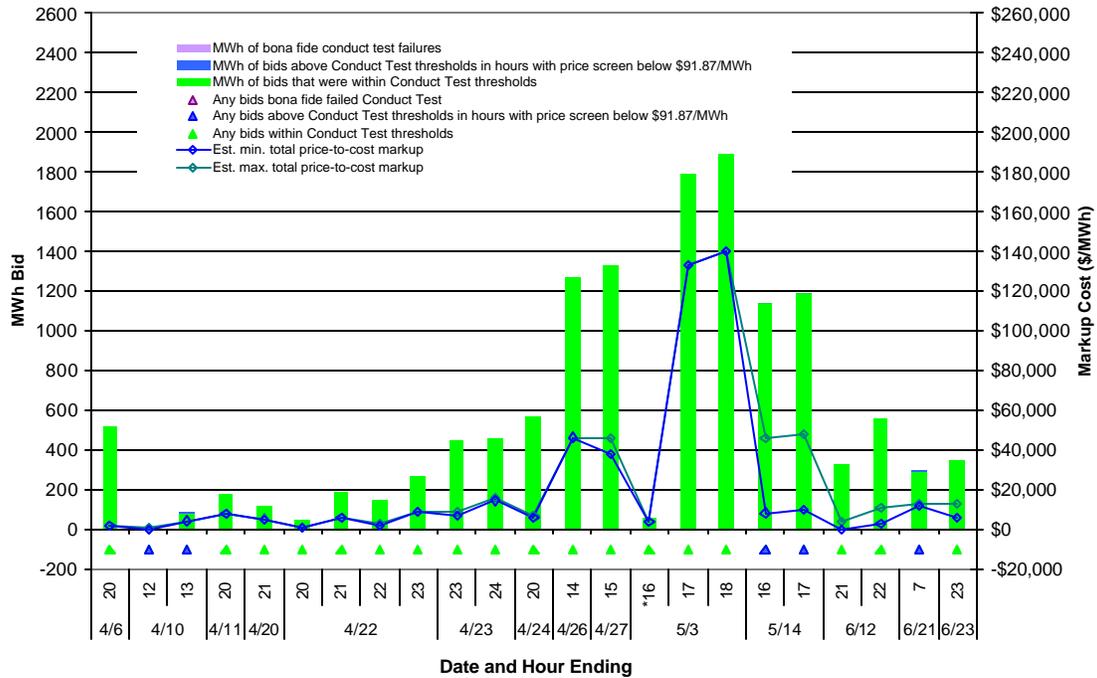
**Conduct Test Bidding Behavior.** Among all hours in which the real-time market-clearing price exceeded \$100/MWh, units that received dispatch instructions had submitted bids in excess of their Conduct Test Thresholds in only five hours. Two of these hours occurred on April 10, two occurred on May 14, and one occurred on June 21. All other price spikes during the quarter occurred despite suppliers bidding within their respective reference level thresholds. The following chart compares dispatched bid volumes in which the bids were within and in excess of conduct test thresholds during the quarter, in hours in which the real-time INC price exceeded \$100/MWh. The chart also shows estimates of marginal costs in each hour.

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<sup>2</sup> The California ISO Department of Market Analysis estimates price-to-cost markup in two ways. The “conservative” index does not account for potential economic withholding by assuming that suppliers who bid above the MCP are bidding their true marginal costs. This creates a relatively high estimate of the competitive price as it ignores potential economic withholding, and thus a low estimate of markup. That is, a marginal cost relatively close to the actual market price indicates a relatively low markup. The “liberal” index incorporates the effects of economic withholding into the markup estimate. The liberal index reconstructs the supply curve so that bids above the MCP are replaced with estimated marginal costs, potentially causing some bids that were actually extramarginal in the dispatch to become inframarginal. This creates a lower estimate of the competitive price, and thus a higher estimate of markup. Both indices take into account units that were skipped in the economic merit order dispatch sequence due to operational constraints.

<sup>3</sup> This report relaxes the standard for inclusion in Figure 1 because only the spike on May 3 would have met the standard for inclusion in previous AMP Reports.

**Figure 1. Volumes of Dispatched Bids, Within and in Excess of Conduct Test Thresholds Whenever Price Exceeds \$100/MWh, April-June 2004**



The following is a discussion of bidding behavior and resultant AMP performance during the aforementioned spikes in which units bid in excess of Conduct Test thresholds and received dispatches. It also includes a discussion of the May 3 spike, in which units bid within their Conduct Test thresholds.

**April 10 price spike.** On April 10, a forced outage of a large nuclear generating unit caused the ISO to dispatch significant amounts of imbalance energy via the real time market, resulting in a price spike ranging from \$120/MWh to \$222.79/MWh, between 11:50 a.m. and 1:00 p.m. The \$222.79 price was set by an energy bid submitted as part of a non-spinning reserve capacity bid from a participating load. Meanwhile, two utility-scheduled inframarginal hydroelectric units bid \$150/MWh and \$151.50/MWh, well in excess of their reference levels of \$10.49/MWh and \$10.43/MWh, respectively, and received dispatches for a combined total of approximately 4 MWh. Because the AMP price screen algorithm runs at 53 minutes prior to the operating hour, it could not have enabled AMP during this price spike's 70-minute duration. The estimated total markup of this spike was below \$5,000. Although the ISO does not view this event as an attempt to exercise market power, it illustrates some of the problematic issues associated with AMP that may make it less than effective during times of market stress.

**May 3 price spike.** In the second quarter of 2004, the real-time price-to-cost markup index exceeded the lesser of 40 percent of marginal cost or \$20,000 (the threshold for inclusion in previous Reports) when the price was above \$100/MWh in only two or three hours, all on the afternoon of May 3, a day in which the ISO experienced several challenges. Load within SP15

reached 23,384 MW, the highest level within SP15 since the previous all-time high of 24,610 MW. Meanwhile, the ISO declared a transmission emergency due to overloaded transmission south of the Lugo Substation into Southern California. In addition, technical problems with the ISO's computerized dispatching system necessitated some manual dispatches in hour ending 15:00 (between 2:00 and 3:00 p.m.). Due to generating constraints, the SP15 INC price reached \$185/MWh between 3:00 and 6:00 p.m., and was set by a combustion turbine known to have high operating costs. No unit was observed to have bid in a manner that would have failed the AMP Conduct Test during this period. Indeed, the unit that bid and set the \$185/MWh price had a reference level on that day of \$137.70/MWh, and an estimated marginal cost of approximately \$132.50/MWh. Interestingly, the price prediction was below \$91.87/MWh during the bulk of this spike, although the prediction did include a price of \$210/MWh in hour ending 15:00, the hour of operation just prior to the hour in which units were dispatched manually. At any rate, no units that received dispatches between hours ending 16:00 through 18:00 (between 3:00 and 6:00 p.m.) had bid in excess of their reference level thresholds. The estimated total price-to-cost markup of this spike was approximately \$273,000 for hours ending 17:00 and 18:00.<sup>4</sup>

**May 14 Spike.** The SP15 zonal spike on May 14 lasted for 20 minutes, but straddled two hours of operation, from 3:50 to 4:10 p.m. The price-setting bid during this period of \$157.70/MWh was submitted by a hydroelectric resource, and was **exactly** its reference level threshold, \$100/MWh above its reference level of \$57.70/MWh. The next highest bid of \$155/MWh dispatched during this period was from an inefficient thermal resource with an estimated marginal cost of \$136/MWh. Depending on the methodology used for calculation, this spike resulted in a total price-to-cost markup ranging between \$18,000 and \$94,000.

**June 21 Spike.** The NP15 zonal spike on June 21 occurred as a thermal unit tripped. The zonal MCP reached \$210/MWh between 6:30 and 7:00 a.m., and was set by a hydroelectric resource with a reference level of approximately \$17.50/MWh. The next highest dispatched bid of \$150/MWh was from a relatively efficient thermal unit with an estimated marginal cost of \$64/MWh and a reference level of \$60.54/MWh. This spike resulted in a total price-to-cost markup of approximately \$12,000.

**Effectiveness of the AMP Impact Test.** The AMP Impact Test considers whether bids that fail the Conduct Test would increase the Market Clearing Price at least \$50/MWh or 200 percent. If so, the Impact Test is failed. To date, the impact test has yet to be failed in any hour.

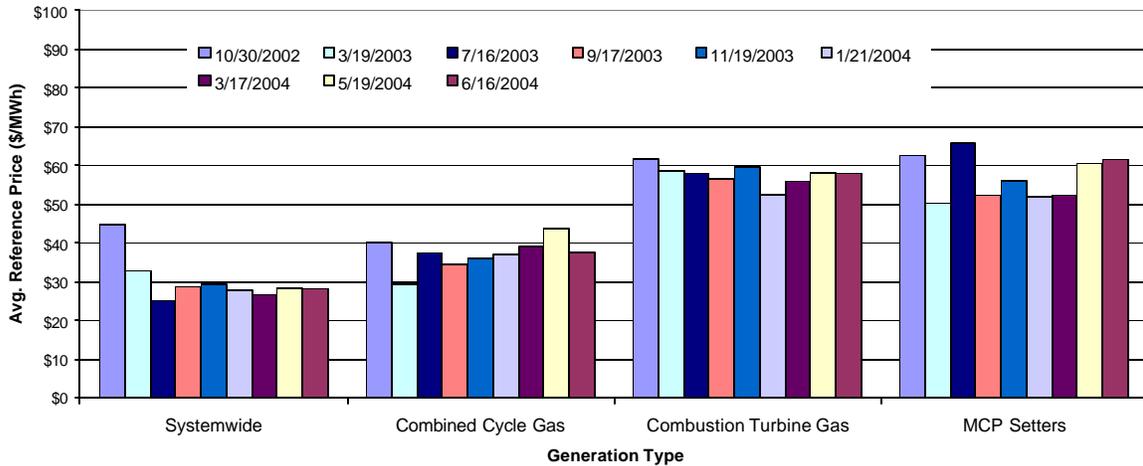
**Reference Level Trends.** Reference levels have been relatively stable, reflecting the competitiveness and lack of incremental market-wide activity in the market. When adjusting for changes in the price of natural gas, reference levels continue to be stable as in the last few quarters. The peak-hour gas-normalized reference level index for combustion turbines (CTs) has

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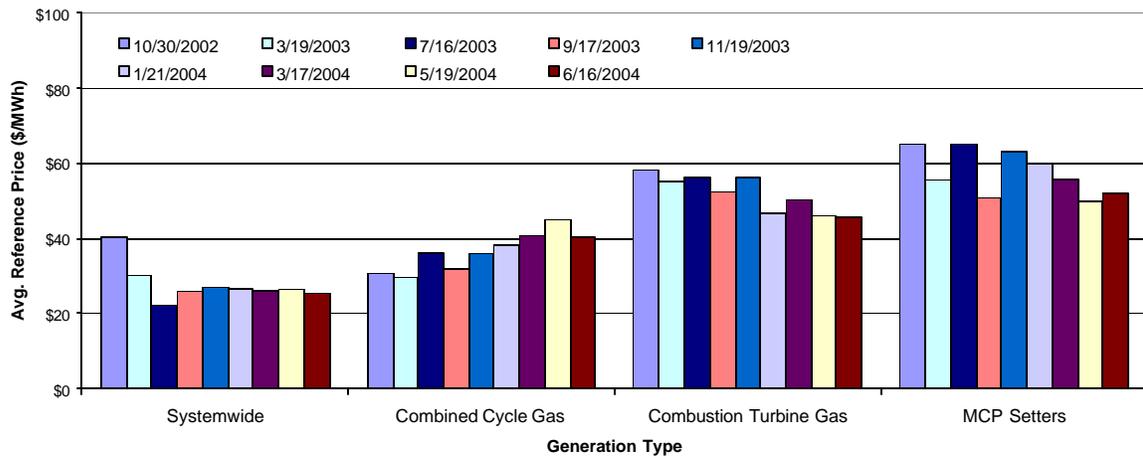
<sup>4</sup> The ISO uses available data to determine whether any units that received dispatch instructions had bid in excess of their reference levels, and to estimate price-to-cost markup. It is possible that these data were incomplete for May 3, hour ending 16:00 (between 3:00 and 4:00 p.m.), due to the manual dispatch and the resultant after-the-fact manual accounting. However, bidding behavior appears generally to be similar to that during hours ending 17:00 and 18:00 (between 3:00 and 5:00 p.m.), during which no units that received dispatch instructions had bid in excess of their reference level thresholds. It was not possible to estimate markup for hour ending 16:00.

varied within the range of \$52.55/MWh to \$59.86/MWh since November 2003. The CT off-peak normalized reference level index has declined from \$56.26/MWh in November 2003 to \$45.72/MWh in June 2004. Meanwhile, the combined-cycle index for both peak and off-peak hours has increased to the neighborhood of \$40/MWh in the recent quarter. The large price spike on May 3 changed the peak-hour index of price-setting units, raising it from \$52.53/MWh in March to the low \$60/MWh range in June. Because there were few if any spikes in off-peak hours during this quarter, the off-peak index of price-setting units has continued a declining trend, ending at \$52.23/MWh in June. The following charts show trends of gas-normalized reference level indices through June.

**Figure 2. Gas-Normalized Reference Level Indices in Peak Hours, By Generation Type, through June 2004**



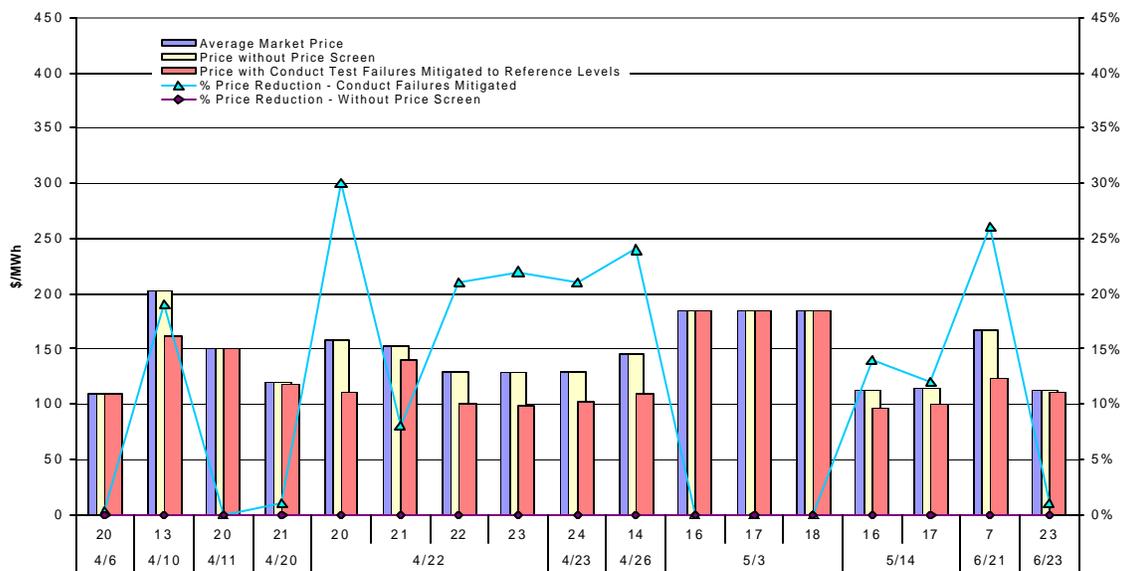
**Figure 3. Gas-Normalized Reference Level Indices in Off-Peak Hours, By Generation Type, through June 2004**



**Estimates of market savings due to mitigation.** To review the effects of the \$91.87/MWh price screen and Conduct Test thresholds on the overall market impact of AMP, the ISO has developed estimates of real-time market price under two scenarios. The first scenario eliminates the price screen threshold and AMP is run in every hour regardless of the predicted MCP. The second scenario goes a step further and calculates an estimated MCP where all units that failed the Conduct Test are mitigated to their reference levels and then re-dispatched.

The chart below compares daily average actual prices (denoted in blue), in the same days that sustained price spikes as shown in Figure 1, to average prices that would have occurred had the price screen not been required (denoted in yellow). Also shown are prices that would have occurred had the price screen and impact test not been required for mitigation; that is, if all bids from units that failed the Conduct Test had been mitigated (denoted in orange).

**Figure 4. Average Prices and Percent Savings under Alternative Mitigation Schemes<sup>5</sup>**



As noted previously, in this quarter, the current AMP structure would have had no effect at all. However, under a scenario in which all bids failing the Conduct Test are mitigated to their reference levels, prices would have been lower during some spike hours. This scenario would have affected prices during the April 10, April 22, and June 21 spikes, reducing incremental energy prices between 20 and 30 percent. It also would have reduced market clearing prices on May 14

<sup>5</sup> The orange bar in this chart, representing the price with bids failing the Conduct Test mitigated to their reference levels, shows the effect of mitigation before units are dispatched. Because the Figure 4 chart assumes a dispatch from mitigated bids, whereas the Figure 1 chart checks for behavior after the actual BEEP unmitigated dispatch, the Figure 4 chart will result in mitigated prices more frequently than the Figure 1 chart detects Conduct Test failures. In addition, Figure 1 includes hours in which interval prices may have exceeded \$100/MWh, whereas Figure 4 only includes hours in which the volume-weighted average price within SP15 and NP15 exceeded \$100/MWh.

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and June 21. Meanwhile, the May 3 price spike, the only very costly spike during the quarter, would not have been affected under any of the scenarios analyzed.

**Caveats.** Due in part to significant out-of-sequence dispatched energy volumes to manage intrazonal congestion, and the large number of units held online through the denial of applications to waive the Must-Offer Obligation, the incremental side of the real-time balancing energy market has exhibited an increase in overall competitiveness in the second quarter of 2004 when compared to previous quarters. As a result, price spikes have been fewer and less of a regular or systematic occurrence in the market. This has provided for a relatively small number of opportunities to examine the performance of AMP during the quarter.

As directed by the Federal Energy Regulatory Commission ("Commission") in its July 17, 2002 Order,<sup>1</sup> the ISO has prepared this seventh Quarterly Report on the Performance of the Automated Mitigation Procedure (AMP). AMP, proposed by the ISO in its May 1, 2002 Market Redesign 2002 filing, was approved by the Commission with modifications in the July 17 Order. This report provides observations and analysis of trends pertaining to the effectiveness of AMP mitigation for the period covering July 1, 2004, through September 30, 2004.

### **Executive Summary**

The real-time incremental balancing market again was relatively competitive among in-sequence dispatches during the quarter, so there were few events of market stress that could test the effectiveness of AMP. That said, the current structure of AMP, which includes the \$91.87/MWh price screen applied to forecasted imbalance energy prices, the Conduct Test, and the Impact Test, continues to be of questionable merit as a tool to inhibit the exercise of market power. Because no unit has yet failed the Impact Test, AMP has yet to mitigate a single bid. In addition, because the ISO estimates the real-time imbalance energy dispatch and corresponding market clearing price prior to the operating hour for the purposes of determining whether the predicted prices exceed the price screen and AMP should be applied, such estimates are often inaccurate, and the ISO cannot possibly estimate real-time price excursions that result from real-time contingencies. In most circumstances, units that have set high incremental market prices are bidding well within their AMP reference level thresholds. In addition, the Conduct Test is failed most often in hours without price spikes or with no incremental market dispatches at all. In a few instances, units had bid at or in excess of their Conduct Test thresholds during spike periods. The overlap between price spikes and Conduct Test failures is so occasional that it almost appears to be coincidental. The ISO has examined the effects of each of the threshold tests separately to see what impact the price screen and impact test thresholds have had on potential price mitigation. At any rate, discussion of AMP as a mitigation method was somewhat theoretical during this quarter, because the demand for real-time incremental balancing energy was small, especially when compared to dispatches used to manage intrazonal congestion (must-offer commitment and out-of-sequence dispatch activity), and the resultant overwhelming need for real-time balancing energy in the decremental direction.

**Effectiveness of the AMP Price Screen.** The \$91.87/MWh price screen was a factor in preventing AMP from being enabled in one hour during the quarter in which price spikes occurred. Overall, the price screen resulted in false positives (where the real-time price was predicted to be above \$91.87/MWh, when the actual maximum market clearing price was below \$91.87/MWh) in 29 hours, and false negatives (where the real-time price was predicted below \$91.87/MWh, when the maximum actual market clearing price exceeded \$91.87/MWh) in 18 hours. The price screen did not accurately predict a price spike, including the August 17 price spike (see below), in any hour during the quarter. The price screen was run 53 minutes prior to the top of each hour during the subject quarter.

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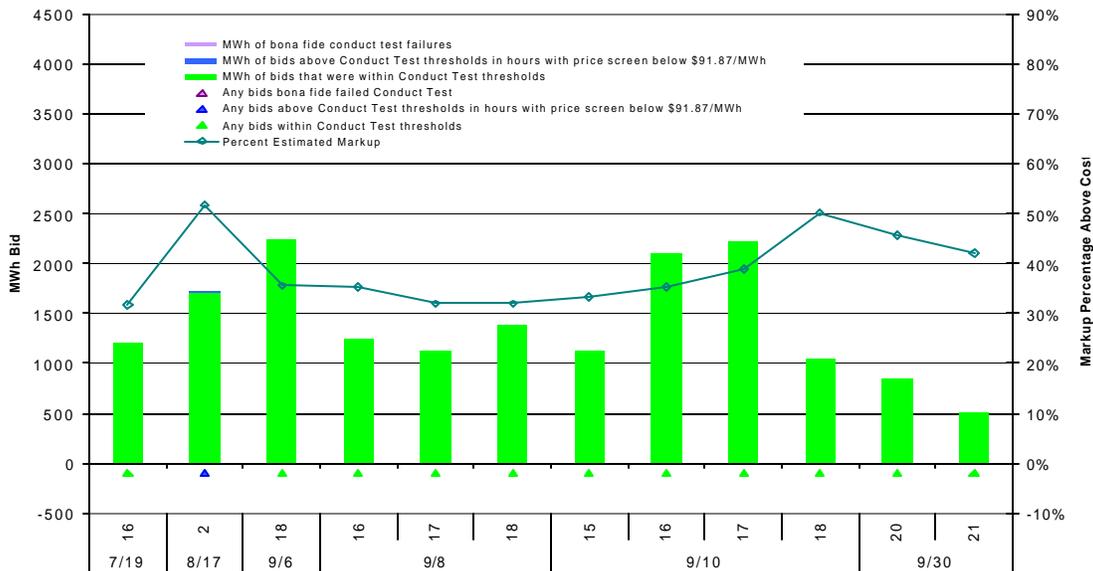
<sup>1</sup> *California Independent System Operator Corporation*, 100 FERC ¶ 61,060 (2002) ("July 17 Order").

**Effectiveness of the AMP Conduct Test.** If a bid exceeds its Reference Level for the same capacity segment from the same unit by at least \$100/MWh or 200 percent, it is considered to have failed the Conduct Test. As described in the third AMP Quarterly Report, filed June 29, 2004, the ISO partitions **dispatched** bids into the categories *Potential Conduct Test Failure*, depicted in blue in the following chart; *Bona Fide Conduct Test Failure*, depicted in purple; and *Non-Conduct Test Failure*, depicted in green. This analysis examines hours in which the real-time price exceeds \$100/MWh and the estimated price-to-system marginal cost markup is at least 20 percent of cost. Markup was again relatively low in this quarter.<sup>2</sup>

**Conduct Test Bidding Behavior.** Among all hours in which the real-time market-clearing price exceeded \$100/MWh, a unit that received dispatch instructions had bid in excess of its Conduct Test threshold in only a single hour in the quarter, on August 17, during hour ending 02:00. All other spikes during the quarter occurred despite suppliers bidding within their reference level thresholds. The following chart compares dispatched bid volumes for which bids were within and in excess of Conduct Test thresholds during the quarter in hours in which the real-time INC price exceeded \$100/MWh and the hourly markup was at least 20 percent of estimated marginal cost. The chart also shows estimates of markup in each hour.

**Figure 1. Volumes of Dispatched Bids within and in Excess of Conduct Test Thresholds, whenever Price Exceeds \$100/MWh and 20 percent of Marginal Cost,**

**July-Sept. 2004**



<sup>2</sup> For description of markup calculation, please see footnotes in the Sixth AMP Report. Liberal and conservative markup indices produced nearly identical results in this quarter. The conservative markup index is shown.

The spikes that occurred August 17 and September 8-10 are described in the Market Analysis Reports covering July/August and September 2004.

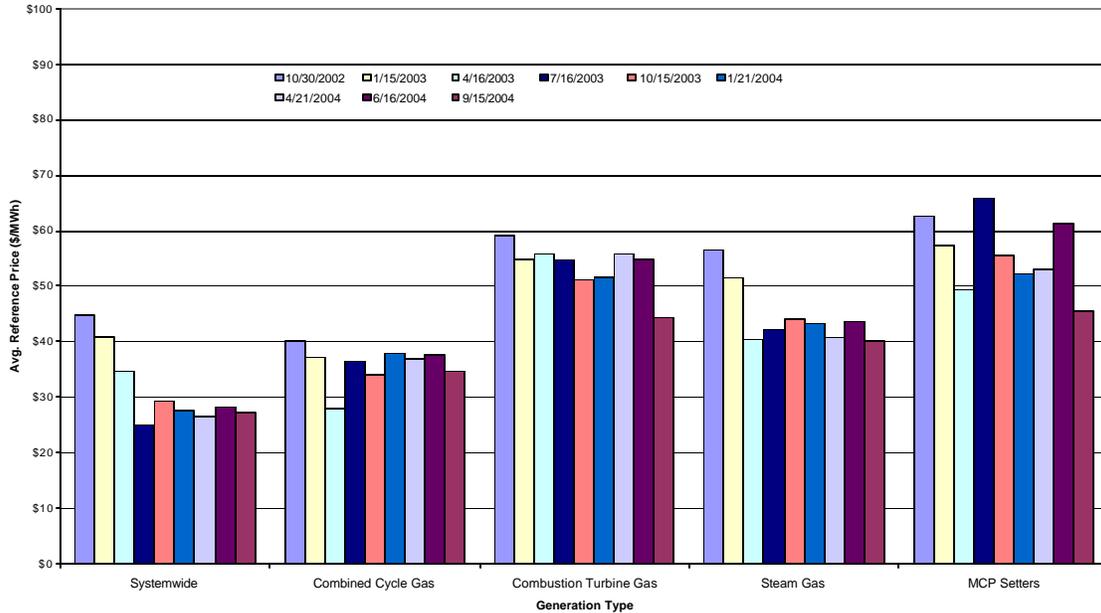
The August 17 spike, which occurred in NP15, followed a trip of a large thermal generator, causing the price to rise to \$165.01/MWh beginning at 1:10 a.m., just after the price screen was run for hour ending 03:00. Because the spike had ended by 03:00, the price screen was not able to predict the event for any hour. However, the bid that set the \$165.01/MWh price was in excess of its Conduct Test threshold, and would have resulted in a Conduct Test failure had the price screen not prevented the activation of AMP.

The price spikes of September 8 through 10 came during a time of all-time peak loads for the ISO. During all of these price spikes, no unit had bid in excess of its reference level.

**Effectiveness of the AMP Impact Test.** The AMP Impact Test considers whether bids that fail the Conduct Test would increase the Market Clearing Price at least \$50/MWh or 200 percent. If so, such bids fail the Impact Test. To date, no bid has failed the Impact Test in any hour.

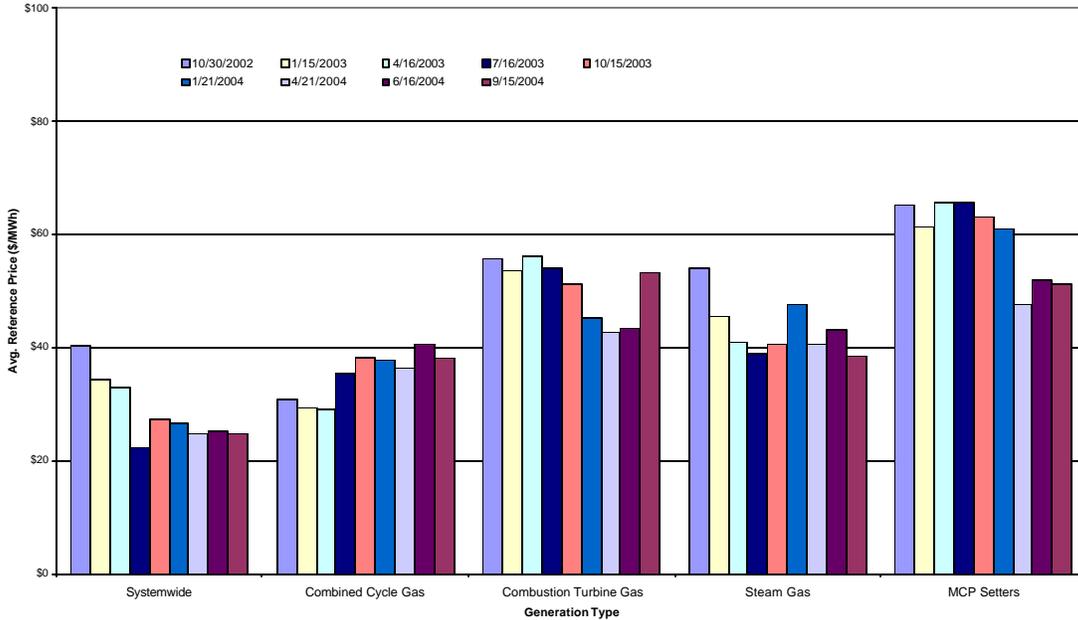
**Reference Level Trends.** Reference levels continued to be relatively stable in the quarter, reflecting the competitiveness of the incremental energy market, due to the lack of market-wide incremental energy requirements. When adjusting for changes in the price of natural gas, the peak-period reference level index for combustion-turbine units actually declined on average, from \$54.95/MWh in June to \$44.38/MWh in September. The decline in the peak-period reference level index for a 90-day moving portfolio of units that have consistently set the market-clearing price has been even more pronounced, from \$61.41/MWh in June to \$45.60/MWh in September. These declines are due largely to the lack of incremental activity in the real-time market. During the subject quarter, most incremental activity was out-of-sequence dispatches to manage congestion, which do not impact incremental reference levels. The following chart shows peak-period reference level indices by generation type, in addition to the index for market-clearing price-setters, normalized against changes in the price of natural gas.

**Figure 2. Gas-Normalized Reference Level Indices in Peak Periods, By Generation Type, through September 2004**



Trends have been slightly different in off-peak periods, featuring an increase in average reference levels between June and September. This increase was due largely to the HE 02:00 spike on August 17. The CT unit that set the price at \$165.01/MWh during this spike increased its reference level to that price from its previous reference level of \$62.30/MWh, and thus raised the off-peak index for CT units through September. Immediately following this bid, the CT unit's off-peak reference level was raised to \$165.01/MWh, and was at least \$146.54/MWh for the remainder of the quarter, despite an estimated marginal cost of \$61.62/MWh in this hour. Other units also continue to have reference levels significantly in excess of marginal costs, a continued concern that high bids have the lasting effect of raising reference levels, and thus diluting the mitigating effect of the Conduct and Impact Tests. The following chart shows off-peak-period reference level indices by generation type, in addition to the index for market clearing price-setters, normalized against changes in the price of natural gas.

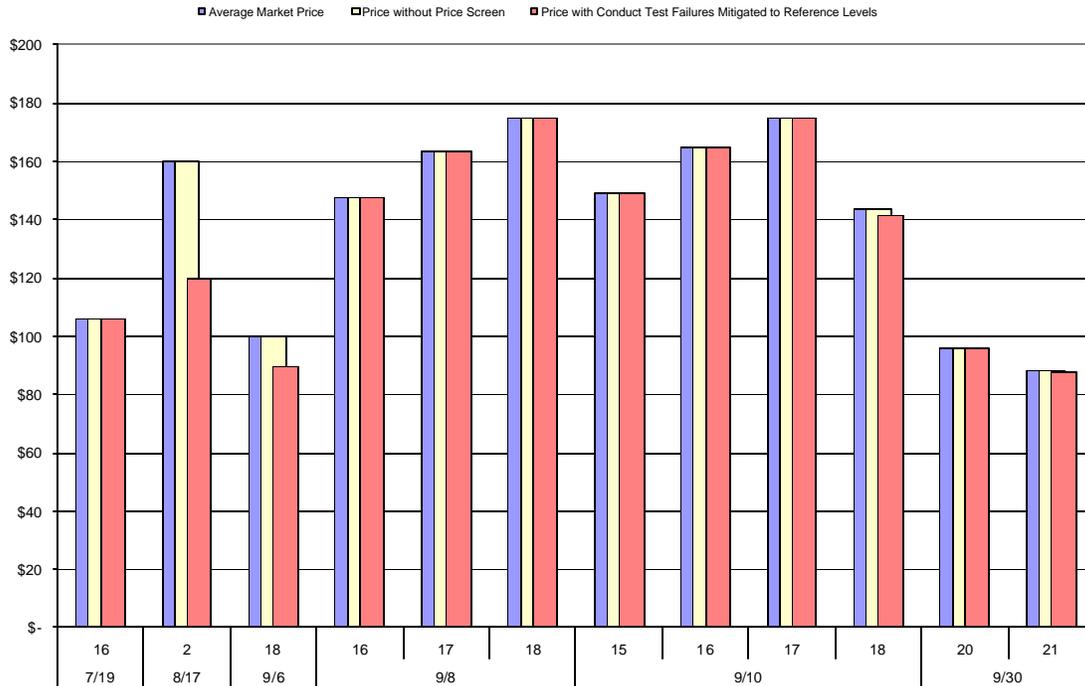
**Figure 3. Gas-Normalized Reference Level Indices in Off-Peak Periods, By Generation Type, through September 2004**



**Estimates of market savings due to mitigation.** To review the effects of the Price Screen and Conduct Test thresholds on the overall market impact of AMP, the ISO has developed estimates of real-time market price under two scenarios. The first scenario eliminates the Price Screen threshold and AMP is run in every hour regardless of the predicted MCP. The second scenario goes a step further by calculating an estimated MCP where all units that fail the Conduct Test are mitigated to their reference levels and the re-dispatched.

As noted above, the only price spike in which a unit that had bid in excess of its reference level and was dispatched occurred on August 17. The price-setting unit would have failed the Conduct Test had the Price Screen not prevented AMP from being applied. However, the Impact Test was never failed, so the Price Screen by itself had no adverse impact on mitigation. As discussed in the next section, this resource would have had a market impact, had all units that failed the Conduct Test been mitigated to their reference levels.

**Figure 4. Average Prices and Percent Savings under Alternative Mitigation Schemes**



As noted, in this quarter as well as previous quarters, the current AMP structure would have had no effect at all. However, under a scenario in which bids failing the Conduct Test are mitigated to reference levels, prices would have been lower during some spike hours. This scenario especially would have affected prices on August 17, reducing the MCP by approximately \$40/MWh. This mitigation scheme also would have had minimal impacts on price on September 6, HE 18:00, and September 10, HE 18:00. In addition, this scenario would have had little actual financial impact on the costly spikes of September 8 through 10.

**Caveats.** With the significant out-of-sequence incremental volume to manage intrazonal congestion continuing through the quarter, and the large number of units held online through the denial of requests to waive the Must-Offer Obligation, the incremental in-sequence portion of the real-time balancing energy market has continued to diminish in volume. As a result, these price spikes have affected a relatively small portion of the market.