UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Nevada Power Company and	)	
Sierra Pacific Power Company,	)	
Complainants,	)	
v.	)	**EL02-26-000**
Duke Energy Trading and Marketing,	)	**EL02-28-000**
L.L.C., Enron Power Marketing, Inc.,	)	**EL02-33-000**
El Paso Merchant Energy, L.P.,	)	**EL02-38-000**
American Electric Power Service Corp.	)	
Respondents.	)	
	)	
Nevada Power Company	)	
Complainant,	)	
v.	)	**EL02-29-000**
Morgan Stanley Capital Group Inc.,	)	**EL02-30-000**
Calpine Energy Services, L.P.,	)	**EL02-31-000**
Mirant Americas Energy Marketing, L.P.,	)	**EL02-32-000**
Reliant Energy Services, Inc.,	)	**EL02-34-000**
BP Energy Company,	) **Docket Nos.**	**EL02-34-000**
Allegheny Energy Supply Company, L.L.C.	) **(Consolidated)**	**EL02-39-000**
Respondents.	)	
	)	
Southern California Water Company,	)	
Complainant,	)	
v.	)	**EL02-43-000**
Mirant Americas Energy Marketing, L.P.,	)	
Respondent.	)	
	)	
Public Utility District No. 1 Snohomish	)	
County Washington	)	
Complainant,	)	
v.	)	**EL02-56-000**
Morgan Stanley Capital Group Inc.,	)	
Respondent.	)	
	)	

PREPARED DIRECT TESTIMONY OF ROBERT F. MCCULLOUGH

Q. Please state your name, title and business address.

A. My name is Robert F. McCullough. I am the Managing Partner of McCullough Research, an energy consulting firm specializing in bulk power issues. My business address is 6123 S.E. Reed College Place, Portland, Oregon 97202.

Q. Please summarize your educational background and professional qualifications.

A. I graduated from Reed College in 1972 and attended graduate school at Portland State University and Cornell. Since 1991, I have been the managing partner of McCullough Research. Our work includes assignments for clients from Québec to California. I have been active in bulk power matters since the early 1980s, negotiating power contracts for industrials and utilities across North America. I am also an Adjunct Professor of Economics at Portland State University.

My curriculum vitae is Exhibit NPC-24.

Q. Please describe your background and experience in the electric industry.

A. I have been working on the market failure in California and throughout the West for the past two years. During that time, I have worked with utilities, industries, regulators, and the Oregon, Washington, and California Attorneys General to understand the causes of the California market failure. Our firm's work on the collapse of Enron Corporation ("Enron") and the possibility of Enron's price leadership in California has resulted in testimony before the U.S. House Energy and Commerce Committee and the Senate Energy and Natural Resource Committee in January and February of this year. My retrospective analysis of the California failure appeared in the April 2002 issue of Public

Utilities Fortnightly, the industry's leading periodical, following my January 1, 2001 analysis in the same journal.

In addition to my work on the California energy crisis, I have, over the past decade, advised industries, utilities, and governments from California to Québec on energy-related matters. At the beginning of 2002, my firm was the lead energy advisor for the $3.5 billion-dollar transaction between Eeyou Istchee and the Government of Québec. We also advised Nordstrom on nationwide energy matters, engaged in power purchasing in Texas, and advised clients in Manitoba, Alberta, Louisiana, Minnesota, Pennsylvania, and Utah.

Before starting McCullough Research, I was an officer at Portland General Corporation, where I had responsibilities in finance, power marketing, and rate setting.

Q. What is the purpose of your testimony?

A. My testimony describes recently discovered manipulation of the California Power Exchange ("CalPX") and California Independent System Operator ("CAISO") markets ("California spot markets") that raised power prices and increased the costs to consumers throughout the Western Systems Coordinating Council ("WSCC") during 2000 and 2001. This market manipulation contributed to the price spikes in energy markets throughout the WSCC and forced buyers to pay prices far higher than those that would have been available in a properly functioning market.

Q. What sources have you used to prepare this testimony?

A. The sources I have consulted include:

1. The Enron memoranda dated December 6 and 8, 2000, released by the Federal Energy Regulatory Commission ("FERC" or the "Commission") on May 22, 2002 ("Enron memoranda") which describe certain trading strategies or marketing schemes which Enron traders and, allegedly, traders of other companies active in wholesale electricity and ancillary services markets in the WSCC, and particularly California, engaged in during the years 2000 and 2001;[1] See Exhibit NPC 25.

2. Additional materials relating to the failure of the California spot markets [a]released by the California, Oregon, and Washington Attorneys General in May 2002;

3. Enron trading emails, reports, and memoranda released by California State Senator Dunn in June 2002;

4. Power marketer affidavits released by FERC on June 7, 2002; and;

5. PerotSystems's response to California State Senator Dunn on June 20, 2002.[2]

[1] Enron appears under numerous different names in the market manipulation documents. The principal names are Enron Power Marketing Incorporated ("EPMI"), Enron Capital and Trade ("ECT"), and Enron North America. ("ENA"). Enron was also active in west coast markets as Portland General Electric Company ("PGE") and Enron Energy Services ("EES").
[2] PerotSystems staff advised market participants, including Enron, about a number of schemes later described in the Enron memoranda.

In addition, I have also reviewed materials from CalPX and CAISO, the WSCC, and a number of other sources.

The Enron Memoranda

Q. Are you familiar with the trading strategies or marketing schemes described in the Enron memoranda?

A. Yes.

Q. How would you characterize these trading strategies?

A. I would characterize them as market abuses, falling into the following categories:

1. Wheel Out
2. Death Star
3. The Big Picture ("Fat Boy")
4. Non-Firm Scheduling for Congestion
5. Load Shift
6. Ricochet
7. Selling Non-Firm Energy as Firm Energy
8. Sham Trading

Q. Would you give a brief overview of the rules that governed the California spot markets and access to transmission, including the actions taken by CAISO to eliminate congestion.

A. Yes. There were two basically incompatible systems in California operating throughout most of the energy crisis. CalPX had its complex set of rules pursuant to which it set prices in the spot market. CAISO had a complex set of rules pursuant to which it charged market participants for the use of congested transmission lines while, at the same time, paying other participants to adjust their schedules in order to relieve congestion. CalPX first determined the point where supply and demand met and then provided its schedule to CAISO. CAISO then determined the extent to which the CalPX schedule would result in congestion, calculated the cost of relieving the congestion, and then provided the amount of those costs to CalPX.

Q. How is transmission congestion handled by CAISO?

A. When a market participant uses a transmission line within CAISO's control, it can file an adjustment bid with CAISO. The adjustment bid is the amount CAISO has to pay the participant to adjust its schedule to relieve congestion in accordance with the capacity of the transmission line. On the other hand, if the market participant has not submitted an adjustment bid or chooses not to adjust its schedule, it must pay a congestion fee for use of the congested transmission line. The participant's bid price is increased by the amount of the congestion fee, thereby increasing the spot market price and cost of energy to all buyers in the market.

Q. Does this mean that a market participant could submit an artificial schedule in order to create congestion together with an adjustment bid and then agree to adjust its schedule to relieve the congestion in return for payment of its adjustment bid?

A. Absolutely. Almost all of Enron's market manipulation schemes were based on collecting adjustment bids for agreeing to adjust schedules that it submitted to create congestion but never intended to fulfill. To the extent that other participants using the congested transmission line were required to pay congestion fees, their bids were increased by the amount of the fee and the spot market prices were increased. In addition, if Enron had generation within the congested area, it would also be paid the increased price.

Q. Does this mean that the artificial creation of congestion affected prices in the California spot markets?

A. Yes. The prices in the California spot markets paid by customers and paid to generators were directly impacted on a dollar for dollar basis by the amount of the congestion fee paid by market participants for use of artificially congested transmission lines.

Q. Did manipulation of the California spot markets affect prices in the spot market in the rest of the WSCC?

A. Yes. The key concept in this situation is opportunity cost. All market participants in the WSCC could buy and sell energy in the CalPX spot market. Power marketers and load-serving utilities outside of California could (and did) buy from and sell to CalPX. Accordingly, a decision to sell energy bilaterally to a third party in the WSCC outside

California was always dependent on whether it was better to sell the energy to the third party or, alternatively, in the California spot markets. Thus, the prices in the California spot markets directly affected the spot market prices in the rest of the WSCC.

Q. Was this also true for real time manipulation of the California spot markets?

A. Absolutely. When Enron manipulated California's real time markets, the result was higher prices in the spot markets. While the real time markets in California are "ex-post," *i.e.*, you only find out the clearing price after the market is closed, the real time market provides a price signal to market participants. Since a generator could reserve generation for real time dispatch, a major issue was whether the real time market was a better choice than other more traditional market choices. Some utilities have indicated that they routinely overscheduled generation, *i.e.*, scheduled more power in the California spot markets than required, in order to be able to sell that energy into the real time market.

Wheel Out

Q. What is "Wheel Out?"

A. The trading strategy referred to as Wheel Out takes advantage of transmission constraints to artificially inflate spot market prices. The following excerpt from a PerotSystems presentation describes the strategy:

> A party with generation on both sides of a small interface could have devised a strategy to control the PX energy prices in CA under these protocols. For example, the Silverpeak interface has a limit of around 30 MW. Suppose that a party bid to sell 100 MWh in the PX auction at $O/MWh. It will likely win the right to sell

100 MWh. That party could schedule an import of 35 MWh at Silverpeak and 65 MWh of generation in CA. If it did not provide a decremental adjustment bid on its 35 MWh import, the ISO would reduce the import by 5 MWh and set a default usage charge of $250/MWh on the intertie. Under the old PX protocols, the energy price in CA would have been set at $250/MWh. In this way, the party could ensure that it received $250/MWh for its 65 MWh generated in CA.[3]

Q. Was this trading strategy ever implemented?

A. Yes. On May 24, 1999, at 6:10 A.M., Enron submitted four bids of 725 megawatts each for the heavy load hours of May 25 at prices from $18 to $29 per MWh. An hour later, CalPX notified Enron that it was the successful bidder. At 7:29 A.M., Enron identified Silver Peak as the delivery point for the energy. At 11:17 A.M., CAISO called Enron to ask if the bid (and delivery point) were in error. Enron explained that it was prepared to go ahead with the transaction.

CAISO accepted the bids filed by Enron. Although CalPX had provided a balanced schedule to the CAISO, once the congestion on Silver Peak was taken into account, the CalPX schedule was 2,885 megawatts below projected loads. CAISO balanced the loads by increasing imports, using reserves, and providing considerably higher prices back to CalPX. The congestion costs raised the CalPX unconstrained price by 70% – from $24 to $41 per MWh.

Q. Where is Silver Peak?

A. The Silver Peak transmission line is not a central part of the regional power market. The connection, two 55 kV lines that stretch from the town of Silver Peak into California, was

[3]Ed Smith letter to Rich Davis, p.3 (April 8, 1998). See Exhibit NPC-26.

built to facilitate generation at the Beowawe Geothermal unit. While the theoretical landscape of CAISO allows the transmission line to be treated as an intertie, its actual operation is closely tied to this one power project. In actual practice, Silver Peak is simply used to carry the geothermal unit's output to Southern California Edison Company. Not only is the line not capable of carrying more power than the geothermal unit can generate, the interconnections in Nevada are also very weak.

Q. What was the response of CalPX and CAISO to the Silver Peak incident?

A. While CAISO's market surveillance unit apparently did not notice the price excursion, the market immediately observed what had happened.[4] The Energy Market report for May 25, 1999, noted:

> Speaking of the PX, much of the hubbub on Tuesday surrounded the $44/MWh congestion adjusted prices. Rumors circulated that an unnamed party had manipulated the PX on Monday by bidding 3000 MW of power on a 20 MW line between Nevada and California. "Someone played a game yesterday which caused everyone's adjustment bid schedules to come into play, and that resulted in the higher prices throughout the system, said one market pundit. Other players did not believe that someone could consciously manipulate PX prices from a UMCP of $27.25/MWh to an adjusted price of $44.31/MWh, and blamed human error for the high price. Nonetheless, sources indicated that the PX was going to look into the matter to determine if "market manipulation" had actually taken place.[5]

Two complaints were filed, and CAISO initiated an investigation in the summer of 1999. Enron entered into a settlement with CAISO on April 27, 2000. Enron agreed not to

[4] The CAISO Weekly Market Watch's only mention of the Silver Peak incident was a statement that "Price spikes of $177/MW and $162/MW occurred on May 25 at hours ending 1600 & 1700 due to significant incremental energy requirements that exceeded 2400 MW." See Exhibit NPC-27.

"substantially repeat" the Silver Peak manipulation and to pay $25,000 to reimburse CalPX for its costs during the investigation. The unstated understanding was that the details of the settlement would be kept confidential – even from the California Attorney General.[6] In the course of the investigation, the CalPX staff estimated that the Silver Peak incident cost consumers $4.6 million to $7.0 million.

Q. What is the significance of the weak market surveillance in California at CalPX and CAISO?

A. The Silver Peak incident showed that there was little risk in manipulating the California spot markets. Enron responded by developing a series of new trading strategies to manipulate the market that extended the techniques pioneered in the Silver Peak incident.

Deathstar

Q. What is "Deathstar"?

A. The trading strategy referred to as Deathstar is probably the most significant of the strategies identified in the Enron memoranda. This trading strategy caused CAISO to charge congestion fees and, as a result, dramatically increase prices in the California spot markets.

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[5] Energy Market Report, p.1 (May 25, 1999). See Exhibit NPC-28.

[6] June 19, 2001 letter from Richard Sanders to Michael Kirby (Enron attorneys) includes the line "I have enclosed both the file produced by the PX related to the Silver Peak investigation and the entire PX Silver Peak investigation file. I was able to convince the PX not to give the Attorney General the entire file." See Exhibit NPC-29.

Q. What are congestion fees?

A. When generators and buyers file their schedules with CalPX and CAISO, CAISO is responsible for making any necessary adjustments to take into account transmission congestion. CAISO's CONG computer program calculates the degree of congestion and derives the appropriate level of payment necessary to induce market participants to adjust their schedules to the needs of the transmission system. After the adjustments to schedules are made, CAISO can enter "real time" knowing that the basic operation of the system is consistent with the physical constraints of the transmission lines. Market participants who do not adjust their schedules pay a congestion fee.

Enron developed a number of finely tuned schemes that enabled it to receive payment for adjusting its schedules and, at the same time, to inflate spot market prices.

Q. Did market participants manipulate particular transmission lines?

A. Yes. Since the winter of 2000/2001, CAISO has identified congestion over Path 15, the transmission lines between Los Angeles and San Francisco, as a major reason behind the rolling blackouts in Northern California. During the California energy crisis, energy supplies in Northern California were particularly tight – mainly due to the large scale outages of thermal units in the area.

Q. What are Firm Transmission Rights?

A. In California, CAISO has established an annual auction to market rights on its transmission lines. A Firm Transmission Right ("FTR") is a one megawatt one-way

priority right on a transmission line. The FTR owner is entitled to a share of the congestion fee proceeds on the line. In theory, a utility with a firm customer would buy an FTR over the path needed to serve them in order to hedge the congestion fees since they would be paid a share of the proceeds just equal to their congestion payments. There is evidence that by September 14, 2000, Enron had used its FTRs over Path 15, which cost $2 million, to earn congestion rents of $60 million.[7]

Q. Do "Deathstar" transactions create apparent transmission congestion or relieve it?

A. A "Deathstar" transaction can be used to create or relieve congestion. For example, a "Deathstar" transaction could be used to relieve congestion and, as a result, raise prices in the area to which power flows as the result of the reduction in congestion. CAISO identifies the adjustment bids associated with the Deathstar necessary to relieve the imaginary congestion, and charges the participants using the transmission line a congestion fee to cover the costs associated with the payment of these adjustment bids. The price in the congested area is increased by the amount of the congestion fee. Alternatively, a "Deathstar" transaction could add to congestion and, as a result, prevent power from flowing into the purportedly congested area thereby raising the spot market price in the congested area.

Q. Did Enron act alone?

A. No. All "Deathstar" transactions require the use of counterparties. Each participant is both a supplier and customer for the same imaginary energy.

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[7] Memorandum To File, Karl Marlantes, December 20, 2000. EC 071233859. Exhibit NPC-30.

Q. How do Deathstar transactions work?

A. The Enron memoranda indicate that Enron and its counterparties discovered a way to schedule energy into California and schedule energy out of California that exactly cancelled out. In the industry, this is known as "counterscheduling." While the party initiating the transaction knows that the counterscheduled energy will not actually be transmitted – and need not even exist – a profit can be made if knowledge of the counterschedule is kept from CAISO. If CAISO sees only one half of the transaction, it can be mislead into paying adjustment bids and charging congestion fees, allowing the energy in the congested area to be exempted from price controls, or even declaring an emergency. All of these outcomes can be very profitable for the parties to the transaction and increase spot market prices and costs to consumers.

Q. How do each of these outcomes affect prices in the California spot market?

A. In the most simple case, the imaginary congestion relief adds costs to the real users of the congested transmission line. Even though energy has exactly cancelled out – and there is no real impact – CAISO has been mislead into paying for the adjustment of schedules to relieve the imaginary congestion. In addition, market participants using the transmission line pay a congestion fee which increases the spot market price in the purportedly congested area.

The more serious case is where CAISO is fooled into believing that it is impossible to transmit more power into an area like Northern California. In this case, CAISO pays the participants their adjustment bids for reducing their non-existent schedules. More importantly, CAISO faces an emergency since it will not be able to meet its targeted

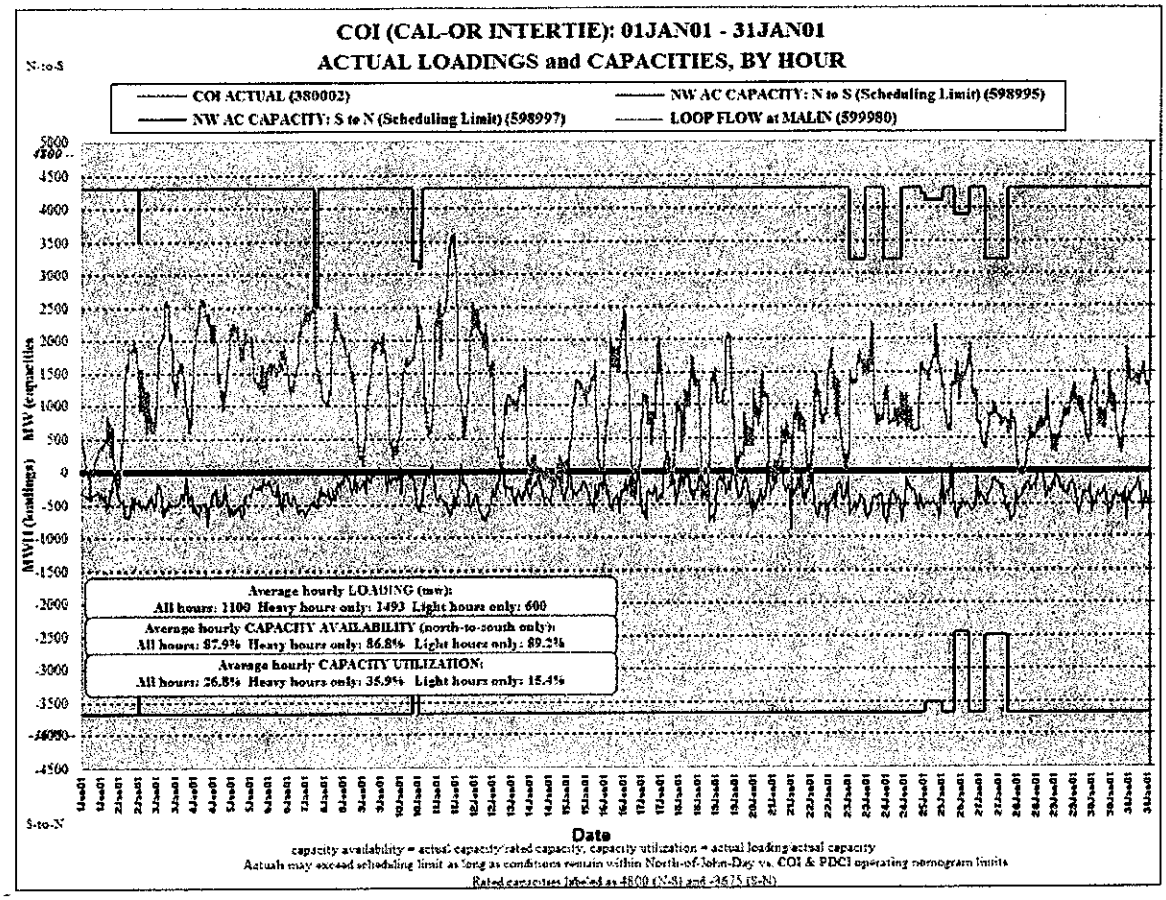
reserves for the congested area. The declaration of an emergency results in power purchases at prices above any caps.

Q. Do you mean to say that sellers would submit schedules solely for the purpose of creating congestion on transmission lines?

A. Yes. Each Deathstar transaction is based on the fact that schedules can be cancelled before the energy actually flows. This allows market participants to create an imaginary cycle of trades through CAISO. They never anticipate that actual generation will run to support the schedules they file with CAISO. One scheme in particular, the "Forney Perpetual Loop," was designed to create an illusion of power flowing in a circle from John Day in Oregon through Mead in Nevada, through the critically congested pathways in California, without any input of energy whatsoever.

Q. Were the transmission constraints that resulted in rolling blackouts in California real?

A. Not entirely. While Path 15 is the best route between Los Angeles and San Francisco, it is also possible to schedule energy north to Oregon over the DC intertie and then back to California over the AC intertie. The following chart shows the Bonneville Power Administration's loads over the AC intertie during the month of January 2001. The yellow line represents actual loadings on the AC intertie. The purple line represents actual AC intertie capacity. The difference is the unused capability to transfer power from Southern California to Northern California by way of Oregon.



While CAISO was forced to resort to rolling blackouts in Northern California, the chart above shows that lines south from Oregon to Northern California were largely unloaded. Deathstar transactions may well explain why CAISO perceived congestion on lines going into Northern California that the rest of the industry could not see.

Q. Has the use of "Deathstar" transactions become clearer recently?

A. Yes. In the past few weeks, discovery by the California State Senate Select Committee to Investigate Price Manipulation of the Wholesale Energy Market has revealed a family of "Deathstar" type transactions designed to exploit parallel paths throughout California. Each of these transactions involves the filing of an imaginary schedule with CAISO that

elicits payments for the alleviation of congestion. The ability to cause congestion can also force CAISO to declare an emergency because congestion blocks access to loads.

Q. What happens when CAISO declares an emergency?

A. Since CAISO views its primary responsibility as one of keeping the lights on, it is willing to pay any price for power during an emergency. For example, if CAISO is close to a Stage 3 Emergency in Northern California and a market participant wants the highest possible price for a block of energy within NP-15, the creation of imaginary congestion into Northern California would make CAISO believe that it was impossible to transmit more energy into Northern California. This would cause CAISO to declare a Stage 3 Emergency. The block of energy within NP-15 could then be sold to CAISO at a vastly higher "Out-of-Market" price. From all appearances, this is what took place during the Stage 3 Emergencies in January 2001.

Q. Please give specific examples showing how Deathstar transactions can work.

A. See Exhibits NPC-31, 32, 33, and 34 describe different types of "Deathstar" transactions, including the "Forney Perpetual Loop," "Red Congo," and "Cong Catcher." Detailed materials authored by Michael Driscoll, an Enron trader, on April 5, 2000, during the height of the California energy crisis, describe how Deathstar actually worked and provide detailed instructions on how to enter a Deathstar transaction into Enpwer (Enron's California transaction software) or CAPS (software to submit schedules to CAISO). "Project Deathstar has been successfully implemented," Mr. Driscoll said, "to

capture congestion relief across paths 26, 15 & COI."[8]

The Big Picture ("Fat Boy")

Q. What is "Fat Boy?"

A. The trading strategy referred to as "Fat Boy" is a scheme used by a power supplier to manipulate CAISO's real time adjustment scheme to extract undeserved payments and inflate spot market prices.

Q. How does the Fat Boy scheme work?

A. CAISO adjusts transmission schedules in "real time" during each hour so that the generation schedules match actual loads. As part of this process, generators submit incremental and decremental bids to CAISO. The CAISO dispatcher submits these bids to a program called "BEEP." When an imbalance on the system occurs, BEEP finds the price associated with the necessary correction and the dispatcher transmits the chosen action to a second program called "ADS", which transmits the information to the generator.

By under forecasting the load it serves, a market participant can cause CAISO to have to address a sudden demand in real time when the actual load materializes. The market participant can then charge an inflated price to meet the additional load. Conversely, by over forecasting load, the market participant can extract payments for changes, *i.e.*, reducing its load, ordered by CAISO. To work well, the market participant must have a

[8] "The FINAL PROCEDURES FOR DEATH STAR, disregard the other 2 emails," Michael Driscoll, May 5, 2000. See Exhibit NPC-35.

dominant market position in the area where the load change would take place. In fact, this was the situation at various locations within California.[9] Artificially high real time prices serve as an incentive for suppliers to remove energy from the daily and hourly market – reserving the energy for sale in the distorted real time market. The impact of such distortions is to increase prices in the hourly and daily markets as well. Energy reserved for sale in the lucrative real time market is not available for sale in other markets.

Q. Is there evidence that market participants were able to take advantage of the Fat Boy scheme?

A. It is very likely that CAISO did not notice the abuse of real time dispatch – especially during the stressed circumstances surrounding the California energy crisis. Our own attempts to reconstruct plant dispatch with the BEEP, OOM, OOS, and RMR directions have been frustrated by CAISO's own data problems and the sheer complexity of the process. From discussions with CAISO managers in this area, it is clear that CAISO seldom reconciles the data after the fact.

Nevertheless, it is apparent that Enron and other market participants took advantage of the Fat Boy scheme. Several whistle blowers have stepped forward from California generators to support the inference of market manipulation from the evidence of inexplicable dispatch instructions.[10]

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[9] While the real time market is one way for CAISO dispatchers to meet their real time needs, they have several other options as well. A number of California resources have been designated "Reliability Must Run" or RMR resources.

[10] Dispatchers from Duke's South Bay plant testified before the Senate Select Committee last year complaining about frequent inexplicable cycling on their units. See Exhibit NPC-36 .

Non-Firm Scheduling for Congestion

Q. Please describe how "Non-Firm Scheduling for Congestion" is used to manipulate markets.

A. The concept here is simple. Because congestion fees were calculated before energy actually was transmitted, Enron and other market participants could schedule the transmission of non-firm energy, receive payment for adjusting (reducing) the scheduled transmission, and then, because the energy was not firm, cancel the sale of energy entirely at no cost to Enron or the participant. As the Enron memoranda note, this practice was quickly identified and prohibited in August 2000. See Exhibit NPC-25.

Q. How might this manipulation of the market have affected prices in the California market?

A. This maneuver allowed the market participant to create an illusion of congestion. CAISO paid the participant its adjustment bid to reduce its non-firm schedule and charged users of the congested transmission line a congestion fee. The congestion fee increased the spot market prices paid by buyers and eventually consumers.

Q. Wasn't this manipulation of the market obvious?

A. Yes, and CAISO eventually reacted. The importance of the scheme was its simplicity. In effect, Enron was taking a free option on a transmission line. Since the transaction was non-firm, Enron received a payment for reducing a schedule that it had no need to fulfill. The slow response of CAISO to this manipulation of the market suggests how little control there was over more complex Deathstar stratagems.

Load Shift

Q. What is "Load Shift?"

A. Load Shift simply is designed to create the illusion of additional loads in areas likely to suffer from congestion. Market participants which have FTRs have the first right to use transmission along specified paths. CAISO pays market participants that yield their FTRs back to the CAISO in order to relieve congestion. Any market participant that serves load and that has FTRs can engage in this scheme. For example, Enron would create the illusion of congestion by scheduling a load considerably larger than its actual size over a transmission line on which it had FTRs. CAISO would pay Enron for yielding its FTRs back to CAISO. CAISO would then charge congestion fees to provide the revenue with which to pay Enron. The imposition of the congestion fees would in turn increase the spot market price. Enron's memoranda indicate that it earned a nominal $30 million dollar profit from this practice as of December 2000.

Q. Can you give an example?

A. Yes. If a market participant scheduled a load of 500 MW in San Francisco, knowing that the actual load was 250 MW, CalPX would schedule resources to meet that load. CAISO would calculate the congestion fees on the basis of moving 500 MW across the congested Path 15 to meet CalPX's requirements. If the participant owned FTRs on Path 15, it would be owed part of the congestion proceeds. In real time, the market participant "tells" CAISO that the actual load is 250 MW. It pays congestion fees on 250 MW but recovers FTR revenues for 500 MW.

Q. How is this different than meeting a true 500 MW load?

A. If the load really was 500 MW, the market participant would have had to transmit 500 MW into Northern California. This would have required it to pay congestion fees in theory just equal to its FTR revenues.

Q. Is there external evidence – other than the Enron memoranda – that the Load Shift scheme has actually been used?

A. Yes. Exhibit NPC-37 is one page from Enron's August 5, 2000 trading log which shows a series of load shift transactions in the center of the page.

Ricochet

Q. What is "Ricochet?"

A. As a term of art among traders, Ricochet has come to mean a schedule filed with an immediate counterschedule. In the summer of 2000, it was clear that market participants were scheduling energy north to the California Oregon Border ("COB"). The resulting import of energy into California was not subject to price caps. In addition, when enough energy was scheduled out of state, the total energy offered to CalPX was considerably less than the real load CAISO was required to serve. Whenever CAISO was unable to meet load and maintain its required reserves, it was forced to declare an emergency.

Q. Were "Ricochet" transactions actually implemented?

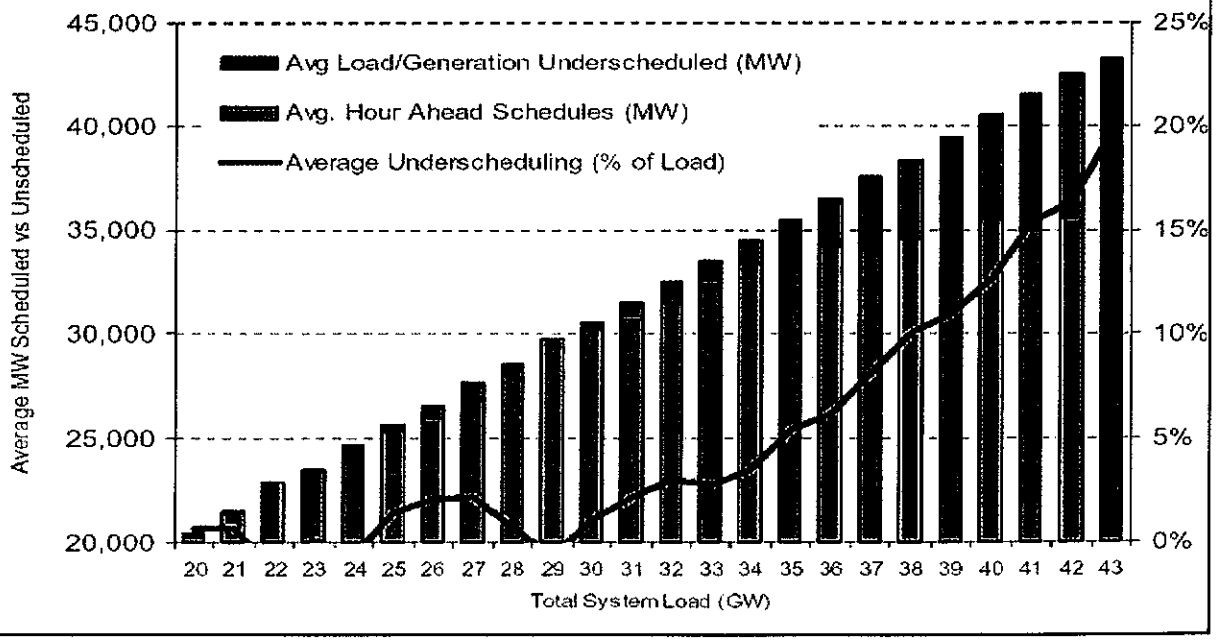
A. This trading strategy has been observed since the beginning of the western energy crisis. During the summer of 2000, a number of analysts observed a large increase in schedules

filed for shipment of power from California to Oregon in CAISO and CalPX reports. The irony of these schedules is that loads in the Pacific Northwest were much lower during that summer, so the probability that such exports actually represented the transmission of energy is low.

The impact of these trades was enormous. CAISO has noted that bids into CalPX fell during periods when emergency declarations might occur. The following chart shows the degree of "underdispatch."

Overall, this manipulation enhanced the ability of sellers to initiate a CAISO emergency by not offering day ahead energy to CalPX and CAISO. As described above, these schemes made power seem scarce to CAISO and could be profitable as the power was "discovered" and available for out of market purchase by CAISO the following day.

Figure 13. Average Underscheduling of Loads and Generation by System Load Level (June, 2000)



Q. Has this abuse been curbed by the FERC's imposition of a price cap on the spot market in the WSCC?

A. This abuse has been largely eliminated by the region wide price caps imposed by the FERC in mid-June 2001. Shipping energy out of state only to "discover" it the following day makes little sense if CAISO is forbidden to pay "imports" more than energy supplies from California. In addition, the FERC's "must offer" rule makes it more difficult for California generators to understate the amount of capacity actually available to CAISO.

Selling Non-Firm Energy As Firm Energy

Q. How can non-firm energy be sold as firm?

A. The concept of non-firm energy is not standardized within the industry. Within the WSCC, "non-firm" is often intended to mean schedules that can be broken on short notice without explanation. Within CAISO, the term means energy not backed by ancillary services. Clearly, substantial confusion can occur between parties over which definition is currently being used. Moreover, audit and enforcement of firmness of energy deliveries are virtually impossible.

Q. Is there any mechanism to detect such problems?

A. Yes and no. The National Electricity Reliability Council has developed a series of tags designed to identify specific schedules across control areas. The plan, though good in theory, is cumbersome in practice. Reconciling schedules with tags is highly labor intensive and leaves many opportunities for abuse.

Q. How does this market scheme affect prices and reliability?

A. The impact on prices is difficult to judge. Enron was promising firm service from sources that could be cut for any operating reason. Clearly, during the California energy crisis, this added to the pressure on CAISO. The impact on reliability is far clearer. If the system had come close to a real crisis, utilities who were counting on a firm supply of energy would have found their supplies interrupted without warning. Since no reserves would have been set aside to back up the non-firm schedules, this could have led to large blackouts with little notice.

Sham Trading

Q. What is "Sham Trading?"

A. Sham trading represents transactions between two parties in order to mislead market participants and investors as to the price and quantity of transactions in the market. The Enron memoranda are silent on sham trading. However, the high level of trading between Enron subsidiaries was identified by the California Public Utilities Commission as an area of concern in Chairman Loretta Lynch's testimony before the Senate Commerce Committee on April 11, 2002. See Exhibit NPC-38. Recent revelations concerning sham trading among market participants underscore the importance of this possible market abuse.

Many power contracts in the WSCC market are indexed to prices reported by Dow Jones. Dow Jones uses a carefully structured calculation based on daily filings from market participants. If sham trades between different subsidiaries of Enron or other parties were

included in the calculations, this would enable market participants to increase the market index.

Dow Jones includes data from Portland General Electric Company and Enron in its indices as well as thirty nine other market participants.[11] Enron could have bought and sold power between their subsidiaries in order to increase the index price. The transactions would have had no impact on Enron, overall, since the profits would have been realized by one or more of its different subsidiaries. However, Enron could have otherwise profited by increases in the Dow Jones index.

Sham trading is of considerable concern to market participants. There has been a widespread perception that Dow Jones indices "overreact" at times – generating prices much higher than the overall market. Our investigations comparing Dow Jones index data against the actual average purchase prices for Nevada Power Company and Sierra Pacific Power Company (collectively, the "Nevada Companies") indicates that Dow Jones can overstate market prices.

[11] American Electric Power, Aquila Power Corporation, Avista Corporation (Washington Water Power), Avista Energy, Incorporated, Chelan Public Utility District, CMS Marketing Services and Trading Company, Douglas County Public Utility District, Duke Power Marketing, DuPont Power Marketing, Dynegy Incorporated (Electric Clearinghouse Inc.), El Paso Energy, Engage Energy U.S. L.P., Enron Corporation, Eugene Water & Electric Board, Hafslund Energy Trading, LLC, Idaho Power Company, LG&E Energy Marketing, Merchant Energy Group of the Americas, McMinnville Water and Light, MIECO Incorporated, Morgan Stanley & Company Incorporated, Montana Power Company, New Century Energies (Public Service of Colorado), PacifiCorp. Pennsylvania Power & Light EnergyPlus, LLC., (PP&L EnergyPlus, LLC), PG&E Energy Trading (US Gen.) Portland General Electric (Enron Corporation), Powerex (British Columbia Power Exchange Corporation), Puget Sound Energy Inc. (Puget Sound Power & Light), Reliant Energy (NorAm Energy Services, Inc.), Seattle City Light, Sempra Energy Trading Corporation, Silicon Valley Power (City of Santa Clara), Snohomish County Public Utility District, Southern Company Energy Marketing L.P., TransAlta Energy Marketing (US) Incorporated, TransCanada Energy, US Generating Power Services (PG&E Energy Trading),

Q. How did you undertake this analysis?

A. It is a simple matter to compare the prices actually observed in the market against the results of the index calculation. The basic result is that Dow Jones indices seem considerably higher during "emergency" periods than actual purchases.

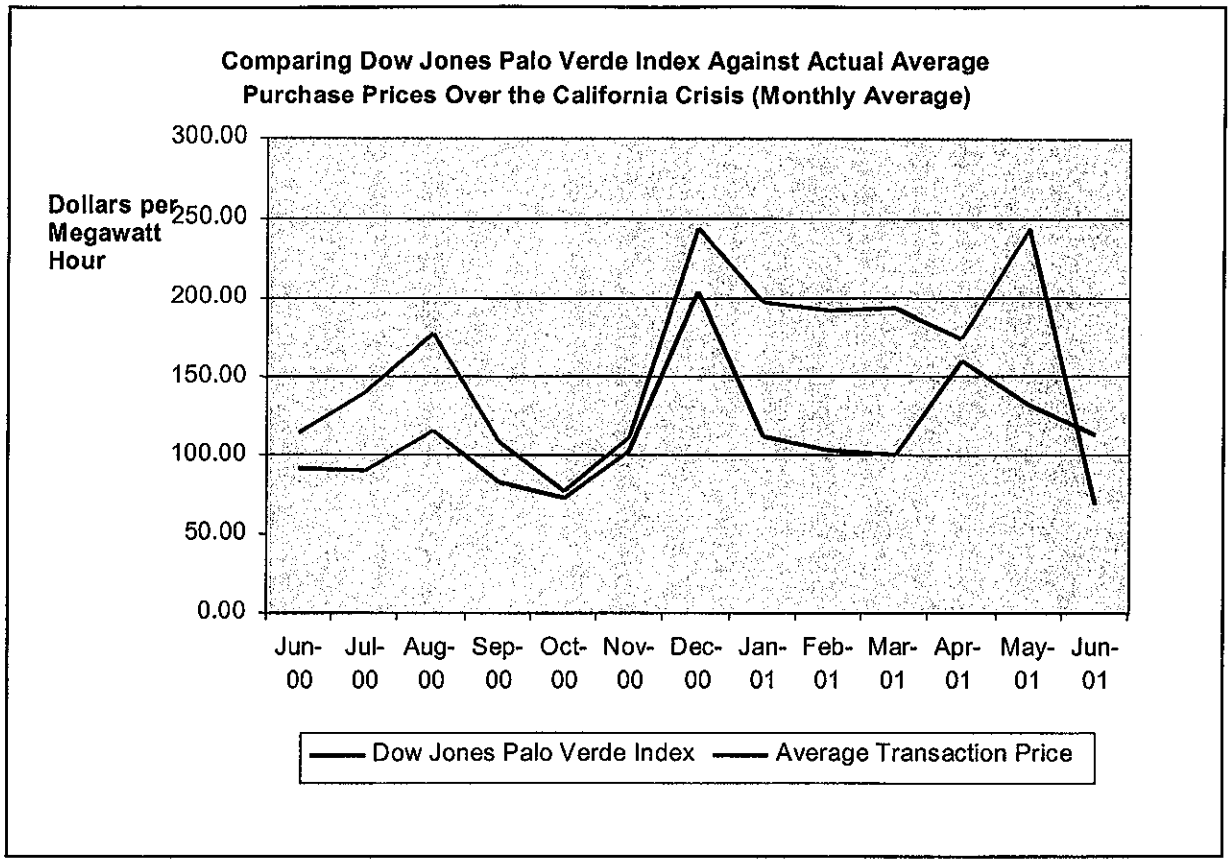
Q. Did you adjust for long term sales?

A. Yes. We used short term transactions only. We have not attempted to reverse engineer transactions on an hour by hour basis to fit the Dow Jones definitions since this would simply reproduce, in part, the failings in the Dow Jones methodology. Instead, we used all short term transactions for each day in which the Nevada Companies made purchases and the Dow Jones index was present. In theory, this should have made the Nevada Companies' purchases more expensive – since Dow Jones does not include short term "super-peak" transactions in their formulas.

Q. Have you actually observed such deviations?

A. Yes. The following chart shows actual average transactions for the Nevada Companies against the prices quoted in the Dow Jones index for the period of the California energy crisis.

Vitol Gas & Electric (AVISTA ENERGY), and Washington Water Power (AVISTA Corp.). Exhibit NPC-39.



Q. Would such price manipulations affect the price of long term contracts?

A. Yes. Since the opportunity cost of long term contracts are revenues in daily sales, biased Dow Jones indices would convince other market participants that the opportunity cost was far higher than it actually was. This would encourage market participants to raise the prices for long term power supplies.

Extent of Market Manipulation

Q. Was Enron the only market participant who was manipulating the California spot market?

A. Clearly not. In the affidavits filed in response to the FERC's May 22, 2002 data requests,

a number of market participants admitted engaging in market abuses ranging from manipulating the CAISO congestion management system to sham trading.

Q. Were the abuses in the California spot market simply a California problem?

A. No. The California spot market is part of a single market that spans the western half of North America including the WSCC. Within this market, prices are closely related by the process of arbitrage. If prices are low in one area, the forces of supply and demand will quickly bring them into balance.

The market abuses described in the Enron memoranda and in the FERC filed affidavits go further than that, however. "Deathstar," in particular, involves transactions that go beyond the borders of CAISO. The raison d'etre of "Deathstar" is the creation of a circular flow of transactions that reaches across transmission lines to the north and the east of CAISO.

Q. Does this conclude your Prepared Direct Testimony?

A. Yes.

VERIFICATION

State of Nevada)
) ss.
County of Clark)

I, Robert F. McCullough, do hereby swear under penalty of perjury that I am the person identified in the attached Prepared Direct Testimony of Robert F. McCullough and that such testimony was prepared by me or under my direct supervision; that the answers and information set forth therein are true to the best of my knowledge and belief; and that if asked to questions set forth therein, my answers, under oath, would be the same.

Robert F. McCullough

Subscribed and sworn to before me this 25th day of June, 2002.

OFFICIAL SEAL
BECKY FORTIER
NOTARY PUBLIC - OREGON
COMMISSION NO. 330222
MY COMMISSION EXPIRES JANUARY 2, 2004

Notary Public

My Commission expires: 1-2-04.