My name is John Powers, and I work as a Principal Consultant at McCullough Research. Thank you very much for inviting me to appear before this panel, as Mr. Robert McCullough has done in the past.

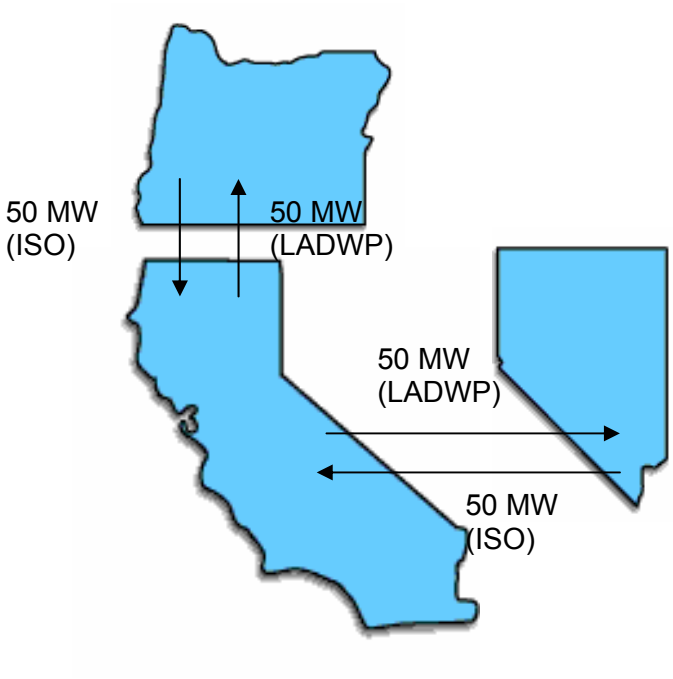
Death Star Detection

We have reviewed the October 4, 2002 report released by Mr. Hildebrandt's group at the California Independent System Operator (ISO) regarding the trading and scheduling strategies of Enron and other parties. McCullough Research has been interested in these strategies for some time, and we have developed a computer model designed to help identify parties and schedules that match the description of trading strategies described in the "Enron memos" cited by the ISO. This model relies extensively on the data made available through the discovery process of the Senate Select Committee to Investigate Price Manipulation of the Wholesale Energy Market, and I want to thank Senator Dunn, Senator Morrow, and specifically Christian Schreiber and Scott Chavez for making this data available. Following Enron's colorful traditions, the working name for this computer tool is the Death Star Detection Engine.

One of the key families of trading strategies described by Enron is known as the "Death Star" strategy. The California ISO has begun calling this family "circular schedules," which is a more descriptive (if less colorful) name. The basic ingredients in a complete "Death Star" are offsetting import and export schedules on the ISO system, combined with offsetting import and export schedules on another system. While it is possible that

this second set of schedules could go entirely around the ISO system (e.g., scheduling through Utah or Colorado), by far the more common and convenient approach was to use other existing transmission contracts (ETCs) in California, such as those owned by various California municipal utilities.

Figure 1: Example Death Star Transactions



As we have begun examining the scheduling practices of Enron and other parties, we have expanded the vocabulary to include "full Death Stars" (described above) and "half Death Stars," which simply consist of a single import or export on the ISO system paired with a single export or import on the same intertie scheduled on a different system.

Many of the most valuable transmission contracts are held by the Los Angeles Department of Water and Power (LADWP). The computer program mentioned above compares ISO records of power imports and exports with corresponding records kept by LADWP. From our initial examination of these data, it appears that Enron made

extensive use of LADWP's ETCs to file circular schedules. In fact, the number of matches we have seen from our model suggests that the practice was more common than has been revealed through any of the FERC proceedings to date. While the results of our model require extensive due diligence, Table 1 below provides some indicative results:

Table 1: Example Enron "Death Star" Events, Summer 2000

			CAISO		*LADWP*	
Date	**Time**	**MW**	**From**	**To**	**From**	**To**
6/6/2000	14-15	40	COB	Mead	Mead	COB
6/13/2000	17-20	45	COB	Mead	Mead	COB
7/14/2000	15-19	35	COB	Palo Verde	Palo Verde	COB
7/15/2000	16-17	35	COB	Palo Verde	Palo Verde	COB
7/17/2000	16-21	45	COB	Palo Verde	Palo Verde	COB
8/2/2000	11,13-20	25	NOB	Mead	Mead	NOB
8/11/2000	12-17	45	COB	Mead	Mead	COB
8/14/2000	13-19	45	COB	Mead	Mead	COB
8/15/2000	12-15	45	COB	Mead	Mead	COB
8/17/2000	11-18	45	COB	Mead	Mead	COB
8/18/2000	11-18	45	COB	Mead	Mead	COB
8/19/2000	14	45	COB	Mead	Mead	COB
8/21/2000	12-19	45	COB	Mead	Mead	COB
8/22/2000	13-19	45	COB	Mead	Mead	COB
9/7/2000	17-20	45	COB	Mead	Mead	COB

The methods used by our model differ from those employed in the ISO report. On the plus side, we have made use of the LADWP data, so we can see matching counterschedules more directly than ISO staff could in their report. On the other hand, we have made no attempt yet to tie these matching schedules to congestion payments; we will be undertaking this analysis in the near future.

In addition to these and other transactions by Enron and its affiliates, our model has identified "full Death Star" events scheduled by other parties. As I indicated above, a positive result from our model is the beginning of a due diligence process, not the end. For example, we identified several sets of matching schedules filed by Powerex, the wholly owned subsidiary of BC Hydro. Last week, we had a very detailed discussion with Powerex staff, in which they explained the business purposes of these transactions. The specific transactions under discussion appear to have had a legitimate business purpose, and we were able to improve the matching power of our algorithm as a result of the discussion. (Again, many thanks to Christian and Scott for facilitating these important discussions.)

In addition to the "full Death Star" events described above, we have identified many more "half Death Stars." Indeed, these appear to have been at least an order of magnitude more common. Enron, Powerex, and many additional parties filed exactly offsetting schedules on the LA and ISO systems. Work is ongoing to discover the legitimate business purposes of these transactions.

Taken together, the ISO report and our own analysis suggest a pattern of circular scheduling on a larger scale than previously identified. We remain concerned that extensive use of deceptive scheduling practices could have contributed to price distortions and operational difficulties during the crisis.

C66 and Artificial Prescheduled Congestion on ISO Lines

We have also reviewed the recent material provided by the ISO regarding limitation of transfers of power from California to the Pacific Northwest. There is no doubt that the Winter of 2000/2001 was a time of great difficulty for the ISO, and that ISO management had many difficult decisions to make. As a general principal, in such times, greater transparency and flexibility are usually preferable to rule-based restrictions. For almost four decades, the Pacific Northwest and California have benefited from the differences between their two electric systems. These benefits rely on a mutual understanding of the capabilities between the systems, and on the massive interties connecting the two regions.

In June, my colleague, Robert McCullough, appeared before this committee speculating on the anomalous congestion reports issued by the ISO during the height of the crisis. We were concerned with high levels of congestion reported by the ISO on the AC Intertie during hours when loadings were clearly very light. Put colloquially, we were forced to wonder why the parking lot was full during hours when the store was closed.

The effect of the imposition of a capacity benefit margin (CBM) on the California Oregon Intertie (COI) restricted the flexibility operators in both regions had to deal with extremely difficult conditions. The explanation provided by the ISO (essentially, that Path 15 was congested, so wheeling power from the Southwest to the Northwest would hurt the ISO's ability to meet load in Northern California) is incomplete. The CBM was imposed every hour of every day for an extended period, including hours during which

Path 15 was not congested. As shown in the table below, the CBM known as "C66" did more than just "restrict" the day-ahead and hour-ahead market for power exports on COI; it closed that market during a key part of the crisis. Further, placing restrictions directly on Path 15 would clearly be a more transparent method for explaining to any scheduling coordinators what the real system conditions were.

Table 2: South to North Capacity, California-Oregon Intertie (COI) January 17, 2001 (all figures in MW)

Time	Capacity	ETC	FTRs	Residual	C66	Available Capacity
1	3675	3187	33	455	455	0
2	3675	3187	33	455	455	0
3	3675	3187	33	455	455	0
4	3675	3187	33	455	455	0
5	3675	3187	33	455	455	0
6	3675	3187	33	455	455	0
7	3675	3149	33	493	493	0
8	3675	3149	33	493	493	0
9	3675	3149	33	493	493	0
10	3675	3149	33	493	493	0
11	3675	3149	33	493	493	0
12	3675	3149	33	493	493	0
13	3675	3149	33	493	493	0
14	3675	3149	33	493	493	0
15	3675	3149	33	493	493	0
16	3675	3149	33	493	493	0
17	3675	3149	33	493	493	0
18	3675	3149	33	493	493	0
19	3675	3149	33	493	493	0
20	3675	3149	33	493	493	0
21	3675	3149	33	493	493	0
22	3675	3149	33	493	493	0
23	3675	3183	33	459	455	4
24	3675	3185	33	457	455	2

Even harder to explain (and unaddressed by the recent Fact Sheet) is why such a CBM would be placed on the DC Intertie connecting LA to the Northwest. This transmission corridor is an alternative to Path 15, and no restriction on this path could possibly alleviate congestion on Path 15.

The ISO spends considerable energy defending its authority to impose a CBM. There is no doubt that they can do so – under certain circumstances. The entirety of Section 6.9 in the Dispatch Protocol of the ISO Tariff cited in their Fact Sheet addresses transmission system reliability and security. From the NERC document addressing the same subject, however, it is clear that the intent of CBM and TRM reservations is to allow transmission operators to notify market participants of true operational constraints on their systems -- constraints related to reliability and security issues. That the cited ISO protocol is found in the "Security Monitoring" section of the Dispatch Protocol indicates to the layman that the intent in the ISO Tariff is similar. It may be worth investigating whether or not imposing a restriction on power flowing North when the majority of power is flowing in the opposite direction is typically related to reliability or security.

The ISO's description of their timely disclosure of the imposition of these CBMs is not consistent with our own experience in discussing the matter with a great many industry professionals. We have had numerous discussions with Pacific Northwest industry leaders, and made presentations at conferences well attended by Northwest owners of the COI and DC Interties, and not a single person, even to this day, understood that the ISO had taken specific actions to restrict northbound power scheduling on these interties. In fact, the subject of reduced northbound power deliveries has been litigated extensively without any testimony featuring use of the terms Capacity Benefit Margin or Transmission Reliability Margin.

Our understanding of the ISO's motives here was simply to explain to market participants that if they wanted to move power from the Southwest to the Northwest during this period, they would have to find a different path or wait for the real-time market. However, there is no other path of comparable capacity outside of California, and many plants have operating characteristics that make waiting for the real-time market a risky and inefficient proposition.

We understand that the ISO did not intend to restrict its own flexibility in dealing with the crisis, but that may well have been the effect. Even though the ISO could lift these restrictions in the real-time market, the fact that the restrictions were in place during the Day Ahead and Hour Ahead markets may have had the effect of discouraging market participants from providing any bids whatsoever for power exports.

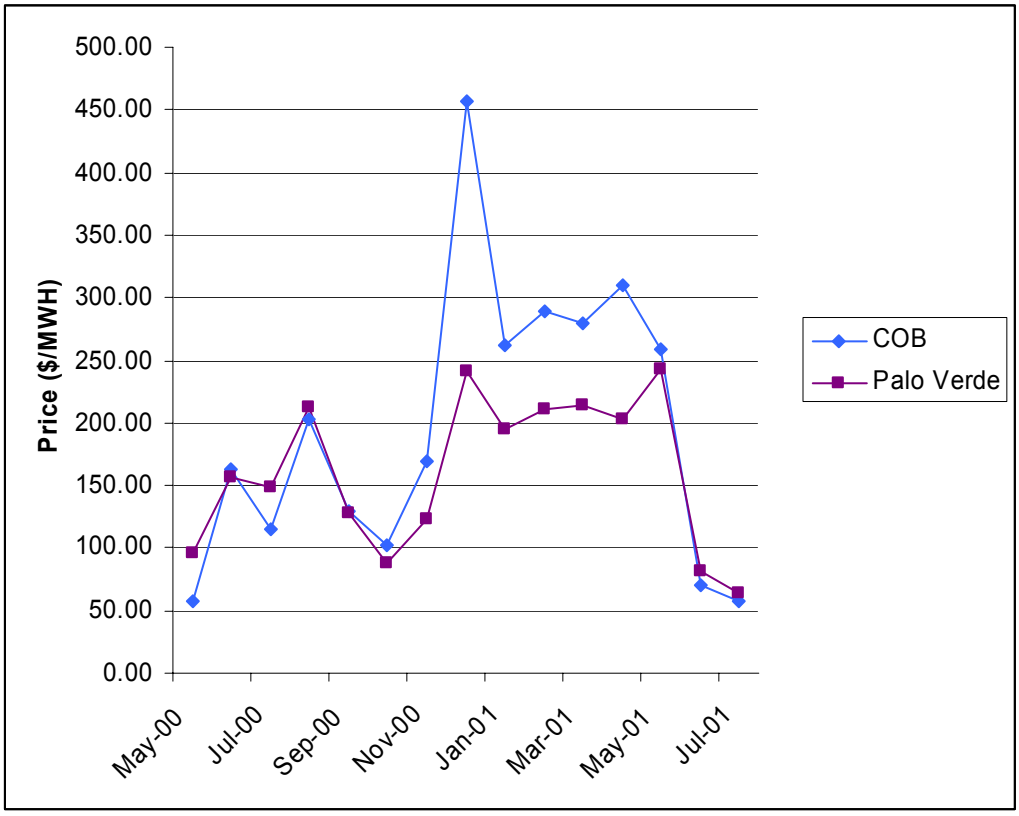
The reality is that power sent to the Pacific Northwest during periods of low use in California raises the availability of power during California peak periods. Thanks to the load shaping abilities of the Columbia River dams and the huge capacity of the interties between California and Oregon, power sent up at night can be reliably available the next day, or several days later. The ISO used this strategy extensively during the crisis – but there may have been additional opportunities foregone by imposing restrictions not well understood by outside parties. The DC Intertie was not fully loaded for many days leading up to the blackouts in mid-January; while we are not as familiar with the specific complexities of Path 15, we understand it was not congested during certain light-load hours either. COI was never fully loaded in either direction during this period. The total

energy shortfall during the period of rolling blackouts was actually quite small, especially compared to the tens of thousands of MWH transferred between California and the Pacific Northwest each day.

ISO inexperience with the larger market may well have been part of the problem. While hydroelectric operations are exceedingly flexible, industry practice is to preschedule the vast majority of hydroelectric operations. When the ISO forced day ahead and hour ahead operations into real time, they sacrificed much of the flexibility that would otherwise have come to benefit both systems.

A side effect of this policy was the curious deviation in pricing between the Pacific Northwest and California during this period. Pacific Northwest prices increased considerably over California's. This pricing deviation caused extensive comment at the time – especially since it was California that was in emergency conditions.

Figure 2: Wholesale Electricity Prices, COB & Palo Verde



The irony in the C66 policy is that it may have increased the prices – unnecessarily – in the same region that the ISO was purchasing. If so, the ISO may have ended up costing itself large sums while enriching groups who were exporting Pacific Northwest energy to California.

Our purpose here is again to state the case for greater transparency and flexibility in ISO operations.

Thank you for your attention; this concludes my statement.