U.S. Department of Energy
Office of Inspector General
Office of Audit Services

Audit Report

Management Controls over Transmission Scheduling and Usage for Memo Schedule Customers of the Bonneville Power Administration

OAS-M-05-01

January 2005

Department of Energy
Washington, DC 20585

January 25, 2005

MEMORANDUM FOR THE ADMINISTRATOR, BONNEVILLE POWER ADMINISTRATION

FROM: William S. Maharay
Deputy Inspector General for Audit Services
Office of Inspector General

SUBJECT: INFORMATION: Audit Report on "Management Controls Over Transmission Scheduling and Usage for Memo Schedule Customers of the Bonneville Power Administration"

BACKGROUND

The Bonneville Power Administration (Bonneville) owns and operates about three-quarters of the Northwest region's high-voltage electric grid, which encompasses 15,000 miles of power lines throughout the Northwest. Bonneville is responsible for ensuring that the region has a safe and reliable electrical grid. Bonneville's Transmission Business Line sells the use of its transmission capacity and related services to utility companies through contractual agreements to generate revenue and pay expenses. The agreements establish customers' rights to schedule either firm (guaranteed) or non-firm (interruptible) transmission.

To manage the flow of power across the Federal Columbia River Transmission System, Bonneville requires customers to submit schedules in advance of their planned transmission usage. However, Bonneville has several customers, including some of the Northwest's largest utilities, who are physically separated from their power generators and have to transmit energy across Bonneville's service area. These customers have less rigid transmission scheduling requirements for a portion of their power generation and submit "memo schedules," which are estimates of their transmission usage for the day. Bonneville began using memo schedules when it had ample transmission capacity; however, increasing transmission demands and changing reliability criteria have now placed constraints on a number of Bonneville's transmission paths. While memo schedule customers are fewer in number than standard schedule customers, their transmission scheduling, particularly over the constrained paths, could impede the efficient management of Bonneville's transmission system. Therefore, we initiated the audit to determine whether Bonneville's use of memo schedules provides for the most efficient use of transmission capacity.

RESULTS OF AUDIT

The use of memo schedules by Bonneville did not always provide for the efficient utilization of transmission capacity. We found that certain memo schedule customers scheduled more transmission than they needed or exceeded their scheduled transmission amounts. For example, several customers consistently scheduled between 30 and 99 percent more transmission than they utilized. Customers were not scheduling accurately because Bonneville has not:

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- Conducted a thorough examination of its contractual agreements to determine its authority to enforce more accurate estimates;

- Developed a mechanism to require customers to more accurately estimate their transmission needs;

- Implemented a formal tracking system to permit comparison of scheduled transmission to actual usage for memo customers; and,

- Charged customers for the non-firm transmission they scheduled but did not use.

Consequently, Bonneville risked incurring operating capacity violations; performing inequitable power curtailments and schedule reductions to other customers; and losing transmission revenue on the unused non-firm transmission.

In our report on *Electricity Transmission Scheduling at the Bonneville Power Administration* (DOE/IG-0637, February 2004), we noted issues with Bonneville's efforts to meet its need for rapid, reliable, and accurate automated scheduling of complex transmission transactions. In response to that report, Bonneville has taken actions to implement sound project management practices for its scheduling automation efforts. While these actions, when complete, should improve its overall operating environment, additional action is necessary to improve the efficiency of Bonneville's transmission scheduling and usage for its memo schedule customers. Therefore, we made recommendations designed to help Bonneville ensure that its use of memo schedules provides for the most efficient use of transmission capacity.

MANAGEMENT REACTION

Bonneville management concurred with the recommendations and has initiated corrective actions to improve overall scheduling efficiency for these customers. However, Bonneville also expressed some concerns with the presentation of certain facts and the potential risks described in the draft report. Where appropriate, we modified our report in response to management's comments. Comments by management and our responses are summarized starting on page 6 of the report. Management's verbatim comments are included as Appendix 3.

Attachment

cc: Deputy Secretary
Under Secretary for Energy, Science and Environment

REPORT ON MANAGEMENT CONTROLS OVER TRANSMISSION SCHEDULING AND USAGE FOR MEMO SCHEDULE CUSTOMERS OF THE BONNEVILLE POWER ADMINISTRATION

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TRANSMISSION SCHEDULING AND USAGE

Scheduled Versus Actual Transmission Use

The Bonneville Power Administration's (Bonneville) use of memo schedules did not always provide for the efficient utilization of transmission capacity. Specifically, several customers either scheduled more transmission than they needed or used more transmission than they had scheduled. The *Western Electricity Coordinating Council* (WECC), which sets reliability standards for the grid in western North America, emphasizes the importance of communicating schedule information and changes on an accurate and timely basis. However, in our comparison of scheduled data to actual transmission data for 7 customers using 12 memo schedule accounts, we found that these customers' transmission estimates were consistently inaccurate.

During the 2-month period we examined, certain memo schedule customers either scheduled more megawatt hours (MWh)[1] of transmission than they used (i.e., overscheduling), or used more than they scheduled (i.e., underscheduling). Specifically, customers for ten accounts scheduled over 1.1 million MWh that they did not use. Over 77 percent of this scheduling variance occurred on one or more constrained paths, which is a path where the transmission equipment is approaching, is at, or is beyond its operating security limit. Customers for five of these ten accounts consistently scheduled between 30 and 99 percent more transmission than they used for the 2-month period. We also noted that customers for two accounts used over 27,000 MWh more than they had scheduled. This scheduling variance is significant because nearly all of the underscheduling occurred on a constrained path[2].

According to Bonneville, memo schedule customers have the ability to more accurately estimate their generation amounts, and thus their transmission needs. The results of our review confirmed that for a number of memo schedule customer accounts, such was the case. Specifically, for 5 of the 12 memo accounts we reviewed, the schedules were overestimated by less than 10 percent during the 2-month period.

Controls Over Transmission Scheduling and Use

Bonneville's use of memo schedules did not always provide for efficient utilization of transmission capacity because Bonneville (1) had not conducted a thorough examination of its contractual agreements to determine its authority to enforce more accurate

[1] One MWh is the electrical unit of power supplied in one hour.
[2] According to Bonneville, the transmission capacity of the West of Hatwai path, which is a constrained path, is 2,800 megawatts per hour under ideal conditions.

estimates; (2) did not have a mechanism in place to require these customers to more accurately estimate their transmission needs; (3) did not have a formal tracking system to compare scheduled transmission to actual usage for these customers; and (4) did not charge customers for the non-firm transmission they scheduled and did not use.

Bonneville officials indicated that they could not enforce better customer estimates because language in contracts provides customers with the flexibility to adjust their transmission schedules to reflect actual amounts. Specifically, Bonneville stated, and we confirmed, that some older contracts include a clause allowing the customers to submit a retroactive report of their actual transmission usage for the previous day, thus providing them with scheduling flexibility. However, Bonneville had not conducted a thorough examination of all the contracts to determine which included the clause and which did not. We found that contracts for 4 of the 12 memo accounts we reviewed did not contain such language. Therefore, for at least a portion of its memo customers, Bonneville may have had more opportunities to require customers to submit better estimates of their transmission needs than it recognized.

Beyond these contracts, Bonneville currently has no other mechanism to enforce or encourage more accurate scheduling by memo schedule customers. Specifically, its Open Access Transmission Tariff, which is Bonneville's set of terms, conditions, and price schedules for providing transmission services, is silent regarding required accuracy of the estimates submitted by memo schedule customers. Bonneville currently relies on voluntary cooperation by customers to obtain more accurate transmission schedules. However, a more enforceable mechanism is needed to ensure that all memo schedule customers are submitting the best estimates possible.

Bonneville also does not have a formal tracking system in place to easily compare scheduled transmission to actual usage for memo schedule customers, and it is unaware of the extent to which the inaccurate scheduling occurs. Currently, Bonneville performs "spot checks" when employees believe that a customer is not scheduling in accordance with its needs. However, without a formal system, Bonneville is not consistently comparing scheduled to actual transmission data and may not be identifying all problems. In order for us to make this comparison during the audit, we obtained copies of daily schedules, compared them to customer transmission usage reports, and then manually loaded the

data into a spreadsheet for comparison purposes. Although this process can be done, it is a time-consuming one that could be streamlined by adopting a formal tracking process to improve Bonneville's ability to easily identify those customers that do not schedule accurately.

Finally, Bonneville's policy is not to charge customers for the non-firm transmission they schedule and do not use. For example, a customer can schedule a large amount of non-firm transmission and then choose to use little or none of it. Therefore, customers have little or no incentive to schedule only what they need.

Impact of Inaccurate Scheduling

Inaccurate scheduling by customers places Bonneville at risk of (1) incurring operating transfer capability (OTC) violations; (2) implementing inequitable curtailments and schedule reductions; and (3) losing revenue on unused non-firm transmission.

Operating Transfer Capability Violations

WECC policy indicates that an OTC violation occurs when actual energy flows on the transmission system exceed established operating limits for over 20 or 30 minutes, depending on the type of path. When the OTC is exceeded, Bonneville must take corrective action to restore energy flows to acceptable levels. If Bonneville cannot reduce energy flows to acceptable limits within specified timeframes, it risks WECC sanctions, including monetary penalties. WECC sanctions depend on the extent and frequency of the violation, but the penalty can range from a notification letter of noncompliance up to a notification letter plus a monetary penalty of $10 per megawatt (MW) exceeded.

Inaccurate transmission scheduling impairs Bonneville's ability to manage its transmission system, which places it at a higher risk of incurring OTC violations. Both underscheduling and overscheduling create a higher risk of OTC violations by making "curtailments" – procedures to relieve congestion on transmission lines by cutting customers' schedules – more difficult. Overscheduling can reduce Bonneville's ability to effectively implement curtailments because it uses the transmission schedules as a basis for taking action. If the curtailment is ineffective, Bonneville will have to apply additional rounds of schedule cuts, making it more difficult to curtail energy flows within the required time limits.

Likewise, Bonneville's risk of an OTC violation increases when customers underschedule their transmission needs, especially when

this occurs on a constrained path. This is because, as customers exceed scheduled amounts, there is more energy flowing over Bonneville's transmission lines than planned. Bonneville cannot always readily determine the source of the added energy. Therefore, Bonneville's actual energy flows can unexpectedly exceed OTC limits, and it could encounter delays in implementing curtailments if it cannot quickly determine the source of the added energy. We found that during the 2-month period, nearly all the underscheduling occurred on a constrained path for which Bonneville had sold more contractual rights to customers than it has available capacity. Although an OTC violation did not occur, such underscheduling increases the risk of such problems.

Bonneville indicated that its dispatchers have various options available to relieve congestion on a path, such as rerouting transmission to an alternate path. Bonneville would apply such options before considering emergency procedures, such as manual load shedding (dropping customers' power supply). However, based on our analysis, we concluded that more accurate scheduling by customers would simplify and could improve Bonneville's timeliness in implementing congestion relief options, and thus reduce the potential need for emergency procedures.

Inequitable Curtailments and Schedule Reductions

Because of inaccuracies in memo schedules, curtailments can be inequitable because some customers may see a reduction in their energy flows while others may not. For example, a customer may not experience an actual reduction in transmission because it significantly overestimated its transmission use. However, other customers who accurately schedule transmission needs could experience an actual reduction.

When customers submit inaccurate schedules, Bonneville may be required to implement schedule reductions that would otherwise not be needed. In addition to the WECC requirement that actual flows must remain within acceptable limits, WECC policy also states that the sum of transmission schedules on a path must remain within acceptable operating limits. Therefore, overscheduling can create the appearance that operating limits are being exceeded. If this occurs, Bonneville may have to reduce customers' schedules to meet acceptable limits.

Potential Revenue Loss

Finally, Bonneville could also be losing potential revenue on non-firm sales when memo customers schedule more transmission than they need. This is because customers are not required to pay for the non-firm transmission they schedule and do not use. When customers schedule large amounts of non-firm transmission but do not use it or sell it to other customers, Bonneville loses the opportunity to sell the transmission to other customers.

During the 2-month period reviewed, memo schedule customers overscheduled more than 17,000 MWh of non-firm transmission. This non-firm transmission was valued at over $61,000 and could have potentially been sold to other customers. According to Bonneville, the amount of revenue lost would depend on various factors, such as billing options, timing, and demand. We were unable to assess the impact of these factors because Bonneville does not record the instances when it turns customers away due to lack of availability, nor does it maintain historical records of how much non-firm transmission is made available for sale. Nonetheless, several Bonneville employees indicated that customers seeking non-firm transmission service are occasionally turned away due to lack of availability.

RECOMMENDATIONS

To ensure that Bonneville's use of memo schedules provides for the most efficient usage of transmission capacity, we recommend that the Bonneville Administrator direct the Transmission Business Line to:

1. Examine existing customer contracts to determine Bonneville's authority over memo schedules and apply any available authority to obtain better customer estimates of transmission needs;

2. Propose additions to its transmission terms and conditions that would require customers to:

    a. More accurately estimate their firm transmission needs; and,
    b. Pay for the non-firm transmission they schedule but do not use; and

3. Develop and implement a formal tracking system compare customers' scheduled and actual transmission usage.

MANAGEMENT REACTION

Bonneville management concurred with the recommendations and has initiated corrective actions to add to the overall scheduling efficiency for memo account customers. However, Bonneville also had some concerns with the presentation of certain facts and disagreed with some of the potential impacts described in the draft report. Specifically, Bonneville was concerned that the examples used in the report do not assist the reader in evaluating the importance of the issues; the report paints an unrealistic picture of operations risks; the recommendations would not significantly benefit operations; and the report overstates the economic impacts of inaccurate scheduling by memo schedule customers.

AUDITOR COMMENTS

Bonneville's comments are responsive to our recommendations, and its proposed corrective actions, when fully implemented, should improve the management of memo schedule customer accounts. However, we disagree with Bonneville's assertions that the examples presented do not meaningfully assist the reader in evaluating the importance of the issues or that the potential risks are not attributable to memo account scheduling inaccuracies. The examples in our report demonstrate that memo account scheduling practices continue to create challenges to Bonneville's efficient management of the system, and more accurate scheduling by memo account customers would improve that efficiency.

The potential risks outlined in our report were described to us by Transmission Business Line employees who play important roles in managing memo account schedules. Throughout the course of the audit, Bonneville employees expressed their concerns with the inefficiency of the system and the operational difficulties in managing inaccurate schedules. We believe that more accurate scheduling by Bonneville will reduce the risks described in the report and eliminate some of the difficulties associated with managing memo account schedules. Therefore, we believe the recommendations could significantly benefit operations.

We acknowledge Bonneville's concern that the amount of any revenue losses would depend on a number of factors, and we identified some of these factors in the final report. However, we disagree with Bonneville's assertion that all of the transmission discussed in the report had been sold. While we recognize that customers pay for their firm transmission rights regardless of whether or not the transmission is used, non-firm transmission may not always be sheltered as part of firm transmission rights. Therefore, Bonneville remains at risk of revenue losses due to inaccurate scheduling by memo account customers.

Finally, in response to Bonneville's concern with the description of unnecessary curtailments, we have made changes to the final report to make clear the distinction between curtailments and schedule reductions.

Appendix 1

OBJECTIVE

To determine whether Bonneville's use of memo schedules provides for the most efficient use of transmission capacity.

SCOPE

The audit was performed at Bonneville's Transmission Business Line facilities in Vancouver, Washington between March and September 2004. The audit compared Bonneville's scheduled and actual transmission for 7 customers using 12 memo schedule accounts for the period February 1, 2004 to March 31, 2004. This 2-month period was examined because it represented the most recent data available at the start of the audit.

METHODOLOGY

To accomplish the audit objective, we:

- Compared scheduled transmission amounts with actual usage amounts;
- Reviewed laws, regulations, policies, and procedures for transmission scheduling;
- Reviewed contractual agreements with customers;
- Interviewed Transmission Business Line personnel; and,
- Reviewed the *Government Performance and Results Act of 1993* and determined if performance plans and measures had been established.

The audit was performed in accordance with generally accepted Government auditing standards for performance audits and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit. Due to the limitations with Bonneville's automated transmission data for memo schedule customers, we were unable to rely on computer-processed data. Therefore, we primarily used documentary data to accomplish our audit objective.

An exit conference was held with Bonneville officials on January 18, 2004.

PRIOR AUDIT REPORTS

- *Electricity Transmission Scheduling at the Bonneville Power Administration* (DOE/IG 0637, February 2004). The objective of the audit was to determine whether or not Bonneville had a scheduling system in place to meet current and future transmission needs in an automated, deregulated environment. The result of the audit was that Bonneville does not have a system that can meet the need for rapid, reliable, and accurate electronic tagging and scheduling of a large volume of complex transactions. This occurred because Bonneville lacked a comprehensive project plan and system development and implementation procedures. Bonneville had already spent $25 million in developing the system and would likely have to spend more to develop a fully functioning system.

- *Information System Development Practices at the Bonneville and Western Area Power Administrations* (DOE/IG-0586, February 2003). The objective of the audit was to assess the Bonneville Power Administration (Bonneville) and Western Area Power Administration (Western) information system development activities. The audit disclosed significant problems with the development of 9 of the 11 major projects included in the review. For example, a major Bonneville project lacked key development activities, such as a cost-benefit analysis, which resulted in schedule slippages of over 2 years and the write-off of approximately $9 million for the abandoned portion of the system development. The report indicated that Bonneville and Western had incurred approximately $11 million in cost overruns due to the key development activities that were not performed.

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memorandum

Bonneville Power Administration

DATE: December 8, 2004

REPLY TO ATTN OF: IG-32 (A04DN031)

SUBJECT: Response to Draft Audit Report on Management of Memo Account Schedules

TO: Rickey R. Hass, Assistant Inspector General for Audit Operations – IG-32

Thank you for the opportunity to comment on the Draft Memo Account Schedule Report dated November 10, 2004. The Bonneville Power Administration (BPA) agrees with the draft report's recommendations because they add to overall scheduling efficiency for the small memo account portion of BPA's scheduled transmission capacity. However, since memo accounts have been successfully managed as part of normal operations, we believe the recommendations are unlikely to produce significant dollar savings. Savings estimated in the draft report are speculative since transmission must be available and there must be a willing buyer and seller; assumptions supported neither by the report nor our experience. Meanwhile, since operational risks discussed in the draft report are not attributable to memo account scheduling inaccuracies, we believe the recommendations will not significantly benefit operations.

We are taking the following actions to respond to the recommendations:

1. BPA is identifying memo account problems and notifying customers about them. Some large customers have changed their estimating practices in response to our initial requests. We expect others to respond as new procedures are developed. A few customers have asserted that their contract rights allow retroactive reconciliation of schedules and prevent resolution of memo account issues.

   Legal staff, in conjunction with contracts staff, is currently reviewing memo schedule provisions in BPA contracts. Upon completion of the reviews for each customer, a one-on-one meeting will be held to encourage accurate memo account scheduling. In preparation for these meetings, BPA has held three joint customer meetings. We expect to complete this process by October 1, 2005.

2. Staff drafted proposals for the 2006 Transmission Rate Case that would address memo accounts including a scheduling deviation penalty, a curtailment compliance penalty and a take- or-pay rate for the hourly nonfirm product. The penalties and take-or-pay nonfirm product would provide financial incentives to encourage accurate scheduling. The proposals and their impacts are further described in Appendix 1, enclosed. There is a tentative agreement with customer representatives to settle the rate case. The agreement should include a curtailment compliance penalty and a take-or-pay nonfirm product.[1] We expect to complete the rate case and implement new rates by October 1, 2005.

3. BPA has created a tracking system to monitor the accuracy of memo account schedules by customers. The system allows BPA to monitor whether its voluntary efforts have been successful and confirm that transmission capacity is being provided efficiently.

[1] Rate case proposals must be approved in a rate proceeding under 16 U.S.C § 839e(i), so BPA cannot promise that staff proposals will be unchanged or part of the 2006 rates.

While we agree with the draft report recommendations, we believe the report paints an unrealistic picture and overstates the economic impacts and potential operational consequences of memo account use by a few BPA customers. For example, the discussion on page one of the reports misstates the scope of this issue by inferring large constant volumes of energy being transferred over constrained paths during curtailment and the potential consequences of such actions. Additionally, the report states, "Customers for ten accounts scheduled over 1.1 million MWh that they did not use." Whether that amount is significant depends on many issues, including the timing and duration of the schedules, as well as loading restraints on pathways.

The report also notes that five of the ten accounts "scheduled between 30 to 99 percent more transmission than they used for a 2-month period." These percentages may be insignificant if they do not represent a large transaction over a short period of time on a constrained transmission path. Indeed, in our experience, most of the time this type of scheduling has inconsequential operational impacts and is inefficient. Moreover, the report fails to note that all of the transmission in question had been sold. Sales lost due to inefficiencies from memo account scheduling would have been nonfirm resales of the previously sold firm transmission capacity that would likely be sheltered by customers under their firm demand. In the end, the quantitative information cited in the report does not, on its own, make a case for memo account impacts on scheduling or operations, or meaningfully assist the reader in evaluating the importance of the assertions.

The draft report also mischaracterizes the relationship between curtailment and memo accounts by inferring that memo account scheduling inaccuracies can induce unnecessary curtailments. Curtailments are directives by dispatchers in response to real time energy flows, problems caused by unplanned events such as outages, not memo account schedule deviations.

Appendix 2 contains additional technical, editorial, and policy comments to improve the balance and accuracy of the report. We have had several productive conferences with IG staff to address these concerns. BPA will include a link to the final audit report and other relevant background information on our web site at http://www.bpa.gov/corporate/about_bpa/audits/

Again, thank you for allowing us the opportunity to comment on the draft report.

Sincerely,

Jeffrey K. Stier
Vice President for National Relations

Enclosure

cc:
M. Mickelsen – Western Area Power Administration
S. Serrano – Western Area Power Administration

IG Report No. OAS-M-05-01

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