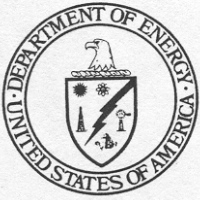




U.S. Department of Energy
Office of Inspector General
Office of Audit Services

Audit Report

Information System Development
Practices at the Bonneville and
Western Area Power Administrations



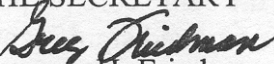
Department of Energy

Washington, DC 20585

February 21, 2003

MEMORANDUM FOR THE SECRETARY

FROM:


Gregory H. Friedman
Inspector General

SUBJECT:

INFORMATION: Audit Report on "Information System Development Practices at the Bonneville and Western Area Power Administrations"

BACKGROUND

The Department of Energy's Power Marketing Administrations are responsible for marketing, selling and transmitting electric power produced largely at various Federal dams to wholesale customers throughout the United States. The Bonneville and Western Area Power Administrations (Bonneville and Western) comprise the vast majority of this activity in the Department. To accomplish their missions, these organizations operate high-voltage energy transmission lines that may cross numerous states and are supported by a complex and critical information technology infrastructure. This infrastructure includes information systems to manage key business operations such as power generation, power and transmission billing, and power grid maintenance activities.

The Office of Inspector General has undertaken a number of reviews designed to evaluate the performance of the Department's information technology program. Based on this work, we concluded, in our *Special Report on Management Challenges at the Department of Energy* (DOE/IG-0580, December 2002), that information technology is one of the most significant management challenges facing the Department. Because of the importance of this issue, we initiated an audit to assess the Bonneville and Western information system development activities.

RESULTS OF AUDIT

Bonneville and Western information system development activities were not always consistent with Federal requirements or guidance. Specifically, we found significant problems with 9 of the 11 major projects included in our review. For example:

- The absence of key system development activities, such as conducting an initial cost-benefit analysis and close monitoring for a major Bonneville project, contributed to schedule slippages of over two years and the write-off of approximately \$9 million for the abandoned portion of the system development;



- Development delays of more than two years and modifications, costing more than \$600,000, to a commercial off-the-shelf application occurred because Bonneville did not perform a detailed analysis to identify shortfalls or examine opportunities to improve existing business processes prior to implementation; and,
- Western permitted three of its regional offices to develop and maintain separate billing information systems, despite having the same core purpose. We concluded that the Department and Western could have enjoyed significant cost savings had the development and maintenance of these separate systems been avoided.

In addition, neither Bonneville nor Western was able to assess the benefits versus resource expenditures for development efforts because project managers did not consistently account for all relevant project costs.

We identified a number of areas in which system development activities could be improved. For instance, program elements had not coordinated all development activities and a number of program-level activities had not been subject to the Chief Information Officer's (CIOs) review. Consequently, management often lacked information necessary to properly evaluate investment decisions and did not take sufficient action to prevent or ameliorate significant implementation delays and project cost overruns totaling over \$11 million.

To their credit, Bonneville and Western have recently formed an Information Technology Alliance comprised of CIOs and other information technology officials that periodically meets to discuss topics of mutual interest, such as opportunities to share innovative technology solutions. Western also implemented a process to facilitate the coordination of enterprise-wide applications and knowledge sharing among its regions. In addition, Bonneville and Western have formed individual information technology executive councils that are briefed on projects specific to each location. We noted, however, that while the respective CIOs are members, the councils do not actively monitor and oversee all projects on an ongoing basis.

We recommended that Bonneville and Western strengthen controls over development activities and require that all projects be coordinated and monitored by the respective CIOs.

MANAGEMENT REACTION

Western and Bonneville management concurred with our recommendations and indicated that they had taken or initiated corrective action.

Attachment

cc: Deputy Secretary
Administrator, Bonneville Power Administration
Administrator, Western Area Power Administration
Director, Office of Management, Budget and Evaluation/Chief Financial Officer
Chief Information Officer

INFORMATION SYSTEM DEVELOPMENT PRACTICES AT THE BONNEVILLE AND WESTERN AREA POWER ADMINISTRATIONS

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SYSTEM DEVELOPMENT

Development Activities

Our review of 11 major projects (see Appendix 1) disclosed that information systems development activities were not always consistent with Federal requirements or guidance. We found development problems with nine of the projects. For example:

- Key planning activities such as cost-benefit analyses had not been performed for eight of the projects we reviewed;
- Evaluations of suitability of potential software solutions were often inadequate or had not been performed;
- Many projects were not adequately monitored and controlled throughout their lifecycle, and project baselines and plans were not revisited in light of scope changes or delays; and,
- For 6 of the 11 projects reviewed, reengineering studies designed to improve business processes before beginning development had not been conducted.

In addition, Bonneville and Western did not consistently include all relevant project costs in accounting for its development efforts.

Project Planning, Monitoring, and Control Examples

In October 1999, Bonneville determined that a new billing system was critically needed due to major changes in the energy industry. The system was intended to replace a legacy system, generate electronic statements, and interface with the corporate accounting system. The new system was to be used by both of Bonneville's major operating units, the Power and the Transmission Business Lines. While initial project costs and timeframe baselines were estimated and a project plan was developed, an initial cost-benefit analysis was not performed. Additionally, planning and baseline documents were not revised to reflect numerous contract modifications and an estimated schedule slippage of over two years. These factors contributed to the termination of the transmission billing portion of the development contract and an increase in the projected cost to produce usable systems to support both business lines.

In another example, the Bonneville Power Business Line initiated a development project designed to replace a largely manual process for tracking power market trading floor transactions. Because the planned system was based on a model already in use at various utilities, management believed it could be easily implemented. Although

Bonneville performed some limited testing of the proposed system, it began development without performing a detailed analysis of its suitability. In addition, even though Bonneville was automating a largely manual process, it did not examine opportunities to reengineer and improve the existing business processes. Further, management was unable to determine if overall project costs were reasonable because a cost-benefit analysis was not performed. Subsequently, this development project experienced unanticipated modifications that cost over \$600,000.

Additionally, three of Western's four regional offices independently developed and maintained separate billing information systems despite having the same core purpose. Specifically, Western permitted its Desert Southwest, Sierra Nevada, and Upper Great Plains Regions to develop separate power billing systems even though they had the same core functions. While Western considered consolidating its various billing systems, it did not perform a detailed analysis to evaluate commonalities or the extent of duplication occasioned by using separate, stand-alone systems. To its credit, after considering a number of options, the Rocky Mountain Region ultimately adopted the system in use by Sierra Nevada rather than initiating a fourth development effort.

Cost Accounting

Contrary to Office of Management and Budget policy requiring accurate and complete lifecycle cost analysis, Bonneville and Western did not consistently collect or report all relevant information technology related project costs. For instance, project managers did not always accumulate all development costs such as Federal/contractor labor and overhead costs associated with the project. Bonneville and Western management told us they were unable to consistently provide accurate project costs because costs were not centrally managed and there were no local requirements to track all costs over the project's lifecycle. Due to deficiencies in the process for accumulating costs, we were unable to either confirm actual project costs or accurately compare costs against initial estimates.

Guidance and Oversight

Bonneville and Western development activities experienced difficulties because management had not instituted an adequate system development methodology. For the 11 projects we reviewed, system development methodologies varied widely. In addition, a lack of thorough and consistent monitoring and oversight of projects by the

Chief Information Officers (CIOs) contributed to the identified problems with systems development. Specifically, program elements did not coordinate all system development activities with the CIOs.

Both Bonneville's business lines and Western's regional offices planned, developed and implemented information systems independent of the respective CIO's involvement. The Bonneville CIO only oversaw about three percent of the estimated \$100 million information technology budget and only had oversight authority over corporate systems. He did not oversee many significant business-line specific projects, such as the Power Billing System development. At Western, the regional offices controlled individual information technology budgets, and only enterprise-wide projects fell within the purview of the CIO. Thus, the CIO did not review all region-specific system development and upgrade initiatives.

Schedule and Cost

These observed development issues contributed to cost increases, delays, and end products that did not always meet users' needs. In addition, top-level management at Bonneville and Western often lacked sufficient information to properly evaluate investment decisions. They did not act quickly to prevent or ameliorate project cost overruns totaling over \$11 million as well as extensive project delays. We noted delays of two years or more for 4 of the 11 system implementations reviewed. In addition, some projects were cancelled or significantly revised because the end-products did not meet users' needs. As an example, inadequate monitoring and control of Bonneville's development of a power and transmission billing system contributed to the termination of the transmission billing portion of the development contract, the write-off of approximately \$9 million in development costs, and a \$5 million increase in the projected cost to produce usable billing systems. For Bonneville's power market trading floor tracking system, inadequate planning and preparation contributed to unanticipated modifications and a rise in estimated project costs from about \$1.2 million to over \$1.8 million. Furthermore, costs for many of the 11 projects were likely understated due to inadequate accounting for project costs. Without complete cost information, management lacked sufficient information to fully evaluate the cost of information technology project costs versus the benefit to be derived.

RECOMMENDATIONS

To improve the management of information system development activities, we recommend that the Administrators for Bonneville and Western require the:

1. Development and consistent implementation of a comprehensive information system development methodology, to include accounting for all relevant project costs.
2. Coordination of all information system development activities with the CIO to ensure that all projects receive adequate monitoring, oversight, and evaluation throughout their lifecycle.

MANAGEMENT REACTION

Western and Bonneville management concurred with our recommendations and indicated that they had taken or initiated corrective action.

Western, however, noted that its three regional power billing systems were developed specifically to support the region that they served. Western management indicated that the functionality of existing power billing systems was examined before initiating new development, and that a path was chosen after evaluating the cost and breadth of the customization required for existing systems. Management also noted that the three power billing systems were developed in 1994, 1997, and 1999, prior to the establishment of the position of Chief Information Officer in Western in 2000.

Bonneville management indicated that acquisition decisions for major information system developments are supported by in-depth cost benefit analyses and due diligence examinations of vendors and their products. Nevertheless, Bonneville stated that the most diligent planning and monitoring could not prevent the damage associated with vendor bankruptcy, a significant factor in the ultimate abandonment of a portion of its billing system at a loss of \$9 million.

AUDITOR COMMENTS

We recognize that the development of Western's power billing systems was completed prior to establishing the position of Chief Information Officer and that officials conducted some analysis of the cost of modifying existing systems. However, Western did not take into consideration the continuing costs of operating, maintaining, and upgrading three separate billing systems. Federal policy requires that management fully consider the costs and benefits of alternative approaches before initiating a development effort.

With regard to Bonneville's development of its Transmission Business Line billing systems, we acknowledge that the project management weaknesses identified in our report were not the sole cause of the \$9 million loss. During our audit we learned that the vendor was experiencing business difficulties, and had been for a long period, but had not declared bankruptcy. As noted in Federal systems development guidance, the application of sound project management practices may have helped management identify vendor difficulties and could have permitted an orderly transfer of the development effort to another firm.

Appendix 1

SYSTEM DEVELOPMENT PROJECTS REVIEWED

Bonneville Power Administration	
Power Business Line – Information Factory Project	\$20,940,000
Power Business Line – Power Billing System	14,054,000
Transmission Business Line – Transmission Billing System	11,299,630
Power Business Line – Transaction Scheduling System (TSS)	9,300,000
Power Business Line – Generation Management System	7,500,000
Transmission Business Line – RODS Transition to ETMS/BCS Project	2,175,000
Power Business Line – KW3000 System	1,810,800
Transmission Business Line – COMPASS Phase II Project	200,000

Western Area Power Administration	
BIDSS/MAXIMO Upgrade Project	\$11,400,000
Rocky Mountain Region TIGER Project	1,562,955
Rocky Mountain Region Power Billing System	124,500

Appendix 2

OBJECTIVE AND SCOPE

The objective of our audit was to determine whether the Bonneville and Western Area Power Administrations' information systems development activities are consistent with Federal requirements and guidance.

The audit was performed between May and November 2002 at the Bonneville Power Administration in Portland, OR, and at the Western Area Power Administration in Lakewood, CO. We did not include the Southeastern and Southwestern Power Administrations within the scope of this audit due to their limited system development activities.

METHODOLOGY

To accomplish our objectives, we:

- Reviewed applicable laws and regulations pertaining to the use and acquisition of information technology. We also reviewed reports issued by the Office of Inspector General and the General Accounting Office;
- Reviewed best practices contained in guidance issued by the Office of Management and Budget, the National Institute of Standards and Technology, the General Accounting Office, and other noted organizations;
- Reviewed the *Government Performance and Results Act of 1993* and determined if performance plans and measures had been established;
- Reviewed numerous documents related to systems development at the Bonneville and Western Area Power Administrations, including system development policy and guidance and documentation for 11 major projects; and,
- Held discussions with program officials and personnel from the Bonneville and Western Area Power Administrations' Headquarters, regional offices, and business lines.

The audit was conducted 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 objectives. Accordingly, we assessed internal controls regarding the development and implementation of information systems. 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. We did not rely on computer-processed data to accomplish our audit objectives. We held exit conferences with management officials on December 9 and 10, 2002.

PRIOR REPORTS

OFFICE OF INSPECTOR GENERAL REPORTS

- *Special Report on Management Challenges at the Department of Energy* (DOE/IG-0580, December 2002). Information technology management remains one of the most serious challenges facing the Department. Although progress has been made in establishing management processes to control information technology planning and investment, and cyber security, the Department must still effectively implement these processes to, among other things, avoid system duplication and minimize vulnerabilities.
- *Power Marketing Administrations' Installation of Fiber Optics* (WR-B-02-01, October 2001). Bonneville and Western were installing fiber optic communication cables that exceeded their operational needs and exceeded the operational needs of utilities with similar requirements. By revising the installation to current and planned operational needs, the PMAs could save approximately \$13 to \$16 million in unnecessary costs.
- *The Department of Energy's Implementation of the Clinger-Cohen Act of 1996* (DOE/IG-0507, June 2001). The Department had not been completely successful in implementing the requirements of the Clinger-Cohen Act of 1996. Specifically, the Department had not closely monitored policy implementation efforts that resulted in inconsistent adherence to policies. The Department's decentralized approach to information technology management and the organizational placement of the CIO caused these weaknesses. Also, the CIO lacked the authority necessary to ensure that policy implementation is consistent across the complex.
- *The U.S. Department of Energy's Corporate Human Resource Information System* (DOE/IG-0494, February 2001). The Department did not adhere to project planning requirements for the Corporate Human Resource Information System (CHRIS) project. As a consequence, full implementation of CHRIS was not anticipated until Fiscal Year 2005, six years after the original forecast. In addition, the final cost will be about \$20.4 million or 155 percent greater than the original estimate. Because of implementation delays and projected cost overruns, it is unlikely that the Department will achieve the project's original estimate of approximately \$9.6 million in savings.
- *Audit of Bonneville Power Administration's Management of Information Resources* (WR-B-96-06, April 1996). Bonneville's management of computer-related equipment was found to be adequate. However, improvements could be made in implementing credit card and property procedures. Specifically, these procedures included control over credit card purchases, ensuring that equipment was tagged and included in property records, maintaining accountability over spare parts, and identifying unused equipment.

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United States Government

Department of Energy

Bonneville Power Administration

Memorandum

DATE: January 28, 2003

REPLY TO
ATTN OF: A-7

SUBJECT: Response to Draft Report on "Information System Development Practices at the Bonneville and Western Area Power Administrations"

TO: Frederick D. Doggett, IG-30 (A02AT010)
Deputy Assistant Inspector General for Audit Services
Office of Inspector General

Thank you for the opportunity to comment on your draft report of the subject audit. Our comments are limited to portions of the report concerning the Bonneville Power Administration (BPA). This response reflects BPA's current efforts to improve the management of our IT infrastructure, efforts that will receive the same rigor and vigor as we are applying to the IT Alliance of the Federal Power Marketing Administrations.

Comments:

Contained in the "Results of Audit" section are observations of several system development activities at BPA for which we offer the following additional information to ensure accuracy of your report.

Major Information System development or acquisition decisions at BPA are supported by in-depth cost benefit analysis and a due diligence examination of vendors and their products provided by nationally recognized energy utility information system intelligence resources. Nevertheless, the most diligent planning and monitoring process for information systems investments cannot prevent the damage resulting from vendor bankruptcy. The collapse of the Transmission Business Line billing system vendor was a significant factor in the difficulties we experienced developing the new billing systems and the ultimate abandonment of a portion of one system at a loss of \$9 million.

Management Reaction:

We agree with your Recommendation 1; "Development and consistent implementation of a comprehensive information systems development methodology, to include accounting for all relevant project costs."

Early in calendar year 2001, BPA's Office of the Chief Information Officer (OCIO) initiated an Enterprise Architecture (EA) strategy for lifecycle management of Information System development, investment monitoring and asset management. This EA strategy is based on the Zachman Architecture model, which is endorsed by the National Federal Chief Information Officer's Council. A component of this comprehensive EA approach is an enterprise Information Technology (IT) Investment Management control process.

In mid-2002, BPA engaged in an executive sponsored IT process re-engineering effort to improve the Agency-wide management of IT that we are implementing. New project management methods that we are implementing will provide project status reporting in a consistent timely, and accurate fashion. The systems referenced in the "Results of Audit" section of your report commenced in 1999 and have not had the benefit of these improvements.

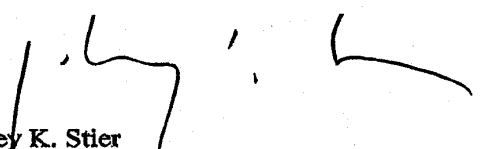
We also agree with your Recommendation 2; "Coordination of all information system development activities with the CIO to ensure that all projects receive adequate monitoring, oversight, and evaluation throughout their lifecycle."

BPA's OCIO is the Agency focal point for IT policy, planning and governance. During the past six months, BPA has implemented improved processes for IT investment management to bring it in line with the Office of Management and Budget Circular A-11 approach.

An additional outcome of the IT process re-engineering effort was the formation of the Business Automation Council (BAC), which consists of both Business and IT managers. It is chartered to actively monitor and oversee all IT investments and initiatives and to optimize for the agency. The BAC is chaired by the CIO.

The BAC, through the CIO, is accountable to the Agency's Business Operations Board, which is comprised of senior executives of the Agency. The board directs and assures the integrated development and operation of all support systems and processes that serve BPA's business lines and program offices.

If you have any questions please contact Brian Furumasu, Acting Chief Information Officer at 503-230-3690.


Jeffrey K. Stier
Vice President for National Relations



Department of Energy
Western Area Power Administration
P.O. Box 281213
Lakewood, CO 80228-8213

JAN 15 2003

MEMORANDUM FOR FREDERICK D. DOGGETT, IG-30 (A02AT010)
DEPUTY ASSISTANT INSPECTOR GENERAL FOR AUDIT
SERVICES

FROM: MICHAEL S. HACSKAYLO *Michael S. Hacskaylo*
ADMINISTRATOR

SUBJECT: Response to Draft Report on "Information System Development
Practices at the Bonneville and Western Area Power
Administrations"

Thank you for the opportunity to comment on your draft report of the subject audit.

Comment. At the top of page 2 of the report, the third bullet beneath the heading "RESULTS OF AUDIT" reads "Western permitted three of its regional offices to develop and maintain separate billing information systems, despite having the same core purpose." While three power billing systems do exist within Western Area Power Administration (Western), each billing system was developed specifically to support the operation and customer structure for the region they serve. Each meets the unique regulatory requirements existing in that region for interface with scheduling and reservation of transmission capacity and e-tagging systems. Very little functionality is redundant between systems. The development or re-engineering of a single power billing system with enough functionality to meet all four sets of regional customer and regulatory requirements would have cost substantially more than did the tailoring of the three smaller systems. In each case, the functionality of existing power billing systems was examined prior to initiating new development, and the new development was chosen as the path of least cost after evaluating the cost and breadth of the customization needed to make the existing systems support the additional requirements.

Management Reaction. The draft report recommends that I require "the development and consistent implementation of a comprehensive software development methodology, to include accounting for all relevant project costs." I concur. To address consistency in development, Western will adapt the DOE guidelines for methodologies commensurate with complexity and size of the Western project. The Western Chief Information Officer Council (WCIOC) already has adopted standard Investment Proposal templates and procedures used to document associated project costs, benefits, and new development decisions. To address project cost accounting and business case development,

Western hired an information technology (IT) capital planning specialist in December 2002. The specialist will track system life-cycle costs in conjunction with OMB Exhibits 53 and 300B planning and execution.

The draft report also recommends that I require the coordination of all information system development activities within Western's Chief Information Officer (CIO) to ensure that all projects receive adequate monitoring, oversight, and evaluation throughout their lifecycle. I concur. I note that the three power billing systems mentioned in this report were implemented respectively in 1994, 1997, and 1999, while I established the Western CIO position in April 2000 in accordance with the Clinger-Cohen Act. Since the CIO position was established, Western has implemented a process for coordination of Western-wide applications and knowledge sharing among its regions. The WCIOC ensures coordination of IT planning and development projects. Additionally, Western formally embraced project management in 1998 and since October 2002 we further strengthened our approach to project management. Project planning now includes cost accounting and life-cycle management as major milestones. A project management advisory group has been established to provide project management oversight. The discipline is being applied using OMB Exhibits 53 and 300B thresholds.

If you have any questions, please contact J. Eun Moredock, Chief Information Officer, at 720-962-7241.

cc:

George Collard, IG-34, Building GTN, Germantown, MD
Daniel Weeber, IG-345, Pittsburgh, PA
Robert Porter, Power Marketing Liaison Office, Washington, DC

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