



Memorandum from the Office of the Inspector General

September 28, 2012

Steven E. Birchfield, MR 6D-C
John G. Trawick, WT 9C-K

REQUEST FOR FINAL ACTION – AUDIT 2011-14477 – REVIEW OF TVA'S FINANCIAL TRADING PROGRAM

Attached is the subject final report for your review and final action. Your written comments, which addressed your suggestions, management decision, and actions planned or taken, have been included in the report. Please notify us within one year from the date of this memorandum when final action is complete.

Information contained in this report may be subject to public disclosure. Please advise us of any sensitive information in this report that you recommend be withheld.

If you have any questions or wish to discuss our findings, please contact David S. Shields, Auditor, at (865) 633-7364 or Rick C. Underwood, Director, Corporate Governance and Finance Audits, at (423) 785-4824. We appreciate the courtesy and cooperation received from your staff during the audit.

David P. Wheeler
Deputy Assistant Inspector General
(Audits)
ET 3C-K

DSS:DBS
Attachment
cc: See page 2

Steven E. Birchfield
John G. Trawick
Page 2
September 28, 2012

cc (Attachment):

Jerry E. Brown, SP 6A-C
Mark A. Creech, MR 2D-C
Micheal B. Fussell, WT 7C-K
Kimberly S. Greene, WT 7C-K
Peyton T. Hairston, Jr., WT 7B-K
Christopher W. Hansen, SP 6A-C
Joseph J. Hoagland, WT 7C-K
Tom Kilgore, WT 7B-K
Christian E. Kuenzli, MR 2B-C
Richard W. Moore, ET 4C-K
David L. Owens, WT 9C-K
Emily J. Reynolds, OCP 1L-NST
John M. Thomas III, MR 6D-C
Robert B. Wells, WT 9B-K
OIG File No. 2011-14477



Office of the Inspector General

Audit Report

To the Senior Vice President, Power
Supply and Fuels, and to the Vice
President and Chief Risk Officer

REVIEW OF TVA'S FINANCIAL TRADING PROGRAM

Audit Team
David S. Shields
Stephanie M. Broome
Rick L. Taylor

Audit 2011-14477
September 28, 2012

ABBREVIATIONS

ERM	Enterprise Risk Management
FCA	Fuel Cost Adjustment
FTP	Financial Trading Program
FY	Fiscal Year
MWh	Megawatt Hour
PwC	PricewaterhouseCoopers
TVA	Tennessee Valley Authority
TVPPA	Tennessee Valley Public Power Association
VaR	Value at Risk

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

BACKGROUND..... 1

OBJECTIVES, SCOPE, AND METHODOLOGY 2

FINDINGS AND RECOMMENDATIONS 3

 DESIGN OF FTP CONTROL STRUCTURE IS APPROPRIATE 4

 COST-BENEFIT ANALYSIS NOT PERFORMED TO ENSURE
 PROGRAM BENEFITS OUTWEIGH RISKS..... 5

 FTP PERFORMANCE IS NOT MEASURED AGAINST THE
 OBJECTIVES OF THE PROGRAM 11

 CUSTOMER COMMUNICATIONS COULD BE IMPROVED 13

APPENDICES

- A. MEMORANDUM DATED SEPTEMBER 26, 2012, FROM JOHN TRAWICK AND STEVEN BIRCHFIELD TO ROBERT E. MARTIN

- B. MEMORANDUM DATED SEPTEMBER 26, 2012, FROM JOHN TRAWICK AND STEVEN BIRCHFIELD TO ROBERT E. MARTIN



Audit 2011-14477 – Review of TVA’s Financial Trading Program

EXECUTIVE SUMMARY

The Tennessee Valley Authority’s (TVA) Board of Directors approved a Financial Trading Pilot Program in September 2003 to hedge or otherwise limit the economic risks associated with the price of commodities covered by TVA’s Fuel Cost Adjustment (FCA). At that time, the maximum Value at Risk (VaR) for TVA’s portfolio was not to exceed \$5 million on an annual basis without the approval of the TVA Board. On May 17, 2005, the TVA Board approved the request to expand and fully implement the Financial Trading Program (FTP). The FTP currently has an aggregate transaction limit of \$130 million (based on one-day VaR) of which \$90 million is allocated to natural gas hedging. TVA management has approved a hedge strategy that requires a minimum of 50 percent to a maximum of 75 percent of the forecasted natural gas volume for the fiscal year (FY) be hedged.

From FY 2006 through the first quarter of FY 2012, TVA’s natural gas-related costs have been \$3.14 billion; the FTP hedging program contributed another \$840 million for total costs of \$3.98 billion. This contribution reflects the difference between the locked-in price of natural gas and the market price of natural gas at the time of delivery. TVA management stated the \$840 million is a result of the dramatic drop in the price of natural gas over the period. In addition, TVA, as of December 31, 2011, expects the hedging program to add \$421 millionⁱ to natural gas costs of \$3.7 billion for the period January 2012 to December 2017 for total natural gas costs of \$4.1 billion. Although this situation could reverse in an environment with rising gas prices, it illustrates the significant potential impact, positive and negative, the FTP can have on TVA’s FCA while attempting to reduce the overall volatility of fuel cost for generation of electricity.

As a result of the growth in FTP financial positions and the inherent risk with the program, we scheduled an audit of the FTP as part of our FY 2012 audit plan. Due to the significant size of the natural gas hedging program, compared to other hedged commodities within the FTP, we generally limited our scope to the natural gas hedging program.

The objectives of our audit were to evaluate:

1. Management oversight and the design of controls in place to mitigate operational risk exposure.
2. The program objectives and related performance measures.
3. Whether TVA is meeting defined performance objectives.

ⁱ The noted \$840 million of recognized realized losses as well as the \$421 million in FTP unrealized losses deferred as regulatory assets were disclosed by TVA in its annual reports for FYs 2006 – 2011 to the United States Securities and Exchange Commission on Form 10-K as well as its quarterly report for first quarter FY 2012 on Form 10-Q.



Audit 2011-14477 – Review of TVA’s Financial Trading Program

EXECUTIVE SUMMARY

4. How the FTP impacts TVA’s overall risk tolerance.

Our audit determined the design of TVA’s FTP control structure was appropriate. However, we identified several areas where management oversight should be improved to validate the usefulness and effectiveness of the program as well as to ensure TVA’s stakeholders’ understanding of the program. Specifically:

- TVA has not conducted a comprehensive cost-benefit analysis to determine whether the benefits derived from the FTP are greater than the inherent risks of the program.
- TVA does not currently measure the performance of the FTP against defined program objectives.
- TVA’s communications with its customers did not sufficiently convey the FTP’s impact on rates.

Our recommendations to TVA’s Senior Vice President, Power Supply and Fuels, and Vice President and Chief Risk Officer are to:

1. Conduct a comprehensive cost-benefit analysis that includes all costs and risks incurred by TVA.
2. Develop and implement macro level performance metrics that specifically measure the objective of the FTP, which is FCA price volatility mitigation.
3. Perform VaR back-testing on a regular basis to measure performance of the VaR model.
4. Improve efforts to ensure FTP performance information is communicated to customers.

TVA Management’s Comments – TVA management provided two separate memorandums in response to our draft audit report. In summary, their responses stated:

1. Although natural gas prices have experienced a dramatic decrease, which resulted in financial losses, the savings to the customer from lower natural gas prices have more than offset the hedged losses. Management also stated it plans to perform a cost-benefit analysis that will address the explicit costs and benefits of the natural gas FTP related to natural gas price risk and will commit to performing:
 - A qualitative assessment of operational risk and reputational risk. However, management stated these evaluations would be performed separately from the natural gas price risk cost-benefit analysis.



Audit 2011-14477 – Review of TVA’s Financial Trading Program

EXECUTIVE SUMMARY

- An assessment of counterparty credit risk.
 - An assessment of collateral/margin posting risk.
2. They plan to retain hedge ladder adherence as the primary performance metric but will commit to calculating new performance metrics, one of which will include an FCA volatility reduction measure.
 3. They plan to perform monthly VaR back-testing.
 4. To improve communication of the FTP performance with customers, TVA will commit to: (1) providing the distributor and directly served customers with status of TVA’s commodity management activities of which financial trading is a component, (2) attending a Power Distributor District Managers meeting at least once per year to discuss the Contracting Plan and the impacts of the FTP, and (3) meeting with TVIC to discuss the Contracting Plan and the impacts of FTP at least once per year.

See Appendices A and B for TVA management’s complete response.

Auditor’s Response – TVA management stated that hedged losses were offset by lower natural gas prices. We agree TVA customers benefited from market conditions that lowered the price of natural gas. However, the \$840 million in natural gas financial trading losses TVA realized reduced the benefit of the lower market gas prices because the losses were passed on to the customers.

Also, it is our opinion an effective cost-benefit analysis should include all costs, not simply the explicit costs of financial trading. Management’s plan to perform risk assessments that are independent of the natural gas FTP cost-benefit analysis may not provide a relevant analysis of the FTP risks because each risk reviewed independent of the others may not appear significant. However, the accumulation of all the risks may be significant. Also, although not specifically addressed by TVA management, in our opinion an analysis of market risk should be included in the cost-benefit analysis. The \$840 million in losses TVA realized clearly illustrate the significant impact the program can have on TVA’s fuel costs which are subsequently passed on to its customers.

We agree with management’s stated plans for (1) calculating new performance metrics, (2) performing VaR back-testing on a regular basis, and (3) improving communications with customers. However, management needs to ensure these communications provide clear information regarding the FTP’s impact on rates and volatility mitigation.

BACKGROUND

The Tennessee Valley Authority's (TVA) Financial Trading Program (FTP) was established to utilize financial instruments to hedge or otherwise limit economic risks directly associated with the price of (1) Fuel Cost Adjustment (FCA) "covered commodities," and (2) other approved commodities under the FTP. TVA's Financial Trading Pilot Program was approved by TVA's Board of Directors on September 11, 2003. At that time, the maximum Value at Risk (VaR)¹ for TVA's portfolio was not to exceed \$5 million on an annual basis without TVA Board approval.

On May 17, 2005, the TVA Board approved the request to fully implement the Financial Trading Pilot Program. The FTP permits the use of futures, options, swaps, and combinations of these instruments to hedge or otherwise limit economic risks associated with the following covered commodities: (1) natural gas, (2) fuel oil, (3) electricity, (4) coal, (5) emission allowances, (6) nuclear fuel, and (7) other commodities (in which the cost is included in calculating the FCA, such as ammonia and limestone).²

The FTP is not permitted to use financial instruments for any purpose other than to hedge or otherwise limit the economic risks associated with the covered commodities. In addition, the FTP is not permitted to use financial instruments for speculative purposes or use nonstandard financial arrangements. The FTP is currently limited to an aggregate transaction limit of \$130 million (based on one-day VaR). Of the \$130 million aggregate transaction limit, \$90 million is allocated to natural gas hedging.

From fiscal year (FY) 2006 through the first quarter of FY 2012, TVA's natural gas-related costs have been \$3.14 billion; the FTP hedging program contributed another \$840 million for total costs of \$3.98 billion. This contribution reflects the difference between the locked-in price of natural gas and the market price of natural gas at the time of delivery. TVA management stated the \$840 million is a result of the dramatic drop in the price of natural gas over the period. In addition, TVA, as of December 31, 2011, expects the hedging program to add \$421 million³ to natural gas costs of \$3.7 billion for the period January 2012 to December 2017 for total natural gas costs of \$4.1 billion. Although this situation could reverse in an environment with rising gas prices, it illustrates the significant

¹ VaR is a calculation representing the amount of money TVA could lose over a certain period of time with a certain level of confidence. TVA bases its VaR calculation on a 1-day holding period with a 95 percent confidence interval.

² On February 12, 2009, the TVA Board approved a pilot program for the hedging of certain construction materials to help control the cost to TVA's projects. In addition, TVA also has pilot programs in place for the hedging of foreign currencies. However, according to TVA personnel, neither of these programs has been implemented.

³ The noted \$840 million of recognized realized losses as well as the \$420 million in FTP unrealized losses deferred as regulatory assets were disclosed by TVA in its annual reports for FYs 2006 – 2011 to the United States Securities and Exchange Commission on Form 10-K as well as its quarterly report for first quarter FY 2012 on Form 10-Q.

potential impact, positive and negative, the FTP can have on TVA's FCA while attempting to reduce the overall volatility of fuel cost for generation of electricity.

OBJECTIVES, SCOPE, AND METHODOLOGY

As a result of the growth in FTP financial positions and the inherent risk with the program, we scheduled an audit of the FTP as part of our FY 2012 audit plan. The objectives of our audit were to evaluate:

1. Management oversight and the design of controls in place to mitigate operational risk exposure.
2. The program objectives and related performance measures.
3. Whether TVA is meeting defined performance objectives.
4. How the FTP impacts TVA's overall risk tolerance.

Our objective was not to assess the effectiveness of TVA's system of internal controls related to the FTP. Therefore, internal controls associated with the FTP were not tested as part of this audit. The scope of our work included the FTP policies, procedures, performance measures, and results from the inception of the FTP. Due to the significant size of the natural gas hedging program, compared to other hedged commodities within the FTP, we generally limited our scope to the natural gas hedging program.

To achieve our objectives, we:

- Obtained and reviewed documentation and guidance pertinent to FTP operations including credit and operational risk mitigating activities.
- Obtained and reviewed previous FTP consulting reports.
- Conducted interviews with TVA personnel from multiple TVA organizations.
- Compared TVA's VaR calculation to the calculation recommended in prior consulting reports.
- Obtained and reviewed information concerning TVA's VaR back-testing.⁴
- Obtained a list of FTP performance metrics and compared them to stated FTP objectives to determine if they were appropriate.
- Obtained and reviewed TVA annual reports to obtain information relevant to the FTP.

⁴ Back-testing consists of looking at how often a loss in a day exceeded the 1-day VaR. If losses exceed the 1-day VaR on about 5 percent of the days for a VaR calculated using a 95-percent confidence level, one would feel reasonably comfortable with the methodology for calculating the VaR. If this happened on about 10 percent of the days, the VaR calculation methodology may not be accurate.

- Obtained and reviewed performance information related to the FTP's objective of reducing fuel cost volatility and its impact on TVA rates.
- Interviewed representatives of the Tennessee Valley Public Power Association (TVPPA)⁵ to determine their opinion of the FTP and what information they have been provided regarding the program.
- Obtained and reviewed Enterprise Risk Management (ERM) risk maps and information relevant to the FTP.
- Conducted interviews with TVA personnel to determine TVA's overall risk tolerance and the impact the FTP has on TVA's overall risk tolerance.
- Obtained a Middle Office review for limit violations occurring from the beginning of FY 2011 through April 30, 2012.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

FINDINGS AND RECOMMENDATIONS

Our audit determined the design of TVA's FTP control structure was appropriate. However, we identified several areas where improvement is needed to validate the usefulness and effectiveness of the program as well as to ensure TVA's stakeholders' understanding of the program. Specifically:

1. TVA has not conducted a comprehensive cost-benefit analysis to determine whether the benefits derived from the FTP are greater than the inherent risks of the program.
2. TVA does not currently measure the performance of the FTP against defined program objectives.
3. TVA's communications with its customers did not sufficiently convey the FTP's impact on rates.

The following provides a more detailed discussion of our findings and recommendations.

⁵ TVPPA is a nonprofit organization that represents the interests of consumer-owned electric utilities operating within the TVA service area.

DESIGN OF FTP CONTROL STRUCTURE IS APPROPRIATE

Many different TVA organizations, councils, and committees play a role in the oversight of TVA's FTP program. At the highest level, the TVA Board is responsible for specifying program purpose and limitations, including portfolio risk limits. At the operational level, TVA's Structuring and Portfolio Management and Standard Products, Power Origination departments in Power Supply and Fuels (Front Office) have responsibility to (1) develop and implement risk-mitigating hedge strategies and (2) enter into the actual financial hedge transactions. The Portfolio Risk Oversight Committee oversees the hedge strategy development and it is the responsibility of the Risk Oversight and Control department (Middle Office) to monitor and determine whether transactions are in compliance with established strategies, procedures, and limits.

From a controls perspective, segregation of duties requires functional separation of Front, Middle, and Back Office⁶ responsibilities. TVA's control structure is as follows:

- The Front Office executes transactions and subsequently enters the transaction details into the Transaction Management System.
- The Middle Office is then responsible for reviewing and verifying all financial transaction details in the Transaction Management System by comparing transactions to broker statements and counterparty confirmations. This review serves as a post-approval for transactions executed in accordance with TVA's hedge strategy and ensures completeness and accuracy of trade data. Approved transactions are "locked" in the Transaction Management System.
- Back Office activities include maintaining margin accounts, reconciling monthly cash activity, and financial reporting.

TVA uses a natural gas hedging ladder to ensure the desired percentage of forecast need is hedged. In general, the hedge ladder requires at least 50 percent, but no more than 75 percent, of expected natural gas requirements to be hedged for the next 18 months with minimum and maximum hedge amounts decreasing beyond 18 months. Hedging up to 75 percent of need allows for changes to generation plans while avoiding over hedging. Recommendations to hedge over 75 percent of need are presented to executive management for approval. Hedge violations are defined as a position above the hard-stop⁷ limit, and the position is not rebalanced:

⁶ The Back Office for the FTP program is made up of several functional areas in TVA including Controller, Business Services- Planning and Commercial Operations, Fossil Generation Controller, Treasury, and Fossil Generation/Coal and Gas Services.

⁷ Hard stop is defined as 100 percent of needs hedged through 18 months, then declining ratably through the 38th month to 75 percent of needs and remaining at 75 percent through the 72nd month.

- For the prompt 3 months within 30 calendar days after notification of a hard-stop violation by the Middle Office.
- For positions beyond the initial 3 months of the ladder, evaluated on a balance of year and calendar year basis, within 90 calendar days after notification of a hard-stop violation.

To assess TVA's compliance with trade limits, we obtained a listing of all hedge ladder limit variances that occurred from FY 2011 and through April 30, 2012. TVA's Portfolio Risk Management group reported financial gas positions were outside ladder limits, but not hard-stop limits, 27 times during FY 2011 and 9 times in FY 2012 through April 30. Each of these instances was subsequently resolved, and TVA's Portfolio Risk Management group concluded because the FTP was never above the hard-stop limits at any time, there were no violations.

In addition to our assessment of TVA's design of its control structure, we also reviewed consulting reports regarding the FTP that were provided to TVA between 2009 and 2012. Although the reports included a few findings related to TVA's controls, the reports generally indicated TVA's FTP controls are standard for their industry.

In summary, the design of TVA's control structure surrounding the FTP appears sufficient to ensure trading is conducted in a manner consistent with TVA Board approval and management-approved hedging strategies.

COST-BENEFIT ANALYSIS NOT PERFORMED TO ENSURE PROGRAM BENEFITS OUTWEIGH RISKS

One of TVA's ERM guiding principles states:

"The cost and benefits of risk management must be understood. A sound risk management plan is based on the understanding of exposure to risk, the cost of mitigation and whether taking on any of the risk is necessary to achieve the TVA mission. Effective risk management plans are actionable and measurable."

TVA management responsible for the FTP stated a cost-benefit analysis for the FTP had not been performed because the cost of the FTP (salaries and trading expenses) is insignificant when compared to TVA's fuel costs. During discussions with management from TVA's Risk Management group, we were informed TVA does not have a high-risk appetite and is generally risk averse. When we asked whether the FTP had ever had a significant impact on TVA's overall risk, we were told by management they were unaware of any significant impact to TVA's risk profile as a result of FTP activities. Management also stated by its general nature, the FTP is a risk-lowering program designed to reduce overall risks associated with price exposures in volatile markets.

Although we agree TVA derives certain benefits by operating the FTP, there are significant inherent risks to operating the FTP that should also be considered. To better illustrate this, we have summarized some of the benefits TVA receives from operating the FTP and some of the risks TVA should consider when evaluating the usefulness of the program.

Benefits of TVA's FTP

Benefits to TVA from operating the FTP include, but are not limited to: (1) natural gas price stability, (2) increased budget accuracy, (3) customer preference for stable prices, (4) increased natural gas market knowledge, and (5) greater market liquidity.

- Natural gas price stability – Attained through the use of financial hedging. Through the use of financial instruments, TVA is able to “lock in” at the intended hedge price. Since changing to a monthly FCA in October 2009, the standard deviation of fuel rates with hedging is \$0.21/megawatt hour (MWh) less than fuel rates without hedges (\$3.27 versus \$3.48). TVA provided the following schedule (see Table 1 below) illustrating the impact of natural gas hedging on rates and on the variation from the average (standard deviation). This schedule shows since inception, the FTP has reduced the volatility of the TVA fuel rate by approximately 8 cents prior to the monthly adjustment in the FCA and by approximately 21 cents after the FCA started being adjusted monthly.

Through April 2012 Actuals		
Since Inception*	Actual Fuel Rate	Fuel Rate Without Hedges
Average	\$21.39	\$20.44
Standard Deviation	\$3.01	\$3.09
Since Monthly FCA*		
Average	\$22.06	\$21.06
Standard Deviation	\$3.27	\$3.48
*The FTP was approved in May 2005. The change to the monthly FCA began in October 2009.		

Table 1

Many factors contribute to FCA volatility. According to TVA management, factors that play a more significant role in FCA volatility than natural gas prices include: (1) rainfall, (2) temperature, and (3) Equivalent Forced Outage Rate.

- Increased budget accuracy – Possible through the use of hedging. In particular, the hedging strategy ladder allows for increased budget accuracy for the prompt 18 months for natural gas fuel expense.
- Customers' preference for stable prices – The primary objective of the FTP. During discussions with the TVPPA, they informed our office distributors and industrial customers have a strong desire for rate stability.

- Increased natural gas market knowledge – Attained through the activities of the FTP. TVA stated knowledge attained in the financial markets is also beneficial to TVA in the physical markets.
- Greater market liquidity – In the financial markets, compared to the physical markets, increases TVA's ability to move in and out of natural gas positions.

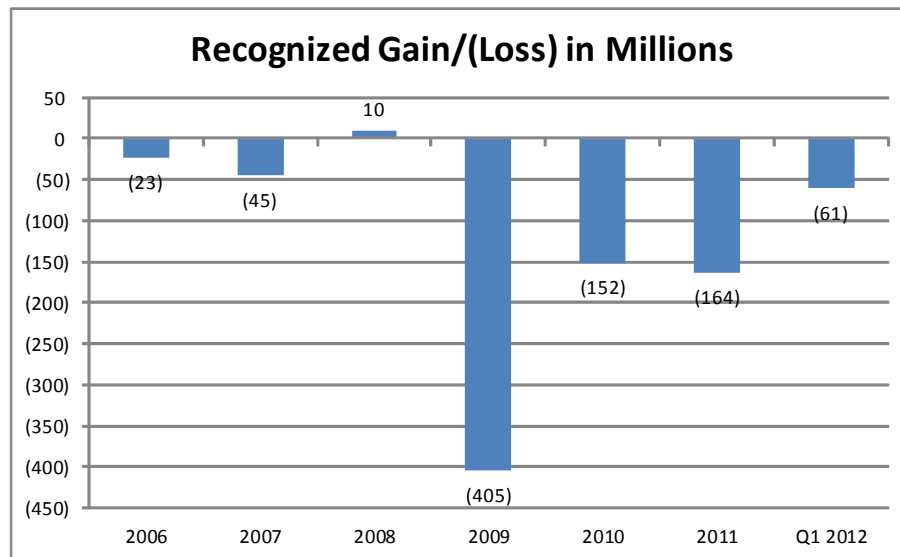
Risks Associated With TVA's FTP

TVA management informed us a cost-benefit analysis for the FTP had not been performed because they considered the cost of the FTP (salaries and trading expenses) as being insignificant compared to TVA's fuel costs. However, an effective cost-benefit analysis should take into account all inherent risks associated with the program. Some of the risks that should be considered in a cost-benefit analysis of the FTP include: (1) market risk, (2) counterparty credit risk, (3) operational risk, (4) reputational risk, and (5) collateral/margin posting risk.

- Market risk – Typically defined as potential variance to budget or cost increases due to higher market prices. However, the other side to this is the risk that hedged prices fall generating trading losses and subsequently resulting in higher-than-market fuel expenses. Hedging is not intended to lower your cost but to stabilize it over time. The objective of hedging is to eliminate the peak prices, but the cost of cutting off the peak is giving away the valley price.

From FY 2006 through the first quarter of FY 2012, TVA's natural gas-related costs have been \$3.14 billion; the FTP hedging program contributed another \$840 million for total costs of \$3.98 billion. This contribution reflects the difference between the locked-in price of natural gas and the market price of natural gas at the time of delivery. TVA management stated the \$840 million is a result of the dramatic drop in the price of natural gas over the period. In addition, TVA, as of December 31, 2011, expects the hedging program to add \$421 million to natural gas costs of \$3.7 billion for the period January 2012 through December 2017 for total natural gas costs of \$4.1 billion. Although this situation could reverse in an environment with rising gas prices, it illustrates the significant potential impact, positive and negative, the FTP can have on TVA's FCA while attempting to reduce the overall volatility of fuel cost for generation of electricity. Table 2 summarizes TVA's natural gas-related FTP recognized gains and losses beginning with FY 2006⁸.

⁸ Data related to FTP gains and losses taken from TVA's annual 10-K and 10-Q financial statements issued during the time period described.

**Table 2**

(Note: According to TVA, the cumulative loss associated with locking in natural gas at the intended hedge price added approximately \$1/MWh to TVA's fuel rate. A \$1/MWh impact is about 1.4 percent on the average wholesale rate. The impact to a residential customer using 1,000 kilowatt hours per month would be about \$1 per month.)

- **Counterparty credit risk** – The potential for losses and increased costs arising from counterparty default. Counterparty credit risk is inherent when private contracts are entered into with direct counterparties. The advantage of direct counterparty trades is avoidance of all or most of the collateral and margin requirements of clearing houses. TVA has already experienced this risk firsthand as it used MF Global, a company that subsequently filed bankruptcy, to clear financial gas trades. TVA had posted approximately \$33 million cash collateral with MF Global at the time of the bankruptcy filing. TVA has recovered approximately \$8 million of this balance from the trustee appointed in the Securities Investor Protection Act proceeding ("Trustee"). TVA filed a claim with the Trustee to recover the remaining funds TVA deposited with MF Global, and on June 4, 2012, the Trustee fully allowed TVA's claim. However, it remains unclear whether TVA will recover all of the remaining funds.
- **Operational risk** – The risk an organization faces that could be caused by human or system errors. Intentional wrongdoing and fraud would also be included in this category. TVA previously had a trader who was not following TVA policies and, as a result, no longer works for TVA. While this trader's actions had no known adverse financial impact to TVA, it does underscore the fact TVA's FTP is not free from operational risks.
- **Reputational risk** – Anything that may have a negative impact on an organization's reputation. TVA risks reputational harm as a result of any of the aforementioned risks. A company's reputation can be damaged much

faster than it can be restored. As Warren Buffet once said, “It can take 20 years to build a reputation and only five minutes to ruin it.”

- **Collateral/Margin Posting risk** – The risk TVA will have to post substantial unexpected cash collateral/margin requirements or other forms of collateral on commodity derivatives and commodity futures. This risk could consequently result in increased cash collateral needs and reduced financial flexibility for TVA. In some instances, collateral/margin requirements can be in the hundreds of millions of dollars depending on the size of the company’s position and market trends. Collateral/margin positions of this magnitude can have a significant impact on TVA, especially if TVA has to borrow money to fund these positions with TVA’s debt ceiling limitations. As of April 2012, TVA ranked “Collateral/Margin Posting” as the tenth most significant risk to TVA.

During calendar year 2012 through the beginning of May, TVA’s total cash collateral for the FTP ranged from about \$155 million to \$325 million (see Table 3 below). Of the total collateral posted, approximately 95 percent was for natural gas positions.

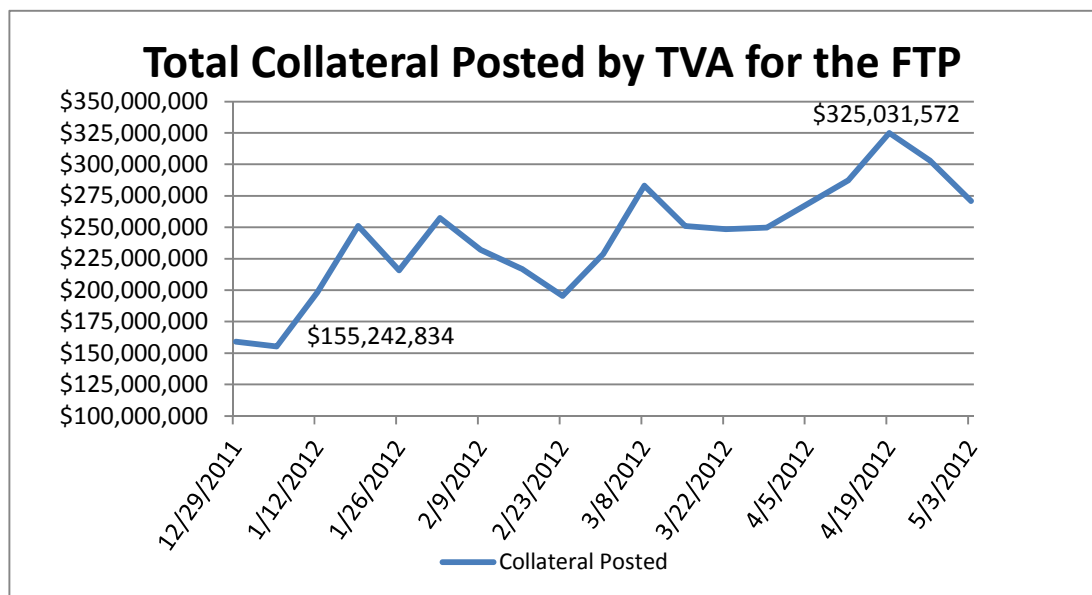


Table 3

With “Collateral/Margin Posting” ranked as TVA’s tenth most significant risk, it appears the FTP program may be increasing TVA’s overall risk exposure to reduce natural gas price exposure. Without performing a comprehensive cost-benefit analysis of the FTP program, TVA management may not be considering all the costs and benefits associated with the program in its risk tolerance deliberations.

Summary – As stated above, we agree the FTP provides a number of benefits for TVA. However, TVA may not be giving consideration to all the FTP risk exposures to accurately determine whether the benefits outweigh the risks of the

program. As stated in TVA's ERM guiding principles, "A sound risk management plan is based on the understanding of exposure to risk, the cost of mitigation and whether taking on any of the risk is necessary to achieve the TVA mission."

Recommendation – We recommend the Senior Vice President, Power Supply and Fuels, conduct a comprehensive cost-benefit analysis of the FTP to determine if the benefits of the FTP are being offset by the risks associated with the program.

TVA Management's Comments – In response to our draft report, TVA management stated:

"To focus solely on the FTP losses without regard to the overall portfolio does not provide a clear picture of the impact to the FCA. Although natural gas prices have experienced a dramatic decrease, which resulted in financial losses, the savings to the customer from lower natural gas prices have more than offset the hedged losses."

Management also stated it plans to perform a cost-benefit analysis that will address the explicit costs and benefits of the natural gas FTP related to natural gas price risk. The costs include administration (salaries, systems, etc.) and operations (transaction costs, etc.), and the benefits include the value of volatility reduction and price certainty. Management also stated it will commit to performing:

1. A qualitative assessment of operational risk and reputational risk. However, management stated these evaluations would be performed separately from the natural gas price risk cost-benefit analysis.
2. An assessment of counterparty credit risk.
3. An assessment of collateral/margin posting risk.

See Appendices A and B for TVA management's complete response.

Auditor's Response – Management stated that hedged losses were offset by lower natural gas prices. We agree TVA customers benefited from market conditions that lowered the price of natural gas. However, the \$840 million in natural gas financial trading losses TVA realized from FY 2006 through the first quarter of FY 2012 reduced the benefit of the lower market gas prices because the losses were passed on to TVA customers.

As discussed in our report, it is our opinion an effective cost-benefit analysis includes all costs, not simply the explicit costs of financial trading. Although management stated it plans to perform separate assessments of various risks, it plans to perform these independent of the natural gas FTP cost-benefit analysis. Performing these independent of one another may not provide a relevant

analysis of the FTP risks because each risk reviewed independent of the others may not appear significant. However, the accumulation of all the risks may be significant. Also, although not specifically addressed by TVA management, in our opinion an analysis of market risk should be included in the cost-benefit analysis. The \$840 million in losses TVA realized clearly illustrate the significant impact the program can have on TVA's fuel costs, which are subsequently passed on to TVA's customers.

FTP PERFORMANCE IS NOT MEASURED AGAINST THE OBJECTIVES OF THE PROGRAM

As discussed in the background section of this report, the primary objective of TVA's FTP is to mitigate the price volatility of the commodities covered by TVA's FCA. This objective is consistent with the objective described by two consultants⁹ employed by TVA to assess the FTP. However, TVA's primary measurements related to the FTP are VaR calculations and hedge position reports. As discussed below, neither of these measure FCA volatility mitigation.

VaR Calculation

TVA's primary risk metric is the VaR measure. VaR is essentially the answer to the question, "What is TVA's worst-case scenario and how much money could TVA lose over a certain period of time with a certain level of confidence?" TVA bases its VaR calculation on a 1-day holding period with a 95-percent confidence interval. Even though TVA has a VaR limit for the FTP, it cannot be used as a performance measure for the FTP because it does not address the objective of the FTP, which is to reduce FCA volatility.

In January 2010, PricewaterhouseCoopers (PwC) recommended TVA implement a new VaR methodology and back-testing. When TVA performed limited VaR back-testing in June 2011, it found it had been calculating the VaR incorrectly and corrected the calculation as of August 17, 2011. However, TVA has not performed another VaR back-test because TVA is in the process of changing the method of calculating the VaR to a Monte Carlo simulation calculation method. TVA stated the average VaR is so far below the VaR ceiling, the calculation error posed no risk of exceeding the TVA Board-approved VaR limit.

Hedge Position Reports

When asked how it measured the performance of the FTP, TVA officials in Power Supply and Fuels and Risk Management stated hedge position reports are TVA's primary performance measure. Using this as a performance measure would indicate the program is successful because TVA had no hedge ladder limit violations from FY 2011 and through April 30, 2012. However, this measure does not provide any information related to the success of the program in

⁹ In its 2009 report to TVA, RMI Consulting stated that providing price stability to customers at a reasonable cost is the most often specified goal of fuel hedging programs. PwC, in a report dated January 2010, similarly stated that utility financial trading programs are generally established for the purpose of limiting economic risk associated with commodities.

reducing FCA volatility. (Note: TVA calculates four other metrics to measure the performance of the gas hedging program, but these are primarily used internally by TVA's Front Office and are not intended to measure the program's effectiveness with regard to FCA volatility mitigation.)

During our review of prior consulting reports, we noted TVA received recommendations from three different consultants (RMI Consulting, Inc.; PwC; and Navigant Consulting, Inc.) to implement a performance metric to measure the hedging objective. In a presentation to the TVA Board's Audit, Governance, and Ethics Committee on March 8, 2010, TVA management informed them that a consultant had recommended TVA implement additional benchmarks to assess the volatility reduction benefit of the hedging program and execution performance/risks. In response to the recommendation, TVA management's presentation stated:

“Agree: Management supports performance benchmarking and back-testing of the effectiveness of its financial hedging program against the stated objective of volatility dampening. For natural gas, upon implementation of the expanded TriplePoint CXL system, management plans to produce an initial performance analysis which will include actual natural gas price performance as compared to both (a) a naked, at-market position and (b) a ‘no financial hedges’ positions . . . (Front and Middle Offices, Q4 2010)”

TVA management informed our office TriplePoint CXL was subsequently implemented in two phases, Q4 2010 and Q2 2011. However, a volatility reduction measure has yet to be implemented.

Recommendations – We recommend TVA's:

- Senior Vice President, Power Supply and Fuels, develop and implement macro level performance metrics that specifically measure the objective of the FTP, which is FCA price volatility mitigation.
- Vice President and Chief Risk Officer perform VaR back-testing on a regular basis to measure performance of the VaR model.

TVA Management's Comments – TVA management stated it plans to retain hedge ladder adherence as its primary performance metric. Management also stated it commits to calculate new performance metrics, one of which will include an FCA volatility reduction measure. Management also committed to performing monthly VaR back-testing. See Appendices A and B for TVA management's complete response.

Auditor's Response – We agree with management's planned actions.

CUSTOMER COMMUNICATIONS COULD BE IMPROVED

TVA recently made a commitment to being more transparent. Regarding the FTP, TVA also made a commitment to communicate. Specifically, in a 2007 presentation to the TVPPA concerning the FTP, TVA stated it would “Communicate, communicate, communicate” while also committing to establishing appropriate performance metrics for the program. As stated previously, TVA has yet to develop a performance measure to address program performance in meeting the objective of reducing fuel cost volatility. Due to the potential effects of the FTP on fuel rates, we interviewed personnel from the TVPPA to determine their opinion on hedging fuel costs.

TVPPA stated it is in favor of a program that will decrease FCA volatility, as rate stability is highly desirable by the distributors. When asked how well TVA communicates the results of the FTP to them, TVPPA stated TVA is generally very good at answering its questions. In addition, the TVPPA members we interviewed stated, in their experience, TVA is more transparent than utilities in the investor-owned community. According to TVPPA, its greatest challenge with regard to attaining information from TVA is in knowing which questions to ask. Additionally, TVPPA stated it would like benchmarking data comparing TVA’s FTP expenses and performance to peer utilities.

We asked TVA if TVPPA was aware of the trading losses the FTP has incurred since its inception, and we were informed TVPPA reviews TVA’s financial statements and would likely be aware of those losses. However, during our interview with TVPPA, we asked if it reviews the financial statements to obtain FTP-related information. TVPPA stated it does not specifically review the financial statements for this information, instead stating it primarily looks for information detailing fuel cost trends. TVPPA also informed us it was not aware of the FTP’s impact on rates.

Recommendation – We recommend the Senior Vice President, Power Supply and Fuels, improve efforts to ensure FTP performance information is communicated to customers.

TVA Management’s Comments – In their comments to the draft audit report, TVA management stated:

“As stated in the Audit Report, TVA’s customers are generally most concerned about the overall fuel cost trends, not individual components that are not driving changing in those trends. Focusing on a particular element of broader program may not facilitate improved communication.”

Management also stated, however, to improve communication of the FTP performance with our customers, TVA would commit to:

1. Provide the distributor and directly served customers with status of TVA's commodity management activities, of which financial trading is a component.
2. Attend a Power Distributor District Managers meeting at least once per year to discuss the Contracting Plan and the impacts of the FTP.
3. Meet with TVIC to discuss the Contracting Plan and the impacts of FTP at least once per year.

See Appendices A and B for TVA management's complete response.

Auditor's Response – Our report does not state that TVA's customers are generally most concerned about the overall fuel cost trends, not individual components that are not driving changing in those trends. Instead, we stated that TVPPA informed us it does not specifically review TVA's financial statements for FTP-related information, and they were not aware of the FTP's impact on rates.

We agree with management's plan to improve communications of the FTP performance with TVA's customers. However, management needs to ensure these communications provide clear information regarding the FTP's impact on rates and volatility mitigation.

September 26, 2012

Robert E. Martin, ET 3C-K
Assistant Inspector General
(Audits and Inspections)

RE: Audit 2011 - 14477 - REVIEW OF TVA'S FINANCIAL TRADING PROGRAM

We appreciate the opportunity to provide comments on the Draft Audit Report
2011-14477 - Review of TVA's Financial Trading Program.

MANAGEMENTS OVERVIEW OF AUDIT RESPONSE

TVA's natural gas Financial Trading Program is focused on reducing volatility of natural gas fuel price as just one component of providing stable fuel cost for electricity consumers in the Tennessee Valley. Both the financial and physical natural gas cost is reflected in the Fuel Cost Adjustment along with the managed cost of coal and uranium fuel.

The use of standard financial instruments allow for a cost efficient and effective method to stabilize gas price. When considering the overall impact of the hedge program, it must be evaluated based on its effectiveness in managing volatility. Hedge gains or losses must be considered in relation to the movements in overall gas price. In the last few years, TVA customers have benefited from dramatically lower gas prices, while also experiencing less gas price volatility as a result of the financial hedging of natural gas.

After reviewing the audit report, Power Supply and Fuels (PS&F) and Risk Management would like to provide the following comments and clarifications to the Draft Audit Report:

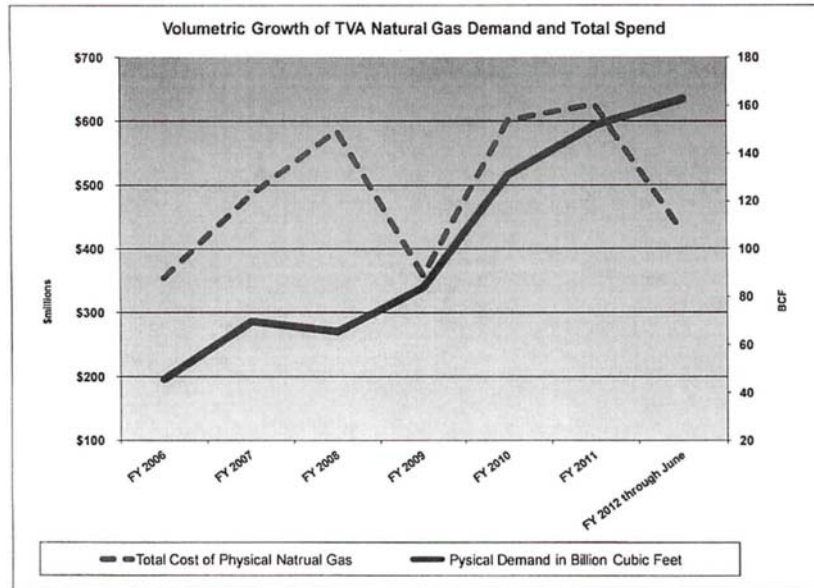
EXECUTIVE SUMMARY

Audit Report presents Item (1) Page i

As a result of the growth in FTP financial positions and the inherent risk with the program, we scheduled an audit of the FTP as part of our FY2012 audit plan. Due to the significant size of the natural gas hedging program, compared to other hedged commodities within the FTP, we generally limited our scope to the natural gas hedging program.

Management clarification and graph to further illustrate Item (1) Page i

TVA's utilization of natural gas has increased from 46 BCF in 2006 to 152 BCF in 2011, and as a result of the growth in natural gas, TVA's FTP positions have increased from 4.3 BCF at the beginning of 2006 to 234 BCF at the end of 2011. Due to the significant size of the natural gas hedging program, compared to other hedged commodities within the FTP, we generally limited our scope to the natural gas hedging program.



Management Clarification Page i and Page 1

To focus solely on the FTP losses without regard to the overall portfolio does not provide a clear picture of the impact to the FCA. Although natural gas prices have experienced a dramatic decrease, which resulted in financial losses, the savings to the customer from lower natural gas prices have more than offset the hedged losses.

FINDINGS AND RECOMMENDATIONS

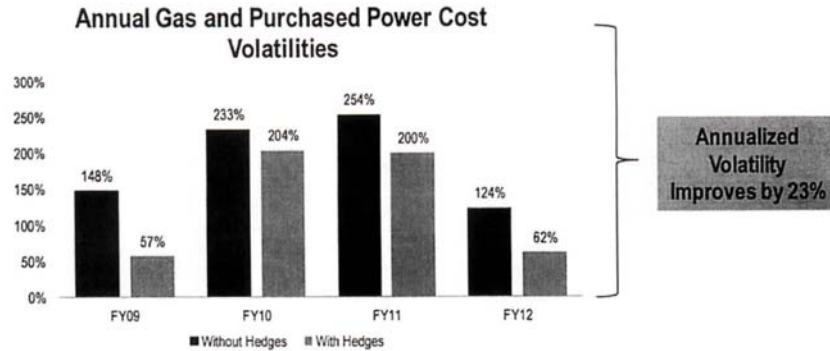
Audit Report presents - Page 3, Bullet Number 2

TVA does not currently measure the performance of the FTP against defined program objectives.

Management clarification and graph to further illustrate Page 3, Bullet Number 2

TVA does not currently measure macro level performance metrics that specifically measure the FCA price volatility mitigation. However, TVA currently produces indicator metrics for management to track the performance of the FTP, related to the natural gas commodity, which are directly related to FCA price volatility mitigation:

- Gas price volatility: annualized historical natural gas price volatility reduction due to hedging



- Hedge effectiveness: comparison of the movement of the hedged position to the movement underlying natural gas commodity (correlation metric)
- Total hedge cost: measure of the cost of transactions including broker fees and margin interest
- Trader performance metrics: various metrics used to compare hedged price versus the market to indicate trader value-added

DESIGN OF FTP CONTROL STRUCTURE IS APPROPRIATE

Management Clarification to Middle Office Page 4

Approval of the natural gas strategy document by Risk is a pre-approval of certain types of transactions in the strategy as long as the front office adheres to the strategy constraints.

COST BENEFIT ANALYSIS NOT PERFORMED TO ENSURE PROGRAM BENEFITS OUTWEIGH RISKS

Audit Report presents Market Risk and Table 2 Page 7/8

Market risk - Typically defined as potential variance to budget or cost increases due to higher market prices. However, the other side to this is the risk that hedged prices fall generating trading losses and subsequently resulting in higher-than-market fuel expenses. Hedging is not intended to lower your cost but to stabilize it over time. The objective of hedging is to eliminate the peak prices, but the cost of cutting off the peak is giving away the valley prices.

Management Clarification and objection to Table 2 and added graph to further illustrate Market Risk

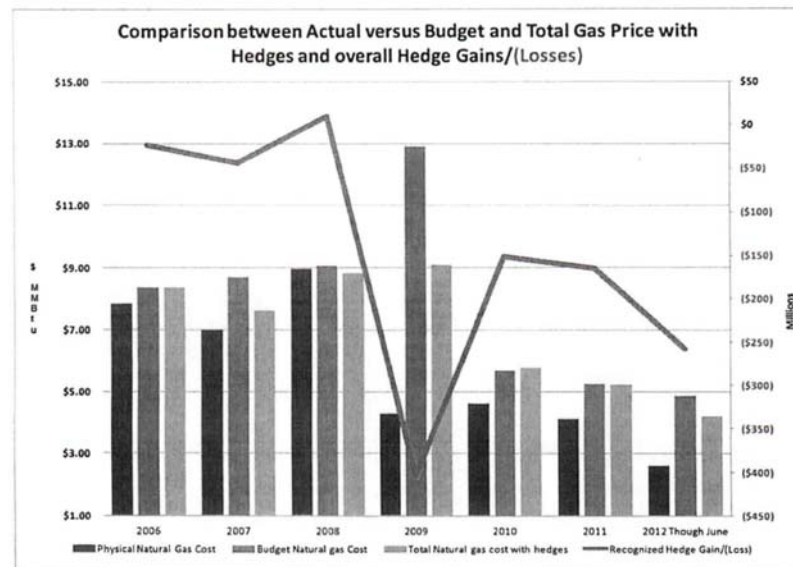
Market risk - Typically defined as potential variance to budget or cost increases due to higher market prices. However, the other side to this is the risk that hedged prices fall generating losses and subsequently resulting in higher-than-market fuel expenses.

Hedging is not intended to lower your cost but to stabilize it over time. The objective of hedging is to moderate the peak prices, but the cost of reducing the peak is not benefiting from low prices on the volume that has been hedged.

OIG FTP Recognized Gain/Loss illustration: Table 2

Management Objection: To focus solely on the FTP losses without regard to the overall portfolio does not provide a clear picture of the impact to the FCA. Management believes the graph shown below (Alternate to Table 2), is a better representation of the hedging program.

**Management Suggested Illustration of Portfolio Gains and Losses
Alternative to Table 2**



FTP PERFORMANCE IS NOT MEASURED AGAINST THE OBJECTIVES OF THE PROGRAM

Audit Report presents Hedge Position Reports Page 10


When asked how it measured the performance of the FTP, TVA officials in Power Supply and Fuels and Risk Management stated hedge position reports are TVA's primary performance measure. Using this as a performance measure would indicate

the program is successful because TVA had no hedge ladder limit violations from FY 2011 and through April 30, 2012. However this measure does not provide any information related to the success of the program in reducing FCA volatility. (Note: TVA calculates four other metrics to measure the performance of the gas hedging program, but these are primarily used internally by TVA's Front Office and are not intended to measure the program's effectiveness with regard to FCA volatility mitigation).

Management Clarification to Hedge Position Reports Page 10

TVA's natural gas Financial Trading Program is focused on reducing volatility of the natural gas fuel price as just one component of providing stable fuel cost for electricity consumers in the Tennessee Valley. Management's assessment is that the hedge ladder would provide the best volatility mitigation. Therefore, adherence to the hedge position ladder as reported by Risk in the daily hedge position is an effective control metric.

Power Supply and Fuels and Risk Management appreciate the opportunity to provide clarification.



John Trawick
Senior Vice President
Power Supply & Fuels



Steven Birchfield
Vice President & Chief Risk Officer
Risk Management

September 26, 2012

Robert E. Martin, ET 3C-K
Assistant Inspector General
(Audits and Inspections)

RE: Audit 2011 - 14477 - REVIEW OF TVA'S FINANCIAL TRADING PROGRAM

We appreciate the opportunity to provide comments on the Draft Audit Report
2011-14477 - Review of TVA's Financial Trading Program (FTP).

After reviewing the report, Power Supply and Fuels (PS&F) and Portfolio Risk Management
(PRM) agree to take the following actions to address the recommendations of the Office of the
Inspector General (OIG).

OIG RECOMMENDATION 1

***"Conduct a comprehensive cost-benefit analysis that includes all costs and risks
incurred by TVA."***

TVA Management is in agreement that a comprehensive cost-benefit analysis is warranted. Due
to recent changes in the market volatility, Structuring and Portfolio Management (SPM) recently
prepared the components of cost-benefit (C/B) analysis for the Natural Gas FTP, and presented
findings to Portfolio Risk Oversight Council (PROC). The methodology is intended to be
reproduced quarterly per the recommendation of the OIG Audit Report.

The primary focus of the C/B analysis will be to address the explicit costs and benefits of the
Natural Gas FTP related to natural gas price risk. The costs include administration (salaries,
systems, etc.) and operations (transaction costs, etc.), and the benefits include the value of
volatility reduction and price certainty.

TVA will commit to the following:

- 1) Perform a qualitative assessment of operational risks with respect to existing control
processes. Conduct a qualitative review of potential reputational risk. These
evaluations will be made separately from the natural gas price risk C/B analysis.
Owner: Cass Larson Due Date: 12/31/2012
- 2) Perform assessment of counterparty credit risk (TVA's Treasury Department)
Owner: Kirk Kelley Due Date: Ongoing
- 3) Perform assessment of collateral/margin posting risk (TVA's Treasury Department)
Owner: John Hoskins: Due Date: Complete

OIG RECOMMENDATION 2

"Develop and implement performance metrics that specifically measure the objective of the FTP, which is FCA price volatility mitigation."

TVA will retain ladder adherence as its primary, daily, weekly, monthly performance metric. To clarify, FCA rate volatility mitigation is not the objective of the FTP; rather, it is a desired outcome of the combined hedge management activities of coal, nuclear, and natural gas. FCA rate volatility mitigation is useful as a trending metric that is best evaluated over time (months and years) given the multitude of drivers of FCA volatility. The trend information can and is used as an input to TVA's hedging ladders, which define how TVA mitigates price exposure over time, adjusting for changes in volumetric expectations.

TVA currently produces indicator metrics for management to track the control and performance of the FTP:

- **Hedge ladder adherence** as the FTP primary, daily, weekly, monthly performance metric
- **Gas price volatility**: annualized historical natural gas price volatility reduction due to hedging
- **Hedge effectiveness**: comparison of the movement of the hedged position to the movement of the hedges
- **Total hedge cost**: measure of the cost of transactions including broker fees and margin interest
- **Trader performance metrics**: various metrics used to compare hedged price versus the market to indicate trader value-added

TVA commits to the following:

- 1) Provide evaluation of new performance metrics: FCA volatility, At-Risk Metrics, FAS 133 tests on gas price and cost.
Owner: Cass Larson Due Date: 12/31/2012
- 2) Implement a combination of current and proposed metrics to monitor hedge program effectiveness.
Owner: Cass Larson Due Date: 12/31/2012
- 3) Generate a report periodically to comply with management oversight needs.
Owner: Cass Larson Due Date: 12/31/2012

Proposed metrics include:

- **FCA volatility**: annualized historical FCA volatility reduction due to hedging.
- **At-Risk Metrics**: the value by which the underlying measure (Cash flow, FCA, fuel cost, etc.) could differ from the forecast at a 95th percentile confidence interval.
- **FAS 133 tests on gas price and cost**: an industry standard test to determine the amount of gas price or cost certainty provided by historical hedges.

OIG RECOMMENDATION 3

"Perform VaR back-testing on a regular basis to measure performance of the VaR model."

In response, Portfolio Risk Management (PRM) has implemented a new Value at Risk (VaR) methodology for better quantification of TVA's risk exposures. This new methodology gives the flexibility of assessing portfolio VaR at different time horizons. PRM has instituted a formal back-testing procedure to check the validity of the new VaR model.

TVA will commit to perform the following:

- 1) On a monthly basis, the daily MTM changes for all trading days up to 250 days will be plotted against the daily VaR forecast to determine if the number of violations is within the statistical threshold.
Owner: Andrew Tudor Due Date: Complete

OIG RECOMMENDATION 4

"Improve efforts to ensure FTP performance information is communicated to customers."

As stated in the Audit Report, TVA's customers are generally most concerned about the overall fuel cost trends, not individual components that are not driving changing in those trends. Focusing on a particular element of broader program may not facilitate improved communication.

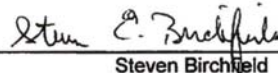
To improve communication of the FTP performance with our customers, TVA will commit to the following:

- 1) Provide the distributor and directly served customers with status of TVA's commodity management activities, of which financial trading is a component.
Owner: David Owens Due Date: 12/31/12
- 2) Attend a Power Distributor District Managers meeting at least once per year to discuss the Contracting Plan and the impacts of the FTP. Meetings for FY13 Contracting Plan are ongoing.
Owner: David Owens Due Date: 12/31/12
- 3) Meet with TVIC to discuss the Contracting Plan and the impacts of FTP at least once per year (held discussions on September 20, 2012).
Owner: David Owens Due Date: 12/31/12

Every effort has been given to thoroughly address these Recommendations. Power Supply and Fuels and Risk Management appreciate the opportunity to provide response to the recommendations.



John Trawick
Senior Vice President
Power Supply & Fuels



Steven Birchfield
Vice President & Chief Risk Officer
Risk Management