



**Memorandum from the Office of the Inspector General**

December 22, 2014

James R. Dalrymple, LP 3K-C  
Diane T. Wear, WT 4B-K

**REQUEST FOR MANAGEMENT DECISION – EVALUATION 2014-15048 – REVIEW OF NATURAL GAS MONITORING**

Due to the Tennessee Valley Authority's (TVA) increased use of natural gas and risks identified during a review of its coal terminals, we initiated this review to determine if TVA is (1) effectively monitoring natural gas and pipeline transportation costs and (2) efficiently managing pipeline transportation and leased storage.

Generally, TVA effectively monitors gas and pipeline transportation costs and efficiently manages storage capacity; however, we identified opportunities for improvement regarding the monitoring of natural gas and transportation costs. Specifically, we determined TVA did not (1) track the financial impact of penalties, (2) consistently witness pipeline meter testing, and (3) verify the accuracy of the variable cost portion of pipeline transportation invoices. We also determined TVA's reconciliation process addresses the risk of overpayments to natural gas suppliers; however, we identified a \$20,000 credit provided to TVA by a natural gas supplier that management has determined was credited in error. Additionally, TVA is efficiently managing storage capacity; however, TVA does not actively manage pipeline transportation capacity because it has made a strategic decision to base firm transportation capacity needs on a percentage of the plants' capacities to ensure reliability.

We recommend the Senior Vice President, Power Operations, perform a periodic assessment of gas pipeline penalties and require meter tests to be consistently witnessed by appropriately trained personnel.

We recommend the Senior Vice President, Power Operations, in conjunction with the Vice President and Controller, Corporate Accounting, implement a process to verify the accuracy of transportation invoices and take action to reimburse the \$20,000 that was mistakenly credited to TVA.

TVA management agreed with three of the findings. However, they took exception to the language in our draft evaluation report and provided additional information and clarification. TVA management disagreed with our finding related to addressing its reconciliation process and provided additional information including their determination that a credit provided by a supplier was an error; as a result, we revised the final report and recommended TVA reimburse the money credited. TVA management also disagreed

with the wording and connotations related to actively managing firm transportation capacity. Please see the Appendix for TVA management's complete response. The Office of the Inspector General evaluated these comments and revised the report as appropriate.

## **BACKGROUND**

Part of TVA Gas Fleet's objective is to safely and effectively operate gas facilities to provide low cost and clean power to TVA's system. TVA has 106 natural gas-fueled generation units at 14 plant sites across the region and purchased more than 130 million MMBtu<sup>1</sup> of natural gas in fiscal year (FY) 2013. In order to provide fuel to its gas plants, TVA transacts with three main external parties: natural gas suppliers, pipeline transportation providers, and storage facilities.

According to TVA, it had about \$485 million in net purchases of natural gas during FY2013. In the same year, TVA paid about \$67 million to pipeline transportation providers to transport the natural gas using firm and interruptible transportation services. Firm transportation is a volume-contracted service that provides uninterruptible natural gas deliveries to a specific receipt and delivery point.<sup>2</sup> Interruptible transportation service delivers natural gas to a delivery point on the pipeline system, but does not guarantee deliveries and can be curtailed by the pipeline.

During FY2013, TVA also paid about \$9.5 million to lease storage capacities at salt dome storage facilities. Egan Hub, Petal Gas, and Saltville are the natural gas storage facilities leased by TVA. These facilities are used to (1) manage significant volume variations and system needs and (2) reserve excess gas for future use.

Natural Gas Operations is responsible for, among other things, providing flexibility for TVA's gas fleet while managing costs and determining the appropriate balance of firm and interruptible transportation. Commercial Processes and Assurance (CP&A), a group within Coal and Gas Services, is responsible for ensuring TVA receives what it pays for regarding gas quality and quantity.

## **OBJECTIVE, SCOPE, AND METHODOLOGY**

Due to TVA's increased use of natural gas and risks identified during a review of coal terminals,<sup>3</sup> we initiated this review to determine if TVA is (1) effectively monitoring natural gas and pipeline transportation costs and (2) efficiently managing pipeline transportation and leased storage. The scope of our review included natural gas purchases, pipeline transportation capacity, and storage capacity during FY2013.

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<sup>1</sup> MMBtu is equal to one million British thermal units (Btu). A Btu is a measure for comparing the energy content of various grades of natural gas and other fuels.

<sup>2</sup> Variables such as emergencies and force majeure may sometimes prevent firm transportation service.

<sup>3</sup> Evaluation 2011-13839 - Review of Coal Terminals Supplying TVA.

To achieve our objectives, we:

- Reviewed documentation and interviewed TVA personnel from various organizations to obtain information related to purchasing, transporting, and storing natural gas.
- Reviewed analyses of plant burns, gas purchases, and storage injections and withdrawals to determine if actions were taken to address any significant discrepancies.
- Compared the amount of natural gas scheduled for delivery with the amount of gas actually used at TVA's gas plants to determine if there were any significant discrepancies.
- Analyzed TVA's contracted firm transportation capacity, interruptible transportation, and storage to determine TVA's utilization rates for these services.
- Identified the top 25 natural gas suppliers by volume of gas payments in FY2013 and selected a random sample of 25 out of 244 natural gas payments made to those suppliers to verify (1) natural gas invoice reconciliations were performed and (2) invoices agreed to information contained in Commodity XL (CXL).<sup>4</sup> We also selected a random sample of 10 out of 25 payments to check for changes made to the data in CXL.
- Randomly selected one invoice from each of the nine pipeline transportation companies TVA made payments to during FY2013 to verify the accuracy of the transportation invoices using meter statements and transportation contract terms.

This review was performed in accordance with the Council of the Inspectors General for Integrity and Efficiency's *Quality Standards for Inspection and Evaluation*.

## **FINDINGS**

Generally, TVA effectively monitors gas and pipeline transportation costs and efficiently manages storage capacity; however, our review identified opportunities for improvement regarding the monitoring of natural gas and transportation costs. Specifically, we determined TVA did not (1) track the financial impact of penalties, (2) consistently witness pipeline meter testing, and (3) verify the accuracy of the variable cost portion of pipeline transportation invoices. We also determined TVA's reconciliation process addresses the risk of overpayments to natural gas suppliers; however, we identified a \$20,000 credit provided to TVA by a natural gas supplier that management has determined was credited in error. Additionally, TVA is efficiently managing storage capacity; however, TVA does not actively manage pipeline transportation capacity because it has made a strategic decision to base firm transportation capacity needs on a percentage of the plants' capacities to ensure reliability.

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<sup>4</sup> CXL is a multi-commodity trading system TVA utilizes to support its natural gas financial and physical trades.

## **TVA COULD INCREASE ITS EFFECTIVENESS OF MONITORING NATURAL GAS AND TRANSPORTATION COSTS**

We determined TVA could increase its effectiveness related to the monitoring of natural gas and transportation costs. Improvements could be made by (1) tracking pipeline transportation penalties and the business case for making the decisions, (2) consistently witnessing pipeline meter testing, and (3) verifying the accuracy of variable costs in pipeline transportation invoices. We also determined TVA's reconciliation process addresses the risk of overpayments to natural gas suppliers; however, we identified a \$20,000 credit provided to TVA by a natural gas supplier that management has determined was credited in error.

### **TVA Did Not Track Pipeline Transportation Penalties and the Business Case for Making Those Decisions**

TVA schedules the transportation of natural gas with pipeline companies based on the expected demands of its gas plants. If the volume of gas scheduled does not reflect the actual amount used during times when it is critical for the pipeline companies to be in balance, TVA can incur penalties from the pipeline companies. We requested TVA to provide information related to penalties incurred; however, TVA could not provide the information because the information is not tracked. Therefore, we determined TVA is not effectively monitoring the financial impact of penalties.

Although TVA maintains a balance of the volume of natural gas scheduled and utilized, it does not maintain a log or any records of the cost of penalties incurred from using more or less gas than originally scheduled. TVA is not frequently assessed penalties, but it could not provide information related to the frequency or the financial impact of penalties. According to TVA management, TVA can choose to incur penalties for strategic business purposes. For example, TVA can decide to keep a plant running to balance the grid or sometimes incurring penalties could be the lowest cost option when compared to buying power or bringing on a different plant.

### **TVA Did Not Consistently Witness Pipeline Meter Testing**

Pipeline transportation providers use metering stations to monitor and measure the natural gas in their pipeline systems. With the large volume of natural gas exchanged daily, it is critical that natural gas is measured accurately. Pipeline transportation providers are responsible for testing the meters to ensure they are providing accurate measurements. The witnessing of the meter tests performed by the pipeline transportation providers ensures the best effort is being exercised during testing and reduces the chance of mistakes by the tester. According to CP&A personnel, TVA was not consistently witnessing meter tests performed by the pipeline transportation providers. Also, the personnel witnessing the meter tests were not appropriately trained to interpret the meter test results.

In August 2004, Power Supply and Fuel (PS&F) issued Standard Processes and Procedures (SPP), PS&F SPP-4.12, Natural Gas Measurement, which required TVA personnel to witness and verify natural gas volume accuracy. However, in September 2009, the SPP was canceled because the processes were no longer performed by PS&F.

Since the cancellation of the SPP in September 2009, TVA had not witnessed any meter tests until CP&A personnel witnessed the meter tests performed in February and March 2014 after our review was initiated.

We obtained copies of the recent meter tests and asked CP&A personnel to explain whether or not the meter test results indicated the meters were working properly. CP&A personnel indicated they could not determine whether or not the meters were working properly because there were several components of the meter test results they have yet to fully comprehend. CP&A personnel stated they were in the process of working closely with the pipelines to obtain an understanding of the meter test results and the testing process.

#### **TVA Did Not Verify the Accuracy of Variable Costs in Pipeline Transportation Invoices**

TVA verifies the firm transportation portion of the pipeline invoices to CXL, which constituted 95 percent of pipeline transportation costs in FY2013. However, we determined TVA is not verifying the variable cost portion of the pipeline transportation invoices by comparing the invoiced amounts with the meter statements<sup>5</sup> or pipeline transportation contracts. Without verifying the accuracy of all transportation costs, TVA has no assurance the invoices accurately reflect the contracted pricing and gas usage.

According to TVA personnel, TVA cannot perform a reconciliation of the pipeline transportation invoices using information contained in CXL because it is not correctly generating pipeline transportation records related to variable costs.<sup>6</sup> According to TVA personnel, CXL is not transferring all variable cost data, and the issue may stem from the current version in use. TVA is considering a system upgrade to address the transferring of variable cost data in CXL. Without accurate variable cost data in CXL, TVA cannot verify the accuracy of the pipeline transportation invoices using CXL.

#### **TVA's Reconciliation Process Addresses the Risk of Overpayments to Natural Gas Suppliers**

We reviewed 25 randomly selected natural gas purchase invoice reconciliations to verify they were performed and the invoices agreed with the data stored in CXL. There were no exceptions noted; however, we found an email from Hess, a natural gas supplier, informing TVA of an overpayment of about \$20,000. We verified a credit was applied to TVA's invoice the following month to correct the overpayment. When we inquired about the credit provided, TVA personnel stated they were unable to identify the cause.

In response to questions raised during this review, additional research was performed and TVA determined the credit to TVA was a mistake. The money has not been refunded at this time.

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<sup>5</sup> The meter statements shows the daily level information about individual meter run's flow along with other information including contact information, gas quality, and prior month volume corrections.

<sup>6</sup> Variable costs are charges based upon the volume of natural gas transported through the pipelines.

## **TVA IS EFFICIENTLY MANAGING STORAGE CAPACITY BUT RELIABILITY DETERMINES FIRM TRANSPORTATION CAPACITY NEEDS**

We determined TVA is efficiently managing storage capacity; however, TVA does not actively manage pipeline transportation capacity because it has made a strategic decision to base firm transportation capacity needs on a percentage of the plants' capacities to ensure reliability. TVA wants to have enough transportation capacity at all times to meet demand.

TVA efficiently manages storage capacity by (1) monitoring daily balances of gas in storage, (2) performing contract renewal analyses of storage usage, and (3) performing monthly analyses. TVA distributes a summary of storage usage to designated Natural Gas Operations personnel daily. TVA performs a contract renewal analysis to determine its storage needs. TVA also performs monthly analyses of storage, which compares the previous and current month's gas balances, injections, withdrawals, and cost of storage use.

While TVA performs a number of steps to monitor storage capacity, it does not perform the same level of review for transportation capacity. TVA does not actively manage firm transportation capacity because it has made a strategic decision to base firm transportation capacities at 80 to 90 percent of the nameplate capacities<sup>7</sup> of the gas plants. According to TVA management, reliability is the key factor in this strategic decision because TVA strives to have enough firm transportation capacity available at all times.

When we compared the firm transportation capacity with the volume of natural gas purchases during FY2013, TVA's natural gas purchases accounted for about 40 percent of the firm transportation capacity. However, the volume of natural gas purchases may not reflect the actual capacity of firm transportation utilized by TVA because gas sent to and from storage or rerouted to another plant would not be included. Therefore, TVA likely used more firm transportation capacity than the volume of natural gas purchased. When we requested the actual fixed transportation usage information to perform our comparison, TVA was unable to provide the information because of CXL's reporting limitations.

## **RECOMMENDATIONS**

We recommend the Senior Vice President, Power Operations:

- Perform a periodic assessment of gas pipeline penalties.
- Require meter tests to be consistently witnessed by appropriately trained personnel.

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<sup>7</sup> Nameplate capacity refers to the intended technical full-load sustained output of a power plant and is the number registered with the authorities for classifying the power output of a power station usually expressed in megawatts.

In conjunction with the Vice President and Controller, Corporate Accounting:

- Implement a process to verify the accuracy of transportation invoices.
- Take action to reimburse the \$20,000 that was mistakenly credited to TVA.

**TVA Management's Comments** – TVA management agreed with three of the findings. However, they took exception to the language in our draft evaluation report and provided additional information and clarification. TVA management disagreed with our finding related to addressing its reconciliation process and provided additional information including their determination that a credit provided by a supplier was an error; as a result, we revised the final report and recommended TVA reimburse the money credited. TVA management also disagreed with the wording and connotations related to actively managing firm transportation capacity. Please see the Appendix for TVA management's complete response.

**Auditor's Response** – The Office of the Inspector General evaluated these comments and revised the report as appropriate.

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Your comments to the draft evaluation report have been incorporated. Please advise us of your management decision within 60 days from the date of this report. Information contained in this report may be subject to public disclosure. Please advise us of any sensitive information that you recommend be withheld. If you have any questions or wish to discuss our observations, please contact E. David Willis, Evaluations Manager, at (865) 633-7376 or Gregory R. Stinson, Director, Evaluations, at (865) 633-7367. We appreciate the courtesy and cooperation received from your staff during the review.



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TVA Board of Directors  
OIG File No. 2014-15048

October 17, 2014

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

**Inspection 2014-15048 - Review of Natural Gas Monitoring**

We appreciate the opportunity to provide comments on the draft report of Inspection 2014-15048 - Review of Natural Gas Monitoring. This document presents TVA management's response to the presentation and accuracy of the OIG's draft report. It is not intended to address specific findings at this time.

We also appreciate the opportunity to meet with Hannah, David, and Greg on September 26 to discuss the draft report. They each shared, with Coal and Gas Services (CGS), their opinion of the overall effectiveness of the Natural Gas team's performance. However, we do not feel their opinion is adequately conveyed in the draft report.

TVA is not in disagreement with the specific findings identified in this draft report, with the exception of findings 4 and 5. However, we feel the draft report overstates the impact of these findings when, in fact, the risks and financial impact are relatively minor.

**General Changes:**

We request that the OIG include a statement at the front of this draft report as to their opinion on the overall effectiveness of TVA's Natural Gas Operations.

On page 2, of the draft report, it was stated that storage facilities can hold gas for future use or sale. It should be noted, TVA does not hold gas in storage in order to sell it at a later time. This would be considered speculating, which TVA is not permitted to do. We ask that the wording "or sale" be removed.

Also on page 2 Commercial Processes and Assurance (CP&A) is noted as a group within Natural Gas Operations. It is instead a group within Coal and Gas Services. This needs to be corrected.

**Findings:**

- 1. OIG finding 1 stated:  
"TVA did not have proper oversight of the meter testing."**

We request that wording "have proper oversight of" be changed to "consistently witness." It is not standard industry practice to witness these tests and so we do not agree that TVA is doing something improper by not witnessing.

We also request that the OIG consider whether this finding merits first listing. It could be interpreted, as first on the list, that this is the issue of utmost concern to the OIG and that may not be the case.



**2. OIG finding 2 stated:**  
**"TVA did not monitor the financial impact of penalties."**

We want to clarify that natural gas "penalties" are not always a bad thing. We can choose to incur them to keep a plant running to balance the grid, or they can be the lowest cost option when compared to buying power or bringing on a different plant. Clarification like this, included on the report, could be helpful to readers.

We request that the OIG change the word "monitor" to "document." We also request that the OIG consider changing the word "penalty", to something which does not carry the same connotations.

A possible alternative wording for this finding that we could support would be...  
*TVA did not document the financial impact of incremental balancing charges assessed by pipelines for being outside of defined daily volumetric tolerances*

**3. OIG finding 3 stated:**  
**"TVA did not verify the accuracy of pipeline transportation invoices"**

TVA does verify the firm transportation portion of the pipeline invoices to CXL. Out of the \$67 million spent on transportation in FY2013 (as noted in your draft report) about \$65 million were fixed costs for firm transportation. The remaining portion, of the transportation charges, was reviewed by Fuel Accounting prior to paying.

We request the OIG clarify that the invoice is reviewed for accuracy and the firm cost, the overwhelming majority of each invoice, is verified. We ask that the scope, in dollar amounts or percentages, be presented to show the relative significance of this finding.

**4. OIG finding 4 stated:**  
**"TVA did not have a reconciliation process to fully address the risk of overpayments to natural gas suppliers."**

We disagree with this finding and request that it be removed from the report. We believe that TVA is effectively monitoring natural gas purchases. The OIG itself did not find any errors on the 25 payments to suppliers it reviewed.

TVA has numerous processes designed to pay only for natural gas purchased and received. Purchases are reviewed internally by Natural Gas Operations by comparing same day and next day purchases in CXL to confirmations faxed from suppliers. Fuel Accounting personnel confirm all long term gas transactions with suppliers and ensures the transactions are properly reflected in CXL. Natural Gas Operations personnel compare actual deliveries per the pipeline bulletin boards to scheduled volumes and make adjustments to CXL as necessary. The result of these activities is amounts included in CXL reflect TVA's record of purchases made and deliveries received from our natural gas providers as entered and verified by Coal and Gas Services personnel.

Prior to payment of a gas invoice, a comparison of the invoice to TVA's records in CXL is made and all variances resolved. Any variance between the gas supplier and TVA's records is compared to pipeline volumes to determine which is correct. Resolution requires either a

submission of a revised invoice from the vendor or a correction to the CXL records depending on the nature of the variance.

In the instance cited by the OIG, TVA reconciled the Hess January 2013 invoice against the CXL information noting a difference of 21 MMBTU - Hess did not provide that gas. Prior to paying the invoice, TVA required Hess to send a invoice reflecting the 21 MMBTU difference. In March 2013, approximately 1 month after settling the January billing, Hess's February billing included a revision to the amount billed for January 2013. The revision reduced the amount billed to TVA by 5,000 MMBTU and approximately \$20,000. The revised invoice indicated that we received 5,000 MMBTU less gas than was shown on the original January invoice but included no explanation of the reduction other than to say TVA overpaid. After efforts of TVA's Fuel Accountants and Gas Supply personnel, including discussion with Hess, TVA was unable to determine the cause of the refund Hess claimed was due to us and we conclude that Hess made a mistake.

We believe that TVA's reconciliation processes are adequate to ensure that the proper amounts are paid to our natural gas providers as evidenced by the detection of the 21 MMBTU difference and the accuracy of the other payments in the OIG sample. We will begin keeping better documentation of our research activities associated with unsolicited refunds like the one received from Hess but we believe that, without additional evidence of overpayment, this finding is not adequately substantiated and should be removed from the report.

**5. OIG additional finding stated:  
"TVA is not actively managing pipeline transportation needs."**

We do not agree with this wording and its connotations. The OIG outlines TVA's position on page 5.

*TVA does not actively manage firm transportation capacity because TVA has made a strategic decision to base firm transportation capacity at 80 to 90 percent of the nameplate capacities of the gas plants. According to TVA management, **reliability** is the key factor in the strategic decision because TVA strives to have enough firm transportation capacity available at all times.*

If there is a satisfactory explanation for TVA's position, as provided by TVA management and noted by the OIG, and if there are no recommendation of improvements TVA could make, then we do not agree that this should be a finding or be associated with the findings.

We recommend that the OIG remove this statement from its report, or at the very least disassociate it from the findings. If kept in the OIG's report we request that the OIG use a statement similar to as follows to replace the current wording.

*TVA contracts for Firm Transportation(FT) services for its Combined Cycle(CC) fleet. FT service is not measured on Capacity Utilization factors and instead is focused on ensuring reliable transportation services for TVA's CC fleet throughout the year.*

Please let us know if you have any other questions or need additional information.



David L. Owens  
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WT 9C-K



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VP & Controller  
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