

Memorandum

To: Audit Committee of the ISO Board of Governors
From: Eric Schmitt, Vice President, Operations
Date: January 29, 2015
Re: **Acceptance of 2014 Settlements System audit report**

This memorandum requires Committee action.

EXECUTIVE SUMMARY

At Management's request, PricewaterhouseCoopers, LLP completed an audit of the settlements system for changes to 100 charge codes and pre-calculations directly associated with several key initiatives implemented in 2014. The objective of the audit was to obtain an independent opinion on Management's assertion that the automated processes within the settlements system for calculating the prices and quantities for these changes were configured in accordance with the relevant ISO tariff provisions as filed and accepted by FERC as of December 19, 2014. PwC issued its report on January 9, 2015 with an unqualified opinion, finding Management's assertion to be fairly stated in all material respects. Management presents the report for the Committee's acknowledgment, with the following motion:

Moved, that the Audit Committee of the ISO Board of Governors accepts the settlements system audit report issued on January 9, 2015 by PricewaterhouseCoopers LLP for the testing of specified charge code calculations implemented in 2014, as attached to the memorandum dated January 29, 2015.

BACKGROUND

In accordance with tariff section 11.29.3.4, Management engaged PwC to perform an independent attestation audit to review specific calculation changes implemented in 2014 resulting from several key initiatives. Management directed that PwC provide an audit opinion, in accordance with generally accepted auditing standards, to verify that the ISO's settlement system calculations of prices and quantities directly associated with the implemented changes conformed to the related tariff provisions as amended. PwC's opinion would thus provide additional assurance to both new and existing market participants.

The audit covered changes resulting from the following initiatives:

- **FERC Order No. 764:** The spring implementation of FERC Order 764 enhanced the increment in which the ISO manages interchange schedules from 60 minutes to 15 minutes, in addition to the 60 minute option. Along with this change, the ISO modified most settlements increments from 10 minutes to 5 minutes to more closely align its market clearing framework between real time and other ISO market periods
- **Renewables integration and bid cost recovery:** Also in spring, the ISO implemented new rules for integrating renewables, which included separating bid cost recovery accounting between day-ahead and real-time markets. Furthermore, the ISO adopted additional rules for the mitigation of bid cost recovery based on persistent output deviations to incent proper market behavior in the context of the separate market rules for bid cost recovery.
- **Network modeling enhancements:** In the fall release, the ISO expanded its modeling of external flows in the day-ahead and real-time market. These changes impacted the settlement charge codes because of changes to the definition of settlement locations at the interties.
- **Energy imbalance market:** Implementation of EIM on November 1, 2014 required adjustment to several existing charge codes as well as the addition of many new charge codes to ensure accurate settlement calculations continue for participants within both the energy imbalance market and ISO balancing authority areas.

The scope of the audit was limited to the automated processes within the settlements system that directly calculated quantities and prices. The quantities and prices calculated within the settlement system depend upon many factors, including the quality and accuracy of calculations performed in other ISO systems, the quality of data inputs from various sources, and the accuracy and completeness of data transfer mechanisms that provide the inputs to settlements. The Management assertion and the audit do not cover these elements.

Specifically, the audit addressed the configuration changes associated with 100 charge codes and pre-calculations (82 existing and 18 new, as listed in Exhibit I of the report) resulting from the above listed initiatives.

AUDIT EFFORT

Audit work began in May 2014 and lasted until the report's issuance on January 9, 2015. The overall effort can be categorized into three major phases of work:

- Pre-audit: determining the scope and performing a risk assessment
- Detailed independent analysis: evaluating the tariff requirements and settlement configuration documents
- Independent testing: evaluating ISO's testing of the new configuration through independent testing and re-performance

Pre-audit

The pre-audit activities ran from May to July. The ISO provided the audit team detailed descriptions of the settlement process, the system architecture, as well as the methodology

followed for system development. This included discussion of how market data is used to calculate and produce settlement statements and invoices. The ISO's comprehensive and standardized system development process was discussed and demonstrated, identifying the key artifacts available for audit.

This effort resulted in the identification of the audit population, a comprehensive list of the charge codes and pre-calculations impacted by the specified initiatives risk ranked based on the following factors:

- Bid cost recovery: higher risk due to the changes required for FERC Order No. 764 and the renewable integration and bid cost recovery changes
- Pre-calculations: higher risk as these provide key bill determinants used in numerous charge codes
- Extent of the configuration change: higher risk for more complex changes
- New charge codes: may be higher risk if complex, lower risk if formulation is simpler
- Multiple changes: higher risk if changes required in spring and again in fall release
- Dollar volume: not a primary driver of risk, analysis of early FERC Order No. 764 dollar settlement volume provided no conclusive information to influence risk ratings
- Retired charge codes and documentation only changes: 'no risk' ranking and scoped out of the audit as no software changes were required to accommodate.

Detailed independent analysis

During this phase, the auditors reviewed the relevant tariff amendment filings, FERC orders, business practice manuals (BPMs) and all other standardized documentation available for each impacted charge code and pre-calculation. The following represents the key artifacts utilized for both the tariff and software assessment portions of the independent analysis:

- Requirements documentation: the BPM Configuration Guides provide a contextual explanation for the subject charge code or pre-calculation, including applicable business rules, validation rules, data inputs, calculation formula, and data output. These documents are crafted and updated by settlement subject matter experts and are made public after cross-functional internal review. Each charge code and pre-calculation has its own BPM Configuration Guide.
- Design documentation: settlement technical experts create internal design guides and design templates which translate the requirements information and formulation as presented in the BPM Configuration Guide into implementation specifications proprietary to the settlements calculation engine.
- Testing documentation: using a combination of the configuration guide, the design guide, and the design template, the settlements testing experts refine and or create standardized test cases, which document the expected and actual testing results for each new requirement.

The ISO provided approximately 615 BPM Configuration Guides, design guides, design templates, and test cases covering the market initiatives that were implemented with the spring and fall releases. The auditors analyzed the BPM Configuration Guide content against the tariff, and examined the BPM content in relation to the design guides and test case results.

Re-performance testing

From July through the end of the audit, the auditors continued to review the documentation and executed their independent and re-performance testing of the ISO's test case results. The ISO responded to all auditor questions submitted, providing supplemental and/or revised evidence where requested.

RESULTS

At the conclusion of the review and testing, PwC found all settlement calculations within the scope of the audit to be in alignment with tariff and no exceptions were noted.

CONCLUSION

Management presents, for the Audit Committee to accept receipt of, the PwC the audit report issued on January 9, 2015. As this audit addressed several critical market initiatives, Management believes that this successful result not only highlights the depth and accuracy of settlement related documentation, but also demonstrates that the system development processes and control methodologies utilized by the settlement implementation team are high quality and comprehensive.