

NYISO METERING TASK FORCE

Report to the NYISO Business Issues Committee February 2006

Background: On July 27, 2005 the NYISO Business Issues Committee (BIC) charged the Metering Task Force (MTF) of the Billing and Accounting Working Group (BAWG) with the following assignment:

BIC Motion #4 (July 27, 2005 meeting):

“2. It is further moved that the Billing and Accounting WG along with the Meter TF and NYISO staff, work to develop a transition plan for bringing the Revenue Metering into compliance with the standards incorporated in the RMR Manual, in accordance with, and consistent with, the NYISO-TO Agreement. A draft plan should be presented to BIC for its consideration within six months.

3. Nothing in this revised motion anticipates a particular schedule of metering changes.”

I. Executive Summary

The MTF has reviewed the status of meter equipment for generators and ties, as related to the Revenue Meter Requirements Manual. The manual establishes standards for two types of equipment at each location, the instrument transformers (PTs / CTs) and the meter devices (for collection & reporting). The recommendations below are specific to one type of equipment or the other.

The MTF submits the following recommendations to the BAWG:

1. First, upgrade all meters that are not considered to be Revenue Grade Meters with “modern” Revenue Meters including the manual’s requirement for Interval Storage and remote communication capability.
2. While not required by the current manual, existing metering systems that meet revenue quality standards should also be required to have Interval Storage and Remote Communication capabilities, or their equivalents.
3. NYISO staff shall work with the MTF to create monthly metering systems performance scorecards to ensure continued monitoring / maintaining accuracy of metering equipment and processes, and provide the BAWG with a semi-annual report on issues and plans for resolution.

4. Wholesale upgrades to revenue quality instrument transformers at non compliant locations may not be cost justified. As explained herein MTF has prepared sample data indicating the amount of error introduced by the existing “relay quality” PTs and CTs. Alternatives should be considered, including prioritizing upgrades and new technologies for error correction.
 - a. Where additional cost benefit analysis is required, input and participation from other groups is necessary. Upgrade costs for equipment and installation would be significant, with additional cost impact for extended outages.
 - b. Cost recovery mechanisms must be investigated and included in any plan that recommends upgrade of the measurement equipment.

5. Further review of issues related to meter installations for external ties should be assigned to an appropriate group. In some cases, there are non-compliant external ties under the responsibility of organizations external to the NYISO. The areas of cost recovery and authority to require upgrade for these installations needs to be addressed.

Some of these recommendations / activities are out of the scope and expertise of the MTF and the BAWG. Assistance from other NYISO committees / working groups will be required to further the BIC goal of bringing all revenue metering systems into compliance with the RMR Manual.

Supporting documentation for the conclusions and recommendations are detailed in the sections below.

II. Working Group Activities and Analysis

Scope of Work

- i. Meter authorities update their meter inventory lists. NYISO to “mask” meter locations for working group activities.
- ii. Review lists and identify meter locations that are not currently in compliance with the RMR Manual standards.
- iii. Calculate performance statistics for all meter locations based on flow and true-up data; estimate the market impact of an assumed random 5% error rate
- iv. Prioritize meter locations in the order of highest to lowest (top 25%, second 25%, third 25% and bottom 25%) based on typical flow data
- v. Identify measurement locations in need of upgrade
- vi. Receive generic replacement cost estimates from Metering Authorities and other sources to perform a total marked impact cost-benefit analysis.
- vii. Finalize a report for submission to the BAWG and the BIC.

Activities

A. Meter Inventories

During its September 14, 2005 meeting, the MTF requested all Metering Authorities (MAs) update their meter inventories list. Inventory listings were required to conform to data column definitions in Appendix (A). These lists were reviewed by all Metering Authorities during October 19.

The RMR Manual requires MAs to update these inventories annually and submit them to the NYISO. Information in these inventories may fall under the guidelines of the draft NERC Cyber Security Standards, posted for comment prior to balloting. Concerns raised by affected Transmission Owners prevent the NYISO from including current Meter Inventories in this report.

A break-down of the wholesale revenue meter locations, as submitted to the NYISO's Web-based reconciliation (WBR) system, is given in table (1). The meter locations have been categorized by type and then divided into flow quartiles, based on annual flow during 2004. For consistency, subsequent tables in this report show the performance of these meter locations by stating the percentage of meter locations in each quartile meeting the criteria of the table.

Type	Total Meters in Inventory	Meter Count by Flow Quartile			
		Top 25%	2nd 25%	3rd 25%	Bot 25%
Gen	239	60	60	60	59
Tie	206	51	52	52	51
Total	445	111	112	112	110

Table 1: Meter Location Count by Type and Flow Quartile

B. Meter Data Analysis

In order to facilitate an open discussion of metering locations, metering data was masked with a unique identification number. This allowed the NYISO to compute statistics on each location and make it available to the task force, enabling a discussion on the impact of metering performance on the NYISO settlement processes. Market confidentiality rules required actual location identifications to be masked from all Market Participants (MPs). Discussions during October and November 2005 led the group to request the performance statistics as defined in Appendix (B), and found in Appendices (C) and (D).

As shown in the table (2), approximately 60% of all WBR meters locations billing had at least 1 correction at the 4-month true-up during 2004. Table (3) shows that 14% of the meter population had 6 or more corrections at the 4-month true-up during the 12 months of 2004.

Type	Total Meters in Inventory	Meters with at least one correction at 4-M T/U (by Flow Quartile)				
		Top 25%	2nd 25%	3rd 25%	Bot 25%	Grand Total
Gen	239	57%	60%	48%	32%	49%
Tie	206	69%	75%	79%	51%	68%
Total	445	62%	67%	63%	41%	58%

Table 2: Meter Locations with at least 1 correction at 4-M T/U, by Type and Flow Quartile

Type	Total Meters in Inventory	Meters with 6 or more corrections at 4-M T/U (by Flow Quartile)				
		Top 25%	2nd 25%	3rd 25%	Bot 25%	Grand Total
Gen	239	25%	32%	17%	3%	19%
Tie	206	2%	2%	6%	20%	7%
Total	445	14%	18%	12%	11%	14%

Table 3: Meter Locations with 6 or more corrections at 4-M T/U, by Type and Flow Quartile

When the MTF compared the performance of meters at the 4-month true-up, the group concluded that meter locations meeting the RMR Manual do not have fewer corrections than those which do not meet the specifications of the manual. This is show in tables (4) and (5).

Meets RMR Manual	Total Meters in Inventory	Meters with at least one correction at 4-M T/U (by Flow Quartile)				
		Top 25%	2nd 25%	3rd 25%	Bot 25%	Grand Total
No	132	63%	63%	75%	35%	55%
Yes	313	62%	69%	59%	45%	59%
Total	445	62%	67%	63%	41%	58%

Table 4: Meter Locations with at least 1 correction at 4-M T/U, by ability to meet RMR Manual and Flow Quartile

Meets RMR Manual	Total Meters in Inventory	Meters with 6 or more corrections at 4-M T/U (by Flow Quartile)				
		Top 25%	2nd 25%	3rd 25%	Bot 25%	Grand Total
No	132	4%	9%	21%	17%	13%
Yes	313	18%	22%	9%	6%	14%
Total	445	14%	18%	12%	11%	14%

Table 5: Meter Locations with 6 or more corrections at 4-M T/U, by ability to meet RMR Manual and Flow Quartile

Although meter location not meeting the requirements of the RMR manual are twice as likely to have required at least one correction at the 12-month true-up during the sample period, a meter location's ability to meet the RMR Manual requirements does not correlate to frequent changes during this true-up. This is shown in tables (6) and (7).

Meets RMR Manual	Total Meters in Inventory	Meters with 1 or more correction at 12-M T/U (by Flow Quartile)				
		Top 25%	2nd 25%	3rd 25%	Bot 25%	Grand Total
No	132	41%	26%	29%	7%	23%
Yes	313	12%	17%	8%	6%	11%
Total	445	19%	20%	13%	6%	14%

Table 6: Meter Locations with 1 or more correction at 12-M T/U, by ability to meet RMR Manual and Flow Quartile

Meets RMR Manual	Total Meters in Inventory	Meters with at least 6 corrections at 12-M T/U (by Flow Quartile)				
		Top 25%	2nd 25%	3rd 25%	Bot 25%	Grand Total
No	132	4%	0%	0%	0%	1%
Yes	313	0%	3%	0%	0%	1%
Total	445	1%	2%	0%	0%	1%

Table 7: Meter Locations with 6 or more corrections at 12-M T/U, by ability to meet RMR Manual and Flow Quartile

Based on this data analysis, the group concluded upgrading a meter location to meet the requirements of the RMR Manual may not have an impact on the NYISO billing cycle. At the November 15, 2005 meeting, the group's consensus was to start any discussion of recommendations to upgrade a noncompliant meter location with meter locations in the top quartile of annual flow, since these meter locations have the largest impact on NYISO billing. Data on these specific meter locations can be found in Appendix (E). MAs responsible for these meter locations were informed of their status by the NYISO following this meeting.

C. Consultation with NYSEMEC

The MTF requested the NYISO review the recommendations of the New York State Electric Meter Engineer's Committee (NYSEMEC), which were in a paper submitted to the NYISO in June 2003. A representative of the NYISO met with the NYSEMEC in October 2005 and discussed the charge by the BIC to the MTF, and the NYSEMEC's June 2003 recommendations.

Key recommendations from the NYSEMEC's June 2003 report, which may be found in Appendix (F), include:

- The NYSEMEC cautions the adaptation of the costly wholesale replacement of instrument transformers. Besides being an expensive, and in some cases unnecessary option, the replacement of instrument transformers may provide the least amount of benefit and should be considered as a last resort. Exceptions to this are in extreme cases where other less expensive options are not applicable (e.g. the use of CCVT's as a source for metering potential).
- The degree of error in existing installations that do not meet the above minimum specifications can vary. A number of these installations may indeed meet revenue quality standards. To determine the degree of error, evaluation

criteria must be developed and agreed to by all stakeholders. Following this, a comprehensive study must be completed on each of these installations where various metering components are evaluated against these accepted criteria. However, in most cases, the data required to perform these studies is not available and often non-existent. It may be that the only workable option to gauge the magnitude of these errors is through on-site testing. In either case, this could be an expensive and lengthy process.

- The NYSEMEC recommends that a program be instituted that prioritizes these sites and at the outset, targets those locations that will provide the highest return on investment. Such a program would need to be implemented over a number of years and include a mechanism for cost recovery. In most cases, these “minimum expense”, “high benefit” candidates would involve installation of revenue grade meters. It’s reasonable to conclude that because the direction of net error is very difficult if not impossible to predict, such a program should be in the best interest of all the stakeholders.

Key points from the NYISO’s discussion with the NYSMEC were:

- Downstream data collection, manipulation and storage systems (translation systems) have the potential to introduce errors of a greater magnitude than typical errors of a non-revenue class instrument transformer.
- Measurement bias errors eventually may be detected through longer-term system load analysis, and will be reflected through the true-up process.

III. Issues Noted during Discussions:

The following two critical issues were noted during the discussions by the MTF. These issues are considered beyond the scope of the MTF to resolve.

A. Cost Recovery

In looking at installations that do not meet the requirements, cost justification to upgrade will need to be determined. MTF members do not feel we are the appropriate group to make any determinations. MTF has come up with some rough estimates from their internal discussions with their own company’s meter experts. Complete update of a metering location, including upgrading of the CT/PT measurement equipment (Revenue Grade Instrument Transformers), could cost from \$200,000.00 upwards to \$1,000,000.00 (in 2005 dollars) for materials, engineering studies and installation. The broad range for this estimate hinges on various voltage levels and varying complexities at the substations. Note that this estimate does not include costs or loss of revenue associated with taking a facility out of service. For the revenue meter itself, we estimate new Interval Meter replacement and installation costs to be at a maximum of \$10,000.00 (in 2005 dollars) per site. This estimate includes materials, engineering and installation. Certainly there may be site complications that could cause that estimate to be much higher.

B. Lack of clear authority over External Ties

The authority to require upgrades to ties external to the NYISO control area and the ability to recover costs associated with such external tie upgrades does not fall under the NYISO or New York Transmission Owner's jurisdiction.

III. Metering Task Force Transition Plan & Recommendations:

The following constitutes the Metering Task Force's findings and plan to bring revenue metering into compliance with the Revenue Metering Requirements Manual. This plan is not listed in any order of importance as Meter Task Force members feel each issue may be equally important.

A. The issues of cost recovery and the authority to require upgrades to external ties need to be addressed. These two issues are critical to a MA's ability to plan upgrades required to bring facilities into compliance with the RMR Manual.

B. Wholesale replacement of non compliant installations may not be justified. Based on the recommendations of the NYSEMEC, and supported by the data analysis performed by the MTF, wholesale replacement of non-compliant instrument transformers may not result in a reduction in the number of true-ups, and have no impact on the NYISO's billing cycle.

C. Recommended Transition Plan

The MTF recommends that the following steps in transitioning non compliant metering installations be as follows:

1. Upgrade all meters first that are not considered Revenue Grade Meter with "modern" Revenue Meters that have Interval Storage and remote communication capability.

It was noted during discussions some MAs already have plans upgrade some non-compliant meter locations, as part of larger transmission facility improvement plans.

2. Upgrade all remaining meters for Gens/Ties that may meet the RMR Manual requirements, but do not have Interval Storage or Remote Communication capabilities.
3. If determined, through data analysis, facility inspection, and testing, that the metering system errors were being created by inadequate Instruments Transformers and/or excessive burden on circuits, then replace equipment.

However, since some of the major equipment upgrades, such as the instrument transformers, will be the most costly, timeliest, and provide the

lowest impact on NYISO Billing, plan these upgrades over long-term periods to be incorporated with major overhauls/capitol improvement projects being done at the Sub Station or Generation site.

4. Based on Item II B - Meter Data Analysis above, incorporate corrective actions needed to reduce meter data corrections to 1% or less for all true-up periods. This can be incorporated into and monitored by the NYISO Meter Scorecards described below.

E. NYISO Scorecard – monitoring/maintaining accuracy:

The RMR Manual requires the NYISO to provide a semi-annual report on metering issues. The MTF believes this process should be expanded to include monthly scorecards for each Metering Authority, allowing stakeholders to easily identify locations that frequently fall below expected performance criteria. Scorecard discussions should lead to investigations of locations introducing the most frequent and largest errors, creating a forum for MAs to present intended corrective action to be taken, up to and including the upgrading of equipment.

The scorecard process should include the following:

- i. Define expected performance criteria, including number and magnitude of true-ups and PTS errors
- ii. Monitor maintenance and calibration status
- iii. MTF hold periodic meetings to discuss meter performance
- iv. MA and NYISO Investigate locations that do not meet expected performance criteria
- v. MTF recommend process or equipment improvements
- vi. NYISO submit a semi-annual report to the BAWG

A draft scorecard, based on 2005 meter data, may be found in Appendix (G).

G. Alternate methods

Alternate should be considered in lieu of wholesale upgrade of metering equipment. Examples include:

- Allow for submission of state estimator calculations as is done in the ConEdison super-zone.
- Calculate Tie/Gen value from other locations that already meet the requirements.
- Redefine subzonal boundaries with meter locations that meet the RMR Manual requirements.

- Investigate use of new technologies, including CT reclassification and optical CTs

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