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nyiso Control Center Requirements manual

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Control Center Requirements Manual
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Revision History

9-18-2003 Revisions:

Section 3.1.2:

- 1st paragraph, 1st sentence: replace "new and existing" with "all"
- 1st paragraph, last sentence: delete
- 3rd paragraph: delete
- 4th paragraph: revise to "All Meter Authorities that report data for Sub-Zonal Ties and Generators used in the calculation of the NYISO market settlements shall also include hourly load profile data. These values are used for NYISO Invoicing."

7-22-2003 Revisions:

Section 2.2:

- 1st paragraph: delete "three protocols"
- 1st and 2nd bullet: delete both bullets
- 1st paragraph after the bullets: delete entire paragraph
- last paragraph: delete all instances of "Director of Information Systems"

Section 2.3:

- after "Hypertext Transfer Protocol-based" insert: (HTTP)

Section 2.5.2:

- 1st paragraph: delete entire paragraph

Section 2.7:

- At end add another paragraph: Generation Providers that desire to receive their control base points directly from the NYISO rather than via the utility or Transmission Owner (TO) SCADA system should refer to the ***NYISO Direct Generator Communications Project Manual***.

Section 3.2.2:

- 2nd paragraph: delete "redundant leased telephone data lines or"

Section 3.2.5:

- Digital Telemetering Subsection: before "backup" add "a" and after "backup" add "metering source"

Section 3.4.2:

- #1: Replace "Systems" with "Technology"
- #2: Delete "NYISO successor group to the Data Coordination Task Force (DCTF) of the"

Section 3.4.4:

- after "CDAS" delete "successor group"

Section 3.7.1:

- #1: replace "before noon" with "48 hours prior to 4:30 pm"
- #2, 1st bullet, at end: add "coordinated by NYISO Customer Relations

Staff"

Section 3.7.3:

- #2: replace both instances of "of Systems" with "Command Center"

Section 3.7.7:

- 1st sentence, at end: add "by the NYISO Supervisor Command Center."

Section 3.8:

- Delete entire section (new section to be created by Project Management and NYISO Committees)

5-2003 Revisions:

Section 3.1:

- 3.1, first paragraph, last sentence, after "These standards provide . . .": Insert "minimum"

Section 3.1.1:

- 3.1.1, third bullet, end of sentence: Add "Defaults to the owner of the equipment related to the metered point."

Section 3.1.2:

- 3.1.2, first paragraph, after "applicable to": either have it read ". . . applicable to **all** metering systems . . ." or " . . . applicable to **new and existing** metering systems . . ."
- 3.1.2, first paragraph, second sentence: either delete this sentence, or modify it by adding "Concerning the November 1999 NYISO online date," before it.
- 3.1.2, second paragraph add: However, for any Revenue Metering points for Sub-Zonal Ties or Generators that do not meet the minimum standards as defined in this document, these points will be required to be upgraded and comply with the accuracy standards defined in Appendix A. This metering shall also be capable of providing Hourly Interval data within 24 hours. These upgrades must be completed by no later than this date: xx/xx/xxxx.
- 3.1.2, second paragraph add: In addition, all Meter Authorities will provided generation metered data within a reasonable time (must specify time frame – 24-72 hours?)
- 3.1.2, add two new paragraphs after the second paragraph:
  Additionally, any Meter Point for Sub Zonal Ties and Generators used in the calculation of the NYISO billing shall also provide 24-hour intervals of load profile data, for the Tie or Gen, transmitted once per day to the NYISO and any other appropriate TO that needs the data to calculate their subzone loads. These values are used for NYISO Invoicing.

  All Revenue Meter points for Subzonal Ties and Generators must also have adequate backup (redundant) Revenue grade metering installed that meets the same requirements as the Primary Revenue Metering.
- 3.1.2, New sixth paragraph, before "must" add: "or NYISO Billing"
- 3.1.2, New seventh paragraph, delete: If an Eligible Customer is serving an LSE that is not an Eligible Customer itself, the NYISO metering requirements shall apply for the LSE.

- 3.1.2, New tenth paragraph, at the end add: “until such time that the Meter Point is upgraded and in compliance with this document.”
- 3.1.2, New thirteenth paragraph, at the end add: “and shall comply with the minimum acceptable accuracy standards listed in Appendix A.”
- 3.1.2, Add new fourteenth paragraph:
  In order for a Market Participant to qualify as a NYISO Meter Authority they are required to comply, participate, and practice all requirements, practices, processes and procedures, etc. as defined in this manual.

Section 3.1.3:
- 3.1.3, after first sentence, add: “All metering should meet standards as stated in Appendix A, and be accessible for transmission to the ISO by the next day.”
- 3.1.3, in the new third sentence, after “. . . precluded. . .” insert: “only”
- 3.1.3, in the new fourth sentence, after “. . .subzonal revenue metering. . .” insert: “Hourly Interval”
- 3.1.3, in the new fourth sentence, after “. . .profile. . .” insert: “generation”.
- 3.1.3, at the end, define the time frame.
- 3.1.3, at the end, delete: If data is required before establishment of statewide standards, data must be supplied through an electronic link and be compatible with the systems in use at the ISO. Compatibility with the ISO systems will be established by each TO.

Section 3.1.5:
- 3.1.5, second paragraph: replace “shall” with “will” (seen twice in this paragraph)
- 3.1.5, second paragraph, at end add: “as stated in Appendix A”

Section 3.1.6:
- 3.1.6, first sentence, after “…NYISO…” delete “TO”
- 3.1.6, at end add: “The ISO will maintain documentation for all test and calibration records. If it is determined that the suspected metering equipment is not within specifications, Meter Authority will submit plan to NYISO with proposed corrective action within 72 hours to the NYISO and any affected Market Participant.

Section 3.1.8:
- 3.1.8, last sentence delete: “the TO and”
- 3.1.8, last sentence add: “and all affected Market Participants”

Section 3.1.9:
- 3.1.9, first sentence replace “TO, Generator, Load, etc.” with “any Market Participant”
- 3.1.9, after “. . . metering data. . .” insert: “or it has been determined an entity has exhibited continued negligence in performing required duties or submitting required data”
- 3.1.9, before last sentence add: “A response from the NYISO Board of Directors to the complaint should be available to all affected Market Participants within 30 days of receipt.”

Section 3.2.2:
- 3.2.2, third paragraph, last sentence, replace: “is” with “must be”

- 3.2.2, third paragraph, last sentence, delete “if available”

Section 3.2.3:

- 3.2.3, #1, second sentence, replace “should be” with “will be”.
- 3.2.3, #1, third sentence, replace “should” with “will” and replace “two years” with “the standards established in Appendix A.”
- 3.2.3, #3, first sentence, replace “shall” with “will”
- 3.2.3, #4, second paragraph, first sentence, before +-1%, insert: acceptable
- 3.2.3, #5, last sentence, at end add: “or specified”
- 3.2.3, #6, replace “shall” with “must”
- 3.2.3, #6, first sentence, at end add: “with equipment meeting standards of Appendix A”

Section 3.2.5:

- 3.2.5, Under *Analog Telemetering*, #1, at end insert: “on all ties and gens.”
- 3.2.5, Under *Analog Telemetering*, #1, delete a, b, c, and d (A. On each interconnection to adjacent areas outside the New York Control Area (NYCA). These should be from the billing meter end to the NYISO independent of the TO Control Center; B. On all circuits that are part of an internal NYISO interface for which transfer limits are observed, from one end to the NYISO independent of the TO Control Center; C. For generation at units 500 MW and above or complexes where the total generation is 500 MW or above where loss of the complex is determined by the NYISO Staff to have a significant impact on NYS Power System security; D: For TO total area net generation which may be computed by the TO’s computer, but should be independent of the TO to NYISO computer data link.)
- 3.2.5, Under *Digital Telemetering*

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1.0 Overview

This manual focuses on the computer, communications, and metering systems required for reliable and economic operations of the NYISO:

- ***Computer Systems*** — Each Transmission Owner must control its transmission system and the generation located within its transmission district using a control computer system. While it is beyond the scope of this document to provide the details of the design and operation of the systems and their interconnection with each other and the NYISO control computer system, some high-level interface and functional requirements are defined herein.
- ***Metering Policy and Certification*** — Metering Requirements are detailed as well as testing and coordination.
- ***Voice Communications*** — The NYISO maintains several diverse communications paths.

1.1 Terminology

The following terms are an integral part of this manual:

- ***Control Computer System*** — The real-time computer used to monitor and control the power system. These systems are often referred to as SCADA (supervisory control and data acquisition) systems, SCADA/AGC (SCADA automatic generation control) systems, or Energy Management Systems (EMSs). Individual TOs may call their systems by other names, such as Power Control System. The term Control Computer System has been used in this manual to generally refer to any or all such systems employed by the NYISO or Transmission Owner.
- ***Control Center*** — The physical facility housing the Transmission Owner operations or the Control Computer System of the NYISO or Transmission Owner.

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2.0 Data and Voice Communications Interface

This section presents the data and voice communications requirements for Transmission and Generation Owners. The term “interface” is considered to encompass all, in this manual:

- The computer-to-computer communications interfaces between the NYISO and Transmission Owner control centers.
- The voice communications interfaces between the NYISO and Transmission Owner control centers.
- The functionality to be supported by the Transmission Owner’s control computer system.

2.1 NYISO/Transmission Owner Control Computer System Model

Each Transmission Owner is expected to monitor and control ~~their~~ its transmission system using a Control Computer System. While many of the design details of this system are not of particular interest to the NYISO and the other Transmission Owners, the system is required to include functionality and interfaces compatible with the other Control Computer Systems operated by the NYISO and the other Transmission Owners.

2.2 Transmission Owner Communications

The NYISO supports communications with Transmission Owner control communication system using ~~three protocols~~:

- ~~NYISO/Bisync as defined in ***New York Power Pool Communications Standards & Message Specifications***, issued August 1992, latest revision April 1996.~~
- ~~X.25/IDEC (Inter Utility Data Exchange Consortium) as described in ***Data Communications Capability Network Interface Control Document***, July 31, 1992.~~
- IEC 870-6-503 as defined in ***TASE.2 Services and Protocol***, version 1996-08. Blocks 1, 2, 4, and 8 will be supported. (TASE.2 is also informally known as ICCP - Inter Control Center Communications Protocol.)

~~Bisync and IDEC will be supported only for existing systems and will not be extended to support new capabilities. New Transmission Owner control computer systems shall use the TASE.2 (ICCP) protocol.~~

The physical connection between the Transmission Owner and the NYISO Communications Network will be a frame relay channel. The specifications for the connection will be determined by the NYISO ~~Director of Information Systems~~. The NYISO ~~Director of Information Systems~~ will also oversee any changes to the NYISO Communication Network and the Transmission Owner connections.

2.3 Market Information System Interface

Each Market Participant, including Transmission Owners, Generation Owners and Interruptible Load shall exchange market information data residing on the NYISO Market Information System and on the NYISO OASIS. The interface with and capabilities of this Hypertext Transfer Protocol-based (HTTP) system are defined in the ***NYISO Market Participant User's Guide,*** which shall be consulted in addition to this manual.

2.4 NYISO/Transmission Owner Voice Communications

Each Transmission Owner must support the following voice communications facilities. These facilities will be developed and maintained in cooperation with the NYISO Director of Information Systems.

1. ***Emergency Hot Line*** — The emergency hot line is a network of diversely routed, private line telephone circuits connecting the control centers of the NYISO and the Transmission Owners. The emergency hot line is a permanently connected, private, conference facility. The system includes two circuits (A and B) routed radially from the NYISO control center to each Transmission Owner control center, and "red phones" in each control center. To initiate a call, one circuit to each location is connected to the conference bridge. Indicators at the NYISO control center indicate the status of all parties (on or off hook) during a call and also inform the NYISO operators of any malfunctions.
2. ***Automatic Ringdown*** — The automatic ringdown circuits consist of a single dedicated voice line between the NYISO control center and each Transmission Owner's control center. To initiate a call, the operator at either control center has only to pick up the appropriate circuit.
3. ***PBX Tie Lines*** — Dedicated lines will be used to connect the private branch exchanges of the NYISO control center and that of each Transmission Owner control center. Only selected staff at the NYISO and each Transmission Owner will be permitted access to the tie lines.
4. ***Direct Inward Dialing*** — The Transmission Owner PBX shall support direct inward dialing to the control center operating positions for general voice traffic.
5. ***Backup lines*** — Conventional dial-up lines will provide back-up to the dedicated and PBX facilities.
6. ***Satellite Telephone/Radio System*** — A voice circuit via satellite that is operated independent of the Public Telephone Switched Network. This system is to be utilized in the event landline telephone with one or more Transmission Owners is inoperable.

2.5 Transmission Owner Control Computer System Functionality

The Transmission Owner Control Computer System shall support the following capabilities. These capabilities are defined largely as viewed from the NYISO control computer system.

2.5.1 Data Acquisition

The Transmission Owner control computer system shall transmit information on the state of the transmission system and generation under its control to the NYISO control computer system. The data to be exchanged shall be as defined in Section 3.2.5 of this manual.

The NYISO may request or transmit data periodically or "by exception" (periodically, as the need for information arises).

The Transmission Owners Control Computer System shall be capable of receiving and transmitting data at the full capacity of the connection to the NYISO Communications Network.

2.5.2 Generation Control

~~For initial ISO startup, the NYISO will operate using an Interim AGC. As the ISO matures, this scheme will be changed to a more centralized, End-State AGC scheme.~~

For details, please review the ***NYISO Ancillary Services Manual,*** Section 4**.**

2.5.3 Backup Dispatch System

When the NYISO control computer system is not in service or when the market has been suspended for any reason, the Transmission Owners may be called on to "manually" dispatch the power system.

The method to be used for backup dispatch can be found in the ***NYISO Backup Dispatch System Manual***.

2.6 Transmission Owner Control Computer System Availability

The Transmission Owner Control Computer System shall be designed to operate even under single contingency failure conditions. The Transmission Owner Control Computer System shall meet the following availability requirements:

1. The failure of any single hardware element shall not render the system unavailable.
2. All connections to the NYISO communications network shall be via redundant communications interfaces.
3. The Control Computer System shall be powered from an emergency power supply capable of sustaining operation of the system.

2.7 Generation Provider Communications

Generation Providers will communicate with the NYISO through the facilities of its area Transmission Owner. The Generation Provider shall satisfy the practices of the Transmission Owner.

Generation Providers that desire to receive their control base points directly from the NYISO rather than via the utility or Transmission Owner (TO) SCADA system should refer to the ***NYISO Direct Generator Communications Project Manual***.

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3.0 Operating Procedures

The operating practices presented herein include:

- Meter Certification for Participants of the NYISO
- NYISO Guidelines for The Installation, Operation and Maintenance of Data Acquisition Equipment
- New York State Electric Meter Engineer Committee Guide for Uniform Practice in Inter Utility Metering
- Metering and Data Accuracy Analysis
- Data Requirements Coordination
- Maintenance and Validation of Scan Data Lists
- Computer Outage Coordination
- Request for Software and System Changes

3.1 Meter Certification for the Participants of the NYISO

This policy provides metering standards for any participant of the NYISO, including loads, generators, etc. The NYISO requires accurate metering from all NYS Power System Generators, Loads, and Transmission Owners (TOs) to ensure the reliable and economic operation of the NYS Power System and the proper settlement of accounts. These standards provide minimum guidelines for the installation and maintenance of all equipment utilized for data acquisition to insure that the data requirements of the NYISO are met.

The standards stated in this document are “minimum standards” and do not supersede other agreements. In cases in which standards differ, the most restrictive criteria shall be used.

3.1.1 Definitions

Listed below are selected definitions of capitalized terms in this policy: others can be found in the ***NYISO Filing Definitions Document*** and the ***NYISO Definitions Manual***.

- ***Data Problem*** — One where the quality of a data item, either telemetered or obtained by other means at a Data Concentrator (DC), has become suspect ~~is poor enough~~ so as to affect the operation of the power system or settlement of the NYISO markets and the cause ~~of such poor quality~~ has been traced to computer programming, communications limitations, computer equipment configuration or field metering equipment.
- ***Data Quality*** — The measure of the reliability and accuracy of a data item transmitted to the ISO Control Center (NYISO).
- ***Metering Authority*** — The ~~designated~~ entity responsible for the meter(s) accuracy and transmission of meter data in accord with NYISO meter

standards, tariff and/or TO contract agreements.

- ***Metering and Data Accuracy Analysis*** — Methods to monitor the quality of NYISO Data and the procedure of communications between parties and ISO Staff can be found in Section 3.5.

- ***Metering Problem —*** One where the quality of an item of telemetered data ~~is~~is ~~poor enough~~ suspect so as to affect the operation of the power system or settlement of the NYISO Markets and the cause of such poor quality has been traced to the metering equipment installed.

- ***Revenue Quality Real Time Metering*** — An accurate metering system that satisfies ANSI C12 requirements for electrical energy billing purposes; approved for use by both the Transmission Owner and the NYS PSC and is capable of providing instantaneous and/or stored energy readings.

3.1.2 Policy Guidance

The requirements of this document are applicable to all ~~new and existing~~ metering systems and equipment whose data are used for NYISO system operation and billing. Concerning the November 1999 NYISO online date, ~~T~~to allow for timely and economical implementation of the NYISO ~~Metering System~~Market, existing metering currently in operation for the NYISO (formerly NYPP), TO's, Eligible Customers and other applicable Participants, although not conforming to these requirements, need not be upgraded until such time that the need for upgrade or replacement is demonstrated to be operationally and economically required, or if required by the NYISO or TO Tariff. ~~However, for any Revenue Metering points for Sub-Zonal Ties or Generators that do not meet the minimum standards as defined in this document, these points will be required to be upgraded and comply with the accuracy standards defined in Appendix A. This metering shall also be capable of providing Hourly Interval data within three business days.~~

~~B.) NYSEG/RGE's version of this paragraph:~~
~~The requirements of this document are applicable to new metering systems and equipment whose data are used for NYISO system operation and billing. To allow for timely and economical implementation of the NYISO Metering System, existing metering currently in operation for the NYISO (formerly NYPP), TO's, Eligible Customers and other applicable Participants, although not conforming to these requirements, need not be upgraded until such time that the need for upgrade or replacement is demonstrated to be operationally and economically required, or if required by the NYISO or TO Tariff.~~

For any ~~existing~~ customer who is obtaining their full power requirement from a single TO~~,~~ other than from the TO in who~~'~~se load area the customer is located, the TO supplying the generation to this customer will provide 24~~-~~hourly intervals of load profile data, for this customer, transmitted once per day to the NYISO and the other appropriate TO.

~~All Meter Authorities will provide generation metered data transmitted once per day to the NYISO. Data for a specific day must be completed, if possible, within three **one** business days. These values will be used for all billing functions.~~

~~Additionally, any~~All Meter Authorities that report ~~Point~~ data for Sub-Zonal Ties and Generators ~~for Sub-Zonal Ties and Generators~~ used in the calculation of the NYISO market settlements ~~billing~~ shall ~~also~~ also include~~provide~~ ~~24~~ hourly~~hour~~ ~~**minute**~~ ~~intervals of~~ load profile data~~, for the Tie or Gen, transmitted once per day to the NYISO and any other appropriate TO that needs the data to calculate their subzone loads~~. These values are used for NYISO Invoicing.

All Revenue Meter points for Subzonal Ties and Generators must also have backup data for the Revenue grade metering. **Although revenue quality metering is not required, the TO must be able to use metering for revenue purposes.**

Except as provided in the preceding paragraphs, all metering systems for customers must meet the requirements of the NYISO and of the Transmission Owner of the facilities in which they attach to the NYS Power System.

All metering systems whose data is used for NYISO systems operation or NYISO Billing must have a designated Meter Authority.

~~If an Eligible Customer is serving an LSE that is not an Eligible Customer itself, the NYISO metering requirements shall apply for the LSE.~~

All metering systems will adhere to the document entitled "NYISO Guidelines for the Installation, Operation and Maintenance of Data Acquisition Equipment" (Section 3.2).

All metering systems will adhere to the document entitled, "New York Electric Meter Engineers' Committee Guide for Uniform Practices in Inter-Utility Metering" (Section 3.3).

The Metering Authority will provide instantaneous and stored metered data which meets the NYISO (and Transmission Owner) requirements to the TO Control Center.

Any Load that is not metered on an hourly or instantaneous basis will have its Load determined by the Transmission Owner in whose Load Subzone they are located, until such time that the Meter Point is upgraded and in compliance with this document.

Ancillary Service suppliers, as defined in the ***NYISO Ancillary Services Manual***, shall provide metering as determined by the NYISO to meet all appropriate service performance tracking requirements.

The Transmission Owner may require that the Eligible Customer install an approved remote terminal unit (RTU) or analog telemetry equipment for the accurate and economical transmission of their data to the Transmission Owner Control Center.

Metering for use in revenue and/or interchange metering must accurately measure energy while minimizing the influence of voltage variation, power factor, burden,

temperature, frequency and harmonics. Instrument transformers must be suitable for use in revenue and interchange metering and shall comply with the minimum acceptable accuracy standards listed in Appendix A.

In order for a Market Participant to qualify as a NYISO Meter Authority they are required to comply, participate, and practice all requirements, practices, processes and procedures, etc. as defined in this manual.

3.1.3 Revenue Metering Data

All revenue metering data supplied for final balancing and billing purposes must be based on energy measurements made with instruments that are traceable to the National Institute of Standards and Technology (NIST) and approved for billing purposes within New York State. All metering should meet standards as stated in Appendix A, and be accessible for transmission to the ISO ~~by the next day~~by the next day ~~.**within three business days**~~. ~~The use of SCADA data for final settlement will be precluded~~ only ~~if revenue grade data is available. The subzonal revenue metering data (energy consumption, demand, profile) shall be transmitted to the ISO in a format and within the time constraints specified by the NYISO. If data is required before establishment of statewide standards, data must be supplied through an electronic link and be compatible with the systems in use at the ISO. Compatibility with ISO systems will be established by each TO~~.

3.1.4 Metering Equipment Standards and Specifications

Specifications for metering equipment and functionality can be found in the following documents:

1. Applicable standards published by the TO of the facilities in which the Eligible Customer is attached to the NYS Power System, obtainable through the Transmission Owner.

2. NYISO Guidelines for the Installation, Operation and Maintenance of Data Acquisition Equipment presented in Section 3.2.

3. New York State Electric Meter Engineers' Committee Guide for Uniform Practices in Inter-Utility Metering presented in Section 3.3.

3.1.5 Maintenance and Calibration

Each Participant (not a retail customer) is responsible for the cost assumed with purchase, installation and appropriate maintenance of meters, wiring, communications equipment and all components essential to their accurate and reliable operation, including spare equipment, if applicable, in accordance with the requirements of the NYISO and the appropriate TO.

All metering shall be calibrated within the guidelines (APPENDICES) of this document and in accordance with the Transmission Owner requirements. Maintenance and calibration shall be performed by the metering authority or its designated representative, who will maintain control over the equipment in

accordance with NYS PSC rules and regulations as stated in Appendix A~~.~~.

The metering and data accuracy analysis administrative process can be found in Section 3.5.

3.1.6 Audits

Beyond any NYS PSC rules, each metering system will be subject to periodic testing and inspection by the NYISO, TO, and/or Market Participant at the request of ~~either~~ any of the three aforementioned ~~party~~parties. If any inspection request is initiated, other than periodical routine testing, the nature and magnitude of the suspected accuracy problem must be stated. If after inspection and testing it is determined that the suspected metering is within specifications, the requestor will be responsible for testing expenses incurred.
The ISO will maintain documentation for all test and calibration records. If it is determined that the suspected metering equipment is not within specifications, Meter Authority will submit plan to NYISO with proposed corrective action within 72 hours to the NYISO and any affected Market Participant.

3.1.7 Scan Data List

Any entity supplying scanned data to the NYISO must supply that data in accordance with existing NYISO database requirements. Each entity must also maintain a data coordinator who will be responsible to communicate proposed scan data changes to the NYISO data coordinator. Reconciliation of scan data lists will take place every April and October.

3.1.8 Loss of Metering or Telecommunications

If data is lost due to a meter or communications failure, the Meter Authority will use the best available information (e.g., logs, schedules, combinations of other meter readings, etc.) to fill in values for data lost. If the data transmission is delayed due to a telemetry failure, the Meter Authority will make its best effort to transmit the data using some electronic means acceptable to the NYISO billing staff. All failed telemetry, metering and communications equipment will be rendered operable in the shortest practical time and calibration compliance must be reported to ~~the TO and~~ the NYISO and all affected Market Participants. In all cases relevant NYS PSC rules will be enforced.

3.1.9 Procedures for Dispute Resolution of Data Issues

If after proper audit, an entity (~~TO, Generator, Load, etc.~~any Market Participant) is suspected of manipulating metering or metering data or it has been determined an entity has exhibited continued negligence in performing required duties or submitting required data, all details will be turned over to the NYISO ~~Board of Directors.~~ NYISO Market Monitoring Unit for further investigation. A response from the NYISO to the complaint should be available to all affected Market Participants within 30 days of receipt. In all cases, relevant NYS PSC rules will be enforced.

3.2 NYISO Guidelines for the Installation, Operation and Maintenance of Data Acquisition Equipment

3.2.1 Introduction and Background

This document provides guidelines for analysis and procedures for the maintenance and calibration of data acquisition equipment.

3.2.2 Present Design Overview

Analog metering transmits selected line megawatt flows, generator megawatts and bus voltages directly from the source to the New York Independent System Operator. Primary transducers are installed in the stations and connected to current and voltage transformers. The output of the transducer is input to the telemetering systems. The telemetering equipment is connected via a leased telephone line to the NYISO where telemetering receivers are installed.

Digital data is transmitted to NYISO via computer-to-computer data links between the NYISO and the Transmission Owners computer. The above link is established using ~~redundant leased telephone data lines or~~ a frame relay network. Digital data expands the NYISO data base to include all major transmission MW and MVAR flows, generator MWs and MVARs, tie line MWs, MVARS and MWHRS; substation breaker status, frequency and voltage. These data points are gathered by the Transmission Owner from local substation Supervisory Control and Data Acquisition (SCADA) terminals to their Control Center Computers.

Digital Data is used as the primary information source with Analog Data as its back up. Final settlement must be ~~is~~ based on revenue quality metering data as described in Section 3.1 ~~if available~~.

3.2.3 Calibration and Maintenance

Periodic calibration of existing metering installations must be made to achieve ~~optimum operation~~performance, as defined in Appendix A.

1. ***Calibration Interval*** — Calibration of equipment shall be performed in accordance with manufacturer~~'~~s’ recommended intervals and procedures. Where a manufacturer does not provide calibration interval recommendations, the interval ~~should be will~~shall be based on equipment stability as demonstrated by historic data. In no case, however, ~~should will~~ shall the calibration interval exceed the standards established in Appendix A. ~~two years~~.

2. ***Test Range Increments*** — Checks shall be made in 20% increments for Transducers from zero to 100%, inclusive, of rated input, or as specified by the manufacturer if more stringent. Test range increments for revenue grade metering devices shall reflect those specified in ANSI C12.1 - American

National Standard Code for Electricity Metering.

3. ***Maximum Errors*** — Transducer error shall not exceed 0.25% of full scale or manufacturer's specifications, whichever is less. Errors exceeding the above, after calibration, indicate that the transducer should be replaced or returned for repair and recalibration. If replacement is required, a new state-of-the-art transducer shall be used.

   If Digital Telemetry error is found to be more than 0.1% ± the least significant bit or outside the manufacturer's specifications, whichever is less, the cause shall be determined and the error reduced to specifications.

   Analog Telemetry found to be outside accuracy specifications, the cause shall be determined and the error corrected to specifications. The error should not exceed ± 0.1% of reading or as state of the art permits.

4. ***Overall Tests*** — Each data point shall be calibrated from source (transducer) to NYISO in 20% increments from zero to 100% of rated input. Using a calibrated power supply input to the transducer, the final NYISO reading shall not exceed 0.25% deviation.
   Where the same data is telemetered in both Analog and Digitals form, the calibration shall be performed at the same time and the data received at NYISO must be within the ±1% range of each other. The comparison shall also be performed using actual live data.

5. ***Test Equipment*** — All test equipment shall be traceable to the National Institute of Standards of Technology (NIST). Test equipment shall conform to the requirements of Section 4.3. Calibration intervals shall be in accordance with manufacturer recommendations or specifi~~ed~~cations.

6. ***Maintenance*** — If periodic maintenance or failures indicate poor reliability, the equipment shall be replaced with equipment meeting standards of Appendix A. If errors exist, the defective component shall be isolated and remedial action taken.

3.2.4 Metering Improvement Priorities

The various data types transmitted to NYISO shall be prioritized on the basis of electric system costs, flow limits, operating limits and security considerations. These priorities shall determine the basis on which metering replacements and improvements are to be completed. The priority classes are as follows:

1. Inter-TO Transmission Lines Megawatts/MWHRs Inter-NYCA Transmission Lines Megawatts and Megavars
2. Generator Megawatts/MWHRs and Megavars
3. Bus Voltages
4. Intra-TO Transmission Lines Megawatts and Megavars

3.2.5 NYISO Data Requirements

The following guidelines shall be used for the determination of NYISO minimum

data requirements resulting from changes being made to the NYS Power System. They are intended to cover the normal requirement but may be superseded by special situations.

Analog Telemetering

Analog Telemetering is provided to enable the NYISO to coordinate operation of the NYS Power System when the NYISO computer system is out of service or when any of the computer-to-computer data links between the NYISO and TOs is not functioning.

1. **MW telemetering will be required:**
    a. On each interconnection to adjacent areas outside the New York Control Area (NYCA). These should be from the billing meter end to the NYISO independent of the TO Control Center.
    b. On all circuits that are part of an internal NYISO interface for which transfer limits are observed, from one end to the NYISO independent of the TO Control Center.
    c. For generation at units 500 MW and above or complexes where the total generation is 500 MW or above where loss of the complex is determined by the NYISO Staff to have a significant impact on NYS Power System security. Generator MW readings may be obtained from the TO Control Centers, but should be independent of the TO's computer.
    d. For TO total area net generation which may be computed by the TO's computer, but should be independent of the TO to NYISO computer data link.

2. **Voltage:**

    Voltage telemetering shall be required on busses 230 kV and above when the need is indicated by a review of transmission configuration changes or operating practices.

3. **Frequency:**

    Frequency telemetering shall be required when the need is indicated by a review of transmission configuration or operating practices.

Digital Telemetering

Digital data is presently obtained by the NYISO computer via the data links between ~~the TO's~~various Market Participants ~~computer~~ and the NYISO ~~computer~~. ~~Therefore, presently only data available in the TO's computer can be obtained by this method. Required data which is not available in the TO's computer should be provided as soon as practical.~~ The NYISO Operations Staff will designate the required data. Telemetering (and a backup metering source~~?~~) will be required on all **sub-zonal** Ties and Gens as outlined below.

1. MW and MVAR will be required:
    a. On all transmission circuits, 230 kV and higher and on designated critical

lower voltage circuits.

b. On all transformer banks whose high voltage side is 230 kV or higher and on designated critical lower voltage equipment.

2. MW, MVAR and MWh will be required on all inter-NYCA ties.
3. MW, MVAR and MWh will be required on all ties between TO Control areas.
4. MW will be required on all generators above 1 MW. Non Dispatchable generation may be provided in the form of plant total or group total dependent on how owner intends to bid generation. MWs will be measured with net injections on the high side of the Generation Step-up Transformer (GSU).
5. MVAR will be required on designated generators. If generator MW is provided in the form of plant total or group total, as allowed in item 4, then MVAR output may also be provided in that form.
6. MVAR will be required on designated synchronous condensers, generators that can be operated as synchronous condensers, and SVC's.
7. Voltage will be required from strategic locations throughout the NYCA sufficient to provide a voltage profile of the 230 kV and higher voltage systems and also to provide critical lower transmission system voltages.
8. Tap position will be required on all load tap changing transformers and all voltage regulating transformers whose high side voltage is 230 kV and higher and on designated critical lower voltage equipment.
9. Frequency will be required from strategic locations that could reasonably end up as an island.
10. Status will be required on breakers that affect facilities 230 kV and higher, and on designated critical lower voltage facilities. Circuits supplying radial load will be exempt.
11. Status will be required on designated synchronous condensers, generators that can be operated as synchronous condensers, and SVC's.
12. Status will be required on switchable capacitor banks and reactors whose voltage is 230 kV and higher and on designated critical lower voltages.
13. Status on disconnects or a combination of NYISO breaker and disconnects will be provided such that the NYISO can determine the status of facilities 230 kV and higher, and on designated critical lower voltage facilities. Circuits supplying radial load will be exempt.
14. Data quality status is an indication of the currency of the analog data values being sent from each TO to the NYISO computer. Data quality status reporting is accomplished by requiring that every analog data point have a corresponding data quality bit. When "set", this quality bit indicates to NYISO programs that the corresponding analog point is not being updated.

    Failures of this type may be handled at the TO by substitution of a manually entered value, or by switching to a back-up source. At the NYISO, such data failures may be handled with manual substitution, or with Analog data substitution. Where Analog back-up exists, the quality bit controls its

automatic substitution. If a TO dispatcher replaces a failed point, or switches to an alternate source, then the corresponding quality bit should be restored to normal since the condition is being managed.

Data Quality Indication

Data quality is an indication of the currency of the MW, MWh, M~~var~~VAR, voltage, and frequency values exchanged among the Market Participants and the NYISO. Each value must be accompanied by a data quality flag. When the flag is set to true, the corresponding value is not being updated by its source. When set false (the expected or "normal" state), the value is considered valid and represents the real-time condition of the value to the best ability of the source. Only the source of the value may set the quality indication.

Invalid (flag = false) data may be handled at its source by substitution (by an operator) of a manually entered value or by switching to a back-up source. At the NYISO, such data failures may be handled with manual substitution or by the substitution of analog data. Where analog back-up exists, the quality bit controls its automatic substitution. If a Transmission Owner dispatcher replaces a failed value or switches to an alternate source, then the corresponding quality bit should be restored to normal since the condition is considered managed.

Revenue Metering Data

All revenue metering data supplied for final balancing and billing purposes must be based on energy measurements made with instruments that are traceable to the National Institute of Standards and Technology (NIST), meet specifications of Appendix A, and are approved for billing purposes within New York State. The use of SCADA data for final settlement will be precluded if revenue grade data is available. In the event revenue quality realtime metering data is not available for a final settlement, the NYISO will consult with ALL affected parties and at that time it will be determined the best data to be used in the final settlement. (Legal to review this section.)

Metering Specifications

The following is the design for ~~new~~ equipment that will meet the requirements of minimal error necessary to affect efficient computer operation at both the TOs and the NYISO. For detailed specifications on meters, Transducers, VTs, and CTs see the New York State Electric Meter Engineers~~'~~ Committee Guide for Uniform Practices in Inter-Utility Metering.

1. ***Voltages for Transmission to NYISO*** — The transducers shall be of the RMS type and have no external adjustments or external mechanical variable resistors. Any internal adjustments shall only be available through the removal of the case or a port capable of being sealed.

   Voltages of 230 kV and higher shall be metered by 3 phase-to-ground voltage transducers. The outputs may be transmitted individually or averaged back to the TO control center. NYISO will require an average value for their calculation. The VT shall be a wound or cascade type. For Voltage

Measurement sources the CCVT type shall not be used on new installations.

2. ***Data Transmission to NYISO*** — Digital data transmission with a maximum error of + 0.1% of reading, or as state of the art permits, is the preferred means from the remote terminal for both Analog and Digital Data telemetry. However, where analog data transmission must be used, the system shall have a combined error of less than 1.0% of full scale reading, or state of the art accuracies, end to end for the telemetering oscillator and converter. End to end is defined as including all equipment from the input terminals of the telemetering oscillator to the output ends of the telemetry converter.
3. ***General Specifications***
   a. Metering and data transmission equipment shall be powered by the station DC bus or an uninterrupt~~a~~ible power supply, with sufficient capability to support the metering for a minimum of eight (8) hours.
   b. Multiple Parameters measured at generating plants or critical transmission stations (KW, KWH, etc.) shall be from the same CTs, VTs, and transducers so that data used at the plant, the operating headquarters, and the NYISO are common. Analog metering shall have the same data quality as Digital metering.
   c. Metering connection drawings, schematics and documentation shall be maintained by the Metering Authority in conformance with the New York State Electric Meter Engineers~~'~~ Committee Guide for Uniform Practices in Inter-Utility Metering.

3.3 New York State Electric Meter Engineers' Committee Guide for Uniform Practices in Inter Utility Metering

The Guide for Uniform Practices in Inter Utility Metering outlines procedures and practices that should result in optimum metering accuracy and uniformity of inter-utility metering.

This document is maintained by the New York State Meter Engineers Committee and is included herein by reference. A copy of the current document is included with this manual as Appendix A. Market Participants are encouraged to obtain the latest version of the document before implementing any of the procedures or practices.

3.4 Metering and Data Accuracy Analysis

3.4.1 Purpose

This procedure provides:

- A method to monitor the quality of NYISO data so that problems can be analyzed, and
- A communications procedure between the Participants and the NYISO staff, whereby data and metering problems can be addressed and resolved.

3.4.2 Administration

1. The Information ~~Systems~~ Technology Staff of the NYISO is responsible for analyzing all metering and data accuracy anomalies as reported to them by NYISO Staff or Participants staff.

2. The ~~NYISO successor group to the Data Coordination Task Force (DCTF) of the~~ Computer and Data Advisory Subcommittee (CDAS) is responsible for maintaining a liaison between the NYISO and Participants staffs for problem analysis and resolution. Additionally, all metering or data problems that cannot be satisfactorily resolved at a staff level will become the responsibility of CDAS successor group.

3.4.3 Procedure

1. If the NYISO Information Systems Staff~~,~~ or ~~the Participants DCTF~~any Market Participant representative~~,~~ determines that a potential metering or data problem exists, an investigation into the cause of the problem will be initiated~~. In the case of a Participant initiated investigation, contact will be made through the NYISO designated Information Systems Staff representative who will coordinate problem analysis~~ through NYISO Customer Relations who will coordinate problem analysis with NYISO Information Systems Staff and representatives of all affected parties.
2. The Participants representative receiving the request must respond by the next working day supplying the following information:
   a. Probable cause of the data or metering problem;
   b. Expected time frame in which the problem will be resolved.
3. Long Term Metering or Data Problems are those for which the time frame specified in 2b above is not acceptable to the NYISO or Participant and will be resolved in the following manner:
   a. Reasons and potential alternatives for problem solution shall be supplied, in writing, by the Participants receiving representative to the NYISO initiating representative and representative of any affected Market Participant;

b. The NYISO initiating representative will respond in writing to all affected parties, analyzing the alternatives presented, indicating their effects on their respective operations;

c. The NYISO representative will forward all long term metering or data problems, with supporting documentation, to CDAS successor group for their review and resolution.

3.4.4 Reporting

~~1.~~ A report will be issued semi-annually by the Information Systems Staff, of the NYISO, to CDAS ~~successor group~~and will be posted on the NYISO Website. The report shall include:

a. A summary of problems and resolutions during the report period;

b. Details of unresolved problems.

3.5 Data Requirements Coordination

Close coordination between the NYISO and the Transmission Owners is required to insure the proper operation of the NYISO and TO control computer systems. The definition of data and telemetering requirements and the addition of the required data and telemetering must be scheduled so that the operation of the NYISO and the functioning of NYISO and Market Participant control computer systems are not adversely affected. This procedure defines the framework under which data and telemetering requirements can be logged, tracked and documented.

3.5.1 Data Requirements Coordination Procedure

1. The Data Coordinator shall inform the NYISO of all power system equipment additions or modifications that may affect NYISO power system operation by completing and forwarding to the NYISO Data Coordinator a *Notification of NYISO Modeling Configuration Change.* The notification shall describe (as a minimum):
    a. The Transmission Owner's name.
    b. The power system facility to be changed.
    c. A description of the change including drawings of the changed facility.
    d. The effective date of the changes.
    e. The notification shall be signed by the Transmission Owner's Data Coordinator.
2. The Guidelines for the Specification of Data Quantity Requirements presented in Section 3.2.5 shall be used in determining minimum NYISO telemetering needs.
3. The NYISO Data Coordinator will update the NYISO data installation schedule to include all data and telemetering required by the NYISO to accurately model and monitor the facility(s) affected by the change.
4. TO's requiring additional data, not scheduled for NYISO purposes, may request the addition of specific data through the NYISO Data Coordinator.
5. Within fifteen (15) days of receipt of a notification to a change in the NYISO data installation schedule, the Market Participant Data Coordinators must report on the availability of all data and telemetering requirements defined.
6. During March and September of each year, the NYISO Data Coordinator will publish the "NYISO Data Installation Schedule." The NYISO installation schedule will include all data and telemetering requirements of the NYISO and the Market Participants projected 18 months into the future.
7. The Market Participant Data Coordinators shall review the NYISO installation schedule and inform the NYISO Data Coordinator within fifteen (15) working days of its accuracy and completeness.
8. Discrepancies between the NYISO request and the Market Participants that cannot be resolved will be referred to the DCTF and, if agreement cannot be reached again, to the CDAS.

9. The Chairman of the DCTF will report semi-annually to CDAS regarding the functioning of this procedure and the NYISO data installation schedule.

3.6 Maintenance and Validation of Scan Data Lists

The purpose of this procedure is to insure that any change made to a TO or NYISO Control Computer System database is coordinated and validated, and that all parties are informed of all changes pending or active.

Scan Data Lists are generated by the NYISO Information Systems Group and define data structures transmitted between TOs and the NYISO. The following lists are generated:

a. ***Summary of Data Item Changes*** — all changes to the NYISO scan database since the last periodic issue of the scan data lists.

b. ***Analog Data List*** — data items transmitted to the NYISO directly from field instrumentation.

c. ***Digital Data Lists*** — data items that are transmitted to the NYISO from each TO.

d. ***Scanout Data Lists*** — data items transmitted from the NYISO TO~~'~~s.

e. ***Dynamic Rating List*** — all power system facilities for which ratings can be dynamically updated.

f. ***MWh Data List*** — all MWh values received by the NYISO.

3.6.1 Maintenance and Validation of Scan Data Lists Procedure

1. Each April and October the NYISO Information Systems Staff will send a copy of the current data paths to the Market Participant Data Coordinator for review and ~~TO~~ to verify that all data lists pertinent to their control computer system are complete and accurate.
2. The TO Data Coordinator shall notify the NYISO Data Coordinator in writing within ten (10) work days of receipt of the scan data lists of their accuracy. All discrepancies shall be reported in the same response. The NYISO will immediately, upon receipt of notice of any discrepancy, review the discrepancy and attempt to reconcile the discrepancy with the TO Data Coordinator.
3. Any unresolvable discrepancies shall be referred to the TO System Computer and Data Advisory (CDAS) Subcommittee member and the NYISO Director of Information Systems.
4. Each TO System Data Coordinator will inform the NYISO Data Coordinator of any pending changes to its scan data list. Similarly, the NYISO Data Coordinator will inform each TO System Data Coordinator of any pending changes.

3.7 Computer Outage Coordination

The purpose of this procedure is to coordinate NYISO and Transmission Owner control computer system outages that could adversely affect the secure and economic operation of the NYISO and the interconnected power systems.

Outages of the NYISO and Transmission Owners Control Computer Systems are assigned to Classes by the severity of the outages. Three classes of scheduled outages and one class of unscheduled outages are employed:

- ***Class 1 Outage*** — Any scheduled outage that would cause the NYISO to operate in Manual Dispatch Operations Mode.
- ***Class 2 Outage*** — Any scheduled outage for which the projected duration would be greater than 15 minutes and NYISO operations would remain in Centralized Dispatch Operations Mode.
- ***Class 3 Outage*** — Any scheduled outage for which the projected duration would be less than 15 minutes and NYISO operations would remain in Centralized Dispatch Operations Mode.
- ***Class 4 Outage*** — All unscheduled outages.

Outages of both NYISO and Transmission Owner control computer system must be scheduled so that other parties in the control area can properly accommodate the outage. The party, NYISO or Transmission Owner, scheduling the computer system outage is referred to as the "outage initiator" for the purposes of this procedure only.

Components that affect the NYISO and the Transmission Owners are those that control the transmission of information between Transmission Owner and NYISO Control Centers. This would include all components affecting computer communications or the receipt of data at the Transmission Owners and the NYISO. Each Transmission Owner is responsible for identifying computer system components that could cause a system interruption and coordinating any outage of these defined components.

3.7.1 Class 1 Computer Outage Coordination Procedure

Class 1 computer outages shall be coordinated as follows:

Outage Initiator Action:

1. Class 1 outages shall be scheduled ~~before noon~~48-hours prior to 4:30 PM of the working day preceding the requested outage date. An outage initiator may schedule a Class 1 computer system outage by providing the NYISO Outage Coordinator the following data:
    a. Date and time of outage.
    b. Scheduled duration of outage.
    c. Reason for outage.

NYISO Action:

2. Notify all of the following of scheduled Class 1 outages at least two hours in advance of the outage. Notification shall be via the control centers' hot line telephone:

   - All ~~Transmission Owner Control Centers~~Market Participants via the TIE List Server coordinated by NYISO Customer Relations staff
   - The NYISO Information Systems Operations Manager
   - The NYISO Director of Information Systems

3. Record all Class 1 outages on the NYISO daily Outage Summary Form indicating if the outage was executed. The following information to be recorded is described in Section ~~4~~3.7.7.

3.7.2 Cancellation or Postponement of Class 1 Computer Outages Coordination Procedure

Outage Initiator Action:

1. Class 1 outages previously scheduled may be canceled or postponed at any time by any affected TO or the NYISO. The TO shall notify the NYISO Outage Coordinator of any cancellation or postponement as soon as practical. The reasons for the cancellation or postponement shall be passed to the NYISO Outage Coordinator at the same time.

NYISO Action:

2. Notify all of the following of the canceled or postponed Class 1 outages as soon as practical. Notification shall be via the control centers' hot line telephone:

   - All ~~Transmission Provider Owner Control Centers~~Market Participants via the TIE List Server
   - The NYISO Information Systems Operations Manager
   - The NYISO Director of Information Systems.

3. The record of the scheduled outage shall be amended by the NYISO Outage Coordinator to indicate that the outage was canceled or postponed and the reasons for the cancellation or postponement.

3.7.3 Class 2 Computer Outage Coordination Procedure

Class 2 computer outages shall be coordinated as follows:

Outage Initiator Action:

1. An outage initiator may schedule a Class 2 computer system outage by providing the NYISO Outage Coordinator the information described in Section ~~4~~3.7.7. The outage initiator shall attempt to schedule Class 2 outages before noon of the working day preceding the requested outage date.

2. If it is not practical to schedule a Class 2 outage as described in item 1, the outage may be scheduled directly with the NYISO Supervisor ~~of Systems~~

Command Center up to one hour before the requested time of the outage. The information provided to the NYISO Supervisor ~~of Systems~~Command Center shall be that described in Section ~~4~~3.7.7.

NYISO Action:

3. Notify all of the following of scheduled Class 2 outages at least one hour in advance of the outage. Notification shall be via the control centers' hot line telephone:

   - All ~~Transmission Owner Control Centers~~Market Participants via the TIE List Server
   - The NYISO Information Systems Operations Manager
   - The NYISO Director of Information Systems.

4. Record all Class 2 outages on the NYISO daily Outage Summary Form indicating if the outage was executed. The information to be recorded is described in Section ~~4.8~~.3.7.7.

3.7.4 Cancellation or Postponement of Class 2 Computer Outages Coordination Procedure

Outage Initiator Action:

1. Class 2 outages previously scheduled may be canceled or postponed at any time by any affected Transmission Owner or the NYISO. The TO shall notify the NYISO Outage Coordinator o~~r~~f any cancellation or postponement as soon as practical. The reasons for the cancellation or postponement shall be passed to the NYISO Outage Coordinator at the same time.

NYISO Action:

2. Notify all of the following of the canceled or postponed Class 2 outages as soon as practical. Notification shall be via the control centers' hot line telephone:

   - All ~~Transmission Owner Control Centers~~Market Participants via the TIE List Server
   - The NYISO Information Systems Operations Manager
   - The NYISO Director of Information Systems.

3. The record of the scheduled outage shall be amended by the NYISO Outage Coordinator to indicate that the outage was canceled or postponed and the reasons for the cancellation or postponement.

3.7.5 Class 3 Computer Outage Coordination Procedure

Class 3 outages require no coordination by either the NYISO or the Transmission Owners.

3.7.6 Class 4 Computer Outage Coordination Procedure

Class 4 computer outages shall be coordinated as follows:

Outage Initiator Action:

1. The outage initiator shall provide the NYISO Outage Coordinator the information described in Section ~~4.~~3.7.7 as soon as practical after the occurrence of a Class 4 computer outage.

NYISO Action:

2. Notify all of the following of Class 4 as soon as practical. Notification shall be via the control centers' hot line telephone:

   - All Transmission Owner Control Centers
   - The NYISO Information Systems Operations Manager
   - The NYISO Director of Information Systems.

3. Record all Class 4 outages on the NYISO daily Outage Summary Form indicating if the outage was executed. The information to be recorded is described in Section ~~4.~~3.7.7.

3.7.7 Recording of Outages

The following information shall be recorded for all Class 1, 2, and 4 computer system outages by the NYISO Supervisor Command Center.

a. Date and time of outage.

b. Scheduled duration of outage (Class 1 and 2 only).

c. Reason for outage.

3.8 Request for Software and System Changes

This procedure describers a means to request, evaluate, and accept or reject changes, additions, and enhancements to the software and systems comprising the NYISO Control Computer System. The procedure is also applicable to TO Control Computer Systems in regard to their operation in coordination with the NYISO systems.

3.8.1 Originating Body

A "Request for Software or System Change" may originate with the NYISO or any Market Participant. For the purposes of this procedure, the person originating the request shall be referred to as the originator.

Originator Action:

1. Complete a change request containing the following information:
   a. The title of the change.
   b. The date of submission of the request.
   c. The name and organization of the originator.
   d. A priority (high, normal, low) as determined by the originator.
   e. A contact person for further information (the originator may be the contact person).
   f. A summary of the requested change.
   g. The reasons, rationale, and justification for the requested change.
   h. A description of the current capabilities to be replaced or modified, if applicable.
   i. Any other comments.
   j. Any references.
   k. The Request shall be sent to the NYISO Director of Information Systems.

NYISO Action:

2. Assign a number to the Request.
3. Open a file on the Request. The file shall include all correspondence and documentation on the Request.
4. Assign a Technical Lead to the problem

Technical Lead Action:

5. Determine the appropriate NYISO and TO staff to review the Request and transmit all pertinent information to the Review Body.
6. Evaluate each Request, in conjunction with the Review body, and determine its cost, benefit, feasibility, and schedule.

7. Produce a Recommendation justifying or rejecting the Request based on the evaluation.

8. Where changes potentially affect regulatory requirements, the Technical Lead shall solicit the advice of appropriate NYISO staff.

9. Forward the Recommendation to the NYISO Director of Information Systems for inclusion in the Request file and for circulation to appropriate Participants.

NYISO Action:

10. After review of the Recommendations with appropriate Participant staff and management, Approve or Disapprove the Request and transmit the completed Request along with the Recommendations to the Originator.

11. If the Request is accepted, transmit the Request file to the appropriate staff for implementation.

(Note: This section is being created by Project Management and NYISO Committees.)

Attachment A:
Guide for Uniform Practices in Inter-Utility Metering

- Rev. 1: October 22, 1982
- Rev. 2: May 25, 1984
- Rev. 3: May 14, 1998

Approved by the New York State Electric Meter Engineers' Committee, May 14, 1998

New York State Electric Meter Engineers' Committee Guide for Uniform Practices in Inter-Utility Metering

1.0 Purpose

1.1 The purpose of this guide is to outline procedures and practices which should result in optimum metering accuracy and uniformity of inter-utility metering.

1.2 The scope of this guide is limited to the metering of 3 phase circuits rated 115 kV or higher and to the metering equipment and practices necessary to provide accurate metering of electrical quantities at, or compensated to, a mutually agreed upon point of measurement.

1.3 Equipment, if any, necessary to telemeter the measured quantities to remote locations is not covered by this guide.

1.4 The guide is intended to apply to new or completely revised metering installations. Its application when upgrading the capabilities of existing installations is encouraged, but it is recognized in those cases that the complete conformance may not be physically, electrically, or economically practicable.

1.5 This guide is intended to cover metering where accuracy is a primary concern. It is not necessarily applicable to measurements intended for local monitoring or for station relaying, control, and operation. Because of the different practices utilized by the two measurement systems, it is not generally practical or meaningful to compare their readings.

2.0 General

2.1 Measurements covered under this guide include, but are not necessarily limited to, quantities such as volts, volts-squared, amperes, amperes-squared, phase angle, volt-amperes, watts, reactive volt-amperes, volt-ampere-hours, watt-hours, reactive volt-ampere-hours, Q-hours, and demand.

2.2 All devices used in inter-utility metering should conform to applicable ANSI standards.

2.2.1 Metering of watt-hours, volt-ampere-hours, reactive volt-ampere-hours, Q-hours and the associated demand components should conform to ANSI standard C12.

2.2.2 Instruments or transducers for the analog measurement of volts, volts-squared, amperes, amperes-squared, phase angle, volt-amperes, watts, and reactive volt-amperes should conform to ANSI standards C39.1, C39.5 and C37.90&.

2.2.3 Instruments for the digital measurement of volts, volts-squared, amperes, amperes-squared, phase angle, volt-amperes, watts and reactive voltamperes should conform to ANSI standards C39.5,

C39.6 and C37.90&.

2.2.4 Instrument transformers should conform to ANSI standard C57.13.

2.3 Each meter, instrument transformer, and transducer shall be provided with a nameplate that lists the manufacturer's name, serial number, and type of device as well as pertinent input and output ratings including impulse levels, where applicable, and necessary connection diagram and polarity designations.

2.4 Wiring connections between the instrument transformers and the metering devices and transducers shall conform to the following guides and to any attached drawings.

3.0 Current Transformers

3.1 All current transformers will ~~shall~~ conform to a class 0.3 or better metering accuracy and shall be provided with certificates of test stipulating the ratio and phase angle corrections at 10% and 100% of rating with the standard ANSI burden nearest to the actual "in-service" burden.

3.1.1 Where the secondary circuit will impose different burdens on the individual current transformers, certificates shall be provided showing ratio and phase angle corrections for the ANSI burdens neare~~a~~st to the highest and the lowest "in-service" burden.

3.2 Three current transformers of metering accuracy shall be installed; one in each of the three phase connections.

3.3 The metering current transformer burdens should be kept as small as practicable and should be limited to those measurement devices requiring a highly accurate current source. Relays, transducers, and meters intended mainly for local control and operation should not be connected to these transformers.

3.4 Other than test devices specifically designed for the purpose of testing meters, no switch, test block, fuse, or other quick disconnecting means should be placed in the secondary circuits of the current transformers.

3.5 All secondary wiring connected to the current transformers should be a minimum of #1OAWG copper and should be limited to the minimum length necessary to complete the circuit to the metering devices and transducers. Short lengths of smaller conductors on switchboard panels may be utilized providing the additional burden imposed by these conductors is negligible when compared to the overall circuit burden.

3.6 The wiring for the secondary circuits of current transformers should utilize separate leads from each secondary terminal of the current transformer to the totalizing point or meter. However, if a common current transformer secondary return conductor is utilized, the conductor should be separate

from the common return of the voltage transformers. The current transformer and voltage transformer common shall be grounded at only one point.

3.7 Secondary circuits should be routed so as to avoid the possibility of induced voltages and the effects of high ground fault voltages. Where this is not practical, the secondary circuit should be designed to minimize these effects. In those circuits involving solid state metering, suitable protection against the effects of fault and switching generated over-voltages should be provided. (Refer to C37.90a.)

3.8 When it is necessary to connect current transformer secondaries in parallel, the paralleling connection should be made as close to the metering burden as practicable.

3.8.1 In order to ensure acceptable accuracy, current transformers whose secondaries are connected in parallel should be designed with a minimum of 1000 ampere-turns at rated current.

3.8.2 Where practicable, the secondary leads from all paralleled current transformers should be of equal length.

3.9 Whenever practical, the current transformers should be designed to withstand continuous operation and maintain class 0.3 or better metering accuracy at twice rated current (ex. rating factor = 2). In these cases, the nominal primary rating of the current transformer should be one-half, or the nearest standard rating above one-half, of the long-term emergency rating of the inter-utility tie.

4.0 Voltage Transformers

4.1 All voltage transformers should conform to a class 0.3 or better metering accuracy and should be provided with certificates of test stipulating the ratio and phase angle corrections at 100% rating with zero burden and with the rated maximum standard burden.

4.2 Three voltage transformers of metering accuracy should be installed; one from each phase conductor to the substation ground. Provisions for attachment of a calibration unit should be provided on each phase conductor.

4.3 The metering accuracy voltage transformer burden should be limited to those metering devices and transducers requiring a highly accurate voltage source. However, where it is necessary to supply other burdens from the voltage transformers, the secondary leads and fuses, if any, supplying the high accuracy metering devices should be completely separate and independent from the secondary circuits supplying voltage to the other burdens.

4.3.1 Where the voltage transformer has multiple secondaries, the measuring devices requiring a highly accurate voltage source

should be connected to a separate secondary winding from that supplying the remaining burdens.

4.3.2 Secondary fuses, if any, should be of a high speed, high-current interrupting construction with current ratings sufficient to assure a low electrical impedance and the mechanical ruggedness to resist the effects of corrosion and vibration. The main purpose of fuses should be for protection of test personnel and the transformer and its secondary wiring against accidental faults or shorts rather than to protect the voltage components of the measuring devices. In no case should fuses be placed in the common secondary return or the ground circuit of instrument transformers.

4.4 All test switches, fuse blocks, and fuses in the secondary voltage circuit should be designed to introduce as small an impedance as practical to the secondary circuit. The overall resistance and reactive impedance of the secondary circuit should be measured. These values should be multiplied phasorially by the burden current to determine the in-phase and quadrature components of the lead voltage drop. These values should be utilized to calculate the overall voltage transformer corrections to be applied to the metering circuit.

4.5 All secondary wiring supplying voltage to the measuring devices requiring a highly accurate voltage source should be a minimum of #12 AWG copper and should be limited to the minimum length necessary to complete the circuit to the metering devices and transducers.

4.6 Where a common voltage transformer secondary return conductor is utilized, the conductor should be separate from the common return of the current transformers. The voltage transformer and current transformer common returns should be grounded at one point.

4.7 Secondary circuits should be routed so as to avoid the possibility of induced voltages and the effects of high ground fault voltages. Where this is not practical, the secondary circuit should be designed to minimize these effects. In those circuits involving solid state metering, suitable protection against the effects of fault and switching-generated overvoltages should be provided.

4.8 Voltage transformers should be of a wound or cascade type. Coupling capacitor voltage transformers (CCVT's) should not be used for metering purposes unless certification is supplied by the manufacturer regarding their accuracy and stability. For the purpose of this guide, acceptable stability of CCVT's is defined as no greater than ±0.1% deviation from the certified accuracy values over the life of the device. Exceptions to this requirement would be permitted upon mutual agreement of all the affected parties.

4.9 Where coupling capacitor voltage transformers are used, test connection points for periodically verifying their ratio and phase angle errors should

be provided. These errors should be determined by test methods that simulate in-service conditions as closely as practical.

5.0 Meters and Transducers

5.1 Meters and transducers for the measurement of 3 phase watthours, volt-ampere-hours, reactive volt-ampere-hours, and Q-hours should be designed with three stators or elements.

5.1.1 For electromechanical type meters, the registers, detents and pulse initiating equipment, if any, should be selected and adjusted so as to present minimum friction and torque requirements to the rotation of the disk.

5.1.2 Where solid state meters are utilized which do not have adjustments to correct for instrument transformer errors over the normal range of loads, consideration should be given to external compensation of the voltage and current transformer errors.

5.1.3 Solid state watthour meters should not exhibit errors in watthours greater than:
±(.1% of reading + .0l% of rated output)

5.1.4 Solid state volt-ampere-hour meters should not exhibit errors greater than 0.25% of the theoretically correct volt-ampere-hour pulse values.

5.1.5 Solid state reactive volt-ampere-hour meters should not exhibit errors in reactive volt-ampere-hours greater than:
±(0.15% of reading + 0.05% of rated output) from frequencies of 59.98 to 60.02 Hertz.

5.1.6 Solid state Q-hour meters should not exhibit errors in Q-hours greater than:
±(0.15% of reading + 0.01% of rated output).

5.1.7 All accuracies for solid state meters stipulated in this section assume an ambient temperature of 23°C + 5°C during the tests. When it is impractical or inconvenient to make tests within this ambient temperature range, the permissible range of errors should be increased by 0.005% per °C from the base of 23°C.

5.1.8 Pulse outputs representing demand should be available over a range of 25 to 25,000 pulses per hour at meter nameplate rating.

5.1.9 Electro-mechanical meters should be mounted on a panel or wall at a minimum elevation of three feet and a maximum of six feet above the floor. A clear space of at least three feet should be provided in front of the meters. The meters should be mounted so that the disk shaft is no more than + 1° from a true vertical position.

5.2 Transducers for the measurement of voltage and current should be of the RMS sensing type. Exceptions may be made in the case of voltage and current transducers utilized in line and transformer loss compensation circuits.

5.2.1 Voltage transducers utilized to measure line voltage for the purpose of maintaining var flow or assuring system stability should not exhibit errors exceeding 0.25% of rated output at 25°C.

5.2.2 Current transducers utilized to measure line current for system control purposes should not exhibit errors exceeding ±0.25% of rated output at 25°C.

5.2.3 Whenever voltage or current transducers are utilized, they should be placed on all three phases.

5.3 Analog devices for the measurement of watts, volt-amperes, reactive volt-amperes, and Q should be designed with three stators or elements.

5.3.1 Transducers used for the measurement of analog values should not exhibit errors which exceed the maximum errors stipulated for the corresponding integrating meter by more than 0.03% (See 5.1.3, 5.1.4, 5.1.5, and 5.1.6).

5.4 Transducers used for the measurement of phase angle should be of the single phase design.

5.4.1 Electromechanical phase angle meters or transducers should not exhibit errors of greater than one degree.

5.4.2 The phase angle meter should obtain its voltage from a phase-to-ground connected voltage transformer and its current from a current transformer whose primary is in series with the phase conductor.

5.4.3 Digital phase angle meters based on zero crossing detection should be designed to filter out harmonic components so that the measured phase angle corresponds to the phase relation between the 60 Hz fundamentals of the applied voltage and current.

5.5 Compensation for line and transformer losses, when utilized, should be accomplished by applying a correction for copper losses proportional to the square of the current and a correction for transformer core losses or line energization losses proportional to the square of the voltage.

5.5.1 These corrections should be continuous and should be added to (or subtracted from) the watthours and reactive volt-ampere-hours (if metered) passing through the electrical point of measurement.

5.5.2 For an electromechanical meter, the core loss compensation should be obtained by passing an additional current through one current coil of the meter. This current should be in phase with and proportional to the square of the voltage. Copper loss compensation should be obtained by adding a voltage to one voltage coil. This voltage should be in phase with and proportional to the square of the line current.

5.5.3 In solid state meters utilizing a current (or voltage) to frequency integrating circuit, the loss compensation should be obtained by adding two currents (or voltages) to the input of the integrator which are proportional to the squares of the current and the voltage, respectively.

5.5.4 Voltage and current (or voltage-squared and current-squared) transducers used in loss compensation schemes should not exhibit errors exceeding 1.0% at rated input.

5.6 Test facilities should be located at or near the meter or transducers. These test facilities should be designed to provide a means to both measure the input quantities from the current and/or voltage transformers and to allow the application of test quantities to the meter or transducer. Where the output of the meter or transducer is an electrical rather than visual quantity, provisions should be made to conveniently measure the output.

5.6.1 The meters, transducers, and test facilities should be located inside a building or structure which provides adequate protection of the equipment and maintenance personnel from the weather.

5.6.2 Adequate lighting should be provided in the area of meters or transducers as required for test, maintenance, and adjustment.

6.0 Testing and Calibration

6.1 Test equipment and test standards intended to be used for the calibration of instrument transformers, meters, or transducers used for inter-utility metering should be certified to values of accuracy and precision which are better than the required accuracy of the equipment under test by a factor of at least two.

6.2 All test standards should be supplied with certified corrections which have been derived no longer than six months prior to use.

6.2.1 All certified corrections should be obtained by comparison against laboratory standards whose accuracies are traceable to the National Institute of Standards and Technology. However, when acceptable to all parties involved, the standard certification values may be determined by the use of data obtained through round-robin procedures between laboratories.

6.2.2 Standards utilized for the purpose of calibrating voltage and

current transducers should be of the RMS sensing type.

6.3 Whenever practical, the tests and calibrations should be performed at ambient temperatures of 23°C + 5°C. When tests must be performed at other ambient temperatures, due consideration should be given to temperature errors of the transducers or meters. (See 5.1.7.)

6.4 Except in those cases where the involved parties agree to the contrary, the utility installing and owning the meter and transducer installation should be primarily responsible for any maintenance and calibration. Any other utility affected by the measurements may request to be notified of pending calibrations and may be present during maintenance and calibration proceedings. In any case, copies of the maintenance and calibration record should be forwarded to all interested utilities.

6.5 Where a dispute over the accuracy or performance of a meter or transducer exists, the interested parties may request a comparison of standards and/or a separate calibration of the meter or transducer.

6.6 Electromechanical watthour meters should be initially calibrated and adjusted to balance the heavy load (5 amperes) unity and 0.5 power factor registration of the stators to within ±0.5 percent. This should be followed by a series test at heavy load (5 amperes) at unity and at 0.5 power factor. If these tests produce results that deviate by more than 0.5 percent, the power factor adjustment should be utilized to bring the two tests within the 0.5 percent limit. Finally, a series heavy and light load (5 and 0.5 ampere) unity power factor test should be performed. If necessary, the heavy and light load adjustments should be utilized to bring the registration of the meter at these two points within 99.8 to 100.2 percent of true registration. If the latter step requires an appreciable use of the light load adjustments, the stator balance and 0.5 power factor tests should be repeated and further corrections made, if necessary, by use of the appropriate adjustments. This overall test procedure should be repeated until the required adjustment at all test points are nominal.

6.7 Electro-mechanical watt-hour meters which are scheduled for re-test should be series tested at the heavy and light load (5 and 0.5 ampere) unity power factor points. If these tests indicate a need for little or no adjustment, no further tests should be performed. Where adjustments of greater than 0.3 percent are required to bring either point within limits, the meter should be tested for corrections at 0.5 power factor and for balance of stators.

6.8 Acceptance testing solid state watthour meters.

6.8.1 Solid state meters should be acceptance tested. This test should include a balance of elements and a series test. The balance of element test points should be at 0%, 10% and 100% (5.0 amperes) at unity and 0.5 power factor. The series test points should be at 0%, 2%, 10%, 20%, 50% and 100% of nameplate rating at unity

paver factor. The 0.5 power factor test shall be made at 100% of nameplate rating. The solid state watthour meters should be adjusted to bring the registration at all test points within the accuracy specifications as outlined in Section 5.

6.9 Retesting Solid State Watthour Meters

6.9.1 Solid state meters which are scheduled for retest after acceptance test should be series tested at 0%, 10%, 50% and 100% of rated input at unity power factor.

6.9.2 A series test at 100% of rated input at 0.5 power factor is required.

6.9.3 Solid state watthour meters should be tested in both directions if used in a bidirectional manner.

6.10 Solid state watthour meters which have both an analog output and an integrated pulse output should be tested for the accuracy of both outputs.

6.11 Printing or recording demand meters may be tested by comparing a summation of the hourly demand readings for a specified period of time with the kilowatthours recorded by the watthour meters for the same period of time. The period between two successive routine recording medium removals is usually acceptable; but when only small quantities have been registered, a longer period is desirable. Registered quantities should be sufficient so that a difference of 1 unit of registered demand will not affect the percentage registration by more than 0.1%. When demand meter registration deviates from 100.0% registration by more than + 0.2%. corrective action should be taken including, when necessary, the adjustment or replacement of associated demand measurement and totalization devices.

6.12 The integrity of the meter readings should be maintained. A meter test should be made during a period of no load or when the load is constant so that the reading can be adjusted upon completion of the test. The pulse circuit should be made inoperative during the test. When this is not practical, other methods must be used, such as notation on the demand meter tape, to segregate pulses registered due to the test from pulses registered due to power flow.

7.0 Test Schedules and Records

7.1 Electromechanical and Solid State Meters Watthour, reactive volt-ampere-hour, and Q-hour meters at major interchange points ~~should~~ will be tested at least once every year.

7.2 All transducers ~~should~~ will be acceptance tested initially and retested thereafter once every 6 months.

If a manufacturer's model of a transducer can be demonstrated to be stable from historic data, testing may be performed less frequently but not less

than once every two years.

7.3 Test records on approved forms ~~should~~ will be maintained for a period of at least six years. Copies of all tests on watthour, reactive volt-ampere-hour, and Q-hour meters ~~should~~ will be forwarded to all interested parties.

8.0 Exchange of Information

8.1 The party responsible for the metering of an interchange should furnish all involved parties with pertinent metering information including the following:

a. Connection diagram.

b. Type and rating of watthour meters, Q-hour meters, volt-ampere-hour-meters, reactive volt-ampere-hour-meters, current and voltage transformers, demand meters, and associated devices.

c. Copies of certificates of test for the metering current and voltage transformers. When certificates are not available, a typical curve for the type of transformers should be furnished, and the parties should agree on the transformer correction, if any, to be applied.

d. Secondary burdens applied to the voltage and current transformers.

e. Resistance and reactive impedance of the voltage transformer secondary leads.

f. The derivation of compensated metering correction, if used, and the method of compensation.

8.2 The forms upon which the above are reported should include the Company's name, the location of the installation, identification numbers of the meters and instrument transformers, feeder identification, and direction of flow being measured.

8.3 All affected parties should be advised of any contemplated changes in the metering equipment or circuits ~~which~~ that could affect the accuracy of the measurement.

9.0 Definitions

9.1 Where there is a question on the meaning of terms used in this guide, the definitions in Section 2 of ANSI Standard C12 should be used. If ANSI Standard C12 does not address the question, the definition, by order of priority, should be obtained from the following:

a. IEEE Standard Dictionary of Electrical and Electronic Terms.

b. McGraw Hill Dictionary of Scientific and Technical terms.

c. Webster's Unabridged Dictionary.