ISO Lessons Learned Report

Ninth Annual Scheduling Coordinators Self Audit
Executive Summary

The ISO Tariff requires Scheduling Coordinators (SCs) to annually complete a Self Audit of their Settlement Quality Meter Data (SQMD) process. The Self Audit requires the SCs to examine their meter data processes to demonstrate appropriate controls and to assure accurate reporting of SQMD and compliance with Local Regulatory Authority (LRA) requirements. Inaccurate reporting of SQMD to the ISO results in Market cost shifting. The purpose of this Lessons Learned Report is to share with all SCs and Market Participants the valuable information from the SC Self Audit, in order to help prevent similar issues from having a negative impact on SQMD and Market Settlement. This report provides a summary of SC Identified Findings, ISO Good Practices, and ISO Recommendations from the Self Audit reports completed and reviewed in 2008/2009. The ISO Recommendations, if implemented, can enhance controls, validations, and checks to assure accurate and complete SQMD.

The ISO uses SC submitted SQMD along with the meter data directly acquired, by the ISO, to settle the California Electric Market. The SCs that submit SQMD must assure that their data accurately and correctly represents the SC Metered Entities (end use customers connected at the distribution system) they serve as a Scheduling Coordinator. The SC Self Audit is one of the tools used to evaluate the SCs’ Tariff compliance.

16 SCs were required to perform the audit for Trade Year 2007 (16 audits were performed for the 2006 Trade Year). All SCs completed the audit and submitted their Audit Reports. Based on Operations Data and Compliance’s review of the reports, it appears the SCs’ SQMD processes are adequate and that:

- Essential controls exist in the Market for the transfer and processing of SQMD.
- Most SCs were able to seamlessly submit and resubmit SQMD data on a timely basis to reflect changes made to the CAISO Payments Calendar in 2007.
- More SCs have implemented “ISO Good Practices”, process improvements, and additional controls that continue to provide value in the processing of SQMD.
- SCs identified issues in the processing of SQMD; these problems can have a varying effect on SQMD. Although most of the identified processing issues have a small impact on the overall Settlement of the Market, if left uncorrected, the cumulative effect could be significant.
- The SCs have demonstrated continual commitment to create and submit accurate and correct SQMD.
- The ISO encourages the SCs, their participants, and the Local Regulatory Authority, to continue their vigilance in ensuring accurate SQMD by: increasing validation routines of customer enrollment and meter data volumes, adhering to CPUC meter data process requirements, and performing periodic sampling and review of meter data submittals.
The SC Self Audit is only one method to evaluate the accurate reporting of SQMD and by its nature, is performed after final settlement of the Market. Therefore, the SCs should be aware that they are required, by the ISO Tariff\(^1\) to “...undertake any other actions that are reasonable (and) necessary to ensure the accuracy and integrity of the Settlement Quality Meter Data provided by them to the ISO.”

Although this year’s SC Self-Audit, as well as next year’s, concentrate on trade years prior to the Market Redesign Technology Upgrade (MRTU) go-live the ISO began to conduct informational meetings with SCs that submit SQMD to discuss and reinforce the requirements for submitting meter data. During this process, methods of data submission, market simulation participation, and discussion of the new MRTU T+43 data submission deadline were discussed with those SCs that submit SQMD. The ISO and the SCs found these meetings very helpful and will consider additional meetings when new initiatives are being implemented such as payment acceleration.

\(^1\) ISO Tariff, Section 10.3.10
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1. Introduction

Section 10.3.10 of the ISO Metering Protocol states in part:

"Each Scheduling Coordinator shall at least annually conduct (or engage an independent, qualified entity to conduct) audits and tests of the Metering Facilities of the Scheduling Coordinator Metered Entities that it represents and the Meter Data provided to the Scheduling Coordinator in order to ensure compliance with all applicable requirements of any relevant Local Regulatory Authority. Scheduling Coordinator shall undertake any other actions that are reasonable (and) necessary to ensure the accuracy and integrity of the Settlement Quality Meter Data provided by them to the CAISO."

To date, the SCs have conducted 9 SC Self Audits covering the following settlement time periods:

1) April 1, 1998 – June 30, 1999
2) July 1, 1999 – December 31, 2000
3) January 1, 2001 – December 31, 2001
4) January 1, 2002 – December 31, 2002
6) January 1, 2004 – December 31, 2004
7) January 1, 2005 – December 31, 2005
8) January 1, 2006 – December 31, 2006

The ISO created the Audit Guidelines specifying the areas to be audited, as well as, providing the guidelines and instructions for the Audit Report content. The Audit Guidelines, for the 2007 Trade Year, were issued to the SCs on May 16, 2008.

Each SC who submits SQMD was requested to provide an Audit Plan by June 30, 2008. The Audit Plans were to include the following:

a) A general discussion of the Market activities the SC represents [i.e. Energy Service Providers (ESPs), Qualifying Facilities (QFs), Existing Contracts, etc].

b) A statement of who will conduct the audit and their qualifications.

c) A general discussion on how the audit will be accomplished.

d) A proposed timeline to complete the audit.

The Audit Plan has proved to be an integral element in the successful completion of the SC Self Audit. The Audit Plan offers the SC an opportunity to discuss issues and concerns with the audit and to bring forth any circumstance that may hinder the completion of the audit. Operations Data and Compliance reviewed each Audit Plan to determine if the described actions, if implemented,

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2 Audit Guidelines are sent to the SCs every year with the Audit Request letter. The 2007 Audit Guidelines are attached (Appendix D)

3 The SC Self Audit is performed after the Trade Year has been completely settled in the ISO Market.
were sufficient to meet the ISO Tariff requirement. A letter providing the results of the Audit Plan reviews were sent to the respective SC.

In addition to the Audit Package sent to the SCs, the ISO also contacted each participating SC in support of the ISO Communication Initiative. The ISO wanted to confirm the appropriate SC contact was reached and if they had any questions or concerns about the audit, they could discuss them directly with ISO staff to avoid any future issues or setbacks.

The Audit Timeline allowed six months to complete the Self Audit and issue an Audit Report. Throughout this effort, Operations Data and Compliance supported the SCs by responding to questions on processes and issues. Operations Data and Compliance instituted proactive e-mails and phone calls to check SCs’ status and to offer assistance and guidance if needed.

The final Audit Report was due to the ISO on October 31, 2008. Operations Data and Compliance evaluated each Audit Report. The evaluation consisted of determining if there was sufficient documentation to confirm that the applicable audit criteria were accomplished and that the SC management is committed to ensuring quality SQMD. If audit criteria could not be verified a request for additional information was made to the SC. A letter was sent to each of the SCs identifying if the Tariff requirement was met or if additional items were needed to complete the assessment. In some cases the letter also documented the request for additional information.

Operations Data and Compliance continues to work with the SCs to evaluate the additional information submitted and to assure the SCs have taken sufficient corrective actions to prevent recurrence of identified problems.
2. Results

Operations Data and Compliance reviewed each of the 16 SC Self Audit Reports to determine the SCs’ compliance to the ISO Tariff requirement. Based on the evaluations, all of the Audit Reports contained satisfactory information to demonstrate compliance with the audit requirements.

Based on the evaluations of the Audit Reports, Operations Data and Compliance assembled a summary of SC Identified Audit Findings to provide a sense of the types of issues that were identified. A more detailed description of the SC Identified Findings can be found in Appendix B “SC Self Audit Findings”. SCs are encouraged to review the detailed list and determine if the same or similar conditions exist in their SQMD process. If so, appropriate corrective actions should be taken. In section 2.2, “Good Practices Summary”, contains a summary of the good practices identified throughout the history of the SC Self Audit Program. SCs should carefully review these items and decide if these items could possibly improve their present processes. In section 2.3, “ISO Recommendations”, suggestions for the various improvements in SQMD processing have been provided to Market Participants.

Most of the audit findings had minimal impact on the overall SQMD for the Market. However, even minor problems should be thoroughly investigated and corrected by the affected parties. Such attention to preventative measures can avoid systematic problems that may be small, but if left uncorrected can lead to large cumulative errors and can affect the proper settlement of the Market.

For reference, this Lessons Learned Report and reports from previous years can be found on the ISO website at: http://www.caiso.com/docs/2005/10/01/2005100114481329995.html located under the Settlement Quality Meter Data (SQMD) section. The Lessons Learned Reports contain the previous Summary of Audit findings, ISO Good Practices Summary, and ISO Recommendations. These reports provide a rich account of previous SC Self Audit efforts.
2.1 Summary of Audit Findings

The summary below provides general groupings of the SCs’ identified audit findings. A total of 22 audit findings were identified. The majority of the audit findings identified were involved with the estimation and meter data processing (which was the area the audit required testing and verification of a sample of data) and with document control and record retention. This report includes additional details in the following Appendices:

Appendix B “SC Self Audit Findings”
Appendix C “Meter Data Flows”
Appendix D “Audit Requirements”

22 SC identified audit findings were categorized into the following groups:

1 - Finding related to the meter facility level.
1 - Finding related to errors created by incorrect system modifications.
1 - Finding related to MDMA processing.
1 - Finding related to incorrect customer account information.
6 - Findings related to document or record control.
1 - Findings related to improper application of distribution loss factors and load profiles.
8 - Findings related to other SQMD processing errors.
3 - Finding related to DST
2.2 Identified Good Practices

The ISO continues to encourage all SCs to review and adopt good practices, where appropriate, into their SQMD process. In the interest of assisting new SCs entering into the Market and who will be participating in the SC Self Audit Program, this section of the Lessons Learned Report lists an accumulation of good practices identified from past and present SC Self Audits. The following good practices have been placed into 5 Categories:

**Meter Data Validations:**
- Many SCs have incorporated the use of historical meter data into their validation and meter data processing routines.
- Many SCs compare meter data to their schedule data and review graphical representations to identify any unusual trends. Some SCs have also set limits in their system. For example, if the variance between scheduled data and meter data was greater than 5% further analysis would be done prior to submitting the meter data to the ISO.
- Other SCs have reports generated for them when usage data discrepancies are found. These are reviewed as they occur and make timely corrections. In one case this has helped the SC identify opportunities for Improvement.
- One SC has a process that detects and processes modified meter data this led to the possible creation of an operations log used to record events that impact SQMD.
- One SC customized its meter data processing system to look for the following abnormalities:
  1. Meter recordings with intervals greater than 35 days
  2. Negative energy consumption
  3. Meter reads with a stop time equal to or preceding the start time
  4. Current reads twice the historical average
  5. Current reads less than one half the historical average
  6. Identification of missing meter reads by comparison to Direct Access Service Request (DASR) responses
- A few SCs implemented automated notification for failure or acceptance, by the ISO metering system, of their meter data file. One SC also implemented an automated notification as a reminder of DST transition dates.
- Several SCs compare meter data to both preliminary and final settlement statements to assure accuracy of the data submitted. Furthermore, SCs compare meter data submitted to the meter data contained in OMAR On-Line to verify accuracy and completeness of the file(s) submitted.
- Many SCs have implemented weekly, monthly and quarterly customer account reconciliations with their participants (i.e. MDMAs, ESPs, UDCs) to assure accuracy of their account list that is used for processing meter data.
- When conducting their audit, some SCs used high UFE days to select their random sample for testing.
- One SC selected both DST transition dates to be specifically incorporated as part of their DLP and DLF testing.
- One SC visually inspected each customer’s meter.

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4 OMAR On-line is the meter data portal the SCs use to submit and view their SQMD.
Many SCs have revised their estimation practices in order to report more complete meter data when meter data is not available by T + 45 C. Some practices are:

1. Use of historical meter data
2. Submitting the same days file from the previous week’s meter data
3. Use of previous days meter data
4. Submittal of scheduled data

One SC contracted with a third party to provide real time hourly values, via the internet, which enabled the SC to track and validate usage on a real time basis. Another SC modified this idea and obtained real time hourly values from a third party for only their large interval customer accounts. This is independent from the meter data received from their MDMA giving the SC another set of data to use for validation or comparison.

Many SCs have incorporated a validation for meter data files that contain a zero value to assure that the zero value is accurate.

A few SCs began comparing the number of metered accounts against the number of active accounts to validate the accuracy of their meter data files.

A few SCS have processes in place to compare meter data received from their MDMA to telemetry data received from their own internal systems. This helps identify any discrepancies in meter data prior to submitting it to the ISO. This practice is applicable for SCs that represent large contiguous sectors of customers, such as cities.

Many SCs have built in processes to validate the correct time format for their meter data and meter data received from their participants.

One SC implemented new reports to identify discrepancies in their account lists between the SC and MDMA to identify active accounts that are not associated with an active ID. This included end dating old accounts rather than appending them to avoid misreporting meter data.

One SC’s meter data aggregation system is the same system used for internal settlement of their customers. Thus, data points such as DLPs and DLFs have already been validated, decreasing the risk of errors and eliminating the steps of data transfers to other systems.

One SC implemented a new validation to verify that all load profiles are in agreement with their existing contract.

One SC manually compares the DASR take out point to the ISO take out point diagram to verify the accuracy of the DASR information.

At the end of each business day, one SC checks out with their customers to confirm actual deliveries compared to what was scheduled.

One SC compares the sum of their meter data, to the sum of their forecast data and then compares the number of accounts in their SQMD file to the number of accounts used in their forecast data. This check helps the SC assure reasonableness with their scheduling amounts and verification of the SQMD submitted to the ISO.

One SC has fully trained 3 staff members who are capable of submitting SQMD to the ISO. These staff members are also on call if any problems arise during the submittal process.

Automated Processes

- Some SCs have instituted an automated process for obtaining meter data from the MDMA’s website.

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5 T+45 C is the date SCs must submit their SQMD in accordance with the 2007 ISO Payment Calendar.
• One SC has fully automated the process of receiving DASR information from the Utility.
• One SC created an automated process to verify that their customers’ meter data was in the appropriate format for DST, and if not, then their automated process would adjust the meter data accordingly.
• SCs were able to start using an automated process to resubmit data into the OMAR Online system when the OMAR Online Enhancement Process became effective in 2007.

Documentation / Change Control Process
• SCs recognized, and reported, that documentation is an important element in processing accurate and correct meter data.
• One SC created and implemented a business continuity plan to assure continuation of operations after a significant event.
• A few SCs implemented redundant systems for all critical systems and created supporting documentation.
• More than one SC included, in their audit detailed step by step procedures used in their SQMD process.
• One SC updated their data resubmission procedures in response to OMAR Online modifications to automate the meter data resubmittal process.
• More than one SC submitted, as an attachment or an appendix, a legend of acronyms used in their audit.
• Several SCs have documented procedures and reports that help identify possible problems on a daily, weekly, and monthly basis.

Communication and Training (Internal / External)
• Many SCs have implemented new processes for communicating important customer account information to affected parties within their company. Some examples are:
  1. Monthly internal departmental meetings
  2. Establishment of procedures to communicate meter information changes by the Utility Distribution Company (UDC) to the MDA and ESP
  3. Weekly internal status e-mails to communicate new contract information
• A few SCs and ESPs sent their staff members to UDC sponsored training sessions that resulted in better communication between the entities.
• Upon contracting with new ESPs, one SC implemented a process to provide a “set up package” that outlines the meter data process and submission requirements to make certain there are no misunderstandings regarding what is expected from the ESP and what each entities responsibilities are in the meter data process.
• One ESP instituted a program to be notified by their MDMA when estimated meter data was submitted to their SC. This allowed the ESP to monitor and track the amount of estimated meter data being submitted to the SC.
• One SC instituted a monthly rotation schedule to train analysts how to estimate meter data based on unique scenarios and account characteristics. This rotational training lasted for one year.
• One SC was identified as having a strong interactive role with the utilities and with their meter data management agent. This was identified as a critical attribute for identifying and correcting late meter data submittals.
• More than 10 SCs participated, in person or via web conference, in CAISO's OMAR Enhancement Training to review new submission and data resubmission changes.
• One SC has on-call trained personnel to submit SQMD should any submittal problems occur.

Other Audits and Reviews
• One SC required a full annual audit from any ESP that does not choose to outsource its meter data aggregation function to a third party.
• One SC instituted an annual review of all procedures to assure the documentation is kept current.
• One SC conducted ad hoc reviews of their meter data processing system that resulted in improved logging and automated upgrades to their systems.
• One SC conducted a complete review of the Lessons Learned Report and responded to each ISO good practice and recommendation describing the applicability and feasibility of implementation into their systems.
• One SC, anticipating future growth, began to prepare for that possibility in terms of personnel, SQMD process, reviewing and trending scheduling of resources, and automating their systems.
2.3 ISO Recommendations to Scheduling Coordinators

As a result of ISO’s evaluations of the SCs’ Self Audit reports, certain process improvements were identified, that if implemented, could possibly increase the accuracy and completeness of the SQMD submitted to the ISO. These recommendations are intended for all entities involved in the SQMD process and should be reviewed for applicability. We also encourage the CPUC to pay close attention to these recommendations and consider taking action where appropriate.

1) All SCs processes were capable of submitting their SQMD by the ISO due date (T+45 calendar days). However, many SCs did not design their systems with the functionality to submit corrected meter data. The ISO Payment Calendar allows for SCs to submit corrected SQMD up until T+49 business days (approximately 70 calendar days). The ISO strongly recommends that SCs add the capability to evaluate and resubmit SQMD after T+45 calendar days when corrected meter data is available. Failure to submit corrected meter data may expose the SC to additional corrective actions and penalties.6

2) SCs should also consider processing their meter data as close to T + 45 calendar days as possible. When meter data is processed earlier there is an increased risk of not providing complete meter data due to changes not identified in reposted data.

3) Through the annual SC Self Audit, the SCs identified and corrected numerous problems. Therefore, in the spirit of continuous improvement, the SCs and their partners should consider performing periodic targeted reviews of their SQMD process.

4) All SCs should carefully review the good practices and decide if these items could improve their present processes. Many SCs have incorporated good practices into their processing routines and as a result, meter data errors have been identified and corrected prior to final settlements. An important recommendation is for SCs to implement an account reconciliation process and to continue to foster open lines of communications with all parties involved in the meter data process.

5) All SCs should carefully review the audit findings (this years as well as previous years) to be aware of issues that other SCs are facing and determine if there is potential for their systems to be vulnerable to the same issue.

6) SCs should work with their Energy Service Providers and review the Usage Data Reconciliation (UDR) reports 7. Corrective actions taken due to these reports will prevent long-term issues that have in the past impacted Market Settlement. A supporting recommendation is provided in the

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6 ISO Tariff, Enforcement Protocol Section 37.5.2., Inaccurate Meter Data, states in part: “Market Participants shall provide complete and accurate Settlement Quality Meter Data for each Trade hour and shall correct any errors in such data prior to the issuance of Final Settlement Statements. Failure to provide complete and accurate Settlement Quality Meter Data, as required by Section 10 of the ISO Tariff and those results in an error that is discovered after issuance of Final Settlement Statements, shall be a violation of this rule.”

ISO Tariff, Enforcement Protocol Section 37.6.1, Required Information Generally as it relates to Late Meter Data (and for this year’s audit period) it states in part that “all information that is required to be submitted to the ISO under the ISO Tariff, ISO protocols, or jurisdictional contracts must be submitted in a complete, accurate, and timely manner.”

7 The Usage Data Reconciliation Report process is presently completed by only one Investor Owned Utility.
next section recommending that the CPUC ensure that the UDR process is being fully implemented by all UDCs.
2.4 ISO Recommendations to the CPUC

1) The Direct Access Usage Data Reconciliation (UDR) process should be completely and continually implemented by all three UDCs. The UDR reports provide a periodic opportunity for the UDCs to discuss ESP and SC SQMD processing. The CPUC should consider the UDR a valuable tool and encourage all parties (UDCs, ESPs, and SCs) to take the appropriate action to obtain full implementation and support. CPUC oversight of the UDR results will help in ensuring compliance to the CPUC requirements. In addition, many ESPs have expressed their desire to have all three UDCs adopt a fully functional UDR process that provides them quarterly updates.

2) Unfortunately, there is no similar UDR process for the assessment of PG&E’s, SCE’s and SDG&E’s SQMD reporting. The CPUC should consider what actions are needed to monitor the UDCs’ reporting of bundled customers’ SQMD.

3) The CPUC should also consider a similar UDR process for future Community Choice Aggregation entities.

4) The CPUC should work with the UDCs to take full advantage of the interval meters installed under the Advanced Metering Initiative to obtain the highest quality SQMD possible.

3. Next Steps

The ISO will issue this Lessons Learned Report to each certified SC who submits Settlement Quality Meter Data. The report will also be posted on the ISO website. The ISO encourages the SCs to share this report with their various participants (i.e. ESPs, MDMA, Aggregators, Auditors, etc.) in the SQMD process.

The Operations Data and Compliance group will meet with members of the CPUC Energy Division to discuss the results of the SC Self Audit Reports and the ISO Recommendations. The CPUC’s oversight of the meter data processing is essential in maintaining accurate and correct SQMD. The Operations Data and Compliance group will work with the SCs to assure they have:

a. Implemented their corrective actions to prevent recurrence of their identified audit findings;

b. Evaluated the Lessons Learned report for applicability to their SQMD processes; and

c. Prepared for changes in meter data processing, such as implementation of Payment Acceleration.

The Operations Data and Compliance group will seek any input from the SCs to refine the SC Self Audit process. Any comments provided will be reviewed for potential improvements in the SC Self Audit process. The ISO will review the audit guidelines and, based on comments, will modify the guidelines where appropriate.

8 Suggestions can be e-mailed to David Alvarez at dalvarez@caiso.com.
The ISO will continue to monitor the reporting of SQMD, and investigate any anomalies. This includes the monitoring of Unaccounted for Energy trends.
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Appendix A  
Definitions

**CPUC – California Public Utility Commission:** The Public Utility Commission of The State of California.

**DLF – Distribution Loss Factor:** The loss of energy over distribution lines.

**DASR – Direct Access Service Request:** An application for direct access service submitted to a UDC on behalf of a customer by an ESP.

**ESP – Electric Service Provider:** An entity, which provides electric service to a retail or end-use customer.

**MSP – Meter Service Provider:** The entity that installs, validates, registers, tests, and maintains the physical meter based on requirements set by the CPUC, or other Local Regulatory Authority.

**MDMA – Meter Data Management Agent:** The entity that takes raw meter outputs, validates them using validation, editing, and estimating rules (VEE), and makes complete customer information available to others.

**LP – Load Profile:** An approximation of a customer’s electric usage pattern as approved by the California Public Utility Commission.

**SC – Scheduling Coordinator:** Any entity certified by the ISO to schedule energy transactions on behalf of generators, supply aggregators (wholesale marketers), and retailers in the California energy Market.

**SQMD – Settlement Quality Meter Data:** Meter data gathered, edited, validated, and stored in a settlement-ready format, for Settlement and auditing purposes.

**UDC – Utility Distribution Company:** An entity that owns a Distribution System for the delivery of Energy to and from the ISO Controlled grid. The three major UDCs in the Market are PG&E, SCE, and SDG&E.

**UDR – Usage Data Reconciliation Report:** Following a CPUC directive, the three major UDCs implemented a reconciliation activity in which the UDCs use internal meter data from its transmission and distribution customers to create comparable meter data to use for comparison against the SQMD submitted by the SCs to the ISO.
Appendix B
SC Self-Audit Findings

The following is a compilation of the SCs’ identified Self Audit findings. Like findings by more than one SC have been combined and is listed only once:

- One SC found that their participants did not have all their meters tested per the testing requirements documented.
- One SC’s billing system dropped a monthly billing cycle resulting in a small percent of under reporting of meter data to the ISO.
- One SC identified that it had processed meter data outside the normal VEE process conducted by the MDMA.
- One SC did not update a new contract end date when the contract was renewed. This resulted in incorrect meter data submitted to the ISO.
- One SC identified that it had incomplete or outdated written procedures and documentation to support the meter data processing that takes place prior to submitting meter data to the ISO.
- One SC identified that no desk procedures describing how and when account start and end dates should be changed and communicated to affected parties are available.
- One SC identified critical reports that are not retained making follow up or analysis more difficult.
- An SC identified a one hour shift in data error when using and comparing schedules with resubmitted data. As a result the SC identified a use for logging meter data resubmissions.
- One SC identified that it lacked documentation or had not updated their procedures after switching to a new MDMA.
- One SC identified that their estimation process was not consistently applied and not thoroughly documented.
- One SC identified the incorrect DLF being applied to the wrong customer class.
- One SC reported meter data for a customer with a terminated contract.
- A few SCs identified the test data used in the audit was different from the source data.
- One SC found that the initial submission of meter data for one account did not include the contractually established transmission loss factor.
- One Utility posted meter reads with outdated account information that resulted in an SC resubmitting meter data to the ISO.
- One SC identified that the criteria for their estimation process can be high if inactive account information is inadvertently included into the aggregation resulting in over reporting meter data.
- As a result of the UDR process, one SC identified several inaccurate meter data submittals to the ISO.
- When researching the root cause of resubmitting meter data to the ISO, an SC noticed that the contract terms in one database would create an incorrect service end date and inadvertently drop active accounts from being included in the meter data processing.
- One SC identified that documentation had not been updated after switching to a new MDMA.
- Two SCs identified errors in the processing of the DLFs. One DLF was stored in DST instead of PST.
- Two SCs identified a one hour error in the conversion of a Utilities dynamic load profiles to PST during DST.
- One SC found that DST shifts were not consistently applied when processing and submitting meter data to the ISO.
Appendix C
Meter Data Flows

RETAIN LOAD METER DATA PROCESSING

Retail Customer

Direct Access Customer

Interval Data Recorder (IDR)

Non-Interval Data Recorder (Non-IDR)

Meter Service Provider (MSP) installs and sets-up meter

Bundled Customer

UDC installs and sets-up meter

Meter Data Management Agent

MDMA (Qualified 3rd party or UDC)

MDMA (Predominately UDC)

UDC-MDMA

Performs VEE, applies Load Profiles and DLF's

Read meter

Perform VEE

Post data to MDMA server

Energy Service Provider

Pull data from MDMA Server

Pull Load Profile and DLF's from UDC

Apply Load Profiles and DLF's

Aggregate Data

UDC reconciles data

Scheduling Coordinator

SC

• Validate data
• Estimate values if required
• Aggregate data

UDC

• Validate data
• Estimate values if required
• Aggregates data

ISO

ISO Settlement Processing

NOTE:
Monitoring Process

Operations Data and Compliance
May 18, 2009
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Accurate and complete SQMD involves all parties’ efforts, MSP (to perform proper meter set-up and testing), MDMAs (read the meters, perform validation, editing, and estimation, and post the data), and ESPs and SCs (apply Load profiles and DLFs, aggregation and estimation, and finally timely submittal to the ISO). The preceding chart demonstrates the normal flow of retail Load meter data from the meter to the ISO. It is important to note that the Local Regulatory Authorities (for the majority of the load customers this Local Regulatory Authority is the California Public Utility Commission) have jurisdiction for the Retail Customer, Meter Data Management Agent, and the Energy Service Provider.
1. Audit Requirement

The Metering Protocol, states in part, “Section MP 4.2.1 Requirement for Audit and Testing, (a) Audit and Testing by SC:

Each SC shall at least annually conduct (or engage an independent, qualified entity to conduct) audits and tests of the Metering Facilities of the SC Metered Entities that it represents and the Meter Data provided to the SC in order to ensure compliance with all applicable requirements of any relevant Local Regulatory Authority. SCs shall undertake any other actions that are reasonable (and) necessary to ensure the accuracy and integrity of the Settlement Quality Meter Data provided by them to the ISO.

2. Audit Scope for Period Covering January 1, 2007 to December 31, 2007:

The audit must evaluate the process flow of meter data beginning with validating, editing, and estimating data (VEE), and following the process through submittal to the ISO. The audit includes four components:

- Follow up documentation from last year’s audit findings and any actions taken as a result of ISO recommendations.

- Reviewing the process controls in place for activities involving the Settlement Meter Data Processing Level.

- Verification and testing of the process controls in place at the Settlement Meter Data Processing Level. Testing shall be done by selecting an appropriate sample. (See section 7 for the process and requirements for selecting an appropriate sample size testing)

- Identification of the root cause for all identified audit findings and the actions taken to prevent recurrence.
3. Definitions (For the purpose of the SC Self Audit requirement, the following definitions apply):

**Audit:**
An audit is a planned and documented activity performed, by a qualified independent entity, to determine by a review, evaluation, and test, the adequacy of and compliance with the standards & requirements and the effectiveness of implementation.

**Qualified Independent Entity:**
An independent professional with appropriate auditing certifications or a staff member independent of the meter data process and implementation with auditing or internal control systems experience.

**Settlement Meter Data Processing Level:** Activities include, but are not limited to:

- Obtaining VEE meter reads for all active participants
- Downloading and application of load profiles (LP) (as appropriate)
- Downloading and application of appropriate distribution loss factors (DLF)
- Estimation (if required)
- Appropriate documentation in the case of performing estimation
- Validation and reasonableness checks
- Creation of SQMD file, and submitting SQMD to the ISO
- Meter data processing documentation, including manual and automated processes
- Corrective actions from follow up SC Self Audit findings, or other audits conducted
- Obtain and evaluate usage data reconciliation reports provided to ESP(s)
- Reconciliations between the SC and their participants active customer lists
- Contingency Plans (i.e. loss of MDMA, ESP, system, or unable to obtain data or schedules)

**SQMD:** Settlement Quality Meter Data
Meter data gathered, edited, validated, and stored in settlement-ready format, for Settlement and auditing purposes.

**Test:**
The application of processes using known data to validate the implementation of the process and to determine compliance to the appropriate standards.
4. **Audit Performance:**

   **Audit Plan** – Due to ISO on June 30, 2008

   The Audit Plan shall state how the SC intends to perform the audit. The audit plan should include the following:

   1. A discussion of the activities and interfaces the SC represents:
      
         (a) What MDMAs and ESPs the SC works with,
      
         (b) A list of Existing Contracts including QFs, Wholesale Distribution Assess Customers, municipalities and cities,
      
         (c) Identification of high transition periods (transfer of customer’s, etc.), and
      
         (d) A list of SC ID’s used and what type of activities (transactions) each ID represented.

   2. A timeline of activities the SC represents [i.e. what ESPs were represented, what MDMAs were used, time periods of direct access (DA) sign up and returns, contract expiration/termination, etc.].

   3. A statement of who will conduct the audit and a brief discussion of their background and qualifications.

   4. A discussion of how the audit will be accomplished, activities to be tested, the source of information, and a proposed timeline for completion.

   5. Any additional information believed to be relevant for the ISO’s review of the audit plan, such as major changes since the last SC Self Audit, or results of other internal audits or reviews.
5. **Audit Implementation:**

Follow Up on Previous Year’s Audit

Review actions taken as a result from last year’s Self Audit, confirming that corrective actions taken are still in place and appropriate. Also, discuss any actions taken based on ISO recommendations or ISO Identified Good Practices contained in the Lessons Learned Report.

Process Controls Review

The Process Controls portion of the audit is intended to evaluate the performance of the VEE process, meter data processing procedures, systems, controls, and reasonableness checks in place at the Settlement Meter Data Processing Level. Each SC must perform the review based on their business practices. Additionally, if any controls are identified as insufficient, these should be identified as a finding and corrective actions should be discussed along with a timeline for implementation.

Verification and Testing

The Verification and Testing portion of the audit is intended to test, by use of a selected sample of meter data, the controls in place to assure accurate and correct settlement meter data processing. The tests should include an appropriate sample of data from throughout the audit period. Section 7 outlines how to create the appropriate sample size. Appendix A, Specific Areas for Verification and Testing, discusses specific areas to test if applicable to your business process.

Root Cause Analysis

The root cause analysis section should clearly describe the audit finding(s), how it was identified, and the cause for the finding(s), what effects the finding had on the meter data submitted to the ISO, and the corrective actions taken to prevent recurrence.
6. **Specific Areas to Review – (Process Controls Section)**

The process review of the Settlement Meter Data Processing Level should, as a minimum, evaluate the following activities where applicable. Furthermore, if any item listed below is not reviewed, provide a discussion clarifying why the item was not reviewed and not applicable. You can provide this information in the report by using checklists similar to Attachments C and D.

1. Documented procedures for meter data processing are accurate, up to date, and being followed.

2. All active accounts, (i.e. SC Metered Entities (SC MEs)) represented are included in the SC’s SQMD file (i.e. existing contracts, municipalities, cities, etc.). It is the SC’s responsibility to ensure accuracy and completeness of their SQMD file. This includes reviewing and examining the controls in place to assure:

   (a) Appropriate reporting of accounts.

   (b) Agreement by all parties on the start and stop date for scheduling and reporting SQMD for the transferred account(s).

   (c) Assurance that the SC representing the transferred account is the only SC reporting SQMD for that account.

   (d) Agreement by all parties for SCs representing Existing Contracts on deemed delivered or scheduled values if there is a need for a logical meter calculation.

3. Load Profiles, if applicable, are applied properly (i.e. downloaded accurately and completely, use of correct profiles, applied to the correct rate class, and with appropriate time shift). Furthermore, document how the process handles missing LPs or incomplete downloading of LPs.

4. Distribution Loss Factors are applied properly (i.e. downloaded accurately and completely, use of correct DLF, and voltage class). Furthermore, document how the process handles missing DLFs or incomplete downloading of DLFs.

5. Appropriate aggregation of meter data to the proper scheduling point.

6. Proper creation of the SQMD file.
7. Any estimation performed by the SC is controlled and documented, and accurate meter data is resubmitted by the final settlement deadline.

8. Identification of any late meter data submittals. Identify and document the cause for the late submittal, how it was identified, and the corrective actions taken.

9. Validation routines evaluating the appropriateness and reasonableness of the submitted SQMD. For example, comparing meter data to scheduled data, number of metered accounts to number of active customer accounts, etc.

10. Any SQMD resubmitted after T + 45 is documented and controlled to assure accurate and correct meter data is submitted to the ISO prior to T + 49 business days.

11. Review of any automated and manual process to verify accuracy with written procedures.

12. Evaluate controls in place to assure the direct access service request (DASR) is processed accurately and that all relevant parties have agreed on the start and stop dates.

13. Proper testing prior to implementing any software changes must be evaluated to assure the new changes still produce accurate and correct SQMD and have no adverse effect on the SQMD processing.

See Attachments C and D for a list of the minimum items to audit.

If any of the steps do not apply to your meter data process, mark the appropriate box with “N/A” and state the reason why it does not apply to your metering process.
7. Creating a Random Sample

The sampling scheme shall be developed as follows:

1. Randomly select at least five days from which to review data.

2. Sampling groups shall then be established that group together classes of customers that have similar data collection and processing methods. Each individual source of meter data other than the SC’s direct customer classes, such as MDMA, meter data aggregators, ESPs, municipalities, etc., shall be considered an individual sampling group. For example, residential accounts that have their loads profiled would be one group, and light industrial accounts that have time-of-use meters would be another group, and so on. With other separate groupings for classes such as heavy industrial, etc. and each MDMA, ESP, municipality, etc. represented by the SC considered a separate group.

3. For each of the days selected in step 1, at least 5 actual customers shall be selected from each group for which to conduct a comprehensive review of the processing of actual data.

The sampling scheme shall be similar to the following. In all cases, the sample size shall be at least five randomly selected days from each group. The SC can increase the sample size, as they deem necessary.

<table>
<thead>
<tr>
<th>Group</th>
<th>Days to Review</th>
<th>Customers for Which to Review Data</th>
<th>Total Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bundled)</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Time-of-Use (TOU)</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Direct Access – Interval</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Direct Access – Non-Interval</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Municipality 1</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Municipality 2</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>City 1</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>City 2</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>MDMA 1</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>MDMA 2</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>ESP 1</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>ESP 2</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>325</strong></td>
</tr>
</tbody>
</table>
A sample could look like the following example:

<table>
<thead>
<tr>
<th>Group</th>
<th>Days to Review</th>
<th>Customers for Which to Review Data</th>
<th>Total Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Access – Interval</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Direct Access – Non-Interval</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>ESP 1</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>MDMA1</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>MDMA2</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>MDMA3</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>150</strong></td>
</tr>
</tbody>
</table>

All account types and entities involved in the meter data processing must be represented in the sample for testing.
8. **Audit Report:**

The Audit Report is due to the ISO by October 31, 2008, and **must** include a clear description of the following:

- Statement of qualifications of the auditor(s).
- Description of the meter data processes evaluated, controls and reasonableness checks in place.
- List of objective evidence evaluated (e.g. dates, documents reviewed, subject matter experts interviewed, etc.).
- Scope of testing performed (e.g. systems, types of transactions, practices and procedures, volumes of data tested, etc.) and dates covered by the testing.
- Results and findings of the testing performed.
- The identification of controls in the process used to create, collect, validate, and submit SQMD to the ISO.
- Identification and discussion of follow up items from previous audits, and any corrective actions taken.
- SC Management’s comments on the all audit findings.
- A statement of Compliance, by SC Management, stating if the processes being implemented are capable of creating accurate and complete SQMD.
- Root cause analysis and corrective actions for any finding identified in the audit.

A matrix describing the activities reviewed and their applicability to the testing conducted during the audit review. See Attachments C and D for checklists.
Specific Areas for Verification and Testing

In addition to the review of the process controls discussed in Section 6, the SC Self Audit shall include detailed verification and testing of the process controls listed below, if applicable, by a comprehensive review of the processing of actual meter data.

1. Review of corrective actions from previous audits, verifying actions taken were appropriate and still in place. If any changes have occurred to the corrective actions, document the change, the reason, and the time period the change occurred, and include in your final audit report.

2. Document and discuss any actions taken as a result of the ISO Recommendations for SCs or ISO Identified Good Practices noted in the Lessons Learned Report.

3. When reporting SQMD during Daylight Savings Time (DST), verify the data submitted to the ISO is in Pacific Standard Time (PST).

4. Validate that although different time standards are used for posting meter data, LPs, and DLFs, the meter data reported is representative of when the actual usage occurred. (i.e. taking into account the data “time stamp” be it hour beginning or hour ending) See matrix on Attachment E.

5. Validate the calculations supporting existing contracts are resulting in accurate and complete SQMD.

6. When making changes to the logical meter calculations, verify all affected parties are notified and appropriate actions are taken to assure accurate and complete reporting of SQMD.

7. When estimating meter data, verify procedures are followed and estimation is documented and controlled. Furthermore, document the procedures and methodology used for estimating data at the ESP and SC level. Verify generation data (if applicable) submitted under existing contracts is accurate and complete.

8. Validate that the calculations being used are in agreement with what is stated in the existing contract and agreements with the ISO.

9. Identify all resources that should be in the logical meter calculation and verify the resources are included and accurately represented.
10. Verify contract termination information is circulated to affected groups with enough time to make appropriate system changes so that data is reported accurately and correctly to the ISO by T + 45.

11. When making changes to logical meter calculations, verify all affected parties are notified and appropriate actions are taken to assure accurate and complete reporting of SQMD.

12. Validate the DASR process of adding new or returning accounts, getting agreement from each party in the change over process, accurate start and stop dates, and reporting of data in the hour the actual usage occurred is accurate and complete.

13. Reviews of any data reconciliation reports provided by the IOUs during the audit period, and any corrective actions taken from the reports. Data reconciliation reports are provided to ESPs. The SC should request this information from their ESP(s).

14. Review of periodic checks between MDMAs, ESPs, and SCs to assure accurate account lists. If multiple systems are used to track account lists, periodic reviews of each system should be conducted to assure accuracy and completeness among the different lists.

15. Verify system testing is completed prior to implementation of any meter data processing system change or modification. Validate appropriate documentation supporting the change has been created and that a comparative review was conducted prior to and after the system changes occurred.
<table>
<thead>
<tr>
<th>Sign or initial when complete</th>
<th>Date Complete</th>
<th>Description of the elements discussed in the SC Self-Audit Report</th>
<th>$Satisfactory or N/A Not Applicable</th>
<th>Reason for Incomplete or other comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Review last year's audit for follow-up issues. Ref 5.</td>
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<td></td>
<td></td>
<td>Review process for performing validation, editing and estimation on settlement meter data and include a list of procedures in your &quot;Documents Reviewed&quot; section of the Audit Report</td>
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<tr>
<td></td>
<td></td>
<td>Identify active accounts in the SC's SQMD file. Ref 6.2</td>
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<td>Verify appropriate reporting of accounts. Ref 6.2.a</td>
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<td>Verify agreements by all parties on the start and stop date for scheduling and reporting SQMD for the transferred account(s). Ref 6.2.b</td>
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<td>Verify the SC representing the transferred account is the only SC reporting SQMD for that account. Ref 6.2.c</td>
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<td>Verify all parties, for SCs representing existing contracts on deemed delivered or scheduled values, the need for a logical meter calculation. Validate calculation supporting contracts for SQMD. Ref 6.2.d</td>
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<td></td>
<td>Verify that changes to logical meter calculation are communicated to all affected parties and appropriate actions are taken to assure accurate and complete reporting of SQMD.</td>
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<td>When estimating meter data, verify procedures are followed and estimation is documented and controlled.</td>
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<td>Verify Load Profiles correct, accurate, complete, and applied to the correct rate class and with the appropriate time shift. Ref 6.3</td>
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<tr>
<td></td>
<td></td>
<td>Describe the process for handling missing Load Profiles or incomplete downloads of Load Profiles. Ref 6.3</td>
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<td></td>
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<td>Verify Distribution Loss Factors are accurate, complete and applied properly for their voltage class. Validate different time standards for posting meter data, LP and DLFs, the meter data reported is representative of when the actual usage occurred. Take into account the data &quot;time stamp&quot; either at the beginning or the end of the hour. Ref 6.4</td>
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<td>Verify the Daylight Savings Time (DST) and Pacific Standard Time (PST) for reporting SQMD.</td>
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<td></td>
<td>Describe the process for handling missing Distribution Loss Factors or incomplete downloads of Distribution Loss Factors. Ref 6.4</td>
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<td>Verify the appropriate aggregation of meter data to the proper scheduling point. Ref 6.5</td>
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<td>Verify the proper creation of the SQMD file. Ref 6.6</td>
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<td>Verify any estimates performed by the SC are controlled and documented and accurate meter data is resubmitted by the final settlement deadline. Ref 6.7</td>
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<td>Identify any late meter data submittals; document the cause for the late submittals, how it was identified, and corrective actions. Ref 6.8</td>
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<td>Document the validation for comparing the meter data to scheduled data, number of metered account to the number of active customer accounts. Ref 6.9</td>
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<tr>
<td>Sign or initial when complete</td>
<td>Date Complete</td>
<td>Description of the elements discussed in the SC Self-Audit Report</td>
<td>Satisfactory or N/A Not Applicable</td>
<td>Reason for Incomplete or other comments</td>
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<td>Any SQMD resubmitted T + 45 is documented and controlled to assure accurate and correct meter data is submitted to the ISO prior to T + 49 business days. Ref 6.10</td>
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<td>Verify contract termination information is circulated to affected groups with enough time to make appropriate system changes so that data is reported accurately and correctly to the ISO by the T +45.</td>
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<td>Validate account data for returned Direct Access accounts to the appropriate system and submitted to the ISO prior to T +45.</td>
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<td>Review any automated and manual process to verify accuracy with written procedures. Ref 6.11</td>
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<td>Evaluate controls to assure the Direct Access Service Request (DASR) is processed accurately and all relevant parties have agreed on the start and stop dates and in the hour the usage occurred. Ref 6.12</td>
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<td>Verify any data reconciliation reports provided by the IOUs during the audit period and any corrective actions taken from the reports. Data reconciliation reports are provided to ESPs. The SC should request this information from their ESP(s).</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Review of periodic checks among MDMAs, ESPs and SCs to ensure accurate account lists. If multiple systems are used to track account lists, periodic reviews of each system should be conducted to assure accuracy.</td>
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<tr>
<td></td>
<td></td>
<td>Verify system testing is completed prior to implementation of any meter data processing system change or modification. Validate documents supporting the change and that a comparative review was conducted prior to and after the system change.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Verify software changes are tested and evaluated to ensure new changes produce accurate and correct SQMD and have no adverse affects on the SQMD process. Ref 6.13</td>
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<td></td>
<td></td>
<td>Randomly select at least five days of data to verify. Ref 7.1</td>
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<tr>
<td></td>
<td></td>
<td>Establish sampling groups where customers have similar data collection and processing methods. See examples in section 7.2</td>
<td></td>
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<tr>
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<td></td>
<td>For each day selected at least five customers from each group and review the processing of the data. See section 7.3 for requirements.</td>
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<td>Perform a root cause analysis for any discrepancies identified during verification of metered data.</td>
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<tr>
<td></td>
<td></td>
<td>Implement and describe actions to prevent recurring discrepancies.</td>
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</tr>
<tr>
<td>Description of the items that must be in the SC Self-Audit Report</td>
<td>(S)atisfactory or N/A Not Applicable</td>
<td>Reason for N/A or other comments</td>
<td></td>
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<td>---------------------------------------------------------------</td>
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<tr>
<td>Verify the Audit Report clearly describes the qualifications of the auditor(s).</td>
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</tr>
<tr>
<td>Verify the Audit Report describes and identifies follow up items from previous audits and any corrective actions implemented. If any changes have occurred, document the change, the reason and the date changes were effective.</td>
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</tr>
<tr>
<td>Verify the Audit Report describes the SC's Management comments on all audit findings.</td>
<td></td>
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</tr>
<tr>
<td>Verify the Audit Report contains a statement of Compliance by the SC Management, stating the processes being implemented are capable of creating accurate and complete SQMD.</td>
<td></td>
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<tr>
<td>Verify the Audit Report describes the results and any finding of the testing.</td>
<td></td>
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</tr>
<tr>
<td>Verify the Audit Report describes the root cause analysis for any problem identified during the audit.</td>
<td></td>
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</tr>
<tr>
<td>Verify the Audit Report describes corrective actions related to the root cause. Additionally, state the date the corrective actions were implemented or when they expect to be implemented.</td>
<td></td>
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</tr>
<tr>
<td>Verify the Audit Report includes a matrix of the activities reviewed and their applicability to testing conducted during the audit.</td>
<td></td>
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</tr>
<tr>
<td>Verify the Audit Report describes any actions taken as a result of the ISO Recommendations for SCs or ISO Identified Good Practices noted in the Lessons Learned Report.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Verify the Audit Report describes the scope of testing performed (e.g. systems, types of transactions, practices and procedures, volumes of data tested, etc) and dates of testing.</td>
<td></td>
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</tr>
<tr>
<td>Verify the Audit Report identifies the controls in the process used to create, collect, validate, and submit SQMD to the ISO.</td>
<td></td>
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</tr>
<tr>
<td>Verify the Audit Report describes the validation of calculation being used are consistent with existing contract and agreements with the ISO.</td>
<td></td>
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</tr>
<tr>
<td>Verify the Audit Report contains all resources that should be in the logical meter calculation (if applicable) and verify the resources are included and accurately represented.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there any trends on accuracy that you have noticed that are not included in this checklist? If yes, please describe your observations in the Audit Report.</td>
<td></td>
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</tr>
</tbody>
</table>
### Definitions/Acronyms:
- **Consumption** - Electric load reading in Watt-hours for an extended period of time (usually a month).
- **DLF** - Dynamic Loss Factor
- **DLP** - Dynamic Load Profile
- **EDI** - Electronic Data Interchange
- **EDI 867** - File and content format for metered and un-metered electric usage data.
- **GMT** - Greenwich Mean Time
- **Int-begin** - timestamp associated with a particular load reading interval in which the timestamp refers to the time at which the recording period began.
- **Int-end** - timestamp associated with a particular load reading interval in which the timestamp refers to the time at which the recording period ended.
- **Interval** - refers to an electric load reading over a specific period (i.e. 15 min, 60 min, etc.).
- **PDT** - Pacific Daylight Time
- **PST** - Pacific Standard Time

*For PG&E consumptive (monthly read) data uses a system generated end time stamp that defaults to the time the EDI 867 file was created. This time stamp is also duplicated as the “start” time. For example:

<table>
<thead>
<tr>
<th>Data File Type</th>
<th>Time Reference Type</th>
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<th>SCE</th>
<th>SDGE</th>
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<td>15 minutes – ending</td>
<td>15 minutes beginning</td>
<td>15 minutes ending</td>
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<td>recording of meter data</td>
<td>Time zone</td>
<td>PST / PDT</td>
<td>PST</td>
<td>PST / PDT</td>
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<tr>
<td>Posting to MDMA Server</td>
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<td>15 minute – ending</td>
<td>15 minute - ending</td>
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<td>GMT</td>
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<td>Start time = Int-begin</td>
<td>Start time = Int-begin</td>
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<td>Time zone</td>
<td>End time = Int-end</td>
<td>End time = Int-end</td>
<td>End time = Int-end</td>
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<tr>
<td>EDI 867 – Consumption*</td>
<td>Period time reference</td>
<td>Start time = Int-begin</td>
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<td>End time = Int-end</td>
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<td>DLF</td>
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<td>PDT</td>
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</table>

*For PG&E consumptive (monthly read) data uses a system generated end time stamp that defaults to the time the EDI 867 file was created. This time stamp is also duplicated as the “start” time. For example:

Start – 3/15/07 09:00
End – 4/15/07 09:00