BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking on the Commission's Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation	)))))))	R. 94-04-031
Order Instituting Investigation on the Commission's Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation	)))))))	I. 94-04-032

FINAL REPORT
OF THE DATA QUALITY AND INTEGRITY WORKING GROUP (DQIWG)
PURSUANT TO CPUC DECISION 97-12-090

Submitted by the California Energy Commission
on behalf of the DQIWG

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DATA QUALITY & INTEGRITY WORKING GROUP

(DQIWG)

Final Report

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1. Executive Summary

There are two sections to this Executive Summary. Section 1.1 provides a brief overview of the Data Quality and Integrity problem and describes the mechanisms proposed by the Data Quality and Integrity Working Group (DQIWG or Group) to mitigate the risks identified in the course of the Group's effort. Section 1.2 summarizes the Group's recommendations, which are developed in more detail in subsequent sections as indicated. These recommendations are addressed to: the California Public Utilities Commission (CPUC, Section 1.2.1); the Independent System Operator (ISO, Section 1.2.2); the Rule 22 Operations Coordinating Committee (OCC, Section 1.2.3); and the participants in a new DQI Subteam to be formed in the OCC to continue the Data Quality and Integrity effort during 1999 (Section 1.2.4).

This Report and its recommendations represent the collaborative effort of DQIWG participants. As a result, some of the recommendations do not have the unanimous support of all parties. *Where there was no consensus on a Group recommendation, the Report provides alternative positions, which are labeled as alternatives and italicized*. In some instances the alternatives may not be mutually exclusive. Once this Report is filed, parties will have 30 days to file their comments with the CPUC.

1.1 Brief Overview

With the filing of this Report, the DQIWG completes the assignment it was given in D.97-12-090 and comes to an end. The Group sees a need for further work, however, and is therefore recommending that a new DQI Subteam of the Rule 22 Operations Coordinating Committee (OCC) be created to perform certain further tasks and to assist and advise on implementation of the recommendations of this Report. Placing further DQI efforts within the Rule 22 / OCC structure should not restrict the scope of the DQI Subteam to retail-side and tariff issues, however. As discussed in Sec. 1.2.4 below, the DQI Subteam should maintain a market-wide perspective encompassing all information flows required for accurate settlements.

Because the activities we identify for the DQI Subteam need to proceed without delay, and in many cases are directly related to current activities of the OCC, we recommend that the new DQI Subteam begin its efforts as of the filing of this Report, without waiting for a formal CPUC decision on this matter, but subject, of course, to the consent and guidance of the Rule 22 Tariff Review Group and the CPUC Energy Division. The new DQI Subteam should complete its work by the end of 1999, as described in Section 1.2 below.

Data Quality and Integrity efforts are undertaken to increase confidence in the accuracy of bills and financial settlements among participants. Billing and settlement accuracy depend on (1) specifying computational algorithms, data processing procedures, and performance standards which are theoretically correct and operationally practical, (2) ensuring that all parties comply

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with these specifications, and (3) ensuring that data is not degraded in quality as it is passed from one party to another. Items (1) and (2) comprise "data quality," while item (3) is "data integrity."

In developing this Report, the DQIWG took the elements of item (1) as given, and largely focused on (2) and (3). Thus the Group did not examine such things as the load profiling (LP) and distribution loss factor (DLF) methodologies in use today, nor the standardized procedures for metering data validation, editing and estimation (VEE) that were recently adopted in CPUC decision D.98-12-080, all of which affect data quality. Likewise, the Group did not examine certain market rules which would affect data quality, such as the rules governing customer eligibility for load profiling in lieu of interval metering.

Most of the recommendations offered below refer to specific detection mechanisms which the DQIWG has identified to mitigate Data Quality and Integrity risks. These risks stem from the potential for inaccurate measurement, processing or reporting of electricity consumption and generation, whether inadvertent or intentional. The DQIWG views the various mechanisms as complementary elements of a data quality detection system which covers the "end-to-end" flow of metered usage data, from the end-use customer meter up to the settlement process of the Independent System Operator (ISO). (See Figure 1, in Section 2.2.2 below, for a schematic of the "end-to-end" data flow.)

For this Report the DQIWG has focused on metered usage data for end-use customers connected at distribution level. The Group has not addressed problems that may occur with the usage data of ISO-grid-connected customers or with generator data. The Group recommends that the new DQI Subteam examine these latter categories of data in coordination with the ISO, the PX and the Scheduling Coordinators, to develop a whole-system assessment of settlement data quality and integrity (Section 1.2.4).

Each of the detection mechanisms proposed by the DQIWG is discussed in detail in Section 3.2 and Appendix E of this Report. Their respective roles within the full system may be summarized as follows:

(1) Usage Data Reconciliation (UDR) is a mechanism for detecting, on an ongoing basis, any mis-reporting of Direct Access usage data by retail Electric Service Providers (ESPs) to their Scheduling Coordinators (SCs) and ultimately to the ISO. UDR starts with the validated usage data provided to ESPs and Utility Distribution Companies (UDCs) by Meter Data Management Agents (MDMAs). It then relies on the UDC to, first, perform the same data processing steps on the MDMA data which the ESP must perform prior to submitting the data to its SC, and second, compare the UDC-processed data against the data actually submitted by the ESP. See Section 3.2.1 for a full description of UDR.

Metering and Meter Data Management (MDM) activities are fundamental to Data Quality and Integrity, since these are the activities responsible for initially producing and validating the data and providing it to the relevant parties in time to support the ISO's settlement timetable. The next three items (performance monitoring reports, independent audits, and event reports) are designed to address these areas. These items are intended to apply to UDC-provided functions as well as to non-UDC providers.

(2) MDMA Performance Monitoring Reports (PMRs). The PMRs cover MDMA performance requirements regarding the timeliness, completeness and the proportion estimated of the data posted to the MDMA server, as well as the availability of the data server and technical support. Compliance with these requirements is essential for meeting the ISO settlement timetable (see Section 2.2.3). The PMRs will be prepared regularly by the UDCs for all MDMAs operating in their service territories, including the UDCs' own MDMA units. See Section 3.2.2 for further details.

(3) Independent Audits of Specific MDMA and Meter Service Provider (MSP) Activities. These audits should be defined narrowly, specifically to verify proper performance of activities that cannot be verified through either the UDR or the PMRs. For example, MDMAs are required to follow standard procedures for validation, editing and estimation (VEE) and archiving of metered usage data (see CPUC decisions D.97-12-048, D.97-12-090 and D.98-12-080). The audit of the MDMA should verify compliance with these standards. See Section 3.2.3 for the details.

(4) Event Reports. These reports would document the occurrence of various types of events which affect Data Quality and Integrity, particularly events which represent deviations from the performance standards adopted for the market. At present, reports of such instances are only anecdotal, making it impossible to assess the frequency and severity of problems, to observe trends, and to analyze causal factors. The proposed event reports are intended as an analytical tool to assist market participants in identifying the most troublesome problems and finding solutions for them. See Section 3.2.5 for details.

(5) SC Estimation Reports Required by the ISO. The ISO now requires each SC to maintain and submit a monthly report which identifies all trading hours for which the SC estimated the data it provided to the ISO for settlement, and specifies the quantities of energy involved, the methods of estimation and the reasons why estimation was needed. These estimation reports will provide documentation of data flow problems which up to now have been reported only anecdotally, and will help parties discover the root causes of problems and develop solutions. See Section 3.2.4 for details.

1.2 Recommendations

1.2.1 Recommendations for the CPUC

The DQIWG makes the following recommendations to the CPUC:

1. Continuing effort on Data Quality and Integrity issues by a new DQI Subteam of the OCC.

The CPUC should approve the formation of a new DQI Subteam of the Rule 22 Operations Coordinating Committee (OCC), to continue working on DQI issues as described in Section 1.2.4 below.

2. Usage Data Reconciliation (UDR, Section 3.2.1)

UDR is seen at present as the only way to detect, on an ongoing basis, mis-reporting of Direct Access usage data by ESPs to SCs and to the ISO. The CPUC should approve in concept the Phase 1 UDR approach described in this Report to be implemented by the UDCs. As the Report describes, SCE has already begun to operate a UDR mechanism based on this approach, and both PG&E and SDG&E are now developing similar systems. The new DQI Subteam should assist in standardizing certain features of the UDR model across the UDCs, including how UDR results should be communicated between the UDCs and other relevant parties, and in documenting UDR data provision requirements and procedures in accordance with the documentation process being developed in the OCC. The UDR should also be documented in the individual UDC operating manuals for ESPs.

3. Bundled-Service Usage Data Verification (Section 3.2.1)

Appendix G contains write-ups provided by the UDCs, describing how they presently verify internally that they are accurately reporting bundled-service usage to the PX.

Alternative 3(a). CPUC staff should work with the new DQI Subteam to develop a method for the CPUC to verify that UDCs are accurately reporting bundled-service usage to the PX.

Alternative 3(b). CPUC authority over regulated utilities is sufficient to ensure compliance and accuracy of usage data. Should the CPUC decide to investigate this matter, it should be reviewed in only one forum, such as the Revenue Adjustment Proceeding. However, this topic was not explicitly investigated in the most recent RAP.

Alternative 3(c). The issue of the accuracy of bundled-service usage data reported to the PX should be addressed at the ISO level, preferably at the existing ISO workshops.

Alternative 3(d). The CPUC should require that the UDCs conduct (or engage an independent qualified entity to perform) audits of their bundled-service meter data processing systems. This audit should be performed to ensure proper handling and reporting of metered usage data. The DQI Subteam should develop the criteria for this audit within 6 months of the CPUC's request for the audits.

4. MDMA Performance Monitoring Reports (PMRs, Section 3.2.2)

PMRs will cover certain features of MDMA performance such as the timeliness, completeness and the proportion estimated of data posted to the MDMA server. PMRs will be produced for UDC MDMAs as well as non-UDC MDMAs. The CPUC should direct the UDCs to implement PMR programs incorporating the basic model described in this Report. Because there are some concerns regarding the uses and initial accuracy of the PMRs, a process should be established to allow review of the PMRs by the MDMAs prior to release of the PMRs to appropriate parties. Market participants should work within the OCC to create such a process.

5. Independent Audits of Specific MDMA and MSP Activities (Section 3.2.3)

The purpose of these audits is to verify proper performance of activities that cannot be verified through either the UDR or the PMRs, such as compliance with various standards for MSPs and MDMAs adopted in decisions D.97-12-048, D.97-12-090 and D.98-12-080. The audits will be narrowly-defined, check-list audits, with audit templates to be developed by the DQI Subteam. The audits could be performed either by an independent outside auditing firm or by qualified internal employees who are independent of the specific unit being audited. The costs of these audits should be borne by the audited entities themselves, and, in the case of UDC MSPs and UDC MDMAs, the costs should be allocated to those functional units within the UDCs.

(a) Timing of Initial Audit
Alternative 5(a)1. The CPUC should require all certified MSPs and approved MDMAs, including UDC MSPs and UDC MDMAs, to have an independent audit within one year of a CPUC decision on this subject, in accordance with the approach described in this Report.

Alternative 5(a)2. The CPUC should require all certified MSPs and approved MDMAs to have an independent audit within one year of a CPUC decision on this subject or the development of audit templates by the DQI Subteam, whichever is later.

(b) Requirement for Subsequent Audits
Alternative 5(b)1. After the first audit, these entities should be required to have a new audit on a reasonable, regular basis, unless the CPUC determines a need to audit sooner based on any identified problems.

Alternative 5(b)2. After the first audit, any additional audits should be "event-driven" where persistent problems arise in data quality.

(c) Who Should Review Audit Reports
Alternative 5(c)1. The audit reports should be filed with the CPUC Energy Division.

Alternative 5(c)2. A notice of successful audit completion, problems identified, and corrective actions taken should be sent to the Energy Division at the CPUC.

Alternative 5(c)3. The DQI Subteam should consider whether ESPs and UDCs should regularly receive and review audit reports for those MSPs and MDMAs they directly contract with or whose performance they indirectly rely upon for settlement data. The Subteam may make a recommendation in this area.

Alternative 5(c)4. Market participants should review each other's audit reports as allowed by existing contracts or tariffs.

6. Event Reports (Section 3.2.5)

The CPUC should approve in concept the event reports and incident logs being developed for various market participants, with details to be developed collaboratively through the DQI and other OCC Subteams. Once the items covered by these reports are identified, the DQI Subteam should request all market participants to provide any applicable, available benchmark statistics on these items to be used for comparative purposes. The recommendations developed by the DQI Subteam should specify who has access to the data, at what level of detail, and how these reports will be used to solve Data Quality and Integrity problems.

7. Applicability of Data Quality and Integrity Measures

Alternative 7(a). The CPUC should endorse the general principle that all monitoring, auditing and other Data Quality and Integrity requirements imposed on market participants must apply consistently to all entities performing a given function.

Alternative 7(b). Delete recommendation 7(a).

8. Cost Impacts of Data Quality and Integrity Measures

Alternative 8(a). The cost impacts on parties to comply with Data Quality and Integrity requirements should be competitively neutral.

Alternative 8(b). Recognize that while these requirements and their attendant costs are necessary for the functioning of the newly restructured market, the benefits from these requirements are expected to exceed these costs.

Alternative 8(c). Let the appropriate cost allocation proceeding be the forum for allocating UDC costs.

1.2.2 Recommendations for the Independent System Operator (ISO)

1. The ISO should direct SCs to review, with their associated ESPs, the UDC usage data reconciliation (UDR) results for those ESP accounts they schedule, as part of the SCs' responsibility under the ISO Metering Protocol (Section 4.2.1) to provide accurate and timely Settlement Quality Meter Data to the ISO. In the case of ESPs using multiple SCs, it should be the ESP's responsibility to segregate the UDR results by SC. The SCs should report to the ISO, in a timely manner, any discrepancies they become aware of. (Section 3.2.1)

2. The ISO should require SCs to review the audit reports of those MSPs and MDMAs from whom they receive data for the settlement process. Review of these reports by SCs may eliminate the need for duplicative audits to comply with ISO requirements. This review should become a standard element of SCs' due diligence in executing their responsibility to provide accurate and timely Settlement Quality Meter Data to the ISO. (Section 3.2.3)

3. The ISO should participate in the DQI Subteam of OCC to further the goal of a market-wide approach to Data Quality and Integrity.

1.2.3 Recommendations for the Operations Coordinating Committee (OCC)

1. The OCC, and any other parties engaged in developing Electronic Data Interchange (EDI) for implementation in the Direct Access market, should adopt the DQIWG's recommendations for EDI testing, acknowledgment and verification procedures, archiving of EDI transmissions and transaction security. The OCC and its subgroups should work out the implementation details. (Section 3.1.2)

2. The OCC should, without great delay, designate a task team to develop a change management process to ensure that all market participants correctly and promptly adopt all procedural changes adopted for the market. The OCC should prominently document this process so that all market participants are aware of and comply with it whenever new procedures or procedural changes are adopted. (Section 3.1.3)

3. The OCC should document all operating requirements that result from adopted Data Quality and Integrity measures; for example, the requirement of the UDR process that the ESPs provide to the UDCs the usage data they send to their SCs for settlement.

1.2.4 Activities to be performed by a new DQI Subteam of OCC

The DQIWG recommends that a new DQI Subteam be created under the Rule 22 OCC, and begin its work following the filing of this Report, subject to the approval and guidance of the Energy Division and the Rule 22 Group. The new Subteam should address the tasks described below, and should complete these tasks by the end of 1999.

1. Assess how well the various standards in CPUC decisions and in the PSWG Report are working from a Data Quality and Integrity viewpoint, and recommend modifications where needed (Section 3.1.1). In particular, re-evaluate the data estimation and completeness standards for posting data to the MDMA server, with the objective of minimizing the need for ESPs and SCs to estimate data to meet the ISO's settlement timetable (see Strategy 1, Section 2.3).

2. Assess the need for additional data security measures and, in coordination with the ISO, evaluate whether a Public Key Infrastructure (PKI) like that being implemented by the ISO is warranted for retail transactions. (Section 3.1.4)

3. Alternative 3(a). Develop certain standard features of the usage data reconciliation model which should be common to all three UDCs' approaches. (Sec. 3.2.1)

Alternative 3(b). Delete Alternative 3(a).

4. Alternative 4(a). Develop a usage data reconciliation proposal for the CPUC to verify accurate reporting of bundled-service usage by UDCs to the PX. (Sec. 3.2.1)

Alternative 4(b). Delete Alternative 4(a).

5. Alternative 5(a). Develop one or more proposals for how usage data reconciliation should be done in the long term, i.e., beyond the "interim" assignment of this responsibility to the UDCs in D.97-12-090. (Sec. 3.2.1)

Alternative 5(b). Delete Alternative 5(a).

6. Develop procedures for review of the MDMA Performance Monitoring Report (PMR) by the MDMA and release of the PMR to the ESP by the UDC. (Sec. 3.2.2)

7. Develop audit templates for the MDMA and MSP independent audits. (Sec. 3.2.3)

8. Identify the elements to be included in event reports and incident logs, and work with other OCC Subteams on the implementation of these. (Sec. 3.2.5)

9. Develop recommendations for post-settlement adjustments, including entering corrections to MDMA usage data archives to ensure an accurate historical usage data reference, and financial adjustments when mis-reporting is detected and money is collected and needs to be distributed to other market participants. The Subteam should coordinate with the OCC Billing Business Rules (BBR) Subteam. (Sec. 3.3.2)

10. Examine the overall structure of commercial relationships and regulatory authority in the market to see if there are any gaps from a Data Quality and Integrity perspective. Recommend solutions where gaps are identified, including, for example, standard contract provisions for the various functions which better define roles, rights and responsibilities regarding Data Quality and Integrity. (Sec. 3.3.3 and 3.3.4)

11. Coordinate with the ISO, the PX and other SCs to examine the big picture overview of settlement data flows, including metered data from generators and grid-connected entities, to assess the need for further DQI Subteam effort in this area. (Sec. 2.2.2)

12. Evaluate the performance of new detection mechanisms now being implemented (i.e., usage data reconciliation, MDMA performance monitoring reports, event reports), to assess whether they are providing useful information, imposing excessive burdens on some parties, or failing to detect significant problems.

2. Overview of Data Quality and Integrity

2.1 The DQIWG Process

Pursuant to Decision 97-12-090, the Data Quality and Integrity Working Group (DQIWG) was formed by the CPUC Energy Division to "evaluate all of the direct access informational exchanges for any gaps or problem areas ... [and] develop and file a report outlining the problem areas and the group's recommendations to solve the problem." The Decision directs the group to "include the informational exchanges at the ISO and SC level which impact the UDCs and ESPs" and to serve the report on "the Commissioners and the Commission staff, the members of the DQIWG, the attendees of the DQIWG meetings, the ISO and the PX and their governing boards, and on the FERC. The latter service requirement will help to ensure that the ISO, PX and the FERC are made aware of potential information exchange problems. It should also help to coordinate state and federal efforts to resolve these problem areas." [D.97-12-090, p. 25]

The Decision originally intended that the DQIWG would file its report in June, 1998. Due to the size and complexity of its task, however, the Group decided, with the concurrence of the CPUC Energy Division, that it would be preferable to postpone the filing date. To inform the CPUC and all market participants and working groups about DQIWG activities, the Group filed an Interim Report to the CPUC on August 21, 1998. The Interim Report is available from the DQIWG page of the Electric Restructuring web site <http://ora.ca.gov/wk-group/dai/dqi>. In accordance with D.97-12-090, the Interim Report was distributed to the ISO and PX and their governing boards, the Office of Electric Power Regulation at the FERC, and the California Electricity Oversight Board, and a notice of availability was sent to the CPUC's Electric Restructuring service list.

On September 29, 1998 members of the DQIWG participated in a briefing at the CPUC for Commissioner Advisors and the Energy Division. The guidance provided by the CPUC at that time was then incorporated into the DQIWG's approach, as discussed in Section 2.3 below.

The Group believes that the present Report goes a long way toward developing systems to ensure the quality and integrity of settlement data. We also see a need for a continuing effort to develop more details of some proposals that are still sketchy at this time, and to provide an ongoing forum to address new Data Quality and Integrity issues that may arise in the coming year.

During the course of its effort, the DQIWG established a working relationship with the Rule 22 Tariff Review Group, whereby the Group provided updates on its progress and activities at the monthly Rule 22 meetings to allow Rule 22 participants to comment and offer suggestions and guidance. As the DQIWG comes to an end, the Group's recommendations should be addressed in the Rule 22 Operations Coordinating Committee (OCC), creating a new DQI Subteam to develop needed implementation details and address remaining tasks. The DQI Subteam should also work with the OCC to ensure that adopted Data Quality and Integrity measures are fully documented for all market participants.

Parties who wish to comment to the CPUC on this Report may do so within 30 days of the filing of the Report's notice of availability to the Electric Restructuring service list (see D.97-12-090, Ordering Paragraph 1(c)).

DQIWG Participation

Continuous participation has been primarily by the three major UDCs, the ISO, CellNet, C3 Communications, LADWP, Sierra Pacific, New West Energy, ABB, ORA, and CEC.

Since the initial meeting on February 27, 1998, the following entities have attended one or more meetings of the DQIWG: ABB, Alta Vista Systems, APX, Audit Pro, California Competition Network, CellNet, CEC, Commonwealth Energy, C3 Communications, Enron, FirstPoint, Green Mountain Energy Resources, HESI, the ISO, LADWP, LKJ Associates, Montana Power Trading & Marketing, MRW & Associates, MZA Grid Services, NEV, New West Energy, Onsite Energy, ORA, the PX, PG&E, PG&E Energy Services, Phaser, SCE, SDG&E, Sempra Energy, Severn Trent Systems, Sierra Pacific, SoCalGas, and CPUC Energy Division.

2.2 Purpose and Scope

From the time the market started to operate in April 1998, there have not been adequate measures in place to ensure that end-use meter data is generated, collected, processed, stored and exchanged according to the standards developed in the working groups and adopted in decisions, and that all parties accurately report all electricity usage for which they should be financially responsible. As a result, data inaccuracies and variations from proper procedures may occur without detection, leading to errors in financial settlements between parties, inflation and/or mis-allocation of Unaccounted-For Energy (UFE), and loss of confidence in the electricity market. Since the market began operating, anecdotal evidence indicates that the potential problems identified in the course of the DQIWG process have been and are still actually occurring. In August 1998 the ISO identified timely submission of accurate settlement data by scheduling coordinators (SCs) as one of the top three ISO compliance problems. Since then there has been progress in the timeliness area, but many concerns about accuracy still remain to be addressed.

2.2.1 Mission Statement

When the Group started working in the spring of 1998 it adopted the following mission statement:

> The DQIWG will develop and recommend practical and cost-effective monitoring mechanisms, audit processes and other elements needed to ensure Data Quality and Integrity.

Data Quality and Integrity refers to the characteristics of metered usage and generation data, at any point in the process of data generation, acquisition, processing, storage, and exchange
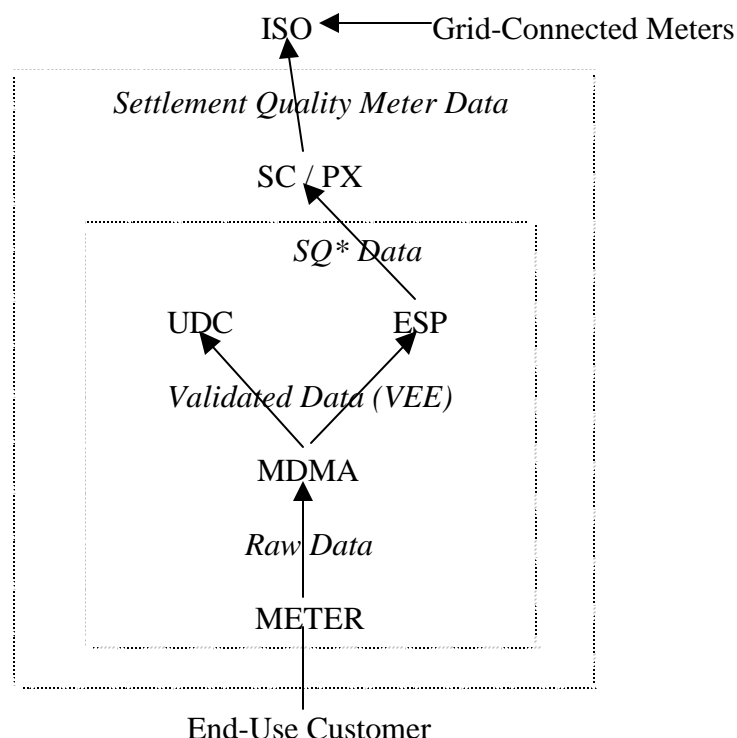
between relevant parties, that ensure its suitability for billing and settlement of electricity transactions.

2.2.2 Scope of the DQIWG Effort

The focus of the DQIWG is the quality and integrity of the metered usage and generation data which is the basis for payments between parties doing business in the electric service market. In principle the DQIWG is concerned with metering data from generators and ISO-grid-connected customers, as well as the metered usage data from distribution-level customers. At this stage of the Group's progress, however, it decided to narrow its focus to distribution-level usage data, because this area has been given the least attention to date and represents the weakest link in the data flow chain.

In approaching the Data Quality and Integrity problem, the Group is examining the entire "end-to-end energy transaction," i.e., the flow of metered usage data from the end-use distribution-level customer meter up to the ISO settlement process. The objective of this examination is to ensure that each step in the data flow meets the requirements of timely and accurate billing and settlement. Figure 1 illustrates the data processing steps and exchanges which comprise the end-to-end transaction.

Figure 1. Routine Flows of Metered Usage and Generator Data for Settlement

ISO ← Grid-Connected Meters

Settlement Quality Meter Data

SC / PX

SQ* Data

UDC   ESP

Validated Data (VEE)

MDMA

Raw Data

METER

End-Use Customer

Notes to Diagram

(1) In this diagram, "UDC" refers to the distribution wires service role of the UDC. In contrast, for its role as provider of energy to bundled-service customers, the UDC should be considered an ESP for the purposes of this discussion.

(2) The diagram does not show the flow of data from generators that are connected at distribution level rather than to the ISO grid. Such data flows through SCs to the ISO.

Data Definitions

Raw Data = data as it is acquired by the MDMA from the meter instrument.

Validated Data = Raw Data to which standardized validation, editing and estimation procedures (VEE) have been applied. Under existing standards, the creation and provision of Validated Data are required activities of the MDM function.

SQ* Data = Validated Data to which statistical load profiles and distribution loss factors have been applied, and which has been aggregated by the ESP to the appropriate ISO grid take-out point, zone or scheduling point. In practice, the processing steps to create SQ* Data may be performed for the ESP as value-added services by the MDMA or the SC; this option is indicated by the dashed arrow from MDMA to SC.

Settlement Quality Meter Data (SQMD) = SQ* data which has been aggregated by the SC across
the ESPs it serves, for each take-out point or zone.

Responsibilities

Inner Box = ESP responsibility under CPUC decisions. In practice the SC may obtain Validated
Data directly from the ESP's MDMA (as indicated by dashed arrow) even though the ESP
is formally responsible for submitting this data (solid arrow).

Outer Box = SC responsibility under ISO tariff and metering protocols.

The actual language of CPUC decisions and ISO tariff and metering protocols which assign data
responsibilities to ESPs and SCs is reproduced in Appendix A.

2.2.3 The ISO's Settlement Timetable

When settlement data flows are viewed as a whole system as in Figure 1, it becomes clear that
the ISO's settlement timetable is a primary driver of performance, with regard to both accuracy
and timeliness. The ISO has identified the timely submittal of accurate Settlement Quality Meter
Data (SQMD) by SCs as one of the top three ISO compliance issues, and has participated in the
DQIWG to develop effective measures for solving SQMD problems. Clearly, in order for SCs to
meet the ISO's requirements for SQMD, all the preceding activities in the data stream need to be
completed correctly and on time.

The ISO's settlement timetable is as follows, for trading day T:

T+41   SQMD (as defined under Figure 1) must be submitted to the ISO by each SC.

T+45   Deadline for submitting revised SQMD to be incorporated in the ISO's Preliminary
            Settlement Statement (PSS). Note: The interval between T+41 and T+45 should not
            be considered a grace period. Revised data submitted in this interval is treated as an
            exception to proper compliance by a SC, and requires additional paper work by the
            SC. The purpose of this time interval to allow SCs to submit actual data for those
            cases where only estimated data was available by T+41.

T+47   ISO releases PSS.

T+57   Deadline for disputing the PSS and submitting revised SQMD to support changes to
            the PSS desired by the SC. A submittal during the time interval from T+47 to T+57
            requires the SC to engage in the ISO's dispute process.

T+61   ISO releases Final Settlement Statement (FSS) and the settlement process for trading
            day T is formally closed.

At the time of filing this Report, discussions are underway at the ISO to consider modifications to the above timetable. One objective of the modifications would be to allow additional time to produce the settlement statements, and thereby to increase their accuracy. The discussions are part of the ISO's "Settlement Improvement Team" (SIT) stakeholder process. Specific proposals and comments on them can be obtained from the web site: http://www1.caiso.com/discus/.

2.2.4 Identified Market Risks

The October 15, 1997 RSIF Supplement on Retail Data Quality and Integrity provided a "Market Risk Matrix" which identified the routine activities and data exchanges where problems with Data Quality and Integrity could arise. For the present Report, the DQIWG began with that matrix and eliminated a number of items which: (1) were deemed to be of low importance or consequence to any party, (2) were being taken care of through existing mechanisms, or (3) were no longer relevant due to changes in the market that have occurred over the past year. The revised matrix is presented in Appendix B of this Report. The last column of the Matrix indicates the Group's recommended solutions for each of the risks. For some risks the Group has not yet developed a recommendation, and these risks will be referred to the DQI Subteam of OCC for consideration.

The original version of the Risk Matrix is presented in Appendix C to give the reader a picture of the full scope of activities and data exchanges the Group reviewed in beginning the effort leading to the present Report.

2.3 Guiding Principles and Strategies

When the Group began its effort in spring of 1998, it adopted the following guiding principles:

(1)   Minimize Unaccounted-For Energy (UFE)[1].
(2)   Build confidence in the energy market.
(3)   Reduce overall transaction costs for market participants.
(4)   Maintain continuous, efficient information flows.
(5)   Develop solutions which are defined in terms of functions, apply consistently to all entities who perform any given function, and emphasize ease of implementation.

Later the Group created a Monitoring-Auditing Subteam (MAS) which met in between monthly meetings of the full DQIWG, to develop strawman proposals to present to the full Group. The MAS proposed and the full Group subsequently revised and adopted the following additional principles for determining how Data Quality and Integrity measures should be implemented:

(6)   <u>Monitoring</u>. Data Quality and Integrity should be ensured via monitoring systems wherever possible, in preference to more intrusive approaches such as auditing. Monitoring should

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[1]   An explanation of how UFE is calculated is provided in Appendix D of this Report.

take an exception-based approach, i.e., monitoring reports should report exceptions, problems or departures from required performance.[2]

(7)   Auditing. Formal auditing should be used for follow-up investigation as needed and for areas where effective monitoring is not possible. In general, audits should be event-driven, i.e., based on a detected problem, except in areas where regular, scheduled audits are the only way to ensure proper performance.

(8)   Existing Contract Provisions. There should be a heavy reliance on the existing contract rights and obligations between participants in determining monitoring and auditing requirements.

Alternative (8)(a). Existing contract provisions should not be precluded or infringed upon as a result of requirements proposed by the DQIWG. The Group may, however, suggest ways in which existing provisions should be strengthened to enhance Data Quality and Integrity.

Alternative (8)(b). Existing contract rights and obligations are not intended to be changed as a result of requirements proposed by the DQIWG.

(9)   Efficiency. Cost considerations of auditing or monitoring should be weighed against the anticipated benefits. Where possible audit approaches should avoid duplicate audits of the same systems or data.

(10) Confidentiality. Audit and other requirements should protect the confidentiality of competitive data and customer privacy.

The Group then developed a few key strategies which guided its approach to solving data quality and integrity problems. These strategies are based upon the Group's learning from the market's actual experience in the first several months of operation, the September 29 briefing at the CPUC, the requirements of the ISO's settlement timetable, and the principles enumerated above.

Strategy 1. Emphasize the role and responsibility of the MDM function as the most fundamental determinant of data accuracy and timeliness.

The ability of SCs to submit accurate Settlement Quality Meter Data (SQMD) to the ISO on time (i.e., by T+41 for trading day T) ultimately depends on the performance of the MDM function. Ideally each MDMA should provide clean, accurate, and complete usage data in a timely fashion to each ESP it serves, to allow SCs to meet the T+41 requirement without the ESP or the SC having to estimate data. From a Data Quality and Integrity point of view, it is preferable for all data estimation to be done by the MDMA rather than the ESP or the SC. At the same time, the Group recognizes that the data completeness and estimation standards contained in the PSWG Report and subsequently adopted by the CPUC were not designed with this objective foremost in

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[2]   Definitions of important monitoring and auditing concepts are presented in Appendix F of this Report.

mind. For example, the limit on the amount of data that can be estimated may lead the MDMA, in cases where meter reads are not available on time, to omit those data points rather than provide estimates. Thus, while this strategy has already guided the development of recommendations in this Report, the Group notes the need for further assessment of these standards by the new DQI Subteam.

Strategy 2. Rely on commercial relationships between parties wherever possible.

Strategy 3. Use existing regulatory jurisdiction to encourage implementation of preventative measures, and to affect the behavior of non-regulated entities through their commercial relationships with regulated entities.

Strategies 2 and 3 reflect the input of the CPUC at the September 29 briefing by the DQIWG.

3. Proposed Data Quality and Integrity Elements

The comprehensive strategy which the DQIWG has developed and is recommending in this Report consists of three main categories of activities or measures to ensure Data Quality and Integrity, each having several complementary elements which are described below. The three main categories are: preventative measures, detection mechanisms, and responsive actions. In connection with each of the elements the DQIWG provides its recommendations.

3.1 Preventative Measures

3.1.1 Standardized Procedures and Performance Requirements

Numerous standards have been developed which should increase the quality and integrity of the data and prevent mistakes from occurring. The Permanent Standards Working Group (PSWG) reviewed the interim standards contained in CPUC Decision 97-12-048 and recommended what permanent standards should be approved by the Commission in its final report dated July 29, 1998. The Commission ruled on that report and adopted permanent standards in D.98-12-080. The adopted standards are now documented in "Direct Access Standards for Metering and Meter Data (DASMMD) in California," which was filed jointly by the PG&E, SDG&E and SCE on March 1, 1999. The DASMMD is available from the UDC web sites.

Neither the PSWG report nor the Decision, however, address the question of how to detect non-compliance with the standards. The DQIWG has therefore focused on developing mechanisms to detect non-compliance with the standards.

The DASMMD includes standards in the following areas:
1. Meter Products (Meter Equipment)
2. Meter Communications
3. Meter Data Management and Meter Reading, including rules for validating, editing, and estimating (VEE) and archiving metered usage data
4. Meter Installation, Maintenance, Testing, and Calibration, including classification of different levels of meter workers.
A more detailed description of the standards is presented in Appendix E of this Report.

DQIWG Recommendation

One task of the new DQI Subteam of OCC should be to assess whether the standards and performance requirements as specified in PSWG recommendations and CPUC decisions are adequate from the Data Quality and Integrity viewpoint and realistic from an operational viewpoint. In particular, the Subteam should re-evaluate the data estimation and completeness standards for posting data to the MDMA server, with the objective of minimizing the need for

ESPs and SCs to estimate data to meet the ISO's settlement timetable (see Strategy 1, Section 2.3). The specific DQIWG recommendations for detecting non-compliance with standards are presented in Section 3.2 of this Report.

3.1.2 EDI Transaction Quality Assurance and Control

Definition of EDI

Electronic Data Interchange (EDI) is the computer-to-computer exchange of business documents in standard, machine-readable formats. EDI can allow all parties to develop business processes and automated systems that facilitate the exchange of business information.

Purpose

EDI is being implemented for several Direct Access information exchanges. With proper planning and implementation, use of EDI for metered usage data exchanges and other settlement-related communications would be an excellent means to mitigate data quality and integrity problems. However, achieving these benefits requires sound data processing practices, which must not be taken for granted just because EDI implementation is underway. Of particular concern is the fact that many of the parties who will be implementing EDI have little or no prior knowledge of EDI to draw upon. The DQIWG therefore offers some suggested practices with regard to EDI implementation and operation.

A basis for developing criteria for these practices is Section D(4) of Rule 22 (D.97-10-087).[3] Section D(4) does not provide specific criteria for judging when these requirements are met, but existing EDI standards can provide mechanisms for improving data flows between market participants, without requiring new standards to be developed.

Description and Status

Presently EDI has been used by all three of the UDCs as part of the UDC and ESP consolidated billing activities, as required by Rule 22. Two of the UDCs have used EDI for DASRs since the market started. The PSWG has recommended to the CPUC that metered usage data and meter-specific services transactions be migrated to EDI as the preferred method for electronic communications supporting Direct Access service. The DQIWG supports the use of EDI for

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[3] Section D(4) of Rule 22 includes the following among the requirements that an ESP must satisfy before providing Direct Access services in a UDC's service territory:

"D(4). The ESP must satisfy applicable CPUC Electronic Data Exchange requirements, including:

(a) ESP must complete all necessary electronic interfaces for the ESP and UDC to communicate for DASRs, general communications and if providing Metering and Data Management Agent (MDMA) services, to satisfy meter reading communications including communicating to and from MDMA Servers for sharing of meter reading and usage data.

(b) The ESP must have the capability to exchange data with the UDC via the Internet. Alternative arrangements may be allowed if mutual agreement is made between the UDC and ESP.

(c) The ESP must have the capability to perform Electronic Data Interchange (EDI), and enter into appropriate agreements related thereto, if the ESP will be offering either UDC or ESP Consolidated Billing services."

electronic communications, and offers the following considerations as a basis for realizing the greatest benefits of implementing EDI:

- The lack of specific criteria for testing electronic data exchanges may have contributed to problems that were experienced at the opening of the competitive market, including failure of data to be received by the intended party, misalignments between data that have been received and other data concerning the customers being served, and the need for manual intervention to research and solve these problems.

- The use of acknowledgments allows the receiving party to report back to the sending party any problem encountered by the receiver's software as the data is interpreted. For example, an additional verification process has been included in recently-developed account maintenance procedures, i.e., an information request that allows the sender to receive all customer account information (e.g., addresses, account numbers, providers of unbundled services, rate options, etc.) pertaining to a specified account. Similar verification processes for other EDI transactions can be recommended for inclusion as those transactions are developed by market participants within the OCC process.

- Archiving of all data comprising EDI transmissions provides the means for verification and audit, protects the originator of a file from damages related to loss of the data, and ensures that other market participants can receive information that they require. The creation of a unique transaction number for each communication is important in ensuring data and file integrity.

- EDI has historically relied on Value Added Networks (VANs) as a transport medium, because VANs provide reliable and proven technology for business data transfers, provide an audit trail, and specialize in providing services in these key areas. VANs' requirements for their subscribers should be considered adequate because security of communications is one service that VANs provide for their customers. VANs can be costly, however, and there is interest among market participants in migrating to Internet transport mechanisms that will be practical and less costly to implement and use. Standards for the conduct of EDI over the Internet are being developed by groups including the Internet Engineering Task Force (IETF, the standards-setting body for the Internet), the Gas Industry Standards Board (GISB), and CommerceNet (an industry consortium), and should be considered once they are established. Until then, the security standards described in Appendices C and D of the July 1997 Meter and Data Communications Standards workshop report (e.g., the HTTP protocol with Secure Sockets Layer, using a recognized Certificate Authority) constitute the established practice for transfer of metered usage data and should be adopted as an adequate security standard.

DQIWG Recommendation

The DQIWG believes that the greatest benefits of EDI would be achieved if the following recommendations are adopted:
- Any use of EDI should be thoroughly planned and tested to ensure that all EDI transactions will be reliable, predictable, accurate and efficient.
- Testing should be built on a simulation of the actual activity.

- All EDI transactions that are sent to the receiver should use acknowledgement and verification processes, with details to be worked out by market participants within the OCC process.
- Procedures should be designed to allow for the sender to recover or recreate, and to retransmit, the data contained in the EDI transaction and for the receiver to omit unreadable data from an input stream.
- Security and/or encryption of transactions and customer information, and establishment of a positive identity of sender and recipient, should be assured.

The DQIWG believes that further development of EDI for meter data transactions should occur in the various OCC subteams. The DQI Subteam should be available to assist or advise in this effort as needed.

3.1.3 Change Management

Purpose

As we learn more about the flow and the exchange of data in this market, processes and systems will be created, revised, and replaced. A sound change management process is required to ensure that the all market participants are fully informed of and correctly implement all new measures and requirements that are developed, approved and implemented in the market.

Description

Once the market begins to use a procedure somewhere in the data flow model, participants will anticipate that the procedure will be repeatable and achieve the same results. However, changes may and will be required to many of the existing procedures, and new procedures will be added. A standardized change management process for all such changes will help to minimize confusion, errors and inconsistencies due to procedural changes. The DQIWG recommends that a standardized change management process be developed, that development of this process become part of the OCC agenda, and that the process be documented by the OCC to ensure that all market participants are aware of and comply with it. The change management process should specify the following elements for each change to be implemented:
- Justification for the change
- Description of the change
- Testing plan
- Implementation plan.

DQIWG Recommendation

DQIWG recommends that the OCC develop and implement a change management process which incorporates the above elements. The process should be fully documented by the OCC. The various working groups, particularly the OCC subgroups, should then apply this process to each new or modified procedure that is adopted for the market. The DQI Subteam should assist in this effort.

3.1.4 Data Security

In its July 29, 1998 Report the PSWG recommended that the DQIWG take up the topic of data security. Subsequently the ISO held a meeting to explain the Public Key Infrastructure (PKI) system it is developing to provide transaction security for its information exchanges with other market participants. Thus far the DQIWG has only briefly considered this subject.

DQIWG Recommendation

The new DQI Subteam of OCC should identify and assess the market risks which data security measures would try to mitigate, and consider whether PKI is warranted for transactions on the retail side of the market. For example, the Subteam should assess the potential risk of unauthorized access to an MDMA server or transaction denial to an authorized party. In addition, as noted in Section 3.2.2 below, data security in connection with the operation of MDM servers should be an element of the regularly scheduled audits of MDMAs.

3.2 Detection Mechanisms

The DQIWG's comprehensive, system-wide approach to detecting Data Quality and Integrity problems involves several elements which are described in this section. They are: usage data reconciliation (UDR), MDMA performance monitoring, MDMA and MSP independent audits, usage data estimation reports by SCs, and event reports and incident logs to be provided by various parties. Table 1 summarizes these elements. The reader should also see the Market Risk Matrix presented in Appendix B for a more detailed mapping of detection mechanisms to specific risks. In addition, Appendix F provides definitions of basic monitoring and auditing concepts discussed by the DQIWG.

Table 1. Summary of Data Quality and Integrity Detection Mechanisms

Function	Monitoring	Auditing
MSP	• event reports – mis-calibration, safety, theft tips, etc.	scheduled independent audit - performance & ongoing certification qualifications
MDMA	• performance monitoring reports (PMRs) • event reports - theft tips, safety, etc.	scheduled independent audit - VEE compliance; raw & validated data archive; server security & access
ESP	• event reports - provision of usage history and billing cycle to new ESP • *(non-consensus) review MSP & MDMA audit reports and PMRs*	data procedures subject to audit by SC, per ISO tariff
UDC (distribution function)	• perform direct access usage data reconciliation • *(non-consensus) review MSP & MDMA audit reports and PMRs*	
SC	• provide Data Estimation Reports to the ISO • review MSP & MDMA audit reports • review usage data reconciliation results • event report - termination of ESP-SC service contract	data procedures subject to audit by ISO, per ISO tariff
Usage Data Reconciliation - covers MDM, ESP, SC and ISO levels	• UDCs reconcile direct access usage data for near term • *(non-consensus) UDR must be supplemented to cover bundled service usage data reported by UDCs to PX*	

Note: The mechanisms identified above should apply consistently to any entity performing the function designated in the first column. It is understood that the UDCs and other integrated companies can perform more than one of the functions in the market.

3.2.1 Usage Data Reconciliation

Problem Statement

A major concern facing the new electricity market is the potential for accidental or intentional mis-reporting of end-use customers' energy consumption. Mis-reporting of usage data can occur for many reasons: inaccurate metering, misapplication of load profiles or distribution loss factors, under-reporting or omission of specific end-use customers' consumption data, and shifts in time-of-use reporting from peak to off-peak periods. The result is consistent, however, in that the cost of the energy consumed will not be charged back to the responsible party, but instead will appear as Unaccounted-For Energy (UFE) which is allocated to all market participants by UDC service territory.

In Decision 97-12-090 concerning the Retail Settlement and Information Flow Workshop Report, the CPUC stated that "failing to schedule electricity through a scheduling coordinator may amount to the theft of utility services. If the value of the services obtained exceeds $400, the offending party could be charged with a felony." The decision further states that, until the feasibility of a statewide detection system can be assessed:

> "this potential problem should be left in the interim to the UDCs to solve. Since the Commission's jurisdiction over scheduling coordinators is limited, the UDCs should establish internal systems to detect when an ESP is no longer scheduling the delivery of electricity to an end-use customer. The UDC will have the name of the ESP's scheduling coordinators, the load data provided to the scheduling coordinators by the ESP, and historical records of past usage. If there is a wide variation between past usage and the load data provided to the scheduling coordinator, the UDC could investigate this discrepancy."

Furthermore, the CPUC approved the following provision in the UDC-ESP Service Agreement:

> "The ESP represents and warrants that for each of its Customers, and at all times during which it provides Direct Access services as an Energy Service Provider, the ESP shall completely, accurately, and in a timely manner account for each of its Customer's loads with a duly authorized Scheduling Coordinator. Load data not accounted for in this manner may provide grounds for termination of this Agreement. For verification purposes only, the UDC shall have complete access to the identity of the Scheduling Coordinator and the load data provided to it by the ESP."

Approach

In response to the CPUC decision (D.97-12-090), the UDCs met to agree upon the data required from participants in order to perform a usage reporting reconciliation and to agree on a process that would be uniform and cause the least impact on operations. The UDCs agreed on the following data requirements from ESPs:

- The ESP, or at the ESP's convenience its SC, will submit to the UDC on a daily basis the hourly settlement data that its SC submits to the ISO. Price or forecast data is not needed.

The intent of this submission is for the UDC to receive the same data that the ISO receives. The data should have DLFs and, if applicable, load profiles applied. This is the data labeled as SQ* in Figure 1 (see Section 2.2.2.)
- The data should be in the same format in which the ISO accepts settlement data.

A usage reconciliation process has now been developed which uses two phases and compares two sources of data. The first phase reconciles usage data reported by the SC to the ISO with usage data submitted by the MDMA to the UDC. The second phase compares current usage data to historical data. The phases are described in more detail below.

Phase 1. The first phase of the model provides a reconciliation of three sources of data.

A. The first data source is from the ESPs. Following the CPUC directive, the UDCs will request each ESP, or at the ESP's convenience its SC, to provide daily settlement data for its Direct Access end-use customers in that UDC's service territory. Basically, this is the same data that that the SC provides to the ISO for that particular ESP (i.e., the SQ* Data of Figure 1, which has already had load profiles and distribution loss factors applied). The intent is to make this communication as convenient and as consistent as possible, to minimize the need to develop separate input data for reporting to the UDC.

B. The second data source consists of the current meter reads, either those gathered by the UDCs or those provided to UDCs by the ESPs, or their MDMAs, for billing purposes (i.e., the Validated Data of Figure 1). This data can be extracted from the UDC's existing system for each ESP's end-use customers. Then, load profiles, if applicable, and distribution loss factors can be applied. Application of the load profiles and distribution loss factors should make this data comparable to the data source A, the data provided by the ESP to its SC for submission to the ISO.

C. The third data source is the ISO. The ISO automatically reports total energy consumption by zone to the participants.

The first comparison to be made is between data sources A and B, after the source B data has been adjusted by applying load profiles and distribution loss factors. This initial comparison will be for reasonableness purposes. Although not necessarily an exact match, the results for individual ESPs should have enough precision to identify situations of both mis-reporting of energy consumption and shifts in reporting from peak to off-peak periods.

The second comparison is between data sources A and C, i.e., the totals of energy consumption by zone as provided by the ISO, and the accumulated totals obtained from the ESPs, as further verification that all applicable consumption data has been reported. This data serves as a check on the reconciliation process to assure that all data from the ESPs and SCs have been received.

In evaluating the Phase 1 reconciliation process, it is critical to realize that significant reporting inaccuracies can exist even though the reconciliation discloses an exact match. This can occur if the settlement data provided to the SC and ISO and the individual end-use customers' meter

readings provided to the UDC for billing purposes are equally misstated. It is for this reason that the second phase of the reconciliation model was developed.

Phase 2. In the second phase of the model, the UDCs will compare the current Direct Access billing data to historical usage. The proposed model will compare current billing data to historical data for individual customers, which may be grouped by ESPs, specified CPUC-designated customer classes, MSPs, or MDMAs.

Upon identification of specific examples of possible exceptions, either those involving suspected mis-reporting of energy consumption or those involving departures from historical consumption patterns, internal resources will be reviewed for possible explanations. If these efforts identify adequate explanations for the situations, no further analysis will be performed and the explanation will be documented for future reference.

Every effort should be made to resolve reconciliation differences through internal sources. For those that cannot be resolved, however, the UDCs plan to investigate the variances in compliance with the directive included in D.97-12-090, or by invoking the audit rights provided in the UDC-ESP Service Agreement. Any explanations identified that sufficiently resolve the differences will be noted for use in investigating subsequent reconciliation variances.

The UDC model offers several desirable features for monitoring and detecting the inaccurate reporting of energy consumption:
- The process addresses many of the possible control risks that are inherent to the market and could result in inaccurate reporting of energy consumption.
- The process can be operated at relatively low cost due to its use of already existing systems and available data for many of the processing steps.
- The process should minimize the disruption of the ESPs' normal business activities.
- The existence of such a process should tend to encourage accurate reporting of energy consumption.

Current Status

Each of the UDCs is presently at a different stage in developing its UDR system.

SCE's system is operational and it is already receiving daily data from all of the ESPs operating in its service territory.

SDG&E is currently developing Phase 1 and Phase 2 UDR systems, and they are scheduled for completion in third quarter 1999.

PG&E is designing a UDR system and has viewed a demonstration of SCE's system. PG&E's Phase 1 system will be completed in mid 1999.

DQIWG Recommendations

1. Standardize certain features of the UDR process across UDCs. A number of details should be standardized to ensure a common approach throughout the ISO system and to minimize false alarms. For example, the data submitted to the UDR by the ESP or SC should be developed from the same MDMA data file that was processed by the UDC. If one of these data sources contains revisions which the other does not, then a false discrepancy may appear requiring investigation. Also, there should be standardized procedures for how UDR results are communicated between the UDCs and other relevant parties.

2. Document the UDR procedure and reporting requirements through whatever documentation procedure the OCC develops for documenting new or revised operating procedures adopted for the market, and in the individual UDC operating manuals for ESPs.

3. Bundled-Service Usage Reporting

Alternative 3(a). CPUC staff should work with the new DQI Subteam to develop a method for the CPUC to verify that UDCs are accurately reporting bundled-service usage to the PX. The market needs assurance that UDCs reporting usage data for bundled service customers to the PX are complying with the same accuracy standards that direct access parties must comply with. In the September 29 DQIWG briefing, a Commissioner advisor told Group members that the CPUC's authority over the UDCs is adequate to ensure such compliance and suggested that the CPUC might implement an ongoing reconciliation check for this purpose, for example, a comparison of usage billed to bundled service customers by the UDC against usage reported to the PX. At this time, however, the Group is not aware of any such check being performed or in the planning stage at the CPUC.

Appendix G contains write-ups provided by the UDCs, describing how they presently verify internally that they are accurately reporting bundled-service usage to the PX. Following its review of these write-ups, the DQI Subteam should consider various approaches which the CPUC might utilize on an ongoing basis, such as reconciling monthly UDC revenue reports against reported usage, and monitoring UFE to see what share of it might be due to errors in bundled-service usage. Following its assessment the Subteam should develop a recommendation.

Alternative 3(b). CPUC authority over regulated utilities is sufficient to ensure compliance and accuracy of usage data. Should the CPUC decide to investigate this matter, it should be reviewed in only one forum, such as the Revenue Adjustment Proceeding. However, this topic was not explicitly investigated in the most recent RAP.

Alternative 3(c). The issue of the accuracy of bundled-service usage data reported to the PX should be addressed at the ISO level, preferably at the existing ISO workshops.

Alternative 3(d). The CPUC should require that the UDCs conduct (or engage an independent qualified entity to perform) audits of their bundled-service meter data processing systems. This audit should be performed to ensure proper handling and reporting of metered usage data. The

DQI Subteam should develop the criteria for this audit within 6 months of the CPUC's request for the audits.

4. Long-term performance of UDR. The UDCs are developing UDR procedures as an "interim measure" to comply with the direction given in D.97-12-090. The new DQI Subteam of OCC should assess and recommend whether UDR, either its current form or a modified form, should continue for the long term, and if so whether the UDCs or some other entities should perform it.

5. The ISO should direct SCs to review, with their associated ESPs, the UDR results for those ESP accounts they schedule, as part of the SCs' responsibility under the ISO Metering Protocol (Section 4.2.1) to provide accurate and timely Settlement Quality Meter Data to the ISO. In the case of ESPs using multiple SCs, it should be the ESP's responsibility to segregate the UDR results by SC. The SCs should report to the ISO, in a timely manner, any discrepancies they become aware of. [4]

3.2.2 MDMA Performance Monitoring

Purpose

The MDM function plays the most fundamental role in ensuring Data Quality and Integrity, and in providing Validated Data to ESPs for ultimate submittal to the ISO settlement process (Strategy 1, Section 2.3). The MDCS Decision (D.97-12-048), the RSIF Decision (D.97-12-090), and the PSWG Decision (D.98-12-080) all recognize this role and provide detailed MDMA performance standards and standardized procedures to ensure proper and consistent performance of essential MDM activities. A gap exists, however, in that there are no established controls to ensure that the adopted MDMA standards are being followed consistently. For example, if the MDMA timeliness standards are not met, it can impact the billing of customers and reduce the quality of data submitted to the ISO for settlement.

In recognition of this gap, the MDCS Decision directed the UDCs to ensure compliance with the standards. In the course of the DQIWG process, one of the UDCs shared its efforts to develop a monitoring mechanism which would satisfy the direction of the MDCS Decision and serve as a contract administration tool for the UDC to ensure compliance with data quality and timeliness requirements. That UDC effort was the basis of the MDMA Performance Monitoring Report (PMR) program discussed here, with the additional provision that it should apply to UDC-provided MDMA services as well as to non-UDC MDMAs.

In summary, the purposes of the MDMA PMR program are to:
1. Comply with CPUC's MDCS decision (D.97-12-048), Ordering Paragraph (1.b):
    All of the following California utility distribution companies (UDCs): Pacific
    Gas and Electric Company (PG&E); San Diego Gas & Electric Company

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[4] ISO Tariff Section 10.6.7.5 contains a requirement for the SC to report to the appropriate UDC any discrepancy the SC detects regarding SC metered entities in each UDC's service territory. At present it is not clear to the DQIWG how this tariff provision is being implemented and how it could affect Data Quality and Integrity in practice. The DQI Subteam should look into this as part of its continuing effort.

(SDG&E); Southern California Edison Company (Edison); PacifiCorp; Sierra Pacific Power Company; and Southern California Water Company, shall adhere to these interim standards and procedures, and shall ensure that the electric service providers (ESPs) and other third parties comply with the applicable interim metering standards and procedures.
2. Help build confidence in the electricity market.
3. Provide a communication tool among market participants to detect problems and trends and to work cooperatively to resolve such problems.

The DQIWG sees the MDMA Performance Monitoring Report (PMR) as a device which, in combination with the independent MDMA audit described in the next section, will verify MDMA compliance with the standards.

Description

An MDMA PMR will be generated to monitor each MDMA's data output for interval data and non-interval data. See Appendix H for a sample format of the MDMA PMR. The PMR is based on standards adopted in the CPUC's Direct Access Implementation (DAIP) decision (D.97-10-087),MDCS decision (D.97-12-048), and PSWG decision (D.98-12-080). These standards are documented in the "Direct Access Standards for Metering and Meter Data (DASMMD) in California" filed on March 1, 1999 by the UDCs:
1. Timely availability of data or data delivery (DASMMD Chapter C, Sections III and VI)
2. Data estimation standards (DASMMD Chapter C, Section I)
3. Server Operation (DASMMD Chapter C, Section V).

The PMR presents each MDMA's performance in relation to each ESP it serves. When aggregated, the information in the PMRs will show each MDMA's overall performance within each UDC's territory.

Current Status

SCE initiated its PMR program and started monitoring on September 1, 1998. SCE is considering initially labeling these PMRs "preliminary" to indicate that the MDMAs have not yet had the opportunity to review and respond to them.

SDG&E and PG&E currently have a similar program to monitor MDMA timeliness and estimation statistics.

A new subgroup within OCC, called "Meter and Data Exception Notices" (MADEN), has been formed to address MDMA data issues. The new DQI Subteam should coordinate its efforts on MDMA issues with the MADEN subgroup.

DQI Recommendations

1. The PMR should be used only as a diagnostic tool, to help parties identify and resolve problems. The UDCs should not use PMR information for any marketing purposes.

2. UDCs performing MDMA functions should be subject to PMRs just as other MDMAs are.

3. The DQIWG understands that MDMAs are concerned about the UDC releasing the PMR to the ESP before allowing the MDMA to review the PMR and, if appropriate, offer corrections or explanatory material. The Group recommends that the PMR be provided initially to the MDMA in draft form, so that MDMA can review its own PMR and that PMR can be revised appropriately to represent a "final" version to go to the ESP. Details of how PMRs should be reviewed and released should be worked out within the OCC.

4. The DQIWG understands there are concerns about using the PMRs as a basis for assessing MDMA compliance. As discussed in Section 3.3.3 of this Report, enforcement should be accomplished through contractual relationships between parties and existing regulatory authority. The DQIWG has identified some concerns about existing language on MDMA compliance, which the Group has found to be unclear and unobtainable (see D.97-10-087, Appendix A, Section H(8)). The DQI Subteam will review this language and recommend changes as appropriate.

5. In conjunction with other OCC Subteams, the DQI Subteam should review the performance standards for MDMAs to see whether they need modification to better serve the objective of performing all usage data estimation at the MDMA level (see Strategy 1, Section 2.3).

3.2.3 Independent Audits of Specific MDMA and MSP Activities

Purpose

There are several important activities of the MDM and MSP functions which are specified in the MDCS Decision (D.97-12-048) and the PSWG Decision (D.98-12-080) which cannot be ensured via ongoing monitoring mechanisms such as the usage data reconciliation or the performance monitoring reports. Because accurate settlements ultimately depend on reliable Validated Data provided by the MDMA, it is essential to ensure that these less visible activities of MSPs and MDMAs are performed properly. The Group therefore recommends, as a permanent feature of the market, that certified MSPs and approved MDMAs be required to have independent audits.

Description

The audits proposed here would have a well-specified scope (presented below in draft form, to be further developed into audit templates by the DQI Subteam) and should not supersede or limit any existing contractual or other audit rights.

To minimize the expense and the disruption to normal business that may be caused by these audits, the DQIWG recommends that "independent" be interpreted to allow the auditor to be an employee of the firm being audited, as long as the auditor has the required credentials and does not work in the MSP or MDMA operations areas being audited. The main concerns are that the auditor be qualified to audit the designated activities and that parties reviewing the audit reports

have confidence in their accuracy and completeness. The DQIWG recommends that auditors be certified, for example as CPAs, CQAs, or CIAs, or have demonstrable experience in operational auditing, and that individuals responsible for each audit be required to attach their statement of qualifications to their audit reports.

The DQIWG conceives of the independent audit as a requirement for ongoing MSP certification and MDMA approval to operate, and as such, an expense to be borne by the individual MSPs and MDMAs. The audit requirement and the expense of the audit should apply consistently to UDC-MSPs and UDC-MDMAs as well as their non-UDC counterparts.

The DQI Subteam may consider the following areas as a starting point for development of an MSP audit template:
- compliance with standards (as adopted in D.97-12-048, D.97-12-090, D.98-12-080);
- meter installation event reports;
- meter communication connection event reports;
- meter calibration event reports;
- ongoing certification of meter workers;
- ongoing certification of operational capabilities;
- procedures for corrective action and change management;
- documentation - procedures, processes, training and worker qualification, compliance with standards, problems encountered and remedied, all documents up-to-date.

The DQI Subteam will revisit this list and develop it into a more detailed audit template, in conjunction with other appropriate OCC subgroups.

The DQI Subteam may consider the following areas as a starting point for development of an MDMA audit template:
- implementation of and compliance with all adopted performance standards;
- ongoing meter reader qualifications and adequacy of training manuals;
- meter data reading (accurate date/time) event reports;
- matching of metering data to customer account event reports;
- accurate application of VEE standards (inspect sample of raw and validated data, review VEE processing algorithms, review training for VEE staff, etc.);
- review PMRs (auditors should have access to UDC PMRs) and records of corrective actions taken in response to PMRs;
- server activity -- set-up, maintenance, performance, security, disaster recovery;
- archiving of both raw and validated data;
- help desk operation;
- documentation -- procedures, processes, training and worker qualification, compliance with standards, problems encountered and remedied, all documents up-to-date.

The DQI Subteam will revisit this list and develop it into a more detailed audit template, in conjunction with other appropriate OCC subgroups.

DQIWG Recommendations

1. The CPUC should authorize independent MSP and MDMA audits as described above, with detailed audit templates to be developed by the DQI Subteam of OCC.

2. Timing of Initial Audit

Alternative 2(a). The CPUC should require all certified MSPs and approved MDMAs, including UDC MSPs and UDC MDMAs, to have an independent audit within one year of a CPUC decision on this subject, in accordance with the approach described in this Report.

Alternative 2(b). The CPUC should require all certified MSPs and approved MDMAs to have an independent audit within one year of a CPUC decision on this subject or the development of audit templates by the DQI Subteam, whichever is later.

3. Requirement for Subsequent Audits

Alternative 3(a). After the first audit, these entities should be required to have a new audit on a reasonable, regular basis, unless the CPUC determines a need to audit sooner based on any identified problems.

Alternative 3(b). After the first audit, any additional audits should be "event-driven" where persistent problems arise in data quality.

4. Who Should Review Audit Reports

Alternative 4(a). The audit reports should be filed with the CPUC Energy Division.

Alternative 4(b). A notice of successful audit completion, problems identified, and corrective actions taken should be sent to the Energy Division at the CPUC.

Alternative 4(c). The DQI Subteam should consider whether ESPs and UDCs should regularly receive and review audit reports for those MSPs and MDMAs they directly contract with or whose performance they indirectly rely upon for settlement data. The Subteam may make a recommendation in this area.

Alternative 4(d). Market participants should review each other's audit reports as allowed by existing contracts or tariffs.

5. The ISO should require each SC to review the audit reports of those MSPs and MDMAs who contribute to that SC's settlement data stream. The ISO Tariff already requires SCs to audit all SC-metered entities in conjunction with SC responsibility for accurate and timely Settlement Quality Meter Data. Review of these audit reports by SCs may eliminate the need for duplicative audits to comply with ISO requirements.

6. UDC-MSPs and UDC-MDMAs must be subject to the same requirements as other entities.

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7. The costs of these audits should be borne by the audited entities themselves, and, in the case of UDC MSPs and MDMAs, the costs should be allocated to those functional units within the UDCs.

3.2.4 Scheduling Coordinator Data Estimation Reports

Purpose

The California ISO has required all Scheduling Coordinators to maintain and submit a monthly log that describes instances where an SC estimates metered load data. This log is intended to provide sufficient records to demonstrate appropriate estimation and to substantiate any re-submittal of actual meter data. From the Data Quality and Integrity point of view, this log will provide documentation of data flow problems which to date have been reported only anecdotally, and will help identify persistent patterns or trends in compliance with ISO tariff requirements.

Description

In accordance with the California ISO Tariff and SC's Meter Service Agreement, the SC has the ultimate responsibility to ensure that the Settlement Quality Meter Data (SQMD) submitted by it to the ISO correctly represents its customers' metered usage, and that all validation, editing and estimation (VEE) steps, application of load profiles and distribution loss factors, and geographic aggregation have been performed properly.

SQMD is due to the California ISO by T+41 (trading day plus 41 days). (See Section 2.2.4 for the complete data submittal schedule.) SCs must submit actual or estimated data for all SC Metered Entities they schedule for (i.e., end-use customers connected at distribution level). Therefore, SCs have a responsibility to estimate missing data if they have not received actual meter data for their SC Metered Entities by T+41. They also have the responsibility to re-submit their meter data, within the appropriate time period, when they have received the actual meter data. The Monthly Estimation Report for each SC will include the following information: trading date and hour of estimation, estimated usage amount, associated ESP, location ID affected, reason for and method of usage estimation, and if estimates are subsequently revised, the revised usage values and date of re-submittal.

DQIWG Recommendations

The DQIWG recognizes that accurate meter data is required for settling all charges in the market. It also recognizes that the SC has the responsibility to report accurate meter data to the California ISO. The SC Monthly Estimation report should provide a good tool to monitor SCs' activities in estimation and re-submittal of meter data, and in particular to monitor patterns and trends. This will be helpful in diagnosing problems elsewhere in the flow of settlement data which contribute to the need for SCs to estimate data. The DQIWG has no further recommendations in this area.

3.2.5 Event Reports and Incident Logs

Purpose

In the Meter and Data Communication Standards Decision 97-12-048, the CPUC approved interim standards for meters and the communication of metered usage data. The decision did not, however, recommend how deviations from these standards should be documented. Event reports and incident logs would document those instances where market participants either themselves deviate from the standards or discover deviations attributable to other parties. At present reports of such instances are only anecdotal, making it impossible to assess the frequency and severity of problems, to observe trends, or to analyze causal factors. The proposed event reports would be a valuable analytic tool to determine the nature of the problems and assist with the development of operational fixes, thresholds for action or revisions to the standards as appropriate. Many of the OCC task teams have discussed this idea and would like to see something implemented.

Description

In order to document the occurrence of various events affecting Data Quality and Integrity, the DQIWG recommends the creation of event reports or monthly event logs by parties performing functions where information is collected, processed or exchanged. Market participants could then analyze these reports for trends and patterns, assess whether existing standards are reasonable (both adequate and achievable), and propose standards where no standards currently exist. Market participants would review each other's event reports to the extent permitted by contracts and tariff provisions.

The reports should be developed with input from the market participants who perform the functions, through the vehicle of the Rule 22 OCC.

Event Reports by Function

Event reports are recommended to cover the activities of the different functions regardless of who performs these functions or who observes the event. For example, an employee of one function (e.g., an MDMA) might detect and report on an event related to the activities of another function (e.g., an MSP). To be clear, however, the DQIWG does not mean to suggest that, once reporting requirements are defined, parties then have an obligation to deliberately look for problems in other parties' performance. Rather, we expect that the events identified here will be encountered in the normal course of doing business.

The following list represents a first cut at possible event report items. Many of these items have been suggested by anecdotal reports of their occurrence in the present environment. The list will be revisited by the DQI Subteam and the full OCC to ensure that it captures the most essential activities and possible problems. The DQI Subteam would then develop templates for the event reports.

<u>MSP Activities</u>

- Unauthorized Meter Installations - data could be lost, or no meter installation was scheduled;
- Assignment of duplicate meter numbers;
- Meters not calibrated properly;
- Meters not returned in a timely manner when switches occur;
- Energy diversion or tampering of meters (the "tip" card for this is already being developed by the Revenue Assurance Team);
- Unsafe conditions;
- Meter communication not set properly at installation;
- Late processing of meter installations;
- Meter installation does not meet standards or has not obtained required permits;
- Meter maintenance not performed.

<u>MDMA Activities</u>

- Posting of bad meter reads (read inaccurately or remote systems not set up properly);
- Late processing (reported in the MDMA Performance Monitoring Report);
- Meter reading schedule not managed.

<u>UDC / DASR Activities</u>

- Late processing of DASR requests;
- Mismatched data (giving out the wrong account and customer information);
- Billing cycle not reported correctly;
- Not sending the 12 months usage history in a timely manner.

<u>ESP Activities</u>

- ESP's contract with SC is terminated, by either party; this event should trigger an event report by the SC to the ISO and the relevant UDCs.

The reports should be generated for a period of at least six months, to give market participants time to set up the reports and for trends to start becoming observable. If there are no trends or the information being reported is not found to be useful, then the certain items or reports should be discontinued. As other events, measures or standards are brought forward in the future to be added to the reports, they should go through the OCC to get the feedback and support of market participants.

DQIWG Recommendations

1. The CPUC should adopt this concept and let the market participants decide the details on the content, codes, format, and frequency of the reports.
2. The event reports discussed here are intended for use as diagnostic tools, to help parties identify and resolve problems.

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3. The DQI Subteam should work with the other OCC subteams on implementation, to develop reporting procedures that impose minimal burdens on parties, utilizing as far as possible their normal operations to generate the needed reports.

3.3 Responsive Action and Enforcement

Once Data Quality and Integrity problems are detected and their causes and impacts analyzed, the appropriate actions to take in response would include corrective and preventative measures to ensure that the problem does not continue, and post-settlement adjustments to ensure that usage data archives are accurate and to financially compensate parties affected by the problem. While these actions are crucial to ensuring Data Quality and Integrity, the DQIWG has devoted very little effort to specifying them as we have had to focus on what we took to be the essential first step, devising the detection measures. Therefore this section presents only some of the basic concepts involved, with the expectation that the DQI Subteam of OCC will continue to work on this area.

3.3.1 Corrective and Preventative Measures

Section 3.1 describes several aspects of the new market which are preventative in their purpose and design. Not all problems can be anticipated and prevented in advance, however. The DQIWG recognizes that specific problems will require corrective actions and new or modified preventative measures to eliminate the reasons why the problems occurred in the first place. We expect that in most cases the measures it identifies for a particular Data Quality and Integrity problem will be handed off to the OCC, where a subteam would refine the details and develop an implementation plan. In addition, the OCC should fully document the measure and disseminate it to the market in accordance with the change management process to be established.

In some instances the corrective measure may be necessary for the specific contracting parties only, in which case it would be handled by these parties. This might occur, for example, if a specific MDMA does not post usage data on time for a subset of customers, which then affects the UDC's ability to bill for distribution charges and the ESP's ability to bill for energy. In this case the UDC, ESP and MDMA should work together to get to the root of the problem and correct it. For more widespread problems, there may be a need to revise tariff language or revisit an element of a decision, in which case the Rule 22 Group would be the forum to discuss this.

DQIWG Recommendations

Detection and analysis of a Data Quality and Integrity problem should, in most cases, result in an appropriate corrective measure to prevent the problem from continuing. Often this will mean creation of a new standard practice or a modification to an existing practice. Once a problem is identified, the DQI Subteam should participate in developing corrective measures. Once these measures are adopted, the change management process to be developed by the OCC should be

invoked to ensure timely and consistent adoption of the change by all market participants. The DQIWG has no further recommendation for the CPUC in this area.

3.3.2 Post-Settlement Adjustments

If inaccuracies in usage data are discovered, or if estimated data can be revised by actual metered data after the close of the ISO's settlement process (i.e., after T+57 for trading day T, after which the ISO no longer accepts revised data from SCs for the Final Settlement Statement), then there may be a need to correct the recorded usage data in the hands of several parties. Perhaps most importantly, the raw and validated data archived by the relevant MDMA need to be corrected. Moreover, if usage had been under-reported and additional load could now be allocated to a specific party, then there is the possibility of recovering funds from the responsible party and redistributing these to other market participants. At present there are no procedures established to: (1) correct the MDMA data archives to ensure accurate usage data exists; and (2) determine the appropriate financial adjustments.

The DQIWG, in conjunction with the UDCs' Revenue Assurance effort, designated a subteam to develop proposals for redistributing to the market any funds collected after the ISO settlement period. This subteam included representatives of the three UDCs and the ISO, but focused only on under-reporting due to physical theft, meter calibration and meter communication errors, i.e., situations addressed by the Revenue Assurance effort. The subteam did not address the instance of estimated usage being used for settlement and then being revised when actual metered data is obtained later, after the settlement process is closed. The DQIWG believes that a much broader effort is needed, to deal with all types of occurrences in which more accurate data becomes available after the close of the ISO settlement for a given trading day.

At its February 11 Client Meeting, the ISO discussed the subject of post-settlement adjustment and announced some specific adjustments it would be making in the near future. For example, the ISO plans to retroactively adjust market charges for UFE back to April 1, 1998. at present it is still developing the methodology it will use to calculate these adjustments. The DQI Subteam should follow the progress of this effort.

The DQIWG offers a number of considerations for pursuing this topic:

1. Good data at the MDM level is needed to be able to evaluate the dollar impacts involved. This underscores the DQIWG's emphasis on the role of the MDM function (see Strategy 1, Section 2.3), as well as the need to ensure that each MDMA is properly doing its data archive service (see discussion of MDMA audits, Section 3.2.3). Moreover, it requires a change control element so that corrections to data are entered in the MDM data archives, to ensure that these records are always as accurate as possible.

2. The ISO's Final Settlement Statement (FSS) is really final. For confidence in the market, parties must be sure that final is final and that the ISO settlement will not, except in the rarest of circumstances, subsequently be reopened for any trading day. This means that if a substantial amount of UFE is suddenly accounted for and funds are recovered, we cannot expect the ISO to

re-run the FSS and issue compensation payments. In particular, the UFE adjustments mentioned above in connection with the February 11 ISO Client Meeting may be one-time corrections and not a model for post-settlement adjustments on an ongoing basis. Some method that is less disruptive and less human-resource-intensive may need to be developed.

3. Any proposal which affects the ISO settlement, such as an ex post financial adjustment, would require FERC approval. For example, the DQIWG has discussed the idea of creating a UFE balancing account which receives funds collected for newly accounted-for UFE and redistributes the funds to market participants via a credit against future UFE. Because of its impact on financial settlements at the ISO level, it would need to go through FERC review and be approved.

4. The UDCs currently have procedures for dealing with billing corrections, including re-posting of usage data and making dollar adjustments to customer accounts when necessary. The DQIWG believes that these procedures differ for each UDC. The "Billing Business Rules" (BBR) subteam of Rule 22 / OCC is presently examining these procedures with the intent of documenting them for the market and possibly standardizing some aspects of them across UDCs. Correction and re-posting of usage data is a good candidate for standardization across UDCs, whereas policies on rebilling of customers for distribution charges may need to retain some differences. At present the DQIWG is not aware of how the UDCs settle with the PX for this type of correction.

DQIWG Recommendation

The DQI Subteam of OCC should continue to work in this area, in accordance with the discussion above. It should coordinate its scope with the Billing Business Rules Subteam of OCC to be sure all aspects of the issue are covered without duplication of effort, and it should maintain a linkage to ISO activities in this area.

3.3.3 Enforcement

Performance standards play an important role in ensuring Data Quality and Integrity. For standards to work effectively requires that: (1) the standards be clearly defined and achievable; (2) failure to conform to the standards be reliably detectable; and (3) any enforcement action taken in response to a failure to conform be designed to reduce occurrence of the failure. Consistent with DQIWG principles and strategies stated in Section 2.3, the Group's preference with regard to enforcement measures is to rely on commercial relationships between parties and existing regulatory authority, and to supplement these only where there are identifiable gaps or incentive incompatibilities. Thus the continuing role of the DQI Subteam in this area is to examine how commercial relationships and regulatory authority would work in relation to the specific Data Quality and Integrity risks we identify, assess whether there are gaps and, if gaps are identified, recommend solutions.

As noted in relation to Figure 1 above (Section 2.2.2), the inner box on the figure is the area of ESP responsibility for provision of accurate metered usage data under the CPUC decisions, as

incorporated in the Direct Access Tariff and UDC-ESP Service Agreement. The outer box on the same diagram is the area of SC responsibility, as incorporated in the ISO Tariff and SC Metering Protocols. The relevant passages of these documents are quoted in Appendix A of this Report.

The responsibilities assigned and enforced by the CPUC and the FERC-regulated ISO constitute an essential complement to the bilateral commercial arrangements between parties. Thus, while the DQIWG approach emphasizes commercial arrangements as the means to ensure Data Quality and Integrity, we also recognize that the authority of the CPUC and the ISO over the UDCs and the SCs, respectively, is a crucial driver for parties to enforce compliance among all market participants. For example, if the ISO is willing to accept a high percentage of estimated data from SCs, then it may be more attractive for SCs to estimate data when an ESP fails to provide it rather than insist upon better performance from the ESP. Alternatively, if the ISO limits to a very low level the amount of estimated data it will accept from SCs and consistently enforces such a limit, then the SC must pass this requirement on down to its ESPs, and indirectly onto the MDMAs, or else be found to be non-compliant itself. Similarly, CPUC authority over the UDCs can be used to affect directly the behavior of ESPs who contract with the UDCs, and indirectly the various firms who provide Direct Access related services to ESPs.

DQI Recommendation

The new DQI Subteam should assess the effectiveness of the commercial relationships between parties (including UDC-ESP, ESP-MSP, ESP-MDMA, and ESP-SC) and existing regulatory provisions (CPUC authority over UDCs and FERC authority over the ISO and SCs) to ensure Data Quality and Integrity. Where gaps or other deficiencies exist the DQI Subteam should offer recommendations.

3.3.4 Defining Compliance and Non-Compliance

Although the DQIWG has devoted very little attention to this area to date, we have identified at least one area where the existing regulatory provisions need clarification. Specifically, the Group sees a need to establish clear and fair definitions for non-conformance to standards, and to specify procedures for parties to follow which encourage parties to correct problems and thereby avoid enforcement actions whenever possible. To give an example, the Direct Access Implementation decision provides the following definition of non-conformance in connection with required provision of customer usage data by ESPs (see D.97-10-087, Appendix A, Section H(8)(c)(3)):

> "Demonstrated pattern of non-conformance by an ESP is defined as more than one percent (1%) of the service accounts served by an ESP, or (5) accounts, whichever is greater, are found to be non-conforming and are not cured during the first six months of Direct Access participation; more than one half of one percent (0.5%), or three (3) accounts, whichever is greater, are found to be non-conforming and are not cured during any six consecutive months thereafter."

The DQIWG believes that this definition needs to be further refined and clarified in a number of ways. This may mean that changes in the tariff are required. Specifically, a refinement of the language on non-compliance regarding provision of usage data should, among other things:

- define what a non-conforming service account is; and
- define what "cured" means, both if the non-conforming party effects the cure, and if the UDC effects the cure at the other party's expense.

DQIWG Recommendation

In connection with the recommendation on Enforcement (Sec. 3.3.3 above), the DQI Subteam should examine existing regulatory provisions which affect Data Quality and Integrity to see that they provide sufficient clarity and create incentives to quickly correct problems in a way that improves the accuracy of commercial settlements. Where deficiencies are identified, the Subteam should recommend improvements.

APPENDIX A

Data Responsibilities Assigned by ISO and CPUC

ESP-UDC. There are established audit rights in the standard ESP-UDC Service Agreements that allow audits based on either party's reasonable belief that errors have occurred concerning specific metering/billing situations. In those instances, the other party has the right to provide documentation supporting the accuracy of those meter readings/billings. Only if that documentation does not adequately satisfy the existing questions can an audit be scheduled.

Although not specifically stated, it would appear that the audit described above would be limited to the specific meters/billings in question. In some instances, however, such an audit may detect more general issues that involve other meters/billings for the same ESP and UDC, or for other ESPs or UDCs who have business relationships with one of the initial two parties. In the future the DQI Subteam may recommend additional "event-report" requirements to address such situations.

The UDCs also have the right under "Unauthorized Use of Energy (Energy Theft)" provisions to investigate instances in which it appears that an ESP has not reported energy consumption for settlement purposes through an authorized SC.

ISO-Scheduling Coordinator. The ISO has the right and responsibility to perform audits to verify that SCs are accurately reporting energy transactions for settlement purposes. Below are some excerpts from the ISO Tariff and the Metering Protocols that relate to SCs' responsibility in the area of providing metered usage data to the ISO. (The ISO Tariffs and Metering Protocols are on the ISO website at the following address: www.caiso.com. From the menu page at this site, select Market Participants, then Documents, then Tariffs or Protocols.)

From the Meter Service Agreement for Scheduling Coordinators:

- The SC shall ensure that the SC Metered Entities it represents shall adhere to the requirements and standards for Metering Facilities of its Local Regulatory Authority (LRA). If the LRA has not set any requirements the SC representing that SC Metered Entity must comply with the requirements and standards for those Metering Facilities as set forth in the ISO Tariff.
- Upon ISO request, the SC shall provide the required information with respect to the meters for all SC ME it represents, including the reference to specific distribution loss factors or methodology it proposes to use as determined by the relevant UDC
- Ensure that the ISO have access to the entire Metering Facilities of the SC ME that it represents from the meter data server to the Metering Facilities in order to inspect, test or otherwise audit those Metering Facilities.
- Provide the ISO with any applicable load profile for each SC ME that it represents that is load profiled in accordance with the ISO Tariff.
- Apply to the Meter Data of the SC ME that it represents, the security and validation procedures prescribed by the relevant LRA. If the relevant LRA has not prescribed any

such procedures, the SC shall apply the procedures set forth in the Metering Protocol of the ISO Tariff.

- ISO shall be a third party beneficiary to the agreements between the SC and SC Metered Entities that the SC represents. Such agreements shall grant the ISO access to any relevant information, records and facilities of the SC ME.
- If the SC provides inaccurate or incorrect Settlement Quality Meter Data or Fraudulent Meter Data to the ISO, the ISO shall be entitled to impose penalties and sanctions, including but not limited to suspension of trading rights following 14 days written notice to the SC. Fraudulent Meter Data means any data provided to the ISO by the SC that the SC knows to be false, incorrect or incomplete at the time it provided it to the ISO.

From the ISO Metering Protocol:

SCs will be responsible:
- (MP 1.3.2 (a).) for ensuring that those SC Metered Entities that they represent and which are subject to the procedures and standards set forth in the ISO Tariff and this Protocol, comply with those procedures and standards; and
- (MP 1.3.2. (b)) for providing the ISO with Settlement Quality Meter Data in accordance with the ISO Tariff and this Protocol for those SC Metered Entities that they represent.
- (MP 2.3.3) SCs shall submit Settlement Quality Meter Data to the ISO when required to do so by the SABP and the ISO Payments Calendar. SCs must also submit SQMD on demand (within 4 hours of demand).
- (MP 2.3.4) SCs shall submit SQMD to MDAS for the SC ME they represent using the Meter Data Exchange Format.
- (MP 3.3.2) If the relevant LRA has not prescribed any certification criteria for the Metering Facilities of a SC ME, the SC representing the SC ME must promptly notify the ISO in writing that no such criteria have been prescribed.
- (MP 4.2.1) 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 necessary to ensure the accuracy and integrity of the Settlement Quality Meter Data provided by them to the ISO.
- (MP 4.2.1) Subject to any applicable Local Regulatory Authority requirements, the Metering Facilities and data handling and processing procedures of SCs and SC Metered Entities are subject to audit and testing by the ISO or an ISO Authorized Inspector in accordance with Section 10.6.7.7 of the ISO Tariff and this Protocol. Subject to any applicable Local Regulatory Authority requirements, the ISO will have the right to either conduct any audit or test it considers necessary or to witness such audit or test carried out by the SC, SC Metered Entity or an ISO Authorized Inspector engaged by the SC, SC Metered Entity or the ISO to carry out those audits or tests.
- (MP 7.2) SCs will be required to ensure that the SC ME that they represent comply with the standards for Metering Facilities of the relevant LRA.
- (MP 9.2) SCs must use Compatible Meter Data Servers to submit SQMD to the ISO for those SC Metered Entities that they represent. SCs shall provide the ISO with the current

password and any other information it needs to access, at all times, the Compatible Meter Data Servers of those SCs so as to ensure the security of those servers.

- (MP 10.2) SCs are responsible for providing the ISO with Settlement Quality Meter Data for the SC Metered Entities they represent and for ensuring that any validation, editing and estimation requirements of any relevant Local Regulatory Authority or the ISO (where the SC Metered Entity is subject to the ISO requirements for validation, editing and estimation) have been properly implemented. The ISO will not perform any validation, editing or estimating on the Settlement Quality Meter Data it receives from SCs.

From the ISO Tariff:

Section 10.6, "Metering for Scheduling Coordinator Metered Entities," describes requirements for SCs to report metered usage data to the ISO for end-use customers they schedule for. Section 10.6.2.1 describes the duty of the SC to report "Settlement Quality Meter Data," which must be either measured for each settlement period or estimated using the applicable Approved Load Profile. Section 10.6.2.2 describes the duty to apply distribution loss factors and aggregate the data in accordance with the metering protocols. Section 10.6.7.5 describes the duty to verify the identity of each SC Metered Entity and to notify the UDC of any discrepancies the SC becomes aware of.

- (10.6.6.1) Each Scheduling Coordinator shall be responsible for the collection of Meter Data from the Scheduling Coordinator Metered Entities it represents and for ensuring that the Settlement Quality Meter Data supplied to the ISO meets the requirements of this Section 10.6 and the ISO metering protocols.

Scheduling Coordinator-ESP. As noted above, the ISO Tariff and Protocols assign substantial responsibility to SCs for ensuring DQI down to the end-use customer meter level. At the time the Tariff was written, however, it was not envisioned exactly what would be required for SCs to comply with this responsibility. Moreover, as Figure 1 indicates (Section 2.2.2 above) the ISO and the CPUC impose overlapping responsibilities on SCs and ESPs, respectively, which need to be reconciled in a way that best serves the Data Quality and Integrity needs of the market. The ongoing efforts of the DQI Subteam and the ISO's Settlement Improvement Team should clarify these issues.

ESP-MDMA/MSP. Although these are private-party relationships, the prevailing assumption is that the relationships are governed by written contracts, and these contracts include provisions for periodic audits to verify that the parties are fulfilling the terms of the agreements. It is not clear, however, to what extent this assumption is correct. Furthermore, it is not clear how well reliance upon contract provisions actually works to prevent and resolve Data Quality and Integrity problems which can have a market-wide impact. As this Report recommends, the CPUC should require regular, scheduled audits of MSPs and MDMAs as part of their continued certification. The following excerpts suggest that the retail energy provider (ESP or UDC/ESP) has responsibility under CPUC decisions for ensuring Data Quality and Integrity, even when some of the relevant activities are sub-contracted to other entities.

From CPUC Decision D. 97-12-048 (MDCS), p. 4:

"Under the direct access tariffs adopted in D.97-10-087, the ESPs and the UDCs are the two entities that are responsible for collecting, transferring and processing metering data for subsequent use. These two entities will assume this responsibility for their respective customers. Should the ESPs or the UDCs decide to do so, they may subcontract these revenue cycle services to other vendors. The ESP may also subcontract with the UDC to perform any of the metering services. (D.97-10-087, App. A, Section H.(1)(a).)"

From CPUC Decision D.97-10-087 (Direct Access Tariff and UDC-ESP Service Agreement), Appendix A (UDC-ESP Service Agreement), Section H.(1)(a):

"These package services [Meter Ownership, Meter Services (Installation, maintenance and testing), Meter Data Management Agent (MDMA) Services] may be provided by the UDC or an ESP, and the parties may subcontract these services to third parties. An ESP may also subcontract with the UDC for provision of any component service of any package, and the UDC may provide such service."

APPENDIX B. MARKET RISK MATRIX

Market Risk Category	Item	Consequence to Market	Existing Controls	DQIWG Recommendations
1. Meter Installation	1. Meter installation does not meet meter standards; required permits or inspections not obtained	• Safety hazard for personnel & public • Potential for UFE • Inaccurate records	• Addressed in commercial contracts • PSWG report has recommended entity to certify MSPs • If not a safety issue, leave between parties	• Require event reports on safety and installation problems • Include in Independent Audit of MSP
	2. ESP installs new meter and UDC meter data is lost	• UDC's closing bill must be estimated • ESP-UDC or ESP-customer disputes, loss of confidence	• ESP required to notify UDC of last meter read. • PSWG standards should be followed for all estimation.	• Require event reports on lost data due to meter install • Include in Independent Audit of MSP
	3. Installed meter does not communicate with reading device; communication not verified	• Potential for late reporting of usage data • Potential for estimated data		• Require event reports on meter communication problems • Include in Independent Audit of MSP
	4. Meters not properly calibrated	• Potential for UFE • Customer disputes, loss of confidence	• PSWG Report provides meter calibration standards	• Require event reports on meter mis-calibration • Include in Independent Audit of MSP
2. Meter Maintenance	1. Meters are unsafe, pose electrical and physical hazards	• Safety hazard for personnel & public	• PSWG Report provides meter safety standards	• Require event reports on safety problems • Include in Independent Audit of MSP
	2. Meter has been tampered with -- potential energy diversion	• Safety hazard for personnel & public • Potential for energy theft and UFE	• Covered in service agreement	Standard theft tip card and investigation procedures are being developed by UDC Revenue Assurance Group.
	3. Meters are inaccurate, have excessive or unusual errors	• Potential ESP-UDC or ESP-customer dispute • Potential for UFE • Loss of confidence	• Validation checks, subsequent maintenance checks • PSWG Report recommends routine maintenance testing	• Require event reports on discovered meter errors • Include in Independent Audit of MSP
3. Meter Reading	1. Meter reader is not qualified or licensed; standards not followed	• Potential for estimated data • Potential MDMA-ESP or MDMA-UDC dispute	Covered in MDMA standards as proposed in PSWG Report	Include in Independent Audit of MDMAs
	2. Meters are read inaccurately	• Potential for UFE • Potential for estimated data • Data Quality & Management Standards not followed	Covered in MDMA standards as proposed in PSWG Report	Include in Independent Audit of MDMAs
	3. Meters are read late; meter-reading timeliness standards not followed or meter reading schedule not managed	• Delay in billing process • Potential for estimated data • Customer disputes, loss of confidence • Potential UDC-ESP dispute • Potential for UFE • Billing disputes	Covered in MDMA standards as proposed in PSWG Report	MDMA Performance Monitoring Report (PMR) includes Timely Posting of Data on MDMA server

	4. Raw meter data not retrieved	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	Covered in MDMA standards as proposed in PSWG Report	• MDMA Performance Monitoring Report (PMR) includes Timely Posting of Data on MDMA server and Proportion of Estimated Data • Include in Independent Audit of MDMAs
	5. Meter reads not communicated to MDMA with correct date and time stamp	• Potential for UFE • Potential for estimated data • Potential UDC-ESP dispute	Covered in MDMA standards as proposed in PSWG Report	MDMA Performance Monitoring Report (PMR) includes Timely Posting of Data on MDMA server and Proportion of Estimated Data
4. Processing of Validated Meter Data	1. Inaccurate validation, editing or estimation (VEE) of energy usage	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	VEE standards proposed in PSWG Report	Include in Independent Audit of MDMAs
	2. Validated Data not accurately reported on MDMA server	• Potential for UFE • Potential UDC-ESP dispute • Validation, Estimation, Editing, Quality and Timeliness, etc. Standards not followed • Customer disputes, loss of confidence		Include in Independent Audit of MDMAs
	3. Improper Archiving of Raw Data	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	Covered in MDMA standards as proposed in PSWG Report	Include in Independent Audit of MDMAs
	4. Improper Archiving of Validated (VEE) data	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	Covered in MDMA standards as proposed in PSWG Report	Include in Independent Audit of MDMAs
5. MDMA Server Operation	1. MDMA Server is not set up or maintained to standards	• Potential for UFE	Server set-up and disaster recovery are covered in the MDMA approval process with testing.	Include in Independent Audit of MDMAs
	2. Improper management of data on MDMA server	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	Covered in MDMA standards as proposed in PSWG Report	• Include in Independent Audit of MDMAs • Possible migration to PKI standards requires further investigation & definition

	3. Improper management of access to MDMA server (e.g., unauthorized access or denial of authorized transaction)	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	• Covered in MDMA standards as proposed in PSWG Report • Interim standards in place from Joint UDC criteria	• Include in Independent Audit of MDMAs • Event records report Passwords used and length of time report. • Possible migration to PKI standards requires further investigation & definition
6. Billing	1. Bills are delayed, issued late (Cash flow)	• Potential UDC-ESP disputes		Individual market participants should monitor this (proposed PMRs cover only MDMA function)
7. Processing of Settlement Quality Meter Data to ISO	1. ESP incorrectly applies distribution loss factor	• Potential SC-ISO dispute • Potential for UFE		• Detect via Usage Data Reconciliation • Include in SC audit of ESP data procedures, being considered by ISO
	2. ESP incorrectly applies load profile	• Potential SC-ISO dispute • Potential for UFE		• Detect via Usage Data Reconciliation • Include in SC audit of ESP data procedures, being considered by ISO
	3. ESP incorrectly performs geographic aggregation of load	• Potential SC-ISO dispute • Potential for UFE		• Detect via Usage Data Reconciliation • Include in SC audit of ESP data procedures, being considered by ISO
8. ISO/PX Settlement	1. SC inaccurately reports energy usage (under-reports meter reads, inaccurately applies load profiles, distribution loss factors, etc.)	• SCs are required to gather, edit, validate, and retain Settlement-Quality Meter Data for settlement and auditing purposes. Any difference between actual and reported data will become UFE and allocated accordingly		• Detect via Usage Data Reconciliation • ISO already performing audits of SC data procedures
	2. ESP does not have active contract with a SC	• ESP does not schedule loads with SC • ESPs meter data not reported to the ISO for settlement • UFE increased by unreported meter data		ISO to provide tariff language requiring SCs to inform ISO and UDCs when an ESP-SC service agreement is terminated.
	3. ESP fails to report all the load of its customers to its SCs	• Data is not reconciled between the SC reported total DA customers and the data submitted by ESPs to UDCs. • All SCs pay UFE charges to cover energy not reported by ESPs.	• Data passed between SC and ISO can be audited by ISO. If differences in data reporting are presented to the ISO, the ISO has the ability to audit the SC and determine the cause of the inaccuracies.	• Detect via Usage Data Reconciliation

APPENDIX C. MARKET RISK MATRIX – Original Version (10/15/97)

1) Market Risks	2) Consequences to Market	3) Risk Level	4) Risk Cat.	5) Existing Controls	6) Recommended Oversight/ Monitoring	7) Responsible Agency/Oversight Body	8) Transition Oversight Plan
DIRECT ACCESS ENROLLMENT							
1. ESP is not registered with the Commission	• ESP not qualified to perform duties	High	CM	CPUC requires registration, DASR	UDC/ESP Agreement, periodic audits	CPUC or other regulatory authority	**UDC** will confirm prior to agreement
2. ESP has not contracted with SC to report all its customer meter data to the ISO	• ESP does not schedule loads • ESPs meter data is not reported to the ISO for settlement • UFE increased by unreported meter data	High High High	ET ET ET	CPUC/FERC authority unclear, required controls do not exist	Warranty in UDC/ESP Agreement, management controls and/or audits	CPUC/FERC authority unclear, required controls do not exist	None exists
3. ESP has not obtained renewables certification	• Customer does not receive "green" energy • ESP unfairly receives preferential treatment	Low Low	CP ET	CPUC requires certification, DASR, other ESPs	Warranty in UDC/ESP Agreement, periodic audits	CPUC or other regulatory authority	None exists
4. Customer has not agreed to Direct Access	• Loss of consumer confidence • Verification process not working	Low Low	CP CM	Customer dispute	Warranty in DASR	CPUC or other regulatory authority	None exists
5. ESP does not obtain Customer agreement to pay UDC's CTC charges	• Customer does not pay CTC	Med	ET	CPUC requires Customer agreement, UDC confirm	Warranty in UDC/ESP Agreement, warranty in DASR	CPUC or other regulatory authority	**UDC** will perform compliance audits
6. UDC is not notified when Customer switches or ESP terminates DA contract.	• Potential for UFE • Customer disputes, loss of confidence	Med Med	CM CP	Customer billing process acquiring ESP, non-response from ESP	DASR, Service Agreement	CPUC or other regulatory authority	None exists

RISK CATEGORY KEY: **CM** = Compliance Risk; **CP** = Consumer Protection; **ET** = Energy Transaction

1) Market Risks	2) Consequences to Market	3) Risk Level	4) Risk Cat.	5) Existing Controls	6) Recommended Oversight/ Monitoring	7) Responsible Agency/Oversight Body	8) Transition Oversight Plan
7. Customer account status information is not accurate	• Customer disputes, loss of confidence	Med	CP	Customer billing process, customer dispute	DASR, RSIF supplement on UDC-ESP Communications	CPUC or other regulatory authority	None exists
METER INSTALLATION							
1. Meter Agent/ESP/Third Party Meter Installer is not certified	• Entity not qualified to perform duties	Low	CM	No existing certification process.	To be determined in MAC[5]		None exists. UDC will be the only MA until standards approved.
2. Meter Agent/ESP/Third Party Meter Installer is not qualified and process to certify individuals is not in place	• Safety to personnel & public • Potential for Customer Disputes • Potential for UFE	High Med Med	CP CP ET	ESPs responsible to meet standards, joint UDC meets	To be determined in MAC	CPUC or other state agency or local regulatory agency	MAC discussions under way
3. Meter installation does not meet meter standards, required permits/ inspections not obtained	• Safety to personnel & public • Potential for UFE • Inaccurate records	High High Med	CP ET CM	Addressed in commercial contracts	To be determined in MAC	CPUC or other state agency or local regulatory agency	MAC discussions under way
4. ESP installs new meter and UDC meter data lost	• UDC-ESP dispute customer disputes, loss of confidence	Med	ET	ESP required to notify UDC of last meter read	To be determined in MAC	CPUC or other state agency	**UDC** joint meetings
5. Installed meter does not communicate with reading device, not verified	• Potential for UFE • Potential for estimated data	Med Low	ET ET	Required State meter standards do not exist	To be determined in MAC	CPUC or other state agency/ MDMA	MAC discussions under way
6. Meters not properly calibrated	• Potential for UFE • Customer disputes, loss of confidence	High High	ET CP	CPUC standards for 3rd party calibration do not exist	To be determined in MAC	CPUC or other state agency or local regulatory agency	MAC discussions under way

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[5] MAC = Metering Acceptance & Certification group

RISK CATEGORY KEY: **CM** = Compliance Risk; **CP** = Consumer Protection; **ET** = Energy Transaction

1) Market Risks	2) Consequences to Market	3) Risk Level	4) Risk Cat.	5) Existing Controls	6) Recommended Oversight/ Monitoring	7) Responsible Agency/Oversight Body	8) Transition Oversight Plan
METER MAINTENANCE							
1. Meters are unsafe, pose electrical and physical hazards	• Safety to personnel & public	High	CP CM	Required State meter standards do not exist	To be determined in MAC	CPUC or other state agency	MAC discussions under way
2. Meter has been tampered with, potential energy diversion	• Safety to personnel & public • Potential for UFE	High	CP/ET ET	Covered in service agreement	To be determined in MAC	CPUC or other state agency	MAC discussions under way
3. Meters are inaccurate, have excessive or unusual errors	• Potential UDC-ESP dispute • Potential for UFE • Customer disputes, loss of confidence	High High Med	ET ET CM	Validation checks, Subsequent maintenance checks	To be determined in MAC	CPUC or other state agency	MAC discussions under way
4. New meter changes are not communicated to UDC	• Potential for UDC-ESP dispute	Low	CM	Covered in tariff, service agreement and in ESP customer contract, RSIF supplement on Meter-Specific Info Flows	To be determined in MAC	CPUC or other state agency	None exists
METER READING							
1. Meter Agent is not qualified or licensed, standards not followed	• MA is not qualified to perform. • Potential for estimated data • Potential MDMA-MA dispute	Low High Med	CM ET CP	State licensing required	To be determined in MAC	CPUC or other state agency	MAC discussions under way
2. Meters are read inaccurately	• Potential for UFE • Potential for estimated data • Data Quality & Management Standards not followed	High High High	ET ET CM	Proposals in RSIF Workshop report on data Quality and Management	To be determined in MAC	CPUC or other state agency	MAC discussions under way

RISK CATEGORY KEY: **CM** = Compliance Risk; **CP** = Consumer Protection; **ET** = Energy Transaction

1) Market Risks	2) Consequences to Market	3) Risk Level	4) Risk Cat.	5) Existing Controls	6) Recommended Oversight/ Monitoring	7) Responsible Agency/Oversight Body	8) Transition Oversight Plan
3. Meters are read late, delays billing process	• Potential for estimated data • Data Timeliness Standards not followed • Customer disputes, loss of confidence	High High Med	ET CM CP	Proposals in RSIF Workshop report on data timeliness	To be determined in MAC	CPUC or other state agency	MAC discussions under way
METER DATA COMMUNICATION					To be determined in MAC		
1. Meter Data Management Agent not certified	• MDMA is not qualified to perform.	Low	CM	Standards do not exist	To be determined in MAC	CPUC or other state agency	None exists. **UDC** will be the only MDMA until standards approved
2. Meter Data Management Agent not qualified	• Potential for UFE • Potential UDC-ESP dispute • Validation, Estimation, Editing, Quality and Timeliness, etc. Standards not followed	High High High	ET ET ET CP CM	Standards do not exist	To be determined in MAC	CPUC or other state agency	MAC discussions under way
3. Meter Data Server is not certified	• Potential for UFE • Potential UDC-ESP dispute	High Low	ET ET	Required State standards do not exist	To be determined in MAC	CPUC or other state agency	MAC discussions under way
4. Meter Data Communication standards are not followed	• Potential for UFE • Potential for estimated data • Validation, Estimation, Editing, Quality and Timeliness, etc. Standards not followed • Potential UDC-ESP dispute	High High High Med	ET ET ET CP	State required standards do not exist	To be determined in MAC	CPUC or other regulatory body	MAC discussions under way

RISK CATEGORY KEY: **CM** = Compliance Risk; **CP** = Consumer Protection; **ET** = Energy Transaction

1) Market Risks	2) Consequences to Market	3) Risk Level	4) Risk Cat.	5) Existing Controls	6) Recommended Oversight/ Monitoring	7) Responsible Agency/Oversight Body	8) Transition Oversight Plan
5. Meter reads are not accurately reported on Data Server	• Potential for UFE • Potential UDC-ESP dispute • Validation, Estimation, Editing, Quality and Timeliness, etc. Standards not followed • Customer disputes, loss of confidence	High High High Med	ET ET ET CM CP	Standards do not exist	To be determined in MAC	CPUC or other regulatory body	MAC discussions under way
PROCESSING OF SETTLEMENT QUALITY DATA							
1. Meter reading schedule not managed	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	High High High Med	ET ET CP CP	Standards do not exist. Proposals in RSIF Reports.	To be determined in MAC	Billing entity, CPUC or other state agency	MAC discussions under way
2. Raw meter data not retrieved	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	High High High Med	ET ET CP CP	Standards do not exist. Proposals in RSIF Reports.	To be determined in MAC	Billing entity, CPUC or other state agency	MAC discussions under way
3. Inaccurate raw meter data retrieved	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	High High High Med	ET ET CP CP	Standards do not exist. Proposals in RSIF Reports..	To be determined in MAC	Billing entity, CPUC or other state agency	MAC discussions under way
4. Inaccurate validation, editing or estimating of energy usage	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	High High High Med	ET ET CP CP	Standards do not exist. Proposals in RSIF Reports..	To be determined in MAC	Billing entity, CPUC or other state agency	MAC discussions under way

RISK CATEGORY KEY: **CM** = Compliance Risk; **CP** = Consumer Protection; **ET** = Energy Transaction

1) Market Risks	2) Consequences to Market	3) Risk Level	4) Risk Cat.	5) Existing Controls	6) Recommended Oversight/ Monitoring	7) Responsible Agency/Oversight Body	8) Transition Oversight Plan
5. Inaccurate formatting of raw data	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	High High High Med	ET ET CP CP	Standards do not exist. Proposals in RSIF Reports..	To be determined in MAC	Billing entity, CPUC or other state agency	MAC discussions under way
6. Data not stored on MDMA server	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	High High High Med	ET ET CP CP	Standards do not exist. Proposals in RSIF Reports..	To be determined in MAC	Billing entity, CPUC or other state agency	Record retention requirements in this document
7. Improper management of data on MDMA server	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	High High High Med	ET ET CP CP	Standards do not exist. Proposals in RSIF Reports.	To be determined in MAC	Billing entity, CPUC or other state agency	MAC discussions under way
8. Improper management of data access to MDMA server	• Potential UDC-ESP dispute • Potential for UFE • Billing disputes • Customer disputes, loss of confidence	High High High Med	ET ET CP CP	Standards do not exist. Proposals in RSIF Reports.	To be determined in MAC	Billing entity, CPUC or other state agency	MAC discussions under way
PROCESSING OF SETTLEMENT READY DATA							
1. ESP incorrectly applies distribution loss factor	• Potential SC-ISO dispute • Potential for UFE	High	ET	Standardized protocols do not exist. Proposals in RSIF supplement on DLFs.	None proposed. Management controls and audits may be required.	FERC/CPUC jurisdiction unclear.	None exists.

RISK CATEGORY KEY: **CM** = Compliance Risk; **CP** = Consumer Protection; **ET** = Energy Transaction

1) Market Risks	2) Consequences to Market	3) Risk Level	4) Risk Cat.	5) Existing Controls	6) Recommended Oversight/ Monitoring	7) Responsible Agency/Oversight Body	8) Transition Oversight Plan
2. ESP incorrectly applies load profile	• Potential SC-ISO dispute • Potential for UFE	High	ET	Standardized protocols do not exist. Some proposals in Load Profile supplements.	None proposed. Management controls and audits may be required.	FERC/CPUC jurisdiction unclear.	None exists.
3. ESP incorrectly performs geographic aggregation of load	• Potential for SC-ISO dispute • Potential for UFE	High	ET	Standardized protocols do not exist.	None proposed. Management controls and audits may be required.	FERC/CPUC jurisdiction unclear.	None exists.
BILLING							
1. DA Customer is billed inaccurate meter reads	• Potential UDC-ESP dispute. Customer disputes, loss of confidence.	Low		Identified in RSIF supplement, no solution proposed	Penalties to ESP	CPUC	None exists
2. DA Customer account information is incorrect (account #, address, name)	• Customer disputes, billing disputes.	Low		Identified in RSIF supplement, no solution proposed		CPUC	None exists
3. ESP does not bill DA Customer CTC charges,	• Potential UDC-ESP disputes.	Low		State requirement, UDC	De-certification of ESP	CPUC	None exists
4. Bills are delayed, issued late (Cash flow)	• Potential UDC-ESP disputes.	Med		State required standards, UDC	Certification	CPUC	None exists
CREDIT							
1. DA Customer disputes CTC charge, does not pay	• Cash flow interrupted	Med		State required standards, UDC		CPUC	None exists
2. DA Customer pays partial bill	• Cash flow interrupted	Med		State required standards, UDC		CPUC	None exists

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1) Market Risks	2) Consequences to Market	3) Risk Level	4) Risk Cat.	5) Existing Controls	6) Recommended Oversight/ Monitoring	7) Responsible Agency/Oversight Body	8) Transition Oversight Plan
3. DA Customer pays late, delays payment process (cash flow)	• Cash flow interrupted	Med		State required standards and tariffs		CPUC	None exists
4. DA Customer does not pay, bankrupt	• ESP suffers loss	Med		State required standards, UDC		CPUC	None exists
REMITTANCES/CREDIT							
1. ESP cannot pay UDC, bankrupt	• UDC draws on deposit or suffers loss	Med		State required standards, UDC	Certification	CPUC	None exists
2. ESP refuses to pay UDC	• UDC draws on deposit or suffers loss	Med		State required standards, UDC	Certification	CPUC	None exists
3. ESP delays payment to UDC (cash flow)	• UDC draws on deposit or suffers loss	Med		State required standards, UDC	Certification	CPUC	None exists
ISO/PX SETTLEMENT							
1. Power Marketer/Exempt Wholesale Generator (PM/EWG) not licensed to supply energy	• May not actually supply energy. ESP will pay ISO for replacement energy.	Low	CM	FERC mandated Interchange agreements must include FERC registration number. Valid list of PM/EWG on file at FERC BBS		FERC	None exists
2. PM/EWG fails to deliver scheduled energy	• ESP will pay ISO for replacement energy	Low	ET	Sending control area informs receiving control area. Control areas balance energy exchanges by tag at midnight		FERC	None exists

RISK CATEGORY KEY: **CM** = Compliance Risk; **CP** = Consumer Protection; **ET** = Energy Transaction

1) Market Risks	2) Consequences to Market	3) Risk Level	4) Risk Cat.	5) Existing Controls	6) Recommended Oversight/ Monitoring	7) Responsible Agency/Oversight Body	8) Transition Oversight Plan
3. SC loses ISO certification	• Schedules will not be accepted by ISO. Meter data not sent for settlements. Impacts UFE	Initial Med	ET/ CM	ISO notifies UDC and Eligible Customers as soon as reasonably practicable. Post notice on WENet in 7 days.		FERC	
4. SC provides inaccurate schedules	• WSCC required security levels not met. ESP will pay ISO for replacement energy	Initial High	ET	ESP pays spot price.		FERC	
5. SC inaccurately reports energy usage (under reports meters/inaccurately applies load profiles, distribution loss factors, etc.)	• Difference between actual and reported end up in UFE and distributed among participants	Initial High	ET	ISO requires SC to warrant the accuracy of settlement data	None proposed. Management controls and audits may be required.	FERC/CPUC jurisdiction unclear	
6. SC disaggregates ISO charges inaccurately	• ISO charges to ESP not correct.	Low	ET	ESP/SC contracts	None proposed. Management controls and audits may be required.	FERC/CPUC jurisdiction unclear	
7. ESP fails to report all the load of its Eligible Customers to SCs	• Not possible for ISO to reconcile total DA customers reported by SCs with data submitted by ESPs to UDCs. • All market participants pay for ESP's unreported energy through UFE.	High	ET		None proposed. Management controls and audits may be required.	FERC/CPUC jurisdiction unclear	
8. Ineligible customer listed as eligible		Low	CM	Eligibility requirements responsibility of LRA, proposals in RSIF Universal Identifiers	RSIF Universal Indentifiers	CPUC/LRA	

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1) Market Risks	2) Consequences to Market	3) Risk Level	4) Risk Cat.	5) Existing Controls	6) Recommended Oversight/ Monitoring	7) Responsible Agency/Oversight Body	8) Transition Oversight Plan
9. SC schedule rejected by ISO, no final schedule approved for SC a. Metering information provided b. Metering information not provided	• WSCC required security levels not met. ESP will pay ISO for replacement energy • b. Impacts UFE	Initial High	ET	ISO requires all schedules except during over-generation periods to be balanced or they are rejected	ISO/SC Agreement(s)	FERC	

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APPENDIX D

Definition and Components of Unaccounted-For Energy (UFE)

UFE is calculated by the ISO for each UDC service territory on an hourly basis. UFE is "the difference between the energy entering a UDC [service territory] at the transmission/distribution (T/D) interface minus the total UDC metered demand with applicable distribution loss factors (DLFs) applied." [Joint Parties Preliminary Report on Unaccounted-For Energy and Upstream Metering (UFE Report, August 10, 1998, p. 9.]

A formal representation is: UFE = (Accounted-For Supply) minus (Accounted-For Demand).

Accounted-For Supply is obtained using a "top-down" calculation:

Supply = G - ATL + I - E, where, for each UDC service territory,
G = measured generation output
ATL = ISO-calculated actual transmission losses for the UDC service territory
I = measured imports into UDC service territory
E = measured exports out of UDC service territory.

Accounted-For Demand is obtained using a "bottom-up" calculation:

Demand = LCM + LRT, where
LCM = measured demand from cumulative meters, with statistical load profiles applied to obtain hourly values and predicted distribution loss factors (DLFs) applied to adjust the hourly measurements to T-D equivalent values;
LRT = measured demand from hourly interval meters, with DLFs applied to adjust the hourly measurements to T-D equivalent values.

Ideally, Supply should equal Demand in each hour, at each ISO grid take-out point or T-D interface, in which case UFE would equal zero. In practice, however, UFE is not zero. Non-zero UFE results from six identified sources: load profiling error, DLF error, transmission loss factor error, meter error, data processing and accounting errors, and energy theft. As stated in Section 2.3, to minimize UFE has been one of the guiding principles of the DQIWG.

APPENDIX E

Summary of Existing Standards for Metering and Meter Data

For details on the standards listed here, see "Direct Access Standards for Metering and Meter Data (DASMMD) in California," which was filed with the CPUC on March 1, 1999 and is available from the CPUC or from the web sites of the UDCs. The standards documented in the DASMMD were adopted by the CPUC in decision D.98-12-080 in response to the recommendations of the Permanent Standards Working Group (PSWG) or, in some instances, in the earlier decisions D.97-12-048 or D.98-05-044.

1. Meter Products or Equipment

- Standards for meter hardware
- Certification and testing requirements for meter products
- Registration and centralized database of direct access compliant meter types
- Stickers, sealing, and locking hardware
- Labeling manufacturing date on new meter products
- Requirements for rebuilt, retrofit, and repaired meter products.

2. Meter Communications

In D.97-12-048, the Commission expressed a desire that meters and communication systems used for direct access have an open architecture to ensure interoperability. This would allow customers to choose among multiple ESPs without having to replace equipment. The PSWG determined that the only area where universal interoperability and interchangeability could be realistically achieved at this time is at the interface between the meter and hand-held devices using an optical port. The PSWG also recommended that only authorized persons should have access to read, update, reset, or reprogram the meter. This will help ensure the integrity of metered usage data. In addition, PSWG recommended that meters must have a visual display to ensure availability of minimal information and allow the customer to read the meter. Finally, the PSWG recommended that ANSI C12.19 be adopted as the standard data format for meter output, for all new meter types submitted after March 20, 2000 to be approved for use in California. Under this recommendation, meter types approved prior to that date, whether or not they have already been installed, would be allowed to be used for the remainder of their commercial lifespans. Decision D.08-12-080 adopted the PSWG recommendations with the exception of ANSI C.12.19. The adopted standards cover the following areas:

- KYZ Contact Output
- Meter Password Authorization
- Consumer Protection on KYZ Contact Output
- Visual Meter Read
- Optical Port Standard

3. Meter Data Management and Meter Reading

- Definitions of MDMA business functions
- MDMA Qualification Testing
- Meter Reading Frequency
- MDMA Safety Requirements
- MDMA Technical and Business Support to ESPs and UDCs
- MDMA Performance Standards
- MDMA Performance Exemptions
- EDI Implementation
- Validation, Editing and Estimation of Metered Usage Data

4. Meter Worker Qualifications, and Meter Installation, Maintenance, Testing, and Calibration

The decision adopted standards for the installation, testing, maintenance, and calibration of direct access meters which are summarized as follows:

A) Meter Worker Qualifications. Meter worker classes were divided into five levels. Any worker performing direct access meter work must be certified for the class of work performed. The Report also recommended the formation of a new "Meter Worker Certification Organization" (MWCO) to manage the qualification process for the higher skill levels.

B) Meter Installations. The PSWG developed a minimum set of standards and procedures that must be followed during the installation and removal process. These standards promote consistency of the installations and enhance safety and reliability.

C) Meter Maintenance. The PSWG recommended a schedule which details the frequency and tests required for a routine maintenance of meters. The schedule for meter maintenance recognizes that meters with high usage warrant more frequent testing.

APPENDIX F

Monitoring and Auditing Concepts

Appendix F defines a number of basic concepts regarding monitoring and auditing, which are the primary mechanisms for detecting actual or potential Data Quality and Integrity problems. These definitions are provided for clarification purposes, not to suggest that the DQIWG recommends all these types of audits.

Monitoring. Ongoing procedures to ensure proper performance and to detect certain types of problems, in contrast to auditing (various types of auditing are defined below). Monitoring processes are also known as controls, and may be of two generic types: (1) preventative or "front-end" controls intended to catch problems before they are propagated through a system; and (2) "back-end" controls that catch problems after the fact and may trigger corrective actions, data revisions, penalties, etc. The Usage Data Reconciliation (UDR) model discussed in this Report is an example of a monitoring mechanism.

Auditing. Examination of the operations and records of an entity, to determine that entity's compliance with certain standards or requirements, or to perform an investigation as part of a particular inquiry. Scheduled audits are generally standardized with respect to procedure and scope, and performed on a regular basis to verify certain aspects of an entity's normal activity. In contrast, event-driven audits are conducted in response to specific triggering events, and generally focus on operations and records related to the triggering event. For example, an audit may be triggered by a dispute between parties, or by a monitoring procedure that identifies a potential problem requiring further examination.

Financial Audits. Annual audits of participants performed by independent certified public accounting firms to attest to the accuracy of the participant's financial statements and the likelihood of participant's continuation as a financially viable going concern.

Operational/Compliance/Quality Audits. Audits performed to verify the adequacy of internal controls, the effectiveness of operations, the adequacy of systems, the accuracy of data, the compliance to stated requirements or regulations, or the quality of performance. For purposes here, these audits would generally be performed by outside third party auditors, either certified public accountants, independent consultants, or outside regulatory agencies. These audits may be either routine or event-driven, the latter occurring when a possible problem was detected by the monitoring systems, for example.

One type of Contract Compliance Audit is an audit to ensure that all required contracts are in place, and that these contracts contain all essential provisions. For example, the purpose of such an audit may be to: ensure that an ESP has contracted with a certified MDMA; ensure that an MDMA is certified in all UDC service territories in which its client ESPs have customers; ensure that an ESP has proper audit provisions in its contracts with MSPs and MDMAs to fulfill its DQI responsibilities.

Dispute Audits. Audits performed as a result of a disagreement with a trading partner to verify the accuracy of data, the compliance to contract terms, or the reasonableness of charges or credits. These audits would generally be performed by employees of the disputing trading partner or contract participant or independent third party auditors engaged by either the disputing party or based on mutual agreement of the two parties. Generally contractual agreements will stipulate the possible scope of these audits.

Self Assessments. Audits performed by a company's employees, generally from the organizational area under evaluation, that assess performance, identify strengths and weaknesses, and establish plans to implement improvements. Self assessments would generally be of an operational, compliance, or quality nature.

Internal Audits. Audits performed by a company's employees independent of the function being audited. The audits could be of a financial, operational, compliance, or quality nature. In contrast to self assessments, internal audits are more independent by relying on a separate section of a company to perform the audit rather than the personnel of the section being audited. Also, the internal audit is more likely to lead to enforcement actions or changes in procedure, as the staff performing the audit usually must report their results to a corporate level audit committee and/or the board of directors.

APPENDIX G

Descriptions of UDC Preparation and Verification
of Bundled-Service Usage Data Reported to the PX

PG&E's Settlement Ready Meter Data Preparation

PG&E's PX Operations department uses a computer application called the Electric Supply Settlements System (ES3) to prepare and submit settlement-ready bundled service measurement data to the PX.

ES3 receives end-use customer demand measurement data from PG&E's Customer Information System (CIS) for each meter read cycle. CIS performs calculations and checks to validate end-use measurement data. After validation, all the data that is billed by PG&E's CIS is provided to the ES3 application. For each meter read cycle (each day) approximately 200,000 accounts are transmitted to ES3. To convert cumulative data received from the CIS system into hourly values, ES3 applies CPUC-approved load profile templates to the cumulative data. Once all measurement data is in an hourly format, ES3 aggregates data by demand zone and voltage service level (i.e., transmission, primary, secondary) and then applies the CPUC-approved distribution loss factors (DLFs) to the applicable hourly data, based on the service voltage level. (Both load profile and DLF output files are regularly checked for accuracy.) The DLFs adjust the secondary and primary service voltage level related data to the transmission/distribution interface level, making the data "settlement quality." This is the level at which the ISO settles actual energy consumption. After completing the process described above, the ES3 application electronically sends the data to the PX for settlement.

PG&E has recently instituted a test file procedure with input from the ISO and PX that has verified the accuracy of PG&E's processes.

SDG&E's Preparation of Settlement Quality Meter Data (SQMD) for its Bundled Customers

The first step in SDG&E's preparation of SQMD is the reading and validation of billing cycle meter data for SDG&E's Bundled Customers. In SDG&E's Validation, Estimation and Editing (VEE) process, Interval Demand Recording (IDR) meter data passes through the MV90 system that checks for: pulse overflow (ensures device is scaling the pulse data properly), data gaps, previous peak tolerance (compares current demand vs. previous month's demand), time tolerance (checks meter time vs. MV90 system time), power outage intervals (flags intervals occurring during a power outage), and sum check (verification that meter constant and pulse multiplier are correct).

The data then passes through a second data verification process that performs a pulse multiplier verification check, high/low usage check (required by the VEE rules set forth in the MCDS

decision) and spike check (also required by the VEE rules). All IDR meter estimation algorithms are performed either in the MV90 or our second data verification process

In the second step the meter data is transmitted to SDG&E's mainframe Customer Information System (CISCO). CISCO performs another series of checks: high/low usage and zero consumption for non-IDR accounts, high/low demand, and meter and account information verification (checks correctness of account number, translator ID number, meter number, and bill cycle). If necessary, meter data is estimated for active non-IDR accounts without a current meter read.

In the third step meter data is provided to a computer application called EADMIN, which is used by the Fuels and Power Supply Department to prepare and submit SQMD to the PX, for SDG&E's Bundled Customers. EADMIN converts the cumulative or "monthly" data provided from CISCO for non-hourly-metered accounts into hourly SQMD using SDG&E's hourly Dynamic Load Profiles (DLPs). EADMIN applies hourly Distribution Loss Factors (DLFs) to hourly and non-hourly metered account data to account for losses from the ISO controlled transmission system to the customer's meter. DLPs are prepared daily, with a five-day delay, for each of SDG&E's eight load profile classes. DLFs are prepared daily for each of SDG&E's four voltage classes. SDG&E's SQMD is prepared daily and compared to SDG&E's forward market energy schedule to check for reasonableness. On a few occasions, SQMD has been estimated. When actual data becomes available, adjustments are incorporated prospectively.

SCE's Preparation and Reporting of Settlement Quality Meter Data for its Bundled Customers

Southern California Edison's Energy Supply and Marketing (ES&M) Department uses the Usage Measurement and Aggregation (UMA) System to collect, process, and prepare settlement quality usage data for submittal to the PX.

Bundled customer meter data is first captured by SCE's meter reading system, receives initial validation, and then is exported to SCE's billing systems. In the billing systems, meter data is prepared for final validation and estimating (VEE), usage calculation and billing processing. The settlement quality meter data is then sent to SCE's Revenue Reporting systems in two data streams, IDR (Interval Demand Recording)and Cumulative. Special Billing data (complicated rate customers) and un-metered usage (e.g. streetlights) are also sent to Revenue Reporting.

IDR meter data is further validated and processed by Revenue Reporting and submitted, by hour and voltage class, to the UMA system daily. Cumulative meter data is processed and grouped into twenty-three Customer Load Profile/Voltage Classes and sent to UMA daily. Revenue Reporting also calculates and submits Distribution Loss Factors (DLFs), and Dynamic Load Profiles to UMA daily, and Static Load Profiles annually.

The UMA receives approximately 200,000 cumulative meter reads daily from Revenue Reporting. Meter reads are converted into hourly data by applying appropriate Load Profile templates for each rate class and voltage level, and corrected for line losses using approved

DLFs. The cumulative data is then aggregated, corrected (adjusted for missing meter reads) and reported in hourly format. IDR data is also corrected for line losses using approved DLFs and reported in hourly format.

Extensive upstream validation is performed in the meter-reading, billing and revenue reporting systems to maintain accuracy. In addition, further validation is performed by ES&M to check the reasonableness of the data for the reporting period.

Cumulative, IDR and Total usage data is submitted to the PX in Meter Data Exchange Format (MDEF) on a daily basis.

APPENDIX H. Sample Template for MDMA Performance Monitoring Report

MDMA Performance Monitoring Monthly Report
ESP: ESP1
MDMA: MDMA1

MDMA	Month	Data Type	Data Availability — After Scheduled Read Date % 1st day	% 2nd day	% 5th day	% Total Acts Posted	Estimation % MDMA Estimation	Pattern of Non-conformance % or # of non-conformance accounts[1]	Server Operation % of Server Availability	# of outages Sched.	Non-Sched.	Help Desk Availability
	CPUC Standards	IDR	80%	90%	99%	99%	<1%		24/365	<2 hours		24/365
		Non-IDR	85%	95%	99%	99%	<10%					
MDMA1	Sept. '98	IDR										
		Non-IDR										

(1) Pattern of non-conformance is defined as 1% of the service accounts or 5 accounts, whichever greater, are not cured during the first 6 months of direct access participation; more than 0.5% or 3 accounts, whichever is greater, are not cured during any 6 consecutive months.