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Decision 98-12-080 December 17, 1998

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.	Rulemaking 94-04-031 (Filed April 20, 1994)
Order Instituting Investigation on the Commission's Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation.	Investigation 94-04-032 (Filed April 20, 1994)

DECISION REGARDING PERMANENT STANDARDS FOR METERING AND METER DATA

I. Summary

Interim meter and meter data standards were initially adopted in Decision (D.)97-10-087 and D.97-12-048. Today's decision addresses the recommendations for permanent standards which were contained in the workshop report filed by the Permanent Standards Working Group (PSWG).

In adopting the permanent standards, we have tried to avoid adopting standards which are too narrow in scope, and which limit technology choices. Today's decision favors an open architecture approach which focus on the continuing safety, accuracy and reliability of meters and meter data. Attachments A, B, C and D of this decision summarize the permanent meter and meter data standards that we adopt. Those attachments reference the pertinent passages in our decisions, and in the appendices to the PSWG's workshop report, which make up the permanent standards.[1] Attachment E contains a glossary of the various acronyms used in this decision.

Among the permanent standards we adopt are the following:

- Meter product standards, the certification testing requirements that meter products must comply with, the submission to the Energy Division of the meter type self-certification document, and

[1] We did not attempt to modify the wording of D.97-10-087 and D.97-12-048 in this decision to conform the passages to today's adoption of permanent meter and meter data standards. That is because D.97-10-087 and D.97-12-048 specifically stated that the standards adopted in those two decisions were interim, and that the interim standards adopted in those two decisions might change. (D.97-10-087, pp. 43-44; D.97-12-048, p. 2.)

the procedures to follow for rebuilding, retrofitting, or repairing meter products.

- Meter communication standards including KYZ contact outputs, and the requirement that a direct access meter have a localized visual kilowatt-hour (kWh) display or a physical interface to enable on-site interrogation of all stored meter data.

- Meter data management and meter reading standards. These include standards for meter data management agents (MDMAs), including how often a meter is to be read, safety requirements, timeliness of validated meter data, and exemptions from having to timely make meter data available.

- An order that the utility distribution companies (UDCs), electric service providers (ESPs) and MDMAs move toward using Electronic Data Interchange (EDI) standards to transfer meter usage information in accordance with the schedule discussed in the decision, and that the Direct Access Tariff Review Committee file a report with its recommendations for implementing EDI on a statewide basis.

- Validating, editing and estimating (VEE) rules for meter data, and an order that a workshop be convened to work on additional VEE issues.

- Meter installation, maintenance, testing and calibration standards. This includes the schedules for the maintenance and testing of meters, meter test procedures, and the calibration and maintenance of test standards.

- Meter worker classifications and, as an interim measure, an order placing the burden on the ESPs to prove that the meter service providers (MSPs) are capable of performing the meter work in the various classifications should any questions arise. Explore what permanent entity should eventually administer and design the meter worker certification tests. We streamline the MSP certification process by eliminating the 50 joint meet and bog requirements, and the provisional certification process.

II. Background

In D.97-12-048, the Commission ordered the creation of the PSWG. The PSWG was formed to review the interim meter standards that were approved in that decision, and to recommend what permanent meter standards should be adopted by the Commission. The decision also directed the PSWG to determine whether other standards could be expected in the future, and to recommend a process for reviewing possible future changes to the permanent meter standards. D.97-12-048 ordered that a workshop be held, and that the PSWG file a Workshop Report with its recommendations for permanent meter standards.

The Energy Division convened a workshop on January 29, 1998. In order to address the numerous metering issues, the PSWG established the following four subgroups: (1) meter equipment; (2) meter communications; (3) meter data management (MDM) and meter reading; and (4) meter installation, maintenance, testing and calibration. A separate subcommittee was also formed to investigate national issues that might impact California standards.

The four subgroups met once every two weeks. The full PSWG membership met once a month to monitor overall progress, and to vote on the items recommended by the subgroups for approval.

Many different entities, including MSPs, MDMAs, meter manufacturers, ESPs, UDCs, employee representative groups, consumer representatives, and municipal utilities, actively participated in the PSWG process.

The PSWG filed its "Permanent Standards For Metering And Meter Data Used In Direct Access" (Workshop Report) on July 29, 1998. The recommendations contained in the Workshop Report were voted upon by at least

two-thirds of the eligible voting membership of the PSWG. When the recommendations were not supported by 100% of the voting membership, the Workshop Report included the non-majority positions, if those views were expressed.

Comments to the Workshop Report were filed by the California Energy Commission (CEC), Coalition of California Utility Employees (CCUE), Pacific Gas and Electric Company (PG&E), and Southern California Edison Company (SCE). Joint comments to the Workshop Report were filed by the Electric Power Research Institute (EPRI), the Institute of Electrical and Electronics Engineers (IEEE) Standards Coordinating Committee 31 (SCC31), and the Office of Ratepayer Advocates (ORA).[2] In addition, the Executive Board of the Southern California Chapter of the International Association of Electrical Inspectors (IAEI) submitted a September 25, 1997 letter in response to the Workshop Report.

III. Summary of the Workshop Report

A. Introduction

In this part of the decision, we provide a summary description of the recommendations that the PSWG voted upon. These descriptions do not fully describe each recommendation or rule. For a full description of the recommendation or rule, one must turn to the appendices which are attached to the Workshop Report.

B. Meter Equipment

The first series of recommendations in the Workshop Report address meter equipment. The PSWG reviewed the applicable national standards and made

[2] These three groups are collectively referred to in this decision as the joint parties.

recommendations as to which performance standards should be required. Appendix A to the Workshop Report contains a recommended list of standards that the PSWG suggests should be adopted (Table I-1), and a list of standards which the PSWG recommends not be required (Table I-2). Appendix A of the Workshop Report also contains a list of the tests that are to be performed in connection with the American National Standards Institute (ANSI) C12.1 and C12.20 standards (Table I-3), and the "Certification Testing Requirements" which detail the procedures and criteria that the meter product testing must comply with (Workshop Report, App. A, Section II). All of the members of the PSWG who voted recommended that the meter equipment recommendations be adopted.

The following is a description of the meter equipment standards that the PSWG recommends be adopted:

1. ANSI C12.1-1995, Code for Electricity Metering

This provision is the basic accuracy, safety, and performance requirement standard for meters and metering equipment. The PSWG recommends that this standard be used in accordance with the "Certification Testing Requirements" that are contained in Section II of Appendix A of the Workshop Report.

The Certification Testing Requirements address general meter testing requirements, the criteria for defining when a meter product fails, the criteria for rejecting certification of a meter type, test setup procedures, a description of the ANSI C12.1 tests, a description of the ANSI 12.20 tests, and a description of the sunlight interference test. The Workshop Report notes that some of the meters that have not met the Certification Testing Requirements,

failed to operate accurately during meter performance trials conducted within California.

2. ANSI C12.7-1993, Requirements for Watt-hour Meter Socket

The PSWG does not recommend that all meters be required to have a meter socket. However, if a meter is socket mounted, the PSWG recommends that the socket and the associated meter meet ANSI 12.7 to ensure the accuracy and safe installation of socket mounted meters.

3. ANSI C12.8-1981 (R1997), Test Blocks and Cabinets for Installation of Self-Contained A-Base Watt-hour Meters

This provision is a safety standard for A-Base meters. The Workshop Report states that this standard ensures that A-Base meters do not represent an electrical hazard.

4. ANSI C12.9-1993, Test Switches for Transformer-Rated Meters

This provision is a safety standard that covers the dimensions and functions of test switches for proper marking and installation.

5. ANSI C12.10-1997, Electromechanical Watt-hour Meters

This standard defines the configuration, accuracy, and performance requirements of electromechanical meters and complements ANSI C12.1-1995.

6. ANSI C12.11-1987 (R1993), Instrument Transformers for Revenue Metering, 10 kV through 350 kV BIL (0.6 kV through 69 kV NSV)

This provision governs the accuracy and performance requirements for instrument transformers for metering. This standard will ensure that the UDCs continue to install the same accurate metering instrument transformers that the UDCs currently install for their own metering needs.

7. ANSI C12.13-1991, Electronic Time-of-Use Registers for Electricity Meters

This standard applies only to meters that have time-of-use (TOU) registers, and defines the accuracy and performance requirements for these registers.

8. ANSI C12.18-1996, Protocol Specification for ANSI Type 2 Optical Port

The PSWG does not recommend that optical ports be required. However, if a meter has an optical port that is physically identical to an ANSI Type 2 optical port, then the optical port shall meet all the requirements of ANSI C12.18. Other kinds of optical port types would be exempt from this requirement.

9. ANSI C12.20-1997, 0.2% and 0.5% Accuracy Class Electricity Meters

This standard adds additional accuracy and performance requirements to ANSI C12.1. The PSWG recommends that for purchasing consistency in California, this standard be used in accordance with the requirements of Section II in Appendix A to the Workshop Report.

10. ANSI C37.90.1-1989 (R1994), Surge Withstand Capability Test

This safety standard adds performance requirements to ANSI C12.1 and ANSI C12.20.

11. ANSI C57.13-1978 (R1987), ANSI C57.13.1-1981(R1992), ANSI C57.13.2-1991, and ANSI C57.13.3-1983(R1991), Instrument Transformers

These four provisions are accuracy and safety performance standards that are used in conjunction with ANSI C12.11. These standards will

ensure that the UDCs continue to install the same accurate metering instrument transformers as they currently install for their own metering needs.

12. Applicable Federal Communications Commission (FCC) Regulations

The PSWG recommends that all of the meters and associated equipment meet all applicable FCC regulations.

13. Registration and Centralized Database

The PSWG recommends that the meter manufacturers file with the Commission their meter type self-certification document. The document would state that the meter type meets the Commission certification testing requirements. After the Commission has reviewed and approved the certification, the PSWG recommends that the Commission post on its web site a list of meter types that are in compliance with all Commission-approved metering standards.

14. Other Requirements

The PSWG recommends that the meter manufacturers attach various identifying labels on the meters. For sealing and locking hardware, it is recommended that this hardware be imprinted with the company name and/or logo, and that it be made with a material other than lead. The sealing hardware owned by the MSPs are to be orange in color, and is to be imprinted with the MSP's certification number.

To identify a customer premise which has a life support system, the sealing hardware is to be white in color and imprinted with a red caduceus (medical symbol). Any stickers to identify the meter as serving a premise which has life support equipment shall also contain the red caduceus.

The PSWG also recommends that a sticker be used to identify a 480 volt service panel and meter. In addition, the PSWG recommends that new meter products be permanently labeled with the manufacturing date.

C. Interconnection, Open Architecture, and Interoperability

The discussion in D.97-12-048 regarding open architecture and interoperability triggered significant discussions by the PSWG. The meter communications subgroup created Diagrams A and B, which appear at pages 14 and 16 of the Workshop Report. Those diagrams visually describe how the meter and meter data systems are interconnected, and identify potential areas where interoperability would be feasible.

Diagram A shows that there are two possible places where open architecture can occur. The first is between the MDM and the retail market participant. The second is between the meter and the meter reading system.

Diagram B is a further detail of the diagram that appeared on page 11 of D.97-12-048.

The PSWG discussed the degree to which interoperability is feasible for direct access, and came to the following conclusions:

- A degree of interoperability is possible and could be achieved at system levels.

- Interchangeability of all discrete components across technologies is not feasible.

- Technology-specific interchangeability requires specifying a standard at every interface and is not practical for all technologies at this time.

- Adoption of some existing communication standards allows some interchangeability within a technology and provides a foundation for the adoption of future communication standards.

The PSWG also concluded that the closer interoperability is to the point of measurement, the easier it is for a customer to switch ESPs. Thus, the PSWG defined a level of interoperability at interface 3 of Diagram B, which is the interface between the meter and the communications modules that connect to the meter reading system.

The majority of the PSWG recommends that interoperability should be available in the following four areas:

1. MDM: The PSWG recommends that there be a migration to EDI, which is a national data format. (Workshop Report, App. C, Section VII.)

2. Data format tables: The meter device data format allows for basic interoperability and functional continuity for the marketplace. The PSWG recommends that ANSI C12.19 be adopted. (Workshop Report, App. B, Section I.1.)

3. Handshake: The communication mechanism and the physical communication connection shown in Diagram A of the Workshop Report connect the communication device to the meter, and provide the handshake, i.e., the initial communication protocol. The PSWG recommends that ANSI C12.18 be adopted for Type 2 optical ports. (Workshop Report, App. A, Table I-1.)

4. Visual Display: The PSWG recommends that the meter have a visual kWh display. (Workshop Report, App. B, Section III.)

D. Meter Communications

Meter communications addresses the communication between the meter and the meter reading device. The objective of the PSWG was to develop standards that will enable a wide number of market participants to access and retrieve data from electric meters. The PSWG makes the following recommendations on meter communication standards to enhance interoperability.

1. ANSI C12.18, Type 2 Optical Port Standard: For meters that use a Type 2 optical port, the PSWG recommends that ANSI C12.18 be adopted. This standard would allow interchangeability at three different layers. All of the voting members of the PSWG agreed to this recommendation.

2. ANSI C12.19, Standard Application: This provision is a data format standard for metering data, and is designed to promote a minimal level of interoperability. This standard uses a metering data structure format which is in the application layer (Layer #7 of the Open System Interconnection [OSI] communications stack). This layer allows the data to be carried by many different communications transport mechanisms, and provides the flexibility to meet a manufacturer's meter design needs. Four entities opposed the use of this standard, while four other entities abstained from voting.

3. ANSI C12.21, Protocol Specification For Telephone Modem, and ANSI C12.22, Meter Interface To Network Protocol Gateway: These two standards have not yet been approved by ANSI. The PSWG recommends that both of these standards be reviewed when they are approved by ANSI. Two entities opposed this recommendation, and one entity abstained from voting.

4. KYZ Contact Output: The PSWG recommends that meters not be required to have a contact output. However, if a meter has a contact output, the PSWG recommends that it should be a KYZ contact in accordance with ANSI C12.1. All of the voting members of the PSWG agreed to this recommendation.

5. KYZ Consumer Protection Regarding Meter Compatibility: The PSWG noted that many of the direct access customers currently have energy management systems which utilize KYZ outputs. The PSWG recommends that direct access customers be notified by their ESP if a meter change will not be compatible with the customer's energy management system. Three entities voted against the adoption of this recommendation, while 11 other entities abstained.

6. Visual Meter Read Requirements: The PSWG recommends that at a minimum, all direct access meters have a visual kWh display, and a physical interface to enable on-site interrogation of all stored meter data. At a minimum, an electronic meter must have a visual display of the total kWh energy consumption. Four entities opposed this recommendation while three others abstained.

7. Meter Password Authorization: There are three types of password authorization: (1) full read and write; (2) billing read and write; and (3) read only. Since the ESPs are responsible for the safety, accuracy, and reliability of the meter used in direct access, the ESPs will have the authority to issue meter passwords at their discretion. ESPs will be required to issue read passwords to the UDCs for audit purposes upon request. ESPs will provide meter passwords in a timely manner for UDCs to perform their scheduled functions. All of the voting members of the PSWG agreed to this recommendation.

Regarding the ANSI C12.19 recommendation, the PSWG agreed that the meter should communicate in the format specified by that standard, but that the entities should not be required to store the data in the ANSI C12.19 format.

The discussions over the C12.19 standard recognized that if the standard was applied, it may not allow for a "plug and play" environment. That is, some meter products may have to be replaced or retrofitted to accommodate the new communications protocol.

The majority of the PSWG agreed that the C12.19 standard will create a degree of interoperability that will benefit the marketplace. The Workshop Report notes that with current telephone modem technology, this standard would make it possible for customers on telephone-read meters to switch ESPs without having to replace their meters.

The majority also agreed that the C12.19 standard will not be compatible with all radio frequency based technologies. Such a standard will have an impact on bandwidth and response times by increasing the message length and making radio frequency transmissions more expensive.

The PSWG recommends that all meter types released before March 20, 2000 to be exempt from the C12.19 standard. Thus, all new meter types released after March 20, 2000 will be required to meet the C12.19 standard.

E. Meter Data Management and Meter Reading

The PSWG reviewed the interim standards related to meter reading and meter data management. The PSWG recommends that the requirements contained in Appendix C of the Workshop Report be adopted. Each of the recommendations is described below.

1. Definition of MDMA Business Functions

The PSWG discussed the functions performed by the MDMA. The PSWG recommends that the functions be separately described as meter reading and MDM functions. (Workshop Report, App. C, Section I.) The Workshop Report notes that separating these functions will facilitate approval processes for these functions.

The functions performed by the MDM entity are as follows:

1. Accept raw meter reads from meter reading entity.

2. As necessary, translate data into format for internal processing.

3. Associate meter reads with customer identifiers for use in validation or estimation, if needed.

4. Validate, edit, and estimate data.

5. If necessary, translate data into Commission-approved format prior to posting to MDMA server.

6. Post validated, edited, and estimated data to MDMA server for retrieval by market participants. This might include performing data adjustments, reframing data, or resending previously posted data, as required.

7. Maintain the MDMA server.

8. Archive raw data and validated data for 36 months. (Workshop Report, App. C, Section I.)

The functions performed by the meter reading entity are as follows:

1. Collect data at the meter, including routine meter reads, special reads, and date and time of reads.

2. Transport data to the MDM.

3. Perform any validation that is required to be performed either on site or at the time of reading.

4. Check for and report suspected energy theft.

5. If meter reading is performed locally, check for and report hazardous conditions. (Workshop Report, App. C, Section I.)

One entity voted against the adoption of this recommendation, while three other entities abstained.

2. Subcontracting MDM Functions

The Workshop Report notes that D.97-12-048 requires an MDMA to be used for all required MDM functions. The PSWG believes that while a MDMA should retain full responsibility for all required MDM functions, the MDMA should be able to subcontract sub-functions, such as meter reading, to other approved entities. PSWG recommends that the Commission revise

D.97-12-048 "to allow an entity to be approved for all or any subset of MDM functions, but, if approved for a subset, the entity must operate as a subcontractor to an approved MDMA." The PSWG also recommends that an entity does not need to be re-approved to provide such functions to another MDMA as a subcontractor.

One entity opposed the subcontracting recommendation, while three others abstained.

3. MSP's Ability to Subcontract Meter Programming to MDMA

The Workshop Report notes that reprogramming a meter remotely is in some cases more efficient than dispatching a technician to reprogram a meter on site. Typically, the MDMAs have remote communications capability with the meters they read. The PSWG recommends that an MSP should be allowed to subcontract with an MDMA to reprogram its meters remotely. The MSP would remain responsible for the reprogramming of the meter. One entity opposed the recommendation, and five entities abstained from voting. (Workshop Report, App. C, Section III.)

4. MDMA Technical/Business Support to ESPs and UDCs

The PSWG discussed the need for the MDMA to provide support to the ESPs and the UDCs. The PSWG unanimously recommends that:

1. The MDMA provide access to technical and business assistance during normal business hours (8:00 a.m. to 5:00 p.m. Pacific). During such time, the MDMA will have staff available to address questions and concerns on data availability, corruption and adjustments, and systems technical support.

2. The MDMA provide technical assistance via a support pager available 24 hours a day throughout the year to address issues of server availability. The MDMA is to respond and provide a status to all pages within two hours.

3. MDMA server availability or access issues be dealt with as soon as reasonably possible. At the MDMA's discretion, concerns over data availability, data corruption and adjustments, or non-urgent problems, will be addressed during the next business day. (Workshop Report, App. C, Section IV.)

5. MDMA Performance Standards

With the experience gained from the market operations of direct access, the PSWG reviewed the current performance requirements associated with the timeliness of the MDMA's actions. These performance standards were originally adopted in D.97-12-048. It is recommended that the following performance standard for interval meters be changed:

> "(iii) 99.99% of all usage data must be available within five days of the scheduled reading date of the meter." (See D.97-12-048, p. 31.)

It is also recommended that the following performance standard for non-interval meters be changed:

> "(iii) 99.99% must be available by 6:00 a.m. on the 5th working day after the scheduled meter reading date." (See D.97-12-048, p. 32.)

The PSWG contends that these two performance standards should be modified by reducing the 99.99% standard to 99.0%. The PSWG contends that 99.99% is an unreasonable goal, and it does not reflect the current performance of the market. If the 99.99% standard is retained, one missing account in 5000 would cause an MDMA to be out of compliance. As technology changes, and new systems and processes impact market performance, these standards should be reviewed again. (Workshop Report, App. C, Section V.)

The PSWG also recommends that the first billing cycle by an MDMA be disregarded in calculating the performance standard. The Workshop Report notes that the initial handoff of the customer by the UDC to the ESP sometimes causes information to be delayed. This delay would skew the MDMA's performance statistics. The tracking of an MDMA's performance should begin after one complete billing cycle has ended. (Workshop Report, App. C, Section V.)

The Workshop Report states that there are no defined procedures which address the situation of when an MDMA is unable to deliver the data to a server within five days. Since there are no present guidelines or procedures for this, the process is inconsistent and unreliable. The PSWG recommends that the process be formalized and documented by the market participants (MDMAs, UDCs, and ESPs) based on the VEE rules in Appendix C-VEE of the Workshop Report. Section A of Appendix C-VEE would be used for interval data, while Section B of that appendix would be used for monthly data.

No one voted against the recommendations, but three entities abstained from voting.[3] (Workshop Report, App. C, Section V.)

6. MDMA Performance Exemptions

The loss of data, as a result of events beyond the MDMA's control, such as large catastrophic events and meter failures, were also discussed. The PSWG recommends that the Commission approve the following:

1. In the event of a large catastrophe, such as an earthquake or hurricane, which precludes the MDMA from reading

[3] With respect to the VEE rules in Appendix C-VEE, one entity voted against the VEE rules, and another entity abstained from voting. (Workshop Report, App. C-VEE.) The VEE rules are described in Section E of this decision.

meters, the MDMA should estimate and post the data. The estimated data would be reported separately by the

MDMA in its performance report, and would not be included in any performance penalties assessed against the MDMA.

2. In the event of meter failure where the meter is not accurately recording usage, the estimated data would be reported separately by the MDMA in its performance report, and would not be included in any performance penalties assessed against the MDMA.

One entity voted against these recommendations while one abstained from voting. (Workshop Report, App. C, Section VI.)

7. Electronic Data Interchange (EDI) Implementation

In order to meet the implementation date for direct access, the Commission adopted the Metering Exchange Protocol (MEP) for meter data transmission that was proposed by PG&E. (D.97-12-048, p. 47.)[4] The MEP was to be an interim protocol until the Commission revisited the issue.

The PSWG recommends that there be a migration to EDI to transfer meter usage data. The EDI was developed by the Utility Industry Group (UIG), which provided input into the ANSI Accredited Standards Committee. The PSWG recommends that this migration occur after the development of a consistent, statewide implementation guide by all interested parties. The Workshop Report expects this guide to be developed by January 1, 1999, and recommends that a migration to EDI be completed within 12 months after the completion of the guide, but no later than December 31, 1999.

[4] The Workshop Report at p. 30 refers to the MEP as the California Metering Exchange Protocol.

Two entities opposed the recommendation, while three abstained from voting. (Workshop Report, App. C, Section VII.)

The PSWG also recommends that for any new transactions between MDMAs and market participants, the preferred standard should be EDI. One entity opposed this recommendation, while five abstained. (Workshop Report, App. C, Section VII.2.)

8. Meter Specific Information Flows

The PSWG recommends that for electronic communications concerning meter-specific information flows, the preferred method is EDI. One entity opposed this recommendation, while five abstained. (Workshop Report, App. C, Section VII.3.)

F. Requirements For Validating, Editing, and Estimating Interval and Monthly Data in Direct Access

1. Introduction

The VEE subcommittee held a series of conference calls and meetings to review the VEE rules for interval and monthly data. Separate recommendations were reached for interval data, and for monthly data.

The recommendations are based upon the following principles that were developed during the course of the meetings:

- The rules should promote fairness in the marketplace.
- The goal of the rules is to provide quality data.
- Solutions must fit the magnitude of the problem. When evaluating solutions, the costs must be considered against the frequency of occurrence and the quality of the data.
- Modifications to the rules should typically be required when they result in a significant improvement in the data quality.

- When modifications to the rules are made, reasonable implementation plans should be defined allowing time for all parties to comply.

- Variations for different technologies should be allowed where appropriate.

The Workshop Report notes that the above principles should also apply to any future suggested changes.

The PSWG recommends that the interval data rules in Section A, and the monthly data rules in Section B, of Appendix C-VEE of the Workshop Report, be adopted.

The PSWG also recommends that the existing requirement to include the estimation algorithm when the data is posted, be eliminated. The Workshop Report notes that any estimated data must always be flagged as estimated data. In addition, the MDMA must record and maintain the estimation algorithm as long as the MDMA is required to store the data, and to make this information available upon request to the appropriate UDC or ESP. The Workshop Report recommends that this requirement be revisited in the future to determine if such a requirement is necessary based on market experience. (Workshop Report, App. C-VEE, pp. 10-11, 31-32.)

The PSWG also recommends that a group composed of UDCs and MDMAs be authorized to resolve these other issues:

- Clarify the rules by adding examples, flow charts, and definitions.

- Review the rules for effectiveness after the market has been operational. The PSWG recommends that the interval rules be reviewed in April 1999, and that the monthly rules be reviewed in June 1999.

- Create a change management procedure, should it be needed, and apply the six principles to any suggested changes.

- Add an additional required code to the MEP, or other approved format, for verified data. Verified data is data which failed at least one validation check, but was determined to be valid. (Workshop Report, pp. 33-34.)

One entity voted against the VEE recommendations, and one entity abstained from voting.

2. Interval Data

The VEE subcommittee developed 11 changes to the interim interval data rules. Of the 11 changes, the PSWG recommends that only the following four changes be required (Workshop Report, pp. 31-32, App. C, pp. 11-12.):

1. The days on which a power failure occurred shall not be used as reference data for estimation.

2. During meter test mode intervals, the MDMA must not report the test bad, and may report zero usage during such time. If the meter is inadvertently left in test mode, the data will be estimated.

3. The selection of reference days for estimation purposes are to be the days that are chronologically closest to the day requiring estimation, whether that is in historical data or the present billing period.

4. The high/low usage check shall always be performed on data that have passed or been verified for previous checks, with no estimated values included. This high/low usage check can also be performed on final data, including estimated values, at the option of the MDMA.

It is proposed that all four of these changes be instituted 90 days from the Commission's decision adopting the changes.

The remaining seven changes are optional and may be implemented at the MDMA's discretion. The seven optional rules cover the following kinds of circumstances:

1. Spike check threshold: For very low usage customers, a valid pulse count of a few pulses may result in failing the spike check. An optional minimum threshold was added to allow MDMAs to automate checking for this condition and passing the data.

2. Kilovar-hours (kVARh) check threshold: For very low usage customers, a valid pulse count of a few pulses may result in failing the kVARh check. An optional minimum threshold was added to allow MDMAs to automate checking for this condition and passing the data.

3. Use of partial days as reference data for estimation: Days containing less than 24 hours of good interval data may be used as reference data to estimate data for other days.

4. Use of accurate meter readings to scale estimated intervals: When data are estimated based on historical data, and accurate meter readings or usage are available, the estimated data can be scaled based on the actual usage.

5. Simplified proration algorithm when meter clock is off: A simpler method of prorating data when the meter clock is off is provided in Appendix C-VEE of the Workshop Report.

6. Automating handling of irregular usage customer: Rules are provided to determine which customers have irregular usage, and how special tests can be designed and automated for those customers.

7. kVARh checks: kVARh checks would be required only when the kVARh is used for billing.

Section A of Appendix C-VEE of the Workshop Report contains both the required changes and the optional changes described above.

3. Monthly Data

The PSWG recommends that the VEE rules contained in Section B of Appendix C-VEE of the Workshop Report be adopted for monthly data. Monthly data include consumption, demand, and TOU consumption and demand.

The recommended data validation checks are designed to identify things that can go wrong at the meter/recorder, and cause the data that are collected to give a reading that does not reflect actual usage. The following data validation checks would be required:

1. Time check of meter reading device/system. Applies to devices/systems which collect TOU data only.

2. Time tolerance check of meter. Applies to meters collecting TOU data only.

3. High/low usage check. This check is used to validate cumulative kWh consumption

4. High/low demand check. This check compares the demand against historical data as a reasonableness check.

5. TOU check. This usage check compares the sum of the kWh meter readings for all periods against the current season total kWh meter reading. This check must be done in whatever units (kWh or pulse values) are read from the meter.

6. Zero consumption for active meters. This checks for zero usage during the billing month.

7. Number of dials on meter. This check applies to cumulative consumption only. The check ensures that the number of digits reported in the read is consistent with the number of dials or digits on the meter display. This check is performed for both remote and local reads if supported by the meter reading technology. If the meter reading technology does not support this check, it is not performed.

8. Meter read demand decimal quantity difference. This check verifies that the number of demand decimal places displayed on the meter is correct. This check is only performed for on-site meter reads, and is not performed for remote meter reads.

9. Meter identification. This check compares the meter's identification markings with the identification that is expected by the meter reading system. There are two types of meter identification checks, the internal meter identification check and the external meter identification check. The type of check that is used depends on how the meter is read.

The Workshop Report states that the PSWG agreed that the "usage for inactive meters" check was not the responsibility of the MDMA and should not be required. An inactive meter is defined in section 3.7 of Appendix C-VEE as a meter "for which there is no customer with financial responsibility."

The PSWG recommends that the estimation rules for monthly data, contained in Appendix C-VEE at pp. 31 to 37, be adopted. These estimation rules are used to estimate usage, demand, TOU usage, and TOU demand, when actual data is not available.

In addition, the PSWG recommends that a group be established to define rules to convert interval data to billing determinants. As part of this process, the monthly data validation and estimation rules would be reviewed to determine the impact of any conversion.

The PSWG also recommends that the UDC/MDMA meeting process address these additional issues:

- Investigate validation rules for TOU demand and usage.

- Determine what is statistically valid as a minimum density requirement for rules based on similar customers.

- Determine sample calculations for optional trend factors to incorporate climatic and demographic areas in validation and estimation. (Workshop Report, p. 34.)

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

1. Introduction

Appendix D of the Workshop Report contains the recommended permanent standards for meter worker qualifications and certification, meter service provider certification, meter installation and removal, meter maintenance, meter system testing, and calibration. The recommendations in Appendix D of the Workshop Report are intended to replace the interim standards that were adopted by the Commission in D.97-12-048. A brief description of the recommended standards appear below. No one opposed the recommended permanent standards.

2. Meter Worker Qualifications

The Workshop Report notes that to "ensure the safe and reliable installation of meters, workers need to have the appropriate training and experience for the different levels of metering work." (Workshop Report, p. 36.) The PSWG agreed to use in its recommendations the five meter worker classes that were discussed by the ESPs, MSPs and UDCs in the Fall of 1997. The PSWG recommends that any meter workers performing direct access meter work would have to be certified for the class of work that they perform. The five meter worker classes are as follows:

Class 1: Installation of single phase self-contained meters.

Class 2: Class 1, plus installation of poly-phase self contained meters below 600 volts.

Class 3: Class 2, plus installation of transformer rated meters below 600 volts and testing of meters with internal diagnostics.

Class 4a: Class 3, plus in-field testing of single phase meters up to 300 volts.

Class 4b: Class 4a, plus in-field testing of all meters that can be installed by meter worker classes 1-4.

Class 5: Class 4b, plus installation and testing of metering transformers and equipment above 600 volts. (Workshop Report, App. D, Section I.A.)

It is proposed that after the Commission approves an MSP's application to be an MSP, and approves the MSP's meter worker training certification program, the MSP can self-certify Class 1, 2 and 3 meter workers after ensuring that all appropriate meter worker prerequisites have been met.

In order to be certified as a Class 4a, 4b, or 5 meter worker, it is proposed that the meter worker pass a written and practical exam administered by the Commission or by a designated entity. (Workshop Report, App. D, Section I.C.) The Commission or the designated entity is to develop and prepare a number of different tests for each of the three worker classifications, and the tests are to be periodically revised and updated. The initial set of test questions are to be developed based on examples described in Attachment D-2 of Appendix D of the Workshop Report.

The Workshop Report recommends that the Commission create a designated entity to manage the function of certifying the higher skill meter workers. This entity would be known as the Meter Worker Certification Organization (MWCO). The MWCO process is described in Section I.D. of Appendix D of the Workshop Report.

The PSWG envisions that there could be one or more MWCOs. The role of the MWCO would be to develop and administer practical and written tests to certify meter workers in Class 4a, 4b and 5. The Commission could also

assign to the MWCO the review of an MSP's proposed class 1, 2 and 3 training certification program. The MWCO would establish reasonable fees for its work, and would have to arrange for a $100,000 bond, or provide proof of general liability insurance. The bond or insurance would need to meet the specifications set forth on page 18 of Appendix D of the Workshop Report.

In recognition of the fact that MWCOs do not exist today, and because it will take a period of time for an MWCO to administer the qualification process, the PSWG recommends that an interim MWCO process be established. This interim process would involve one volunteer from each of the UDCs and permanently certified MSPs, and would be formed within seven calendar days from this decision. This group would finalize the test contents that would be used to test and certify Class 4a, 4b, and 5 meter workers; establish pass/fail criteria for the tests; identify and assign an entity to administer this testing and certification; and publish information on how to apply for these three meter worker tests. The interim process calls for the completion of all these tasks within 90 days from the adoption of such a process. This interim process also calls for the filing of a brief report to the Commission which would report on what was implemented through this interim process. This report would also be posted on the PSWG website. It is recommended that this interim process remain in place for six months, or until the MWCO is approved and ready to operate, whichever is earlier.

The PSWG also recommends that the MSP certification process that was first established in D.97-12-048 remain in place. However, PSWG recommends that some modifications be made to the 50 joint meet process that was adopted in D.97-12-048. The PSWG recommends that this process no longer be used for MSP certification. Instead, the MSPs will provide a detailed work schedule to each UDC for the first 20 installations by the MSP. The UDC is not

required to attend the installation, but may do so in its discretion. The UDC or the MSP can also request that the installation be attended by the other party:

> "as a means to confirm clarity and ensure a smooth transition on issues such as: DA [direct access] process awareness, verification of the processes used by UDCs and MSPs to install or return meters and documentation, and requirements for effectively communicating essential meter related data." (Workshop Report, App. D, pp. 13-14.)

The joint meet forms and bgs that were adopted in D.97-12-048 would no longer be required if PSWG's recommendations are adopted.

The PSWG's recommendation also calls for a mandatory joint meet "for special types of meter installations, testing, and maintenance as defined by a UDC's or MSP's notification published in advance." (Workshop Report, App. D, p. 13.)

The PSWG also recommends that Attachment D-3 of Appendix D of the Workshop Report be used as the application to become a registered MSP.

3. Meter Installation

The PSWG developed a set of minimum standards and procedures that are to be followed during the installation and removal process. These recommendations are set forth in Section II of Appendix D of the Workshop Report. The Workshop Report states that the recommendations will promote consistent installations and enhance safety and reliability. The recommendations cover the following areas:

> 1. Clarification that all instrument transformers, test switches, and associated wiring up to the meter socket, are to remain the responsibility of the UDCs. However, reconnection of existing wires to a replacement of an existing meter socket, A-base socket adapter, or A-base meter may be performed by either UDCs or MSPs. (App. D, p. 20.)

2. Observation and procedures regarding safety related concerns involving customer life support, electrical hazards, physical hazards, unsafe customer premises, and vermin. (App. D, pp. 20-21.)

3. Observation and procedures regarding meter security and accessibility. (App. D, pp. 22-23.)

4. Observation and procedures regarding site verification. (App. D, pp. 24-26.)

5. The procedures that a meter worker must follow when installing or removing meters. (App. D, pp. 27-28.)

4. Meter Maintenance And Testing Schedule

The PSWG developed recommendations for the routine maintenance and testing of meters. The purpose of the meter maintenance and testing program is to ensure that the meters owned by an entity are accurate while the meters are in service.

Section III of Appendix D of the Workshop Report sets forth the maintenance schedule; when testing and maintenance can be requested; the statistical sampling of meters; the criteria for taking corrective actions; coordination with the MDMA regarding data quality; and clarification of the demarcation point for meter work.[5]

5. Meter System Testing

Section IV of Appendix D of the Workshop Report addresses the meter system testing requirements. For the purposes of the testing requirements, the Workshop Report describes the metering system as the meter itself, or the

[5] The demarcation point for meter work was also addressed in the meter installation portion of Section II of Appendix D of the Workshop Report.

meter and its attached equipment or modules. The purposes of the testing requirements are to: (1) ensure that the accuracy of the overall metering system is within Commission-required limits; (2) ensure safety in meter work procedures; and (3) provide consistent testing.

In general, there are seven meter tests that can be used. The type of tests that are used depends on the type of meter technology that is deployed. Attachment D-1 of Appendix D sets forth a matrix of which tests can be applied to a particular type of meter, and a description of each test procedure. The attachment recognizes that some of the tests may not apply to newer types of meters.

The seven meter tests are:

1. Voltage test: this test is necessary to ensure safety in meter work procedures; provide the meter worker with knowledge of the correct service voltage prior to any meter work; and confirm that no short-circuit or hazardous conditions exist in the customer equipment or panel.

2. Light load and full load test or customer-load test: this test is used to ensure that the meter is accurate during various load conditions.

3. Demand test: this test is used to ensure the accuracy of the demand function of the meter.

4. Register verification: this test ensures that the register parts and components are working to provide and retain accurate billing data and information.

5. Phase angle test: this test ensures that the correct wiring is in place for the meter system, which, in turn, affects meter site accuracy.

6. Separate element check: this test ensures that each element of the meter is in good working condition.

7. Burden test: this test is performed to check for proper operating conditions of the current transformer.

6. Test Standards

The test standards contain the standards that are to be used when conducting maintenance testing, and calibration of test standards. These standards are used to test the accuracy of the meters in the field or in the shop. The test standards also cover the situation of when a test standard is found to be out-of-calibration, and which meters need to be re-tested using an accurately calibrated test standard. These standards are described in Section V of Appendix D of the Workshop Report.

H. Data Security

The Workshop Report recognizes that in a direct access environment, meter data will be processed and communicated between many different market players and participants. This exchange of information can lead to data security risks. A summary of the data security issues is contained in Appendix F of the Workshop Report.

The PSWG notes that data security issues are being evaluated by the Data Quality and Integrity Working Group (DQIWG). The PSWG unanimously voted to refer data security issues to the DQIWG.

I. Future Of The PSWG

The PSWG categorized the different subject areas that it reviewed to determine what other issues it needs to address. Appendix E of the Workshop Report contains a list of the subject areas that the PSWG recommends be addressed, and a list of areas that do not require immediate work but can be

performed on a "convene as needed" basis. Two entities voted against the recommendations contained in Appendix E of the Workshop Report.

The PSWG states that its review of the following subject areas is now complete, and that the recommendations are contained in the Workshop Report:

- Meter hardware standards
- Meter communication standards
- Meter worker qualifications
- Meter installation procedures
- Meter maintenance, testing and calibration

The PSWG states that no additional ongoing work is needed with respect to the five subject areas referenced above. However, if a party believes that a change is needed with respect to any of the five subject areas, a party can trigger a possible review by the PSWG if the party files a petition to modify the Commission-approved permanent standard. If a petition is filed, the PSWG suggests that the Commission could issue a decision without the need for technical input from the PSWG. Or, the Commission could order the PSWG to reconvene, have it address the issue, and make a recommendation to the Commission for an eventual Commission decision. The PSWG does not believe, however, that the PSWG should be reconvened more often than once within a six-month period.

The PSWG recommends that the following three subject areas continue to be addressed:

- Electronic commerce/data flows, including issues regarding information related to meters and meter change outs, meter usage data, direct access service requests, account maintenance, etc.

- Validating, editing and estimating usage data

- MDM issues

The PSWG notes that the electronic commerce issues are to be addressed by the Rule 22 working group. Ongoing VEE and MDM issues are to be addressed and resolved in the UDC and MDMA meetings that were ordered by the Commission in D.97-12-048.

IV. Position of the Parties

A. In General

PG&E recommends that the Commission adopt all of the recommendations of the PSWG, including those which did not have unanimous support. PG&E states that for those recommendations which did not have unanimous support, the overwhelming majority of the PSWG participants still supported the recommendation.

PG&E points out that the recommendations were developed in a fair and open process, and represent a careful balancing of all interests. PG&E asserts that the Commission should not be tempted to adjust the majority recommendations in the report to cater to a few discontented voices.

The CEC believes that truly permanent standards should apply consistently to all providers of any given competitive service, whether that provider is a UDC or another firm. The CEC asserts that the PSWG's recommendations essentially exempt the UDCs' bundled services from the permanent standards. The CEC contends that this is fundamentally unfair because it imposes various costs on competitive providers of services by specifying standards for equipment and data processing. In contrast, the UDCs are not obligated to meet the same standards.

The CEC states that D.97-05-039 "clearly permits the three UDCs to enter the competitive metering service, even for bundled service customers." The CEC believes that now is an appropriate time for the Commission to be:

> "absolutely clear that all new metering and communication equipment installations for both direct access, PX [Power Exchange] Hourly Price, and ordinary bundled service customers should conform with any standards imposed as a result of the PSWG report. Otherwise, UDCs will be installing equipment that may not be compatible with future requirements and that will create new 'distribution system' stranded costs." (CEC Comments, pp. 10-11.)

The CEC also contends that the Commission should clarify that the UDCs' operations should conform to all MSP and MDMA requirements by a date certain for all customer activities, whether direct access, PX hourly price, or bundled service customers. The CEC suggests January 1, 2000 as an appropriate target.

The CEC contends that the presumption of technical competence of the UDCs as an interim measure was an appropriate presumption, but is not one that should carry over as a permanent standard. The CEC recommends that the Commission create and adopt a common set of equipment standards, data management protocols, and employee qualifications for each functional service across the entire industry so as to level the playing field for all market entrants.

The CEC contends that the standards should be designed to achieve well defined functional or performance objectives, or business or regulatory requirements. Some of the recommended standards lack clarity as to what objectives the standards are trying to achieve. If further efforts by stakeholders are necessary, the CEC recommends that the Commission specify the objectives, or the business or regulatory requirements, that it wants to achieve. If that is not possible, the CEC believes the Commission should direct the participants to begin their efforts by reaching a common understanding of the objectives. By defining the objectives, the CEC believes that the working groups will be able to complete their work more efficiently.

SCE recommends that the Commission adopt the unanimously supported recommendations as a new General Order, and that the resolution of any disputed issues be added to the General Order.

The joint parties caution that the Workshop Report must be read with the understanding that it was prepared by a body of stakeholders, many of whom were indifferent, or in some cases opposed to the Commission's goals for customer choice, interoperability, and national standards.

The joint parties take issue with the statement in the Executive Summary of the Workshop Report which states:

> "However, having universal interoperability and interchangeability between the meter and data retrieval technologies is not feasible without constraining technological alternatives."

The joint parties assert that the above statement is incorrect. The joint parties point out that relatively short and simple meter data messages can be carried by almost any standard communication network such as telephone, fiber, or radio. These communication networks can accept input from many different devices such as telephone receivers, modems, facsimile machines, etc.

The joint parties state that IEEE Standard 1397 specifies that an interface between a meter and a generic communications network can and should be developed. The IEEE SCC31 has a working group that is addressing a standard that will interface any meter to a radio frequency network, and be compatible with existing and planned Utility Communication Architecture (UCA)-compliant communications networks.[6]

[6] According to the comments of the joint parties, the UCA was developed by EPRI, and is supported by the Gas Research Institute.

The joint parties also take issue with the statement in the Executive Summary which states:

> "The PSWG agreed that the only area where universal interoperability and interchangeability could be realistically achieved at this time was at the interface between the meter and hand-held devices using an optical port."

The joint parties contend that this statement is technically incorrect. The joint parties assert that, in several instances, interoperability using different technologies and existing standards can be achieved. They believe that the standards being developed by the IEEE in support of the UCA activities will make it possible to develop meters that have a high degree of interchangeability within the next few years. The joint parties state that a better and more correct statement is:

> "At the present time interoperability and interchangeability between the same meter and data retrieval technologies generally requires matching of technologies, but this condition is expected to change in the next few years." (Joint Parties' Comments, p. 4.)

The joint parties contend that the PSWG did not discuss or vote on any item that suggested universal interoperability, or that a single meter could be used with any or all communication technologies that are currently on the market. They contend that meters with appropriate interfaces can be designed today to send their messages over nearly all well-designed communication media.

The joint parties contend that the issues of interoperability and open architecture are of concern to customers because they affect the compatibility of the customer's meter with the metering devices used by other ESPs. The joint parties feel that a direct access customer should be informed at the outset as to

whether the customer's direct access meter will be compatible with the metering systems of other ESPs, should the customer decide to switch.

B. Interconnection, Open Architecture, and Interoperability

The PSWG relied on Diagrams A and B in the Workshop Report to describe the points where standards can be used to define interoperability. Instead of using Diagrams A and B, ORA favors the use of the IEEE 1397 Architectural Reference model as the tool for defining interoperability and open architecture. ORA, as well as the other joint parties, believes that the IEEE model is broader, and provides a greater technical description to current and future component and systems developers.

ORA and the other joint parties also point out that the IEEE model uses the OSI model. According to the joint parties, the OSI model is an industry standard that defines data communication services in the form of seven distinct layers. This layering process allows a change to be made to one given layer, without impacting the remainder of the model. As a result, interoperability can be greatly enhanced without having to define a technology based on the OSI reference model. Diagrams A and B do not contain any references to the OSI model. Due to the incomplete communication specifications in Diagrams A and B, the joint parties contend that other providers who want to facilitate customer choice may face barriers to entry.

C. Meter Communications

1. ANSI C12.19

The Workshop Report included the comments by ABB, which favors the adoption of ANSI C12.19. ABB states that it was a participant in the development of ANSI C12.19. ABB states that the standard was expressly designed to encourage and enhance competition by reducing the time and effort

needed to add new and different metering products. To encourage this, a single data structure standard was used. This data structure can be used with multiple transport schemes.

ABB also states that the data structures were not modified to limit their application to any one media. Instead, the standard was designed so that the data structures could meet the needs of the simplest device and yet be expandable beyond any meter in production today. ABB also points out that the data structure allows manufacturers to keep their tables confidential, while other manufacturers who want to, can allow for interoperability.

NERTEC supports the adoption of ANSI C12.19, but disagrees with the unlimited exemption for existing meter types. NERTEC believes C12.19 provides an adequate structure for data definitions, format definitions, and common syntax, which will assure a level of interoperability, and provides a foundation for further standard development.

NERTEC believes that PSWG's recommendation to grandfather those meter types produced before March 20, 2000 from the C12.19 standard should be limited to a maximum of two or three years. NERTEC believes that an unlimited exemption may impair interoperability.

ITRON contends that the recommendation to adopt C12.19 will stifle and reduce competition. In addition, such a standard will be expensive to support and has several drawbacks. For example, ITRON points out that ANSI 12.19 was not intended to provide, and does not ensure or guarantee interoperability. Only a portion of the applications layer of the seven layer OSI model uses data models. No other layers of the OSI model have been standardized for meter reading except for some aspects of the optical and telephony physical layers.

ITRON also points out that the C12.19 standard was prepared for a traditional utility monopoly market, i.e., single utility access to multiple meter types, and was not intended to address issues relating to multiple supplier access. ITRON also contends that C12.19 contains mechanisms which increase the data transmission required to communicate information. This has the potential to increase message lengths, resulting in more expensive communication costs, and shorter battery life for battery powered products.

The California Competition Network, Enron, Schlumberger, and CellNet oppose making the ANSI C12.19 standard a mandatory requirement for direct access meters. They cite four reasons in support of their opposition. First, they contend that the standard is not necessary to make the market work. Second, such a standard will result in added costs because new functions will have to be added to existing and new products. Third, the Workshop Report states that C12.19 does not achieve interoperability. The standard would merely add one aspect of standardization to the meter interface, but would not result in an interoperable standard. They also contend that there is no consensus that the level of standardization in C12.19 is the right standard, nor even that it is an improvement. Fourth, the parties who support applying C12.19 to ESP provided meters, voted against applying the standard to UDC provided meters. They contend that for whatever reasons the UDCs had for voting that the standard should not apply to UDC meters, the same reasoning should apply to ESP provided meters.

The California Competition Network, Enron, Schlumberger, and CellNet also disagree with the statement in the Workshop Report that "moving the point of interoperability closer to the customer makes it easier to switch ESPs." They contend that ease of switching depends on maximizing customer

convenience and minimizing cost, and that the proximity of interoperability to the customer is not necessarily related to these two factors.

The CEC's comments take issue with the C12.19 recommendation. The CEC points out that the recommendation will allow unlimited grandfathering of non-conforming meter types because meter types approved before March 20, 2000 may continue to be installed past that date. The C12.19 standard is also a problem for radio frequency systems. In addition, the standard has technical features that permit the meter to be configured to communicate in proprietary protocols, which does not promote the standardization of metering data communications.

The CEC asserts that the C12.19 debate reflects a fundamental disagreement among the parties about whether standardization at the meter communications level will enhance customer choice and facilitate a competitive, innovative marketplace for electricity, metering and related services. The CEC believes that the Commission did not direct the PSWG to standardize meter communications. Instead, the CEC contends that the Commission's objective in unbundling metering services was to facilitate the direct access market by permitting a customer to choose among the ESPs. What is unclear is whether the meter communication standards furthers this objective. The CEC believes that there needs to be some real experience with the competitive provisioning of metering services before the issue of meter communication standards can be resolved.

PG&E states that it understands the concerns expressed in the minority opinions that the C12.19 standard should be mandated for all meter technologies since for many communication technologies, a C12.19 data format will not allow for interchangeability between meters. However, if a solid state meter using a Type 2 optical port had to comply with C12.19, that would permit

interoperability. PG&E states that such a requirement would allow customers to change ESPs, or to default to the UDC, without requiring that their meters be changed.

SCE is unclear about the intent of NERTEC's comments with respect to the C12.19 standard. If NERTEC's intent is to require the replacement of all meters that are not C12.19 compliant within three years, then SCE opposes the recommendation. SCE contends that such a requirement would result in increased costs to replace essentially new meters.

SCE points out that other parties oppose C12.19 on the basis that if the standard is required of new meters, it must have value, and therefore should apply to the UDCs' existing meters. SCE contends that those parties ignore that if the UDCs were required to replace their installed base of meters, this would greatly increase costs for those customers who choose to remain bundled customers. SCE supports the PSWG recommendation that meters installed before March 20, 2000 be grandfathered until the end of their service life.

ORA abstained from voting on the C12.19 standard. ORA points out that the standard addresses the format and communication of data tables of metered data. Although ORA favors a standard which promotes comparable measurement, the vote also included the proposal to grandfather existing non-complying equipment. ORA favors a two- or three-year exemption from compliance, rather than an unlimited exemption. ORA believes that the exemption discourages real customer choice because the meter manufacturers can continue to maintain and sell older equipment which does not have to meet the C12.19 standard.

The joint parties contend that the C12.19 standard should be adopted. The adoption of that standard will allow for the creation of a common data format whereby metering data can be consistently communicated and

shared with other systems. The joint parties contend that the C12.19 standard is necessary in order to have "plug and play" capability for the various meter-related components. However, the adoption of just the C12.19 standard is not enough. Instead, a complete set of interfaces must be defined in order to have plug and play components. No single standard can assure interoperability in a complex system. A set of standards is especially important when there are multiple suppliers offering the same kinds of products and services.

Some vendors have suggested that the Commission should let the market decide which standard, technology, or communication protocol is best. The joint parties state that allowing multiple proprietary protocols, and letting the market sort out the winners will work, but that consumers will lose out and end up confused. The joint parties favor the adoption of a common set of interfaces, rather than letting the market decide which protocols to use.

The joint parties disagree with some of the statements made by the parties that oppose the C12.19 standard. One of the statements is that "Interoperability of meters would require selection of a single communications technology...." The joint parties state that the technologies are not the constraining factor in achieving interoperability. Appropriate interface standards can be selected which would enable different vendor products to interoperate. The joint parties assert that if the vendor did not bundle the meter reading, transport, and metering functions into a single product or service using proprietary protocols, that product or service would be able to operate with another vendor's products. For example, the joint parties point out that several vendors have bundled the transport mechanism into their product and service offerings. As a result, there are many different proprietary transport mechanisms and interfaces. The joint parties contend that the C12.19 standard should be used by the different vendors for base level interoperability.

The joint parties also disagree with the concept that added costs should be the basis of rejecting a standard. That is because all market participants will be required to meet the standard, and competition will determine who is more efficient in meeting the requirements. In addition, standardization normally reduces the cost of products. The joint parties assert that the manufacturers who seek to preserve proprietary protocols do so because they are able to charge consumers a premium price for a unique product.

The joint parties take issue with the comment at page 20 of the Workshop Report that the ANSI C12.19 standard is not compatible with all radio frequency based technologies. That comment is true, but the joint parties point out that this standard is compatible with some radio frequency based technologies and products. They also state that the C12.19 standard does not always result in a longer message length or that the standard results in the use of more bandwidth. The joint parties contend that even if some meter manufacturer's message length increases slightly, that is a small price to pay for industry-wide interoperability.

The joint parties disagree with Itron's comment that the current C12.19 standard is flawed. The joint parties contend that the standard is complete, as witnessed by the fact that several manufacturers already have products for sale that incorporate the C12.19 standard. The joint parties state that the so-called "flaws" are in large part due to the changes that certain manufacturers have requested so that the standard can accommodate the needs of their existing protocols.

The joint parties also disagree with Itron's statement that the adoption of the C12.19 standard will stifle, not encourage competition, and that the standard will assist those firms who already have some aspects of C12.19 in their product. The joint parties contend that several firms have foreseen and

actively participated in the development of standards, and may indeed benefit from marketing standard products. However, the joint parties assert that it is not a wise policy to penalize firms who had the foresight to invest their resources in the development of a standard that will benefit all consumers through competition and consequent price reductions.

The joint parties oppose the unlimited "grandfathering" of non-complying metering equipment because it will limit the options of customers if meter manufacturers decide to maintain and sell older equipment. Also, allowing non-complying meters to have an unlimited life seriously compromises the purpose of achieving a minimum level of interoperability. Furthermore, the grandfathering may result in consumers having to pay for the inefficiencies of inflexible and fundamentally obsolete equipment which will have to be later replaced at a consumer and societal cost. The joint parties recommend that the grandfather clause be limited to a maximum of two years.

2. Visual Display

The Workshop Report states that ABB and NERTEC do not believe that all meters should be required to have a local visual kWh display. They contend that the two reasons for having a local display, the customer's need to verify the bill, and the UDC's need for access, can be met by different technologies. For example, a customer with a solid state meter may prefer the convenience of having a display inside one's home or business, or being able to access the data on a computer rather than walking outside to read the meter. ABB and NERTEC contend that requiring the use of a local visual display will limit product innovation and impose additional costs on the consumer.

PG&E supports the majority recommendation that the meter must have a kWh display on the meter that is accessible to an on-site meter reader.

PG&E contends that having a display on the meter provides the most basic level of interoperability because it gives all of the parties an opportunity to retrieve meter usage when other communication systems fail, and allows the customer to visually monitor usage. Without a visual meter display, PG&E asserts that it is more difficult to determine whether a meter is working or not. PG&E also contends that the visual meter display is consistent with bundled service, because UDCs currently require a digital kWh display for bundled customers.

PG&E is opposed to the proposal of ABB and NERTEC that customers be allowed to have a display in their home or business as a substitute for a display on the meter. PG&E contends that their proposal is unacceptable, and will destroy the basic level of interoperability provided by a visual display. In addition, PG&E asserts that the kind of technology favored by ABB and NERTEC has not been proven to be reliable or economic.

The CEC also agrees with the PSWG recommendation to require a visual display on the meter. The CEC, however, opposes the requirement that the display be limited to kWh. If the billing is based on determinant units other than kWh, the customer should be able to visually verify these determinants, and the standard should provide for this capability.

In Section V.4 of the Workshop Report at page 27, the need for "visual meter read requirements" was discussed. SCE contends that this should have read "back-up meter read requirements." SCE also contends that the wording was altered from the original text that was presented and approved at the PSWG plenary meeting on April 30, 1998. SCE asserts that the following is how the recommendation should have appeared:

> "There are two reasons for requiring a meter display. (1) For consumer protection. The consumer can verify that the meter read matches the bill and (2) for on-site interrogation when

another communications system fails. The PSWG agreed that the dials on an electromechanical meter are sufficient for these needs. An electronic meter shall display the total kwh energy consumption as a minimum. Additionally, a meter must have a physical interface to enable on-site interrogation of all stored meter data." (SCE Comments, p. 3.)

SCE asserts that through this omission, the meaning of the recommendation was changed. A visual display allows back-up meter reading capability for only cumulative meters or peak demand. For meters that store data on an hourly basis or at 15-minute intervals, a physical interface must exist to allow on-site retrieval of the data. SCE recommends that the Commission adopt the original text, which SCE asserts accurately states the intent of the participants. SCE also recommends that "stored meter data" should be defined as more that 15 days of data.

3. Type 2 Optical Port

The Workshop Report states:

"The PSWG recommends that optical ports not be required. If a meter has an optical port that is physically identical to an ANSI Type 2 optical port, then the optical port shall meet all the requirements of ANSI C12.18. Other optical port types are exempt from this requirement." (Workshop Report, p. 12.)

SCE states that the above recommendation simply says that a C12.18 optical port shall meet the standards for a C12.18 optical port. As written, the PSWG recommendation would allow any type of optical port to be used. SCE contends that if some interoperability is to be achieved, then there should be a standard for the method of communication. SCE recommends rewording the PSWG recommendation to state: "If an optical port is used, it must be a Type 2 port and meet ANSI C12.18."

SCE also recommends that to meet the requirement of back-up meter read capability, and the objective of interoperability, a Type 2 optical port should be required for any meter that stores more than 15 days of data. SCE states that other communication ports would not be prohibited, provided the Type 2 port is also provided. Customers would benefit from this recommendation because any new ESP selected by the customer would be able to communicate with this kind of meter.

The joint parties state that the data communication standards for a Type 2 optical port, i.e., the data format, the application layer, data link layer and physical layer protocols, are necessary to ensure interoperability. That is why the joint parties believe that these four data communication standards should be selected for as many technologies as possible. These four layers would promote the interoperability of different hand-held devices that read information from meters made by different manufacturers.

4. Interface Standards

The Workshop Report at page 15 states: "The Meter Communications Subgroup agreed not to identify or recommend standards for every interface level (numbers 1 through 5 in Diagram B)." The joint parties contend that the decision not to identify standards for every interface level is the equivalent of agreeing not to develop a complete set of standards for meter reading. The joint parties contend that if true interoperability is to be achieved, all of the pieces of the system need to be linked through a defined set of standard interfaces, which is something the PSWG did not do.

The joint parties disagree with the following statement which appears at p. 15 of the Workshop Report:

> "Interface (2) represents the data communications interface between the MDM/Meter Reading function and the Wide

> Area Network (WAN) System employed. The PSWG decided that it was not necessary to identify data communications standards for this interface. Since this interface is currently within a bundled function, PSWG did not explore any standards."

The joint parties contend that interface (2) is not a bundled function. They assert that a meter reader can interface the meter reading system to employ the Internet, the public switched telephone system, or many public packet data networks. The joint parties state that the interface is only bundled for the proprietary systems which have incorporated a wide area communications function into their product and service offerings. The joint parties contend that this bundled group of interfaces is actually several distinct interfaces. By not identifying a standard for the different interfaces, the joint parties contend that there will be no common link for these various interfaces.

The joint parties state that interface standards must be specified for every point at which it is desired to have interoperability. The AMRA standards committees are currently developing interface standards to address many of those interface standards. Significant effort is required by the manufacturers and standards groups to achieve a level of interoperability. The joint parties recommend that these efforts be monitored.

The joint parties also take issue with the PSWG's statements regarding the degree to which interchangeability is feasible. The joint parties argue that interchangeability of discrete components across technologies is feasible in many cases, such as using the Internet or public packet switching systems. The joint parties also assert that technology-specific interchangeability requires specifying a standard at every interface and is practical for many technologies at this time.

The joint parties also disagree with the PSWG's recommendation to define a level of interoperability at interface 3 of Diagram B, where the meter meets the communication connector. The joint parties contend that such a standard restricts customer choice by giving existing meter manufacturers a strong permanent position that excludes new meter manufacturers from entering the market. This occurs because the MDMA must have a complete set of all meter protocols in order to read all meters. New market entrants must convince all MDMAs to add another meter protocol to their library before the new meters can be marketed. In addition, it complicates adding new capabilities to meters because the meter protocols must be modified to support the new capability.

The joint parties state that the PSWG interpreted its mission to define a system that would facilitate the operating of an automatic meter reading (AMR) system. However, the PSWG ignored issues about linking the AMR system to other utility or customer systems. The joint parties contend that such an approach will lead to an AMR system that will be unable to communicate with any other automated utility system. The UCA framework is addressing these kinds of issues, and the joint parties recommend that these issues be considered in a future standards proceeding.

D. EDI Implementation

PG&E supports PSWG's recommendation that there be a migration to EDI. PG&E points out, however, that this change will require systems programming work. PG&E also points out that the cost of maintaining both the MEP and EDI will be a significant drain on programming resources. To minimize the costs of supporting two duplicative systems, PG&E requests that the Commission specify that all market players, i.e., UDCs, ESPs, and MDMAs, be required to move to an

EDI protocol, and that the MEP system sunset within six months of EDI implementation.

The CEC supports the use of EDI for MDMA data exchanges, but opposes the requirement that the Internet be the sole communication mechanism. The CEC asserts that the specification of a single communication mechanism will restrict innovation, and the development of an improved communication system for the electric service marketplace. The CEC believes that the use of the Internet, or any other communication means, should be a business decision between the parties involved in the data transaction. The CEC also opposes the requirement for the use of hyper text transfer protocol (HTTP) as the only allowable protocol. The CEC contends that the use of HTTP, or any other communication protocols such as file transfer protocol (FTP), should also be a business decision between the parties involved in the data transaction.

SCE supports a migration from MEP to EDI, but voted against the PSWG recommendation because of concerns about implementing the recommendation without adequate planning and testing. SCE's specific concerns are:

- Stabilization of the business transactions. It is more efficient to migrate to a replacement which includes all the required fields and transactions, than to continually modify the EDI protocol to incorporate new information or transactions. When the unbundling of meters occurs for all customers in 1999, the MDMA transactions are likely to be impacted, and the EDI format should incorporate these additional requirements.

- Impact on resources. The resources needed for this effort require a trade-off of other system changes that are currently planned for 1998 and 1999, and affects both UDC and ESP resources.

- Internet Reliability. Currently, EDI is most often transmitted through a value added network for reliability reasons. MDMA transactions are time critical and must be reliable, and the potential impact of a delay or loss of information over the

Internet needs to be evaluated. The reliability of transmitting large volumes of data over the Internet on a timely basis must be tested.

- Maintenance Costs. The costs of developing EDI transactions and the associated maintenance costs of security, disaster recovery, and outage activity must be factored into the evaluation of this change.

SCE recommends that the MEP-to-EDI transition team develop a project plan for the migration, and that the plan be published by June 1, 1999. The plan should review and comment on the areas of concern, detail a timeline for a transition to EDI, establish an EDI protocol, establish change control procedures, identify support resources, and address security and data integrity.

The joint parties encourage the Commission to ensure that a migration to EDI as the data exchange format takes place. The joint parties believe that the migration to EDI will establish specific standards which will allow for the effective electronic exchange of customer data. The joint parties also believe that the Commission should encourage parties who are involved in developing further standards for EDI and other communications to integrate their efforts, and to make future recommendations to the Commission as electronic commerce standards evolve.

E. Meter Data Management and Meter Reading

The Workshop Report recommends that the MDMAs be allowed to subcontract any of the activities for which they are approved. Although the CEC supports this proposal in principle, it opposes the recommendation at this time. The CEC is concerned that the proposal could result in a substantial change to the current metering and MDM regulatory framework, and could affect the accountability for data quality and integrity. Although the proposal states that

the MDMA would retain full responsibility for the activities of its subcontractors, the proposal would allow a certified MDMA to divest itself of its staff and become a manager of subcontractors rather than a fully qualified provider. The CEC contends that such a result is not consistent with the way in which these functions were originally structured.

The CEC also states that the Workshop Report seems to assume that the meters will only measure kWh. The CEC believes that the billing determinants for competitive services should be negotiated business decisions between the suppliers and consumers. The CEC asserts that any standardization efforts for metering and data communications should accommodate billing determinants besides, or in addition to, kWh.

SCE supports the PSWG recommendation to allow an MDMA to subcontract functions that relate to meter reading. However, the PSWG recommendation needs to be clarified to state that the MDMA is still responsible for the performance of any work that is subcontracted, and that the subcontractors must demonstrate that they are capable of performing those functions.

SCE points out that it is a supporting member of the Joint Petition to Modify D.97-12-048, which was filed with the Commission on May 29, 1998. That petition recommends that an MDMA may subcontract functions to an MSP. SCE recommends that the Commission incorporate the recommendations from the Joint Petition with those from the PSWG report.

SCE states that it is agreeable to the MDMA performance exemptions in Section VI of Appendix C of the Workshop Report, but voted against the item because of a lack of specificity. SCE supports the recommendation that in the event of a large catastrophe, performance be reported separately and not counted against the MDMA.

SCE also supports the principle that data estimated due to meter failure be exempt, so long as the ESP and the MDMA have taken appropriate steps to remedy the situation. SCE recommends that the estimated data exemption only apply if two conditions exist: (1) the exemption should only occur after verification by manual reading that the meter has failed and there is no problem

with the remote reading technology; and (2) the exemption cannot occur for an account more than once in a 12-month period. SCE asserts that these two conditions will prevent abuse of the exemption and create an incentive to replace or repair faulty meters.

F. VEE

Enron points out that the Workshop Report has identified two separate procedures to perform high/low range checks on monthly meter data. The first procedure that is recommended by the PSWG is to use a simple procedure for determining the appropriate high and low limits for validating data. This procedure sets the high limit to 200% of historical average daily usage (ADU) and sets the low limit to 40% of historical ADU. The current period ADU has to be within this range; otherwise, the meter reading must be estimated.

A second procedure, which Enron contends is more complicated and is used only by PG&E, utilizes valid data ranges based on the computation of the mean and standard deviation of the ADU using the previous day's ADU. This procedure attempts to take into account any abnormal usage patterns such as weather, geography, etc. Enron contends that this procedure requires a large set of data to define a reasonable statistical sample for the region and day in question. Enron argues that only the UDCs have sufficient information in a database to calculate the parameters needed for high/low validation. Also, the UDCs' statistical sample greatly exceeds the totality of data for all direct access customers, i.e., the UDCs have the advantage of using both direct access and bundled customers to form the validation database. Enron asserts that this procedure would place the ESPs who are MDMAs at a disadvantage.

Enron supports the adoption of a single, consistent standard for a high/low range check, and believes that the PG&E procedure is inconsistent with this objective.

PG&E's comments favor the adoption of the recommendation regarding the choice of using one of the two high/low meter data range checks for monthly meter VEE. PG&E points out that under the first procedure, any read that falls outside of this range would be re-read and estimated. MDMAs that use this method would be allowed to refine it based on optional trend factors that take into account peer group usage based on demographics, climatic areas, and customer class. The second of the two alternate methods uses PG&E's existing high/low range check method, which is a more refined and complicated procedure.

PG&E points outs that the VEE technical subcommittee that analyzed this issue, which included both Enron- and CellNet, unanimously recommended to the PSWG that the permanent VEE standards include PG&E's monthly procedures as an option for all market participants. When the recommendation was put to a vote, Enron voted against including the PG&E procedure in the VEE procedure. CellNet voted in favor of the recommendation during the vote, but then changed its position two days before the Workshop Report was filed.

PG&E contends that neither Enron nor CellNet have alleged that PG&E's method lacks validity or soundness. PG&E also points out that the PG&E method is an option, and the MDMAs are free to use the first method. If the MDMA chooses to use the first method, there will be no additional record-keeping burden on the MDMA or the ESP.

As for the claim that the two alternate methods may lead to different validation results, PG&E contends that such an argument applies to all of the

validation processes for monthly data. Thus, the first high/low range check procedure can also lead to inconsistencies among the different MDMAs.

PG&E asserts that if the PG&E procedure is eliminated, such a result will not promote efficiency in the marketplace. PG&E contends that the adoption of a single, consistent standard will not give the MDMAs the flexibility to implement the best VEE routines for their customers. PG&E contends that its method does not disadvantage any market participant, and produces reasonable results. PG&E states that it makes no sense to have PG&E incur the cost of substantial changes to its meter reading and billing systems to implement the first procedure, when PG&E already has in place a perfectly acceptable alternative that is supported by virtually the entire PSWG.

Contrary to Enron's contention that the validation is performed in the handheld devices used by PG&E's meter readers, PG&E asserts that it is PG&E's billing system which passes the range checks to the handheld system. PG&E contends that its handheld system does not keep historical usage history, and therefore the validations cannot be performed by simply using the handheld devices.

G. Meter Worker Qualifications

The CCUE supports the recommendation to adopt the meter worker qualifications that are detailed in Section I of Appendix D of the Workshop Report. CCUE points out that although the standards are substantially different from current utility requirements, they are sensitive to the needs of the marketplace for flexibility, and the standards reasonably protect safety.

SCE supports the meter worker classes and supports a certification process for meter workers. SCE believes, however, that the PSWG recommendation fails to include input from the UDCs and MSPs. SCE proposes that an advisory board

consisting of UDC and MSP representation be responsible for the review of training materials for meter worker certification, and that the board design and perform the practical tests for meter worker classes 4 and 5. SCE contends that its proposal offers the advantage that experts in the metering industry will be involved in the review process, and that the process will promote consistency. SCE proposes that the following be added to the PSWG recommendation:

> "The Meter Certification Advisory Board
>
> The Meter Certification Advisory Board (MCAB) is granted authorization by the CPUC to administer the authorization process of MSPs' training programs and the certification of Meter Class 4-5 workers. The board has independent decision making ability over the safety of meter installations, however, certain issues will require CPUC approval.
>
> I. Responsibilities of the Meter Certification Advisory Board
>
> 1. Reviewing the qualifications and training materials of MSP to perform training of meter worker classes 1-3. Once a MSP receives authorization from the MCAB it can issue individual Meter Worker Classes 1-3 certifications.
>
> 2. Develop and administer the exam process for Meter Worker Classes 4-5 and determine the process for maintaining certification.
>
> II. Administration of Responsibilities[7]
>
> The responsibilities of the MCAB could be performed by hiring a consultant. The MCAB will provide guidance to the

[7] This subject heading was deleted from the Workshop Report.

> consultant to implement the board's responsibilities. If a contract is needed, the board will present it to the CPUC for approval. The cost recovery of the contract would be from fees from MSPs and exam fees.

III. Appeal and Dispute Process

> The CPUC is responsible to resolve any dispute or claim that the MCAB decision were [sic] inappropriate or unfair.

IV Membership of the Meter Certification Advisory Board

> The board consists of highly qualified persons experienced in the electrical metering field. It is necessary that these persons are considered experts to administer the standards of safe and accurate meter installation. Because metering is connected to the electric distribution facilities, representation from the UDCs is required on the MCAB. The MCAB has an equal number of MSP representatives, which are selected by a voting process from MSPs. A chair will be appointed by the CPUC." (Workshop Report, pp. 37-38.)

The CEC points out that the PSWG proposes that the MWCO be created, while SCE prefers that the MCAB be created. The CEC states that both of these proposals recognize the need for a collaborative oversight of selected aspects of the MSP functions. However, the CEC asserts that the proposals are not comprehensive enough to address how MSP and MDMA functions will be overseen.

The CEC believes that the marketplace needs a workable approach to qualification and oversight of the MSP and MDMA functions for the long term. The CEC contends that the recommendations are not appropriate beyond the near term. If the functions are truly going to be competitive, the oversight

approach should treat UDCs and UDC affiliates the same as it treats non-UDC providers. Also, the DQIWG suggests the need for the ongoing recertification of these entities, scheduled performance audits, and regular performance monitoring reports. The CEC also states that a majority of the PSWG participants favor a proposal to further unbundle the MDM function, and allow firms to be certified to perform any subset of MDM activities.

The CEC believes that the Commission should start a process to develop permanent arrangements to qualify and oversee providers of metering and MDM services as soon as possible. In the area of oversight, the CEC believes the Commission should explore the feasibility of establishing direct authority over the MSPs and the MDMAs, either by the Commission or by another government agency. The CEC believes that these functions should be overseen by an appropriate authority.

H. Meter Installation

The IAEI commented that the definition of "meter" has not been determined. IAEI point out that if the utilities continue to own, operate, and maintain metering transformers as part of their distribution facilities under their exclusive control, the metering transformers will not be covered by the National Electrical Code (NEC). If customers own, operate, and maintain metering transformers as part of the meter installation, the installation will be covered by the NEC. If the NEC applies to customer-owned metering transformers, the following would have to occur:

1. All wiring and equipment that is installed shall be listed and labeled. This process could take six to twelve months or longer and may result in equipment cost increases.

2. The NEC would require that the transformer be sized based on the connected load that is served, which would result in an

increase in the cost of the customer's metering installation. Currently, the utilities size current transformers based on the demand load.

3. If customers are responsible for the installation of metering transformers and auxiliary equipment, the NEC would require such installations to be inspected by the authorities having jurisdiction. This would require additional staffing and training of inspectors, which may increase permit fees that would be passed on to the customer. At the present time, the authorities having jurisdiction are not required to inspect metering transformers and auxiliary equipment installed by a utility because the installation is not covered by the NEC.

The IAEI supports the installation and maintenance of all secondary wiring, including metering transformers, meter loop wiring, test switches and phasing transformers, by the utility.

I. Future Of The PSWG

EPRI's comments about the future work of the PSWG are contained in the Workshop Report. EPRI states that the process proposed by the PSWG is inconsistent with the direction in D.97-12-048 at p. 48 which stated that: "The PSWG should also indicate whether other standards are expected in the future, and recommend a process for reviewing possible future changes to the permanent standards."

EPRI points out that there was insufficient time during the PSWG deliberations to thoroughly identify the technical requirements, and to review meter and data communication standards. EPRI notes that several meter and data communication standards will be approved by national organizations over the next several months. Once these new standards are adopted, the standards will ensure interoperability of diverse meeting and communications systems in California.

EPRI contends that as a result of the failure of the PSWG to specify key data communication standards, proprietary standards will be used at key interfaces. The use of proprietary standards will create barriers to the development of innovative products and services that other vendors could provide. That is because these vendors will need to build their products to conform to multiple proprietary data communication standards, which will increase costs and foster a fragmented, and less vibrant marketplace. In addition, if the ESPs procure products and services that utilize proprietary standards, the customers of those ESPs will tend to be "locked in" to those products or services because of incompatible metering and data communication standards.

In order to resolve this problem, EPRI recommends that a voluntary group of participants be formed to continue to address these kinds of interoperability standards. Ideally, this group would be made up of the entities which participated in the PSWG process. EPRI recommends that this group be charged with the following:

1. Identify new or changed technical requirements which impact the meter and data communication standards, and assess the impact of these changes on the installed systems or systems to be installed.

2. Identify and assess for possible implementation, new meter and data communication standards that are published or that are up for final approval from the principal national or international standard committees.

3. Prepare recommendations to appropriate standard bodies to enhance existing standards or develop new standards.

4. Prepare recommendations to the Commission for the adoption of new standards when a consensus has been reached that the new standard would foster a vibrant marketplace, or be of benefit to

market participants and customers.

5. Work with entities in other states that are actively engaged in the direct access of electricity to support the adoption of national international metering, data format, and data communication standards. Particular attention should be paid to addressing security and the adoption of security architecture.

The joint parties' comments reflect the same views as EPRI's comments. The joint parties recommend that EPRI's suggestion to form a voluntary group of participants be adopted.

V. Discussion

A. Introduction

The work on meter and meter-related data standards was initiated in D.97-05-039 and D.97-05-040 when the investor-owned electric utilities were ordered to confer with interested parties to develop such standards. A workshop on meter and data communications was held in July 1997, and a workshop report on the subject was filed on July 25, 1997. This was followed by the issuance of D.97-10-087. In that decision, the Commission adopted the approach that the provisioning of meter services and MDMA services be provided through the UDC or an ESP. In addition, the Commission adopted some interim metering standards and criteria as part of the direct access tariffs that were approved in that decision.

In D.97-12-048, the Commission further refined the interim metering standards. The refinements were needed to make clear what interim standards all direct access meters would have to meet, to make the meters available to the public in a timely manner, and to allow an unbundled metering environment to occur. The Commission stated that it would revisit the interim standards and develop permanent metering-related standards with the help of the market

participants. Today's decision addresses the recommendations in the Workshop Report, and adopts permanent meter and meter data standards.

The process that the Commission and the market participants have gone through to develop recommendations regarding permanent standards has been of immense benefit to the Commission. As the Commission noted in D.97-05-040 at page 48, the review and development of permanent standards should involve all of the market participants since many of the standards are technical in nature and beyond the expertise of the Commission. This process appears to be well suited for reaching resolution of numerous operational issues, and for identifying contested issues.

Much of the debate that occurred among the PSWG participants appears to center on what the Commission meant by the terms "open architecture," "interconnection," and "interoperability." Some of the parties feel that the Commission should adopt standards for all possible interfaces. Others feel that the Commission should adopt broad standards, and let the market and the market participants decide what other standards should be adopted.

We noted in D.97-12-048 that open architecture has been described "as an environment where the specifications for interfaces, services, protocols and data formats are vendor-neutral, published, freely available, and agreed upon in an open process under the auspices of a recognized national or international standards body." (D.97-12-048, p.9.) The Commission stated that open architecture allows interoperability to occur. Interoperability refers to the creation of specifications that allow dissimilar devices or systems to communicate with each other in a way that is transparent to the users. Through interoperability, customers are able to choose from multiple suppliers of electric services.

In adopting permanent metering standards, we want to avoid a situation where the Commission is in a position to dictate what kind of specific technologies manufacturers must use. Such a result would tie the hands of meter manufacturers, and could lead to a situation where a meter meets the California standards but could not be used outside the state. The Commission recognized this tension when it prepared its November 1993 report to the Governor, which was entitled "Enhancing California's Competitive Strength: A Strategy For Telecommunications Infrastructure" (Infrastructure Report).

The Infrastructure Report addressed a strategy for encouraging the development of an advanced public telecommunications network in California. As part of this strategy, the Commission said that "state policy should not dictate specific technologies to deliver advanced telecommunications, nor select specific firms that will be responsible for infrastructure development." (Infrastructure Report, p. 25.) We believe that the same approach should be used in the unbundling of meters and meter-related services, and in the adoption of permanent operating standards.

Many of the same concerns that were expressed in the Infrastructure Report apply to the new direct access electricity market as well. For example, the Infrastructure Report recognized the rapid pace of technological progress, and how advanced telecommunications were relying on the use of computing technology. The report also recognized the following four disadvantages with having the government plan the telecommunications infrastructure:

> "First, public decision-making is inevitably slower than that in the private-sector because of due process requirements. Second, government agencies are not generally able to sustain a state-of-the-art level of technical expertise because of budgetary and personnel constraints. Third, many of the most important innovations will continue to emerge from firms outside the universe familiar to

> regulators as the lines between the telecommunications, computing, information and entertainment industries continue to blur. Fourth, the de facto standardization imposed by a centralized government decision can freeze network innovation, by precluding the incremental and continuous improvement in the state's overall infrastructure that independent decisions made by many different firms can produce." (Infrastructure Report, p. 26.)

The opening of electricity markets to direct access has resulted in technological changes and advancements. Meter manufacturers offer a variety of different products and services, and transfer of meter data has increasingly relied upon Internet protocols and other communication technologies. The concerns about the government planning and regulating technological changes hold true today as well. If we adopt standards which are too narrow in scope, there is a danger that other technological innovations will render our standards obsolete. Thus, the Commission's approach should be one of open architecture, i.e., an open platform, which provides opportunities for all market competitors on an equal basis. The adoption of standards should be broad enough so that no one technology is favored over another. At the same time, the standards must ensure the continuing safety, accuracy and reliability of the meters and the meter data. These safety, accuracy, and reliability concerns are what drives our desire for standards. The standards and requirements which we adopt today meet these objectives.

We decline at this time to adopt SCE's recommendation that the permanent meter and meter data standards be incorporated into a General Order of the Commission. We anticipate that there are likely to be other changes and modifications to the standards as time evolves. Rather than change the General Order each time a change is made to the permanent standards, we would rather make the changes by way of a Commission decision. Perhaps in the future,

when the market participants have adjusted to the permanents tandards, and no other changes are likely, a General Order could be issued which details all of the permanent standards in one convenient reference.

When the Commission moved to unbundle metering services, many of the "participants expressed confidence that open platform standards could be developed within several months." (D.97-05-039, p. 15.) Although many agreements have been reached among the market participants, there are a number of other issues that still remain contested. It may be that concerns regarding open platform standards should best be left to the marketplace, rather than settled in the regulatory arena. We first turn our attention to the uncontested recommendations.

B. Unopposed Recommendations

1. Meter Equipment

In D.97-12-048, the Commission adopted interim standards for direct access meters. The interim standards required the direct access meters to meet at least one of the four following criteria:

> "(1) Existing meters that meet the direct access requirements as detailed in D.97-05-040 and D.97-10-087, and that meet all of the local UDC's installation, safety, accuracy, and reliability criteria as of the date of this decision; or
>
> "(2) Meters which presently meet the applicable sections of the following ANSI standards:
>
> - ANSI C12.1 Code for Electricity Metering
> - ANSI C12.6 Marking and Arrangement of Terminals for Phase-Shifting Devices Used in Metering
> - ANSI C12.7 Requirements For Watthour Meter Sockets
> - ANSI C12.10 Electromechanical Watthour Meters

- ANSI C12.11 Instrument Transformers for Revenue Metering, 10 kV BIL through 350 kV BIL (0.6 kV NSV through 69 kV NSV)
- ANSI C.12.13 Electronic Time-of-Use Registers for Electricity Meters;
- ANSI C12.20 0.2% and 0.5% Accuracy Classes; or

"(3) Meters which meet the Independent System Operator Specification MTR1-96 (Engineering Specification for Polyphase Solid State Electricity Meters for Use on the ISO Grid); or

"(4) Existing in-service meters which meet local UDC's installation, safety, accuracy, and reliability criteria as of the date of this decision, and which can be retrofitted with a device to meet these criteria as well as the direct access requirements as detailed in D.97-05-040 and D.97-10-087. If an optical pick-up type retrofit module is used, the meter shall pass the sunlight interference test described at page 5 of Appendix A of the Meter and Data Workshop Report."

In addition, the meters used for direct access must meet the following requirements:

"(1) If the meter has metering communications capabilities, the meter must meet the applicable provisions of the Federal Communications Commission (FCC) Regulations, Part 15, subpart B (47 Code of Federal Regulations), or it must have a Type 2 optical port or other suitable means of on-site or remote interrogation.

"(2) If the meter or meter devices are certified by the manufacturer, the manufacturer's certification must conform to the applicable provisions of ANSI C12.1 (Code for Electricity Metering) and ANSI C37.90.1 (Surge Withstand Capability (SWC) for Protective Relays and Relay Systems).

> "(3) The meter or the meter data system must be capable of providing and storing required interval data for a minimum of 35 days." (D.97-12-048, pp. 14-15, footnotes omitted.)

Attachment A of this decision provides a summary of the permanent meter equipment standards which the PSWG recommends be adopted. The PSWG recommendations are found in Appendix A of the Workshop Report,

which we incorporate by reference.[8] Appendix A of the Workshop Report provides a detailed explanation of each "meter product"[9] standard; the certification testing requirements that the meter products must comply with; the filing of a meter type self-certification document with the Commission by the meter product manufacturers, and the posting of compliant meter types on the Commission's web site; required stickers, and sealing and locking hardware; labeling of the manufacturing date on the meter product; and the procedures to follow to rebuild, retrofit, or repair meter products.

A comparison of the recommended meter product standards with the interim meter standards that we adopted in D.97-12-048, reveals that the PSWG participants believe that many of the interim standards should remain permanent. In addition, several other ANSI standards have been added to the list of recommended permanent standards. All of the recommended standards appears to related to safety, accuracy, and testing concerns. None of the recommendations appear to prescribe that meter product manufacturers must adhere to a particular type of technology.

No one opposes the adoption of the meter product recommendations. We will adopt the recommendations set forth in Appendix A of the Workshop Report, as summarized in Attachment A of this decision. We

[8] We also incorporate by reference all of the other provisions in the appendices to the Workshop Report that we have adopted in this decision.

[9] The Workshop Report defines a meter product as: "A device which measures, calculates, records and/or communicates energy consumption data for the purpose of determining the financial obligation for an entity consuming energy. Shall include any optional circuit boards, devices, or modules enclosed within the meter cover." (Workshop Report, App. A, p. 1.)

will also require that an additional interim standard be made a part of the permanent standards. For meter products which store and provide interval meter data, the meter must be capable of providing and storing the interval meter data for a minimum of 35 days. (See D.97-12-048, p. 15.) This will ensure that the meter is capable of storing the meter data for sufficient periods of time.

Except as provided for below, effective 120 days from today, all direct access meter products shall meet the requirements set forth in Attachment A, in accordance with the time table set out at page 1 of Appendix A of the Workshop Report.

One of the meter product standards calls for the filing of a meter type self-certification document. The purpose of the document is for the various meter product manufacturers to certify that its meter types meet the Certification Testing Requirements that are contained in Section II of Appendix A of the Workshop Report. (Workshop Report, App. A, Section III.) We must establish internal procedures to handle these kinds of filings. Although the standard calls for the self-certification document to be "filed," we do not believe that the document should be filed with the Commission's Docket Office. Instead, this self-certification document should be submitted to the Energy Division. The Energy Division shall be responsible for developing procedures for accepting and reviewing these kinds of documents. The Energy Division shall also determine how the self-certification document should be phrased, and whether any supporting documents should be required at the time of submission. The Energy Division shall have 90 days from today to develop the procedures that we have just described, and to make those procedures available to all interested persons after the 90 days has elapsed.

During the review process, the staff of the Energy Division shall be entitled to obtain from the meter product manufacturer all back up

documentation that is related to the certification testing requirements for the meter that the manufacturer is certifying. If the Energy Division determines that the self-certification document for a particular meter is in order, the Energy Division shall post the model number of the meter type, along with the name of the meter product manufacturer, on the Commission's web site. The design of the Commission's web page needs to adequately describe the purpose of the list so that viewers of the page understand its purpose.

As the name of the self-certification document implies, we shall require that the document be verified by an officer or authorized employee of the manufacturer with the following statement:

"

DECLARATION

I, (print name and title) _____ hereby certify that I am empowered to act on behalf of _____ (manufacturer's name) and to submit this self-certification document on its behalf. I declare under penalty of perjury under the laws of the State of California that the above statements are true and correct, and that if any documents are furnished in connection with this self-certification document, that those documents are true and correct copies.

Dated _____, at _____.
(date) (place of execution)

Signature: _____"

If the verification is made outside of California, the verification must be made by an affidavit sworn or affirmed before a notary public.

One of the unresolved issues is what should be done about the direct access meters that do not meet the requirements of Attachment A, but do meet the interim standards that we adopted in D.97-12-048. The Workshop

Report does not address the issue, and none of the parties who commented on the Workshop Report directly answers this issue.[10]

The Commission adopted the interim meter standards as a way to ensure that direct access meters would be made available to the public in a timely manner. We should not punish meter manufacturers and the MSPs, who relied upon these interim standards to make meters available to the public, by immediately discontinuing their use. Instead, we should allow MSPs to continue to offer direct access meters which meet at least one of the four meter criteria that are set forth in D.97-12-048 at pp. 14 and 15. The MSPs may continue to offer direct access meters which meet those interim standards for the next 120 days. Direct access meters which only meet the interim standards, as adopted in D.97-12-048, shall be retired from service no later than June 30, 2002.[11]

It shall be incumbent upon the meter product manufacturers, the UDCs and the ESPs to ensure that meter product standards have been adhered to. Section H (2) of Appendix A of D.97-10-087 provides that it is the responsibility of the ESP or the UDC, as the MSP, to ensure that the interval meter used for direct access complies with the Commission's meter design specifications. The failure to comply with the requirements for meters or meter services can lead to the remedial actions that are provided for in Section H (8) of Appendix A of D.97-10-087. In addition, the Commission could bring an

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[10] Some of the parties did address the grandfather exemption that the majority of the PSWG members recommended be adopted as part of the ANSI C12.19 recommendation.

[11] The web page which lists the meters that are in compliance with the meter product standards shall also contain a description of how meters which meet the interim standards set forth in D.97-12-048 can be used.

enforcement action against the ESPs or UDCs in accordance with the Public Utilities Code. We will continue to expect that the ESPs and the UDCs, as the MSPs, will ensure that the permanent meter product standards that are summarized in Attachment A are adhered to.

2. KYZ Contact Output

In Section II.1. of Appendix B of the Workshop Report, the PSWG unanimously recommends that if a meter product has a contact output, it should be KYZ pulses in accordance with ANSI C12.1. There is no requirement, however, that the meter product must have a contact output.

We shall adopt that recommendation as reflected in Attachment B of this decision.

3. Meter Password Authorization

The recommendation for the meter passwords allow an ESP to issue varying levels of access to a meter for which the ESP is responsible. The ESP would also be required to issue a password to the UDC for audit purposes and for other scheduled functions. No one voted against the recommendation. (Workshop Report, App. B, Section IV.)

We will adopt the recommendation as reflected in Attachment B.

4. Meter Data Management

The PSWG unanimously recommends that the MDMA provide technical and business support to the ESPs and UDCs during normal business hours. In addition, the recommendation provides that the MDMA will provide access to a support pager, which is to be made available at all times, to address issues about the availability of the MDMA's server. These recommendations are set forth in Section IV of Appendix C of the Workshop.

We will adopt the recommendation for the MDMA technical and business support that is set forth in Section IV of Appendix C of the Workshop Report, and which is summarized in Attachment C.

5. Meter Maintenance And Testing Schedule

Interim meter maintenance standards were discussed in D.97-12-048 at p. 19. During the interim period, the Commission required meter maintenance to be performed in accordance with the UDC's practice. Section III of Appendix D of the Workshop Report contains the meter maintenance and testing schedule. We will adopt these provisions as the permanent meter maintenance and testing schedule for direct access meters. (See Attachment D.)

6. Meter System Testing

The purposes behind the testing of the meter system are described in Section IV of Appendix D of the Workshop Report. Attachment D-1 of Appendix D describes each of the test procedures. No one has objected to the meter tests. We will adopt Attachment D-1 of Appendix D as the permanent meter system tests.

7. Test Standards

The calibration and maintenance of test standards are described in Section V of Appendix D of the Workshop Report. No one has objected to these test standards. These provisions are adopted as the permanent test standards for calibrating and maintaining meter test standards. (See Attachment D.)

8. Data Security

The PSWG recommends that data security issues be addressed by the DQIWG. The DQIWG was formed in D.97-12-090 to evaluate any gaps or flaws in the rules and procedures for data information exchange. We will address data security issues, of the kind that were raised in Appendix F of the

Workshop Report, in a decision which addresses the recommendations of the DQIWG. The DQIWG filed an "Interim Report To The CPUC" on August 24, 1998. The final report of the DQIWG is expected shortly.

C. Contested Recommendations

1. ANSI C12.18 Type 2 Optical Port Standard

As part of the permanent meter product standards, we adopted the unanimous recommendation that if a Type 2 optical port is used, the port must meet the C12.18 standard. SCE recommends that if an optical port is used, it must be a Type 2 optical port and meet the C12.18 standard.

We decline to adopt a requirement that would mandate the use of a Type 2 optical port for meter products that use an optical port. Meter product manufacturers should be free to use other kinds of optical port types. The Commission adopted a similar position with respect to meter mounts. In D.97-12-048, the Commission adopted an open architecture platform with respect to meter connections. Instead of limiting meter connections to only meter sockets, the Commission allowed "ANSI approved sockets or other mounting options agreed to between the manufacturer and the UDC and ESP." (D.97-12-048, pp. 11-12.)[12] The same type of open architecture should apply to optical ports as well. We believe that this kind of approach will give manufacturers more flexibility in responding to market conditions and demands.

[12] SCE's comments to the Workshop Report state that non-socket based meters should be prohibited until nationally recognized standards exist for these kinds of meters. We believe that the meter product standards in Attachment A, and the market participants, will ensure that non-socket based meters meet all necessary safety, reliability, and accuracy standards.

If, however, a Type 2 optical port is used, that port will need to meet the C12.18 standard.

2. ANSI C12.19 - Utility Industry End Device Data Table

The debate over the ANSI C12.19 standard was the most heavily contested issue, and the issue with the least consensus. The C12.19 standard involves the issue of whether meter product manufacturers should be required to communicate data in the data format specified by C12.19. The majority of the PSWG members recommend requiring all new meter types released after March 20, 2000 to meet the C12.19 standard. Meter products released before that date would be exempted from the C12.19 requirement for the duration of their commercial product life.

The Workshop Report pointed out several drawbacks with the C12.19 standard. The Workshop Report acknowledged that if the C12.19 standard is adopted, the standard may not by itself allow for a plug and play environment.[13] For example, if a customer has a meter which communicates over a microwave frequency, and the customer switches to an ESP that reads meter products via a telephone line, the meter will have to be replaced or retrofitted to accommodate the new communications channel. The Workshop Report also acknowledges that the C12.19 standard "would not be compatible with all radio frequency based technologies," and that it "would have an impact on bandwidth and response times." (Workshop Report, p. 20.)

The positions taken by Itron, and the California Competition Network, Enron, Schlumberger, and CellNet provide some good reasons why the

[13] The plug and play argument is one of the reasons why the proponents favor the C12.19 standard.

C12.19 standard should not be required. They point out that the C12.19 standard is not necessary to make the market work, nor will it ensure that interoperability will occur. This is supported by the comments of the joint parties, which indicate that various committees are working on a national level to develop communication interface standards for specific technologies. If that is the case, meter product manufacturers will feel the pressure to adopt these kinds of standards on a voluntary basis so that their products can interconnect with other products and services which use the same voluntary standards. In addition, requiring that the C12.19 standard be adopted could unduly influence how these standards are ultimately shaped.

The positions of Itron, Schlumberger and CellNet are also persuasive given their perspective as actual meter product manufacturers. They point out that the adoption of the C12.19 standard will result in added costs because the meters will have to add new functions. They also point out that there is disagreement on whether the C12.19 standard is the right standard to choose, and that the meters of the UDCs will not be required to meet the same standard. We are uncomfortable in mandating a standard that creates a tier of C12.19 compliant meters and a tier of non-complying meters. Unlike industry standards which are voluntary, government standards are not voluntary, and as such, should only be adopted after careful consideration, and only when the public interest demands such action.

We also agree with the opponents of the C12.19 recommendation that exempting meters built on or before March 20, 2000 would result in the continued use and continued availability of meters which are non-C12.19 compliant, and result in additional costs for those manufacturers who have to comply with the C12.19 standard. Also, instead of achieving interoperability, the unlimited exemption of meters built before this date would discourage

interoperability because non-complying meters issued before that date could still be used and sold.

Given the acknowledged drawbacks of the C12.19 standard, the concerns that other market participants have raised, the lack of any consensus, and the possibility that voluntary standards may be developed in the near future, we decline to adopt the C12.19 standard for meter communications. Furthermore, this standard is not required to ensure safety, accuracy, or reliability. We are also wary of adopting any standard which is opposed by the manufacturers who will actually be developing and bringing such meter products to the market.

3. ANSI 12.21 and ANSI 12.22[14]

No one expressed any views about these two communication specifications. Since neither of the two specifications has been approved yet by ANSI, we decline to take any action. Should these specifications be approved by ANSI in the future, and a market participant feels that the two communication specifications should be included as a standard, the participant may file a petition to modify the permanent standards that we adopt in this decision.

4. KYZ Consumer Protection

The Workshop Report notes that most energy management systems utilize KYZ outputs. A majority of the PSWG recommends that if a new direct access meter will not be compatible with a customer's energy management

[14] The C12.21 specification is referred to as the protocol specification for telephone modems, and the C12.22 specification is referred to as the meter interface to network protocol gateway.

system because of its KYZ outputs, the ESP must notify its customer of this incompatibility. (Workshop Report, App. B, Section II.2.)

We will adopt the notification recommendation. It is important for a direct access customer to know whether a planned meter purchase will operate seamlessly with the customer's other systems. The PSWG recommendation would allow customers to find out ahead of time of possible incompatibilities. Our adoption of this standard is reflected in Attachment B.

5. Visual Meter Read

SCE contends that the intent of this recommendation was to provide for "back-up meter read requirements," and not to provide a visual meter display. As a result, SCE asserts that the meaning of the recommendation has changed because a visual meter display requirement allows back-up meter reading capability for only cumulative meters or peak demand meters. However, for a meter which stores hourly or 15-minute interval data, there must be a physical interface to allow on-site retrieval of data.

We have compared Section III of Appendix B of the Workshop Report with the text that SCE supplied in Attachment A of its comments. It is clear that a discrepancy exists with the title of the recommendation, but the wording of both versions results in the same outcome. Under either version, the meter will be required to have a meter display. For electromechanical meters, dials are sufficient. For an electronic meter, the total kWh that have been consumed must be displayed, at a minimum. If the meter retains stored meter data, the meter must have a physical interface to enable on-site interrogation of all stored meter data. Thus, the requirement of a kWh display, and, if necessary, a physical interface, are necessary whether for reading the meter visually or for back-up reading purposes.

We do not agree with the comments of ABB and NERTEC, which do not favor the requirement of a local display on the meter. They prefer the flexibility of having remote meter reading capabilities from within one's home or office. We view remote meter reading capability as an additional service that some people may want. However, such a service should not be required, nor should it become part of a standard. Simply because some customers may desire a feature or a function is insufficient justification for the Commission to set such a standard. However, having a display at the meter source allows anyone with the appropriate access to read the meter.

We are concerned that the requirement mandates that the meter must have a display in kWh. As the CEC points out, billing on a kWh basis may not be the universal billing unit since other measurement units can be used. We will therefore modify the recommendation of the PSWG to allow electromechanical meters to display in kWh, or if a meter stores meter data, that there must be a physical interface to enable on-site interrogation of the stored data. As modified, the adopted visual meter read standard reads as follows:

> "All direct access meters shall have a visual kWh display or a physical interface to enable on-site interrogation of all stored meter data. There are two reasons for requiring a visual meter display: (1) For consumer protection: The consumer can verify that the meter read matches the bill, and (2) For on-site interrogation when other meter communication systems fail. This would enable entities who are responsible for billing/settlements to obtain the meter read when investigating the communications failure. For electromechanical meters, the dials are sufficient for this on-site interrogation. At a minimum, electronic meters must have a physical interface to enable retrieval of all stored meter data."

The above standard will give meter product manufacturers the flexibility of deciding whether the meter should display kWh units, in addition to the stored meter data. Needless to say, if the meter has only a physical interface, the customer must be provided with the means to be able to retrieve the stored meter data in a way that can be understood. In addition, appropriate passwords would need to be issued to allow authorized customers, UDCs, and MDMAs to retrieve the stored meter data.

SCE also seeks to have us define "stored meter data" to mean more than 15 days of data. We do not believe that is necessary. Stored meter data should refer to any meter data stored by the meter.

6. Definition of MDMA Business Functions and Subcontracting of MDMA And MSP Functions

Sections I, II and III of Appendix C of the Workshop Report all revolve around the issue of subcontracting. Most of the PSWG members who voted recommend that MDMAs be allowed to subcontract functions, such as meter reading, to other approved entities, and that MSPs be permitted to subcontract with MDMAs to reprogram its meters.

We are not opposed to the idea of permitting MDMAs and MSPs to subcontract some of their functions. The CEC, however, correctly points out that the subcontracting issue substantially affects the metering and data management framework that the Commission established in D.97-10-087 and D.97-12-048, and raises data quality and integrity issues as well. We believe that the public and the market participants will be better served if we take a considered and unhurried approach to this issue. Therefore, we will defer the issue of subcontracting MDMA and MSP functions to a future decision.

7. MDMA Performance Standards

The MDMA performance standards are generally addressed in D.97-12-048 at pp. 27 to 33. The Workshop Report did not address two requirements which were included in D.97-12-048. The first requirement is that MDMAs are required to read the direct access meter at least once a month. (D.97-12-048, p. 30.)

The second requirement addresses safety requirements for MDMAs. In D.97-12-048, the Commission stated:

> "We will require in the direct access tariffs that all MDMAs comply with the pertinent electrical safety provisions of Cal OSHA and the UDC's safety requirements as they apply to the reading of electric meters. Prior to allowing an ESP, in its role as the MDMA, or a third-party MDMA, to perform meter reading, we will require the UDCs, as discussed below, to review the safety training and procedures that the MDMA and its employees are to follow.
>
> With regard to the recommendation that the MDMA report meter, safety, and hazardous conditions, and that site-specific information be kept, those safeguards are already contained in the direct access tariffs in Sections H (3) and H (8)(e) [of the direct access tariff]."

No one has disputed that both the monthly meter read requirement, and the MDMA safety requirements, should be retained. Since the Workshop Report remained silent on these issues, we will include both of these requirements as part of our permanent meter data management and meter reading standards as reflected in Attachment C.

The PSWG recommends that the percentage of validated meter data that must be made available on the MDMA's server should be reduced from 99.99% to 99% for both interval data and non-interval data. The PSWG points out that the present percentage requirement of 99.99% is an unreasonable goal. If

this percentage requirement remains unchanged, one missing account out of 5000 would cause an MDMA to be out of compliance. We will adopt the recommendation of the PSWG for interval meters as follows:

> "(iii) 99.0% of all usage data must be available within five days of the scheduled reading date of the meter."

We also adopt the recommendation of the PSWG for non-interval data as follows:

> "(iii) 99.0% must be available by 6:00 a.m. on the 5th working day after the scheduled meter reading date."

The other timeliness standards shown in D.97-12-048 at pp. 31 and 32 shall remain unchanged, and shall be incorporated into our permanent standards as reflected in Attachment C.

The PSWG recommends that the first billing cycle after the initial switch should be ignored in determining the timeliness of validated meter reading data. The PSWG points out that during the first month following the initial switch, information is sometimes delayed. If the first billing cycle is considered in how well MDMAs are providing timely meter data, this would skew the performance statistics. We will adopt the PSWG's recommendation, and exempt the first billing cycle following the submission of the direct access service request from having to meet the timeliness standards for validated meter reading data.

The PSWG also recommends that when data cannot be delivered to the MDMA server within five days, the MDMA be permitted to use the VEE rules that are contained in Appendix C-VEE of the Workshop Report for both interval data and monthly data. No comments were filed in opposition to this recommendation. We will adopt the recommendation to use the VEE rules in Appendix C-VEE to estimate meter data that cannot be timely delivered to the

MDMA server. Section A of Appendix C-VEE shall apply to interval data, and Section B of Appendix C-VEE shall apply to monthly data.

8. MDMA Performance Exemptions

The PSWG recommends that the Commission adopt two exemptions from having to timely make meter data available on the MDMA's server. The first recommendation would exempt MDMAs from having to include in the MDMA's performance report situations where no meter reads occurred due to a large catastrophe, such as an earthquake or hurricane. If such an event occurred, the MDMA would be allowed to estimate and post the data. The estimated data would be reported separately in the MDMA's performance report, and would not be included in any performance penalties assessed against the MDMA.

No one has objected to the adoption of the first recommendation. This kind of exemption makes practical sense. A natural catastrophe could occur which prevents an MDMA from being able to read the meter during the normal billing cycle. In such cases, the data should be estimated, and the failure to obtain actual meter data should not count against the MDMA.

The second recommendation would allow the MDMA to separately report estimated data if a meter was not accurately recording usage. The estimated data would be separately reported in the performance report, and it would not be included in any performance penalties assessed against the MDMA.

SCE supports the idea that estimated data due to meter failure be exempt from a MDMA's performance record. SCE believes, however, that incentives should be in place so that the ESP and MDMA will take appropriate steps to fix or replace the faulty meter. Thus, SCE recommends that the exemption only apply if two conditions are met: (1) that the exemption only

occur after a manual verification reading that the meter has failed and there is no problem with the remote reading technology; and (2) the exemption cannot occur for an account more than once in a 12-month period.

SCE's conditions are reasonable, and will be adopted as part of the second exemption. The first condition is likely to occur regardless of whether the Commission imposes that condition. The second condition will create an incentive for the ESP and MDMA to fix or replace the faulty meter.

Attachment C provides a summary of the above discussion.

9. EDI Implementation

The majority of the PSWG members voted in favor of a migration to the EDI standards for the transfer of meter usage data. The recommendation proposes that there be a migration to the EDI standard following the adoption of an implementation plan that is to be developed by the market participants. The plan would include file format and business rules, and the implementation date for the start of EDI. It is also proposed that the retrieval of data from the servers continue to use HTTP with Secure Sockets Layer. The communication mechanism could change in the future in response to other processes that are addressing standards.

The comments that we received regarding the use of EDI support its implementation although some very practical problems are raised. PG&E points out that the changeover to EDI will require systems programming work, and that having to maintain both the MEP and EDI would be a significant drain on programming resources.

The CEC favors the use of EDI for MDMA data exchanges, but opposes the idea that the Internet be the sole communication mechanism, and that HTTP be the only allowable protocol.

SCE also supports a migration from MEP to EDI, but believes that the migration requires adequate planning and testing. SCE recommends that the MEP-to-EDI transition team develop a project plan for the migration, and that the plan be published by June 1, 1999. The plan should review and comment on the areas of concern, detail a timeline for a transition to EDI, establish an EDI protocol, establish change control procedures, identify support resources, and address data security and integrity.

It is obvious from the comments that an instant cut-over to EDI from MEP cannot take place. Instead, there appears to be a need for a transition period to allow participants to prepare for, adjust to a new standard, and to verify that the EDI format is working properly.

We will adopt the recommendation which calls for all interested parties to work together to create a statewide implementation guide for the use of EDI. We will direct the Energy Division to ensure that this result is achieved through the Direct Access Tariff Review Committee established in D.97-10-087.[15] We would like to implement the use of EDI on a trial basis no later than September 1, 1999, with the goal of having EDI as the only standard for transferring meter usage data no later than February 1, 2000. With this in mind, the Direct Access Tariff Review Committee needs to develop a proposed statewide implementation guide, and to file it no later than April 2, 1999. Comments to the report should also be permitted, and should be filed within 21 days of the report's filing. A Commission decision would then issue in June or July of 1999 to address the EDI standards and implementation guidelines. Under such a schedule, market participants can gear up to move toward an EDI format,

[15] We understand that this Committee is actively involved in addressing EDI issues.

with the expectation that a trial period will take place in the last four months of 1999 and in January of 2000, and that the MEP data format will be discontinued on February 1, 2000.

We believe that the various EDI comments can be addressed by the Direct Access Tariff Review Committee and in the resulting report. This should result in a proposed implementation guide that addresses the needed resources and cost of implementing EDI; specification of the EDI standards; what communication links and protocols must be used and whether other means will be permitted; the time line for implementing the changes; testing of the new standards; a procedure to make future changes to the EDI standards; and how EDI will address data security and integrity issues.

We will refrain from adopting permanent EDI standards until after the report and comments have been filed. We will, however, direct the UDCs, ESPs, and MDMAs, to move toward using EDI to transfer meter usage information in accordance with the schedule described above.

As for the PSWG recommendation that any new transactions between MDMAs and market participants use EDI as the preferred method of transferring meter usage data, that idea has merit but, we will address that issue after the EDI report has been filed. As we noted, the migration to EDI will take some time. The participants in the Direct Access Tariff Review Committee are free to develop recommendations on how the implementation of EDI can accommodate new transactions occurring after a certain date.

Similarly, the recommendation that EDI be used as the preferred method of electronic communications for meter-specific information flows, should be addressed in the Direct Access Tariff Review Committee and EDI report as well.

10. VEE Rules (Interval and Monthly)

The interim VEE standards were contained in D.97-12-048 at pp. 41 to 46. The PSWG recommends that the interval data rules in Section A, and the monthly data rules in Section B, of Appendix C-VEE of the Workshop Report be adopted as the permanent VEE standards.

The only objection to the proposed permanent standards came from Enron. Enron opposes one of the two procedures for performing a high/low usage check on monthly meter data. (See Workshop Report, App. C-VEE, pp. 20-26.) Enron opposes the procedure, which is based on previous day usage of similar customers, because a large set of data is needed in order to develop a reasonable statistical sample. Enron contends that the UDCs are the only ones who have the information to calculate the parameters needed for this validation test.

PG&E contends that no one disputes the validity or soundness of the procedure. In addition, the procedure is optional, and the MDMAs are free to use the other procedure for performing the high/low validation test. PG&E also asserts that it should have the flexibility to implement the best VEE routines for their customers.

We agree with PG&E on this issue. The high/low usage check permits the use of two different methods to validate kWh consumption. Although the non-utility MDMAs lack the kind of information needed to calculate the previous day usage of similar customers, the non-utilities can use the historical data procedure to validate kWh consumption. We will not delete the previous day usage procedure from the high/low usage check. If, in the future, it appears that the UDCs are using the previous day usage procedure in a way that disadvantages the MDMAs, a complaint with the Commission can be filed, or a petition to modify this decision can be filed.

We adopt the materials contained at pages 1 through 16 of Section A of Appendix C-VEE of the Workshop Report and Attachment C-VEE-A, as the permanent VEE standards for interval meter data. We also adopt the materials at pp. 17 through 37 of Section B of Appendix C-VEE and Attachment C-VEE-B of the Workshop Report as our permanent VEE standards for monthly meter data.

The PSWG also recommends that "the existing requirement to include the estimation algorithm when the data is posted" be eliminated. We assume that the PSWG is referring to the interim standard that we adopted in D.97-12-048 at p. 44 which states: "estimated usage data is to be identified, along with the estimation technique used." Since Appendix C-VEE does not require the estimation algorithm to be included as part of the posted data, the reference at p. 44 of D.97-12-048 is no longer applicable.

The PSWG also recommends that a group be sanctioned through the UDC/MDMA meeting process to perform the following tasks: clarify the permanent meter and meter data standards by providing examples, flow charts and definitions; review the effectiveness of the permanent meter and meter data standards after they have been operational; and propose a procedure for making changes to the permanent VEE standards.

We will direct the Energy Division to convene a workshop within 90 days from today to determine whether there is an interest by the UDCs, ESPs and MDMAs to pursue these additional tasks. If there is no interest in pursuing these tasks, the Energy Division shall prepare a workshop report notifying the Commission of this, and its recommendations on whether the above-described tasks should still be pursued, and if so, in what manner. If the workshop participants are interested in addressing these additional tasks, a workshop report shall be prepared with its proposed recommendations. The workshop

report shall be filed and served within 60 days of the conclusion of the workshop. Comments to this workshop report may be filed by interested parties within 21 days of the filing of this workshop report.

11. Meter Worker Qualifications

No one is opposed to the MSP and meter worker qualification standards that are set forth in Section I of Appendix D of the Workshop Report. Although the PSWG recommendation and the various comments suggest that there is a need for a collaborative oversight of the five meter worker classifications, the participants disagree on the type of organization that should be set up over the long term to design and administer the tests for the higher skilled meter worker classes.[16]

The PSWG recommendation favors the creation of the MWCO. The recommendation contemplates that there could be more than one MWCO. The MWCO would have to be knowledgeable about the meter services that it certifies, and could be a UDC, a MSP, or an entirely independent organization. The recommendation proposes that the MWCO establish reasonable fees for its work.

SCE favors an approach that utilizes representatives from the UDCs and the MSPs. SCE believes that the advantage of the MCAB is that experts in the metering industry will be involved in the review process, and that the process will promote consistency.

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[16] Everyone appears to agree that an interim group should be formed using volunteers from the UDCs and MSPs who have already been permanently certified. This interim group would be responsible for the design and administration of tests for the higher skilled meter worker classes until the Commission or a designated entity could take over this effort.

As a result of the restructuring of the telecommunications and electricity market, and the unbundling of the products and related services, the Commission has increasingly found itself in a position of creating new advisory bodies, redefining the Commission's role, or experienced the creation of new entities eager to play a role in the restructured marketplace. The testing and certification process for the different meter worker classes is another challenge that we face. The Commission could redefine itself to take on this new challenge, or as the CEC suggests, other state agencies might be able to take on the testing and certification role.[17]

To solve this problem, we agree with the PSWG's recommendation that it is important that a permanent entity be responsible for the testing and certification of meter workers. We also agree with the CEC and SCE that the entity should receive input from both the UDCs and those MSPs that have already been permanently certified. These companies have the individuals with the kind of collective experiences that are needed to design the tests. Meter product manufacturers and organizations involved in electrical standards could provide assistance and expertise as well. In addition, the entity may need other resources to assist in the design and administration of the tests.

We agree with the PSWG that it will take some time before a permanent entity can design and administer the tests. That means an interim process is still needed. Although the PSWG's recommendation calls for an interim process, we are not so confident that the group could complete all of the

[17] One agency that comes to mind is the Contractors' State License Board. However, its present licensing role would probably need to be expanded to accommodate the testing and certification of meter workers.

contemplated tasks in the time required. Additionally, much of the work that the interim group is expected to undertake would duplicate much of the same work that the permanent entity is expected to do. The advantage of having an interim process up and running within 90 days is that there will be a process to administer tests to meter workers who want to be certified to do Class 4a, 4b and 5 meter work.

Instead of rushing to form an interim group so as to begin the testing and certification process, we believe that the participants should focus their energies on determining what permanent entity should be responsible for testing and certifying activities and for designing proposed certification testing. By doing so, we eliminate having two groups perform substantially the same work.

Although it is desirable to implement the various meter classes, and the testing and certification process as soon as possible, we believe the same safeguards can be implemented in a much quicker fashion by utilizing the framework of our interim standards, adopting the first four subdivisions in each of the five meter worker classes,[18] and placing the burden on the ESP to prove to the UDC that the MSP that it is using is capable of performing meter work in the various classes.[19] Until the permanent entity is fully functional, i.e., accepting

[18] The first four subdivisions in each of the meter worker classes are: (1) metering types and voltages; (2) work to be performed; (3) essential technical skills; and (4) worker safety and safety equipment.

[19] Proof that an MSP is capable of performing meter work for a particular meter type could come from utilizing some of the criteria that are found in the subdivisions for the meter classes which are entitled: "Worker Qualification: How Essential Technical and Safety Skills Are Determined" and from "Experience Requirements." Other criteria

Footnote continued on next page

applications for testing, and administering the tests, the procedures for certifying MSPs that was adopted in D.97-12-048 shall continue. Should the UDC question the ability of an MSP to work on a particular meter type, the burden will be on the ESP to prove to the UDC that the MSP that it is using is qualified to work on that particular meter type.

We note that the UDCs will receive notice of any meter installation work as a result of the rules that we adopted in D.97-10-087. In order for an ESP to initiate a meter change, the meter change must be noticed as part of the direct access service request. (D.97-10-087, App. A, Sections E.(3), E.(15); D.97-10-087, App. B, Section 23.) Thus, the UDC and the ESP, as well as the ESP's MSP, will know in advance what meter will be replaced. If the removal or installation involves skills in a higher meter class, the ESP may need to prove to the UDC that the MSP it is using possesses the necessary skill and experience for removing and installing a particular kind of meter. We expect that the ESPs and MSPs will closely monitor the UDCs' actions for any signs of anti-competitive behavior with regard to this process. We therefore adopt as part of our permanent meter worker qualifications, the first four subdivisions in each of the meter worker classes shown in Appendix D at pp. 2 to 11.

As for the permanent entity, we are not yet convinced of the need for the Commission to establish a new advisory body. At this time, we wish to further research whether the Commission or some other state agency can conduct the testing and certification activities.

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that demonstrate that the MSP has employees who are qualified or possess the experience necessary to work on a particular meter type are acceptable as well.

Once the permanent entity has had an opportunity to do some work, it will be possible to decide whether the certification and testing procedures contained in Appendix D of the Workshop Report should be adopted as the permanent MSP meter worker qualification standards. Since we have not yet adopted the recommended self-certification process for Class 1, 2, and 3 meter workers, the revised application for meter service and installation certification should not be adopted at this time.

The PSWG recommends that the MSP certification process that was established in D.97-12-048 be continued with the exception of the 50 joint meets and required logs, and the provisional certification process. (Workshop Report, App. D, Section I.B.; See D.97-12-048, pp. 26-27.) Instead of requiring the UDC and ESP to meet during the first 50 meter installations, and to keep logs of such meetings, the PSWG recommends that the MSP be required to provide a detailed work schedule to each UDC for the first 20 installations by the MSP. The UDCs may attend the installations should they decide to do so. Except for some MSPs that fall within a certain window period, there would no longer be a provisional MSP certification number. Instead, a permanent MSP certification number would be issued once the MSP application is reviewed for compliance with the MSP certification process.

Presumably, all of the PSWG participants see some value in streamlining the MSP certification process. The detailed work schedule for the first 20 installations by a new MSP will be used instead of requiring or waiving 50 joint meets. Thus, the detailed work schedule essentially acts as a substitute for an actual meeting. In order to ensure that the UDCs have adequate information to make an informed assessment as to whether or not it should attend any of the 20 installations, we will require the work schedule to describe the meter type that is being removed and installed, a description of all the

procedures it will follow for removing and installing the meter, and what safety precautions will be taken during these procedures.

We will adopt the MSP certification process described at pp. 22 to 27 of D.97-12-048, except as altered by the above discussion and Section I.B. of Appendix D of the Workshop Report, as the permanent MSP certification process. For those MSPs that have been permanently certified as MSPs prior to today's decision, they shall remain certified, provided the MSPs abide by all the permanent meter and meter data standards that we adopt today.

12. Meter Installation

The IAEI commented that the Commission should clarify that the electric utilities continue to be responsible for the ownership, operation, and maintenance of metering transformers as part of their distribution facilities. The IAEI contends that if customers are responsible for metering transformers, the installation will be covered by the NEC, which will require additional labeling, inspections, and added cost.

The same kind of issue was raised in D.97-10-087, i.e., whether the transformers are considered to be part of the distribution system or part of the meter system. In the Commission's approval of the direct access tariff, we approved the provision which stated: "Potential and current transformers shall be considered part of the distribution system and shall remain the responsibility of the UDC." (D.97-10-087, App. A, Section H.(1)(b).) Thus, the concerns that the IAEI warns of will not occur because the transformers, test switches, and associated wiring up to the meter connection, remain the responsibility of the UDCs as part of their respective distribution systems. However, we agree with the PSWG recommendation that "reconnecting existing wires to a replacement of

an existing meter socket, A-base socket adapter, or A-base meter may be performed by either UDCs or MSPs." (Workshop Report, App. D, Section II.)

No one else commented on the remaining meter installation and removal procedures. We therefore adopt Section II of Appendix D of the Workshop Report as the permanent meter installation and removal standards.

13. Future of the PSWG

The PSWG indicates that its work objectives have been completed, and that there is no need for the PSWG to meet again unless the Commission needs its assistance to resolve a permanent standard. As mentioned in other sections of this decision, other outstanding issues related to meter data are being addressed by other working groups or are being handled by the additional processes that we have created. Since it appears that the PSWG has completed all of its work, we agree that the PSWG's work is complete. We thank all of the PSWG participants for assisting us to develop permanent meter and meter data standards.

Findings of Fact

1. In D.97-12-048, the Commission ordered the creation of the PSWG to review the interim metering standards adopted in that decision, and to recommend what permanent standards should be adopted by the Commission.

2. The PSWG workshop was held on January 29, 1998.

3. Many different entities, including the UDCs, ESPs, MSPs, MDMAs, and meter manufacturers, actively participated in the PSWG process.

4. The Workshop Report was filed on July 29, 1998.

5. The recommendations were voted upon by at least two-thirds of the eligible voting membership of the PSWG.

6. The meter equipment recommendations are found in Appendix A of the Workshop Report.

7. The discussion in D.97-12-048 about open architecture and interoperability triggered significant discussions by the PSWG.

8. One of the conclusions of the PSWG is that technology-specific interchangeability requires specifying a standard at every interface, and is not practical for all technologies at this time.

9. The PSWG recommends that interoperability be available in the areas of meter data management, data format tables, the initial communication protocol, and that all meters have a visual kWh display.

10. Meter communications refers to the communication between the meter and the meter reading device.

11. The recommendations for meter communications are found in Appendix B of the Workshop Report.

12. The PSWG recommends that the meter communicate in the format specified by the C12.19 standard, but that the entities should not be required to store the data in the C12.19 format.

13. The discussions over the C12.19 standard recognized that if the standard was applied, it may not allow for a plug and play environment.

14. The PSWG agreed that the C12.19 standard will not be compatible with all radio frequency based technologies.

15. Under the PSWG's recommendation, all meter types released before March 20, 2000 would be exempt from the C12.19 standard.

16. The recommendations concerning meter reading and meter data management are found in Appendix C of the Workshop Report.

17. The PSWG recommends that the functions performed by the MDMA be separately described as meter reading and MDM functions.

18. The PSWG recommends that D.97-12-048 be revised to allow a MDMA to subcontract subfunctions out to other approved entities.

19. The PSWG recommends that an MSP be allowed to subcontract with a MDMA to reprogram its meters remotely.

20. D.97-12-048 adopted the MEP as the interim meter data transmission standard.

21. The recommendations for the permanent VEE standards for interval and monthly data are in Appendix C-VEE of the Workshop Report.

22. Appendix D of the Workshop Report contains the recommended permanent standards for meter worker qualifications and certification, meter service provider certification, meter installation and removal, meter maintenance, meter system testing, and calibration.

23. Under the PSWG's recommendation, an MSP could self-certify Class 1, 2 and 3 meter workers once the MSP's meter worker training certification program was approved by the Commission, and the meter worker met the appropriate prerequisites.

24. Under the PSWG's recommendation, in order to be certified as a Class 4a, 4b or 5 meter worker, the applicant must pass a written and practical exam administered by the Commission or by a designated entity.

25. It is proposed that the initial set of test questions for Class 4a, 4b, or 5, be developed based on the examples described in Attachment D-2 of Appendix D of the Workshop Report.

26. The PSWG recommends that the Commission designate the MWCO as the designated entity to manage the function of certifying the higher skill meter workers.

27. The PSWG envisions that there could be one or more MWCOs.

28. The PSWG recommends that Attachment D-3 of Appendix D of the Workshop Report be used as the application to become a registered MSP.

29. A summary of the meter data security issues is contained in Appendix F of the Workshop Report.

30. The PSWG recommends that the data security issues be addressed by the DQIWG.

31. The recommendation regarding what the PSWG should do in the future is in Appendix E of the Workshop Report.

32. D.97-10-087 adopted the approach that the provisioning of meter services and MDMA services be provided through the UDC or an ESP.

33. D.97-10-087 adopted some interim metering standards and criteria as part of the direct access tariffs that were approved in that decision.

34. D.97-05-040 recognized that the review and development of permanent standards should involve all of the market participants since many of the standards are technical in nature and beyond the expertise of the Commission.

35. The term open architecture was described in D.97-12-048 as an environment where the specifications for interfaces, services, protocols and data formats are vendor-neutral, published, freely available, and agreed upon in an open process under the auspices of a recognized national or international standards body.

36. Open architecture allows interoperability to occur.

37. Interoperability refers to the creation of specifications which allows dissimilar devices or systems to communicate with each other in a way that is transparent to users.

38. Requiring specific technologies to be used would tie the hands of meter manufacturers and could lead to a situation where a meter meets the California standards but could not be used outside the state.

39. The Infrastructure Report stated that state policy should not dictate specific technologies to deliver advanced telecommunications, nor select specific firms that will be responsible for infrastructure development.

40. Many of the same concerns that were expressed in the Infrastructure Report apply to the direct access electricity market as well.

41. The opening of electricity markets to direct access has resulted in technological changes and advancements.

42. The permanent meter and meter data standards should not be incorporated into a General Order at this time.

43. When the Commission moved to unbundle metering services in D.97-05-039, many of the participants thought that open platform standards could be developed within several months.

44. The interim standards for direct access meters required the meters to meet at least one of four criteria.

45. The definition of "meter product" appears in Appendix A of the Workshop Report.

46. The Energy Division needs to develop procedures for accepting and reviewing the meter type self-certification document that will be submitted by the meter product manufacturers.

47. It is incumbent upon the meter product manufacturers, the UDCs, and the ESPs to ensure that the meter product standards have been adhered to.

48. Data security issues will be addressed in a decision which addresses the recommendations of the DQIWG.

49. Meter product manufacturers should be free to use other kinds of optical ports besides a Type 2 optical port.

50. If a Type 2 optical port is used, then the port must meet the C12.18 standard.

51. The debate over the C12.19 standard was the most contested issue with the least consensus.

52. The 12.21 and 12.22 standards have not yet been approved by ANSI.

53. Convenience features, such as remote meter reading capability, are insufficient justification to mandate that the feature become a permanent standard.

54. Billing on a kWh basis may not be the universal billing unit.

55. Stored meter data refers to any meter data stored by the meter.

56. Since the subcontracting issue affects the metering and data management framework that was established in D.97-10-087 and D.97-12-048, this issue should be resolved in a future decision.

57. The monthly meter read requirement, and the MDMA safety requirements should be retained as part of the permanent standards.

58. An instant cut-over from MEP to EDI is unlikely to take place.

59. The Commission should refrain from adopting permanent EDI standards until after the EDI report and comments have been filed.

60. The high/low usage check allows the use of two different methods to validate kWh consumption.

61. There is disagreement on the type of entity that should be established to design and administer the tests for the higher skilled meter worker classes over the long term.

62. As a result of restructuring and the unbundling of products and related services, new entities have been created, and the Commission has redefined its role in the restructured marketplace.

63. An entity should address testing and certification of meter workers.

64. The UDCs receive notice of any meter installation work to be performed as a result of the rules adopted in D.97-10-087.

65. An entity that receives input from interested market participants regarding the design and administration of meter worker tests will help ensure uniform and consistent testing procedures.

Conclusions of Law

1. The Commission should not dictate what kind of specific technologies must be used for meters and meter data.

2. If the Commission adopts standards which are too narrow in scope, there is a danger that other technological innovations will render the standards obsolete.

3. The Commission's approach to permanent standards should be one of open architecture that provides opportunities for all market competitors on an equal basis.

4. The permanent standards must ensure the continuing safety, accuracy and reliability of the meters and the meter data.

5. All of the provisions which appear in the appendices to the Workshop Report, and which were discussed in this decision and adopted as permanent standards, are incorporated by reference into the permanent standards.

6. The Energy Division should be given access to all back up documentation that is related to the certification testing requirements for the meter type that the manufacturer is certifying.

7. Since government standards are not voluntary, they should only be adopted after careful consideration, and only when the public interest demands such action.

8. The Direct Access Tariff Review Committee should develop and file a proposed statewide implementation guide for the use of EDI.

9. The UDCs, ESPs, and MDMAs are directed to move toward using EDI to transfer meter usage information in accordance with the schedule described in this decision.

10. A workshop should be held to determine the interest in working on some additional VEE issues.

11. Instead of establishing an interim process to design and administer the meter worker tests, the same kind of safeguards can be implemented using the framework of the interim standards, adopting portions of the meter worker recommendations, and placing the burden on the ESP to prove to the UDC that the MSP is capable of performing meter work in the various classes.

12. The Commission should further research whether the Commission or some other state agency can conduct the testing and certification activities.

13. The "detailed work schedule" should contain the information described in the text of this decision.

14. The Commission should adopt the provisions shown in Attachments A, B, C, and D of this decision as the permanent meter and meter data standards.

ORDER

IT IS ORDERED that:

1. The Commission adopts as the permanent meter and meter data standards those items which are summarized in Attachments A, B, C, and D of this decision, and which reference the specific passages in prior Commission decisions, and in the appendices to the Permanent Standards Working Group's (PSWG) report that is entitled "Permanent Standards For Metering And Meter Data Used In Direct Access" (Workshop Report).

   a. All of the investor-owned electrical corporations, electric service providers (ESPs), meter data management agents (MDMAs), meter service providers (MSPs), and meter product manufacturers, shall

comply with all applicable standards which affect the product or services that they offer.

b. The investor-owned electrical corporations are authorized to submit advice letters to make any necessary changes to their direct access tariff provisions as a result of this decision.

(1) The advice letter shall be filed with the Energy Division within 30 days from today's date.

(2) Any protests to the advice letter shall be filed with the Energy Division within 20 days of such filing.

(3) The effective date of the advice letter shall be the 40th day after the filing of the advice letter.

c. Should it be necessary, the assigned Administrative Law Judge (ALJ) may issue a ruling which gathers all of the different references to the permanent standards mentioned in Attachments A-D, and to place all of the standards into one document.

2. Except as provided for below, effective 120 days from today, all direct access meter products shall meet the requirements set forth in Attachment A in accordance with the time table set out at page 1 of Appendix A of the Workshop Report.

a. MSPs may continue to offer for the next 120 days, direct access meters which meet at least one of the four meter criteria that are set forth in Decision (D.)97-12-048 at pages 14 and 15. After 120 days from today, all meter products used in direct access shall meet the permanent meter product standards that are summarized in Attachment A of this decision.

b. Direct access meters which only meet the interim standards adopted in D.97-12-048, shall be retired from service no later than June 30, 2002.

3. All direct access meter products which meet the permanent meter product standards shall be self-certified by the meter product manufacturers in accordance with the procedures described below.

a. The certification testing requirements shall follow the procedures set forth in Section II of Appendix A of the Workshop Report.

b. The meter product manufacturers shall complete the self-certification form that is to be developed by the Commission's Energy Division. The form states, in essence, that the meter product type has met the certification testing requirements. The meter product manufacturers are to submit the form, together with any required documents, to the Energy Division.

4. The Energy Division is directed to develop the appropriate forms, procedures, and criteria for accepting and reviewing the meter type self-certification form, and for posting the complying meter types on the Commission's web site.

a. The Energy Division shall determine how the self-certification form should be phrased, and whether any supporting documents should accompany the self-certification form at the time of submission. Phrasing of the form shall include the declaration language discussed in the text of this decision.

b. The Energy Division shall have 90 days from today to develop the procedures described above, and to make those procedures available to all interested persons after the 90 days has elapsed.

5. The five meter worker classes, summarized in Attachment D, shall be used to classify the ability of the meter workers.

a. As an interim measure, should a utility distribution company (UDC) question the ability of an MSP to work on a particular kind of meter, the burden will be on the ESP to show that the MSP it is using possesses the necessary skills and experience to perform that kind of meter work.

b. The Commission will explore if it or some other state agency can conduct the testing and certification activities.

6. The UDCs, ESPs, and MDMAs shall take the initiative, in accordance with the schedule discussed in the text of this decision, to move toward using Electronic Data Interchange (EDI) standards to transfer meter usage information.

a. To ensure that this initiative is implemented, the Energy Division shall confer with the Direct Access Tariff Review Committee, and ensure that the Committee files an EDI report which contains a proposed statewide implementation guide for the use of EDI.

(1) This EDI report shall be filed and served no later than April 2, 1999, and shall contain a proposed implementation guide.

(2) Interested parties may file comments within 21 days of the filing date of the workshop report.

7. The Energy Division shall convene a workshop within 90 days from today to determine whether there is an interest to pursue the additional tasks mentioned in the discussion of the validating, editing and estimating rules.

a. A workshop report shall be filed and served no later than 60 days after the conclusion of the workshop.

b. Interested parties may file comments within 21 days of the filing date of the workshop report.

This order is effective today.

Dated December 17, 1998, at San Francisco, California.

RICHARD A. BILAS
President
P. GREGORY CONLON
JESSIE J. KNIGHT, JR.
HENRY M. DUQUE
JOSIAH L. NEEPER
Commissioners

ATTACHMENT A
Page 1

Permanent Meter Product Standards

Standards	Comments/Reference
ANSI C12.1-1995, Code for Electricity Metering	To be used in conjunction with Certification Testing Requirements in Section II of Appendix A to PSWG Workshop Report.
ANSI C12.7-1993, Watt-hour Meter Socket	Applies only if a meter socket is being used.
ANSI C.12.8-1981 (R1997) Test Blocks and Cabinets for Installation of Self-Contained A-Base Meters	Applies only is an A-base meter is used.
ANSI C12.9-1993, Test Switches for Transformer-rated Meters	
ANSI C12.10-1997, Electromechanical Watt-hour Meters	
ANSI C12.11-1987(1993), Instrument Transformers for Revenue Metering, 10 kV-350 kV VIL (0.6-69 kV NSV)	
ANSI C12.13-1991, Electronic TOU Registers for Electricity Meters	Applies only if the meter has a time-of-use register.
ANSI C12.20-1998, 0.2% & 0.5% Accuracy Class Meters (approved but not yet published)	To be used in conjunction with Certification Testing Requirements in Section II of Appendix A to PSWG Workshop Report.
ANSI C37.90.1-1989 (R1994), Surge Withstand Capability (SWC) Test	Adds to ANSI C12.1.
ANSI C57.13-1978(1987), C57.13.1-1981(1992), C57.13.2-1991, C57.13.3-1983 (1991), Instrument Transformers	These accuracy and safety performance standards are used in conjunction with ANSI C12.11.
ANSI C12.18-1996, Protocol Specification for ANSI Type 2 Optical Port	Applies only if a Type 2 Optical Port is being used.
Applicable FCC Regulations	All meters and associated equipment are to meet all applicable FCC

	regulations.
Certification Testing Requirements.	Discussed in Section II of Appendix A to the Workshop Report.
Submission of meter type self-certification document to the Energy Division. Meter product manufacturer to make available all back up documentation that is related to the certification testing requirements for the meter type that is being certified.	Section III of Appendix A to the Workshop Report, and as discussed in the text of this decision.
Stickers, sealing and locking hardware requirements	These requirements are set forth in Section IV of Appendix A to the Workshop Report.
Manufacturing date to be included on all new meter products.	Section V of Appendix A to the Workshop Report.
Procedures to follow when rebuilding, retrofitting, or repairing a meter product.	Section VI of Appendix A to the Workshop Report.
For meter products which store and provide interval meter data, the meter must be capable of providing and storing the interval meter data for a minimum of 35 days.	Contained in the text of this decision.

(END OF ATTACHMENT A)

ATTACHMENT B

Permanent Meter Communication Standards

Standards	Comments/Reference
ANSI C12.18, Type 2 Optical Port Standard	Adopted as part of the permanent meter equipment standards.
KYZ Contact Output	Section II.1. of Appendix B of the Workshop Report.
Notification of KYZ Contact Compatibility By The ESP	Section II.2. of Appendix B of the Workshop Report.
Visual Meter Read	As discussed in the text of this decision.
Meter Password Authorization	Workshop Report, App. B, Section IV.

(END OF ATTACHMENT B)

ATTACHMENT C
Page 1

Permanent Meter Data Management And Meter Reading Standards

Standards	Comments/Reference
MDMA Technical/Business Support To ESPs and UDCs	Section IV of Appendix C of the Workshop Report.
MDMAs required to read direct access meters at least once a month	D.97-12-048 at page 30, and as discussed in the text of this decision.
MDMA safety requirements	D.97-12-048 at page 32, and as discussed in the text of this decision.
Timeliness for validated meter reading data	For Interval Meters: (i) 80% at page 31 of D.97-12-048 remains unchanged. (ii) 90% at page 31 of D.97-12-048 remains unchanged. (iii) modify 99.99% to 99% at page 31 of D.97-12-048. For Non-Interval (Monthly) Data (i) 85% at page 31 of D.97-12-048 remains unchanged. (ii) 95% at page 31 of D.97-12-048 remains unchanged. (iii) Modify 99.99% at page 32 of D.97-12-048 to 99%.
First billing cycle by an MDMA following a direct access switch is to be exempt from the timeliness standards.	Workshop Report, App. C, Section V.
Section A of Appendix C-VEE is to be used to estimate interval meter data if the MDMA is unable to timely deliver the meter data to the MDMA server.	Workshop Report, App. C, Section V.
Section B of Appendix C-VEE is to be used to estimate monthly meter data if the MDMA is unable to timely deliver the meter data to the	Workshop Report, App. C, Section V.

MDMA server.	
In the event of a large catastrophe, which precludes the MDMA from reading meters, the MDMA should estimate and post the data. The estimated data should be reported separately by the MDMA in its performance report, and would not be included in any performance penalties assessed against the MDMA.	Workshop Report, App. C, Section VI.
In the event of meter failure where the meter is not accurately recording usage, the estimated data should be reported separately by the MDMA in its performance report, and would not be included in any performance penalties assessed against the MDMA, so long as the following conditions are met: (1) a manual reading has verified that the meter has failed and there is no problem with the remote reading technology; and (2) the exemption cannot occur for an account more than once in a 12 month period.	Workshop Report, App. C, Section VI, and as discussed in the text of this decision.
EDI: The UDCs, ESPs and MDMAs are directed to move toward using EDI to transfer meter usage information. An EDI workshop is to be held within 60 days. EDI to be used on a trial basis no later than September 1, 1999, and EDI is to be the only standard beginning on February 1, 2000.	As discussed in the text of this decision.
VEE Procedures	Workshop Report, Appendix C, Section VIII, and Appendix C-VEE. For Interval Data: Section A of Appendix C-VEE.

	For Monthly Data: Section B of Appendix C- VEE.

ATTACHMENT D

Permanent Standards For Meter Installation, Maintenance, Testing, And Calibration In Direct Access

Standard	Comments/Reference
Meter worker qualifications: Until a permanent entity is fully functional, i.e., accepting applications for testing, and administering the tests, the procedures for certifying MSPs that was adopted in D.97-12-048 shall continue. The first four subdivisions in each meter worker class at pages 2 through 11 of Appendix D of the Workshop Report is adopted. Should the UDC question the ability of a MSP to work on a particular meter type, the burden will be on the ESP to prove to the UDC that the MSP that it is using is qualified to work on that particular meter type.	As discussed and referenced in the text of this decision, Appendix D of the Workshop Report at pages 1 through 12.
Those MSPs who have been permanently certified prior to today's decision, shall remain certified, provided that they abide by all the permanent meter and meter data standards.	As discussed in the text of this decision.

The MSP certification process described at pages 22 to 27 of D.97-12-048, except as altered by the discussion in the text of this decision and Section I.B. of Appendix D of the Workshop Report, is adopted as the permanent MSP certification process.	As discussed in the text of this decision, and in conjunction with D.97-12-048 at pages 22 to 27, and Section I.B. of Appendix D of the Workshop Report.
Meter installation and removal standards.	Appendix D of the Workshop Report, Section II, pp. 20-28.
Meter maintenance and testing schedule.	Appendix D of the Workshop Report, Section III, pp. 29-30.
Meter system testing.	Attachment D-1 of Appendix D of the Workshop Report.
Test standards.	Appendix D of the Workshop Report, Section V.

(END OF ATTACHMENT D)

ATTACHMENT E

GLOSSARY OF ACRONYMS

ADU: average daily usage
AMR: automatic meter reading
ANSI: American National Standards Institute
CCUE: Coalition of California Utility Employees
CEC: California Energy Commission
DQIWG: Data Quality Integrity Working Group
EDI: Electronic Data Interchange
EPRI: Electric Power Research Institute
ESP: electric service provider
FCC: Federal Communications Commission
FTP: file transfer protocol
HTTP: hyper text transfer protocol
IAEI: International Association of Electrical Inspectors
IEEE: Institute of Electrical and Electronics Engineers
kVARh: kilovar-hours
kWh: kilowatt-hours
MCAB: Meter Certification Advisory Board
MDM: meter data management
MDMA: meter data management agent
MEP: Metering Exchange Protocol
MSP: meter service provider
MWCO: Meter Worker Certification Organization
MWCAB: Meter Worker Certification Advisory Board
NEC: National Electrical Code
OSI: Open System Interconnection
ORA: Office of Ratepayer Advocates
PG&E: Pacific Gas and Electric Company
PSWG: Permanent Standards Working Group
SCC31: Standards Coordinating Committee 31
SCE: Southern California Edison Company
TOU: time-of-use
UCA: Utility Communication Architecture
UDC: utility distribution company
UIG: Utility Industry Group
VEE: validating, editing and estimating

(END OF ATTACHMENT E)

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ATTACHMENT A - Permanent Meter Product Standards

ATTACHMENT B - Permanent Meter Communication Standards

ATTACHMENT C - Permanent Meter Data Management and Meter Reading Standards

ATTACHMENT D - Permanent Standards For Meter Installation, Maintenance, Testing, And Calibration In Direct Access

ATTACHMENT E - Glossary of Acronyms