

**Report on 5th Independent Operational Audit of the Systems and Procedures on Market
Operations**

for the period 26 June 2013 to 25 December 2014

by RSM Bird Cameron

(2014-02)

PEM Audit Committee

September 2015

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Executive Summary

This report lays down the basis for the conduct of the Market Operations Audit and presents the scope and results of the 5th Independent Operational Audit of the Systems and Procedures on Market Operations (“5th Market Operations Audit”) as well as the recommendations made as a result of the said Audit.

The audit project, covering the period 23 June 2013 to 25 December 2014, was conducted by RSM Bird Cameron, Australia, in partnership with Reyes & Tacandong, Philippines and Market Reform, Australia, collectively referred to in this report as the “Market Auditor”. The Audit was conducted in accordance with International Auditing Standards and ISAE 3000 Assurance Engagements Other than Audits and Reviews of Financial Information, and accordingly included such tests and procedures considered necessary to confirm PEMC’s compliance with the WESM Rules, Market Manuals and its Internal Business Procedures (“IBPs”).

The Market Auditor identified twenty-one (21) findings summarized below:

Scope Area	H 1	H 3	M 3	L 1	L 2	L 3	O 3	Total
Task 1: Market Software and Systems Review	-	-	-	-	-	4	-	4
Task 2: Information Security and Technology Review	-	1	1	-	-	1	1	4
Task 3: Process and Compliance Review	1	-	1	1	2	6	-	11
Task 4: Bid-to-Bill Analysis	-	-	-	-	-	-	-	-
Task 5: Review of Rules and Manuals	-	-	-	1	-	1	-	2
Total								21

Based on the procedures performed, the Market Auditor identified one high risk-level one non-compliance issue, two low risk-level one non-compliance issues, and other issues ranging from high risk to low risk where internal controls in relation to the operation of the WESM can be improved.

The Market Auditor reached a conclusion on two broad aspects of the audit as follows:

1. **For Task 1**, a reasonable assurance conclusion was rendered, which essentially certifies that the software for Market Dispatch Optimisation Model (“MDOM”) and Billings, Settlement and Metering (“BSM”) System is used in a manner intended and is provided with correct input data, thus, will perform substantially in compliance with the WESM Rules and Market Retail Manuals.
2. **For Tasks 2 to 5**, the Market Auditor arrived at qualified limited assurance conclusion. This conclusion was grounded on the following findings:
 - (a) one **high risk-level one** non-compliance issue, two **low risk level-one** non-compliance issues, and other issues ranging from **high** risk to **low** risk where internal controls in relation to the operation of the WESM can be improved;
 - (b) scope limitation existed with respect to procedures that were intended to be performed on critical IT controls, which resulted in the inability to obtain appropriate evidence; and
 - (c) prior audit issues, namely breaches in the area of prudential requirement and poor nodal forecasts were assessed as **high** risks.

A follow-up of prior audit issues was conducted to report the actions taken by the management, and PEMC’s interface with System Operator has also been reviewed by the Market Auditor to determine the effectiveness of controls on critical inputs required for the Market Operator to perform its operational functions. Based on the analysis conducted, the Market Auditor opined that there should be transparency and comfort in the adequacy of controls of the System Operator. To determine this, the Market Auditor opined that a reasonable assurance audit of the System Operator will provide the whole electricity industry with a level of assurance on the processes and internal controls of the System Operator.

I. About this Report

This report is being prepared pursuant to Section 3.7.2 of the PEM Audit Market Manual. It contains the objectives, scope and audit approach for the conduct of the 5th Independent Operational Audit of the Systems and Procedures on Market Operations (“5th Market Operations Audit”) as well as the significant findings, recommendations and PEMC’s responses regarding the issues identified in the course of the 5th Market Operations Audit.

II. Background

The PEM Audit Committee (PAC) is mandated by the WESM Rules to conduct, coordinate and supervise the audit of the systems and operations of the spot market and of the Market Operator, on its own or through appointment of external auditor. The purpose for the conduct of said audit is to reinforce the WESM Members’ confidence in the transparency and adequacy of the operation of Wholesale Electricity Spot Market (WESM).

In line with this mandate, the PAC administers independent operational audits of the systems and procedures on market operations through an External Auditor, with an end view of having a reliable third-party opinion on the integrity, accuracy, and adequacy of WESM operations, procedures, results and reports.

Since 2009, the PAC has administered the conduct of the following audits on the systems and operations of the spot market and of the Market Operator, covering the following periods:

- a) 26 June 2007 to 25 June 2009 – 1st Market Operations Audit conducted by Deloitte Touche Tohmatsu of Australia, in partnership with Intelligent Energy Systems (IES) and Manabat Delgado and Amper (Deloitte Philippines);
- b) 26 June 2009 to 25 June 2011 – 2nd Market Operations Audit conducted by PA Consulting Group Ltd., New Zealand;
- c) 26 June 2011 to 25 June 2012 – 3rd Market Operations Audit conducted by PA Consulting Group Ltd., New Zealand;
- d) 26 June 2012 to 25 June 2013 – 4th Market Operations Audit conducted by PA Consulting Group Ltd., New Zealand;

For this year, the Philippine Electricity Market Corporation (PEMC) engaged RSM Bird Cameron, Australia as the 5th Market Operations Auditor (the “Market Auditor”), to conduct a limited and reasonable assurance engagement of specified Wholesale Electricity Spot Market and Retail Contestability and Open Access (RCOA) activities of PEMC, for the period 26 June 2013 to 25 December 2014, as required by the WESM and Retail Rules and Manuals.

III. Audit Objectives & Scope

The annual audit of the Spot Market and Market Operator is anchored on Section 1.5.2 of the WESM Rules. The general objectives of the said audit are laid down in Section 7.2.2 of the PEM Audit Manual, as follows:

- a. Assess procedures and working processes in the Market Operator;
- b. Assess the usefulness and appropriateness of settlement systems, data management and other procedures and working processes used by the Market Operator to administer the WESM, in order to:
 - i. Identify appropriate steps and measures to help the Market Operator effectively and efficiently perform its responsibilities in time and form in accordance with the WESM Rules;
 - ii. Review that the Market Operator practices and work processes ensure the necessary transparency, independence, predictability and non-discrimination, and are in compliance with the WESM Rules and best international practices; and
 - iii. Assess if the systems, calculations, information flows and data management protect accuracy and quality of data and results in generation scheduling, dispatch, prices and settlement, as well as if internal controls exist and are sufficient to guarantee security and confidentiality where appropriate, proposing recommendations to improve the procedures to collect and process the information and the controls of quality and security of data in the WESM.
- c. Assess the usefulness and appropriateness of the interfaces and exchange of information between the System Operator and the Market Operator in relation to generation scheduling, constraints and dispatch; and
- d. Review compliance by the Market Operator with the WESM Rules.

In order to carry out the above-mentioned objectives, the PEM Audit Committee and the PEMC agreed to review PEMC's control procedures to ensure compliance with the WESM and Retail Rules, and procedures. The following audit areas were established in the Terms of Reference as part of the audit scope:

- 1) **Task 1: Market Software and Systems Review** – It covers the review of the systems, tools and programs changed or introduced during the covered period, and the review of the billing and settlement programs and tools, without limitation. The main systems reviewed by the External Auditor consist of the following:
 - a) Market Network Model (MNM);
 - b) Market Dispatch Optimization Model (MDOM);
 - c) Market Management System (MMS);
 - d) Market Assessment System (MAS); and
 - e) RCOA-related software, programs and tools.

- 2) Task 2: Information Security and Technology Review** – It includes the following activities:
- a) Review and check the adequacy of the process for software change management;
 - b) Review of market-related systems and network performance;
 - c) Review of market-related back-up and restoration processes;
 - d) Review of WESM Website's security; and
 - e) Vulnerability assessment.
- 3) Task 3: Process and Compliance Review** – It includes the following activities:
- a) Review the Market Operator's compliance with its obligations in the WESM and Retail Rules and Market and Retail Manuals;
 - b) Validate the Market Operator Performance Standards (MOPS) Report approved during the period; and
 - c) Propose enhancements in processes and MOPS to achieve best international practices.
- 4) Task 4: Bid-to-Bill Analysis** – It includes the conduct of chronological testing of the market processes from the market participants' registration, submission of offers up to invoicing and payment by the Market Operator.
- 5) Task 5: Review of Rules and Manuals** – It includes the following activities to ensure the harmonization and consistency of relevant market documentations:
- a) Review of the WESM Rules vis-a-vis the WESM Manuals; and
 - b) Review of the Retail Rules vis-a-vis the Retail Manuals.

IV. Audit Methodology

The Market Auditor employed ISAE¹ 3000 or the “Assurance Engagements other than Audits or Reviews of Financial Information” as its approach in reviewing PEMC's control procedures. This kind of engagement establishes mandatory requirements and provides explanatory guidance for undertaking and reporting on assurance engagements other than audits or reviews of historical financial information covered by Auditing Standards or Auditing Standards on Review Engagements.

The Market Auditor performed the two types of assurance engagements under ISAE 3000. These are the reasonable assurance engagement and limited assurance engagement, which applicability to each task is described below:

¹ International Standard on Assurance Engagement

Review Area	Level of Assurance
Task 1: Market Software and Systems Review	Reasonable Assurance
Task 2: Information Security and Technology Review	Limited Assurance
Task 3: Process and Compliance Review	
Task 4: Bid-to-Bill Analysis	
Task 5: Review of Rules and Manuals	

The objective of a reasonable assurance engagement is a reduction in assurance engagement risk to an acceptably low level in the circumstances of the assurance engagement as the basis for a positive form of expression of the assurance practitioner’s conclusion. Reasonable assurance means a high, but not absolute, level of assurance.

The objective of a limited assurance engagement is a reduction in assurance engagement risk to a level that is acceptable in the circumstances of the assurance engagement, but where that risk is greater than for a reasonable assurance engagement, as the basis for a negative form of expression of the assurance practitioner’s conclusion.

The Market Auditor focused its approach on risk, compliance and controls and embedded a market operations specialist overlay to ensure that underlying root cause of issues are provided.

In order to provide a clear distinction between matters of compliance with the review criteria, and matters which represent a risk to compliance, the Market Auditor applied the compliance and risk ratings below for every issue identified.

Rating		Description
Level 1	1	Evidence of non-compliance with review criteria. These should be addressed as a matter of high priority.
Level 2	2	Issues which could possibly result in non-compliance with review criteria, but where no evidence of actual non-compliance was found. However, there is considered to be insufficient formal evidence of controls in place or being actioned in relation to these issues. These should generally be addressed within 1-2 months.
Level 3	3	Housekeeping matters and opportunities for improving internal controls and procedures relating to electricity market operations. These should be addressed within 3-6 months.

The Market Auditor also applied PEMC’s Enterprise Risk Management (ERM) Framework in assessing the risk associated with issues identified during the audit. The ERM Framework was developed and implemented by PEMC in accordance with ISO 31000 to ensure that the organization is not only aware of its key risks but is also managing them strategically to ensure that objectives in operating the spot market and compliance to Retail Market Rules are

achieved. The ratings below have been tailored to reflect the impact of the issues identified on the spot market in relation to PEMC's ERM Framework.

Rating		Description
Extreme		Issues which may have a catastrophic impact on WESM operations if they are not addressed immediately and require executive action with regular reporting at Board level.
High		Issues which may have a major impact on WESM operations if they are not addressed as a matter of priority. These issues require senior management attention with regular monitoring and reporting at executive and Board meetings.
Medium		Issues which may have a moderate impact on WESM operations if they are not addressed within a reasonable timeframe. These issues require management attention with regular ongoing monitoring.
Low		Issues which may have a minor impact on WESM operations if they are not addressed in the future. These issues are the responsibility of management with regular monitoring and reporting at staff meetings.
Efficiency/ Opportunity		Housekeeping matters and opportunities for improving internal controls and procedures and efficiency relating to WESM operations.

Further, each key risk area was assigned an inherent risk rating and a residual risk rating in testing PEMC's procedural controls. Inherent risk is defined as the risk in the absence of any action management might take or controls to mitigate either the risk's likelihood or impact. On the other hand, residual risk described as the risk that remains after management's responses and controls to mitigate either the risk's likelihood or impact.

The use of residual risk ratings as a tool for assessment is based on the assumption that the PEMC management had already provided the necessary actions and controls to mitigate the inherent risks previously established and determined by the same management.

V. Audit Findings and Follow-up of Prior Audit Issues

The Market Auditor identified twenty-one (21) issues, with risk and compliance ratings as follows:

Scope Area	H 1	H 3	M 3	L 1	L 2	L 3	O 3	Total
Task 1: Market Software and Systems Review	-	-	-	-	-	4	-	4
Task 2: Information Security and Technology Review	-	1	1	-	-	1	1	4
Task 3: Process and Compliance Review	1	-	1	1	2	6	-	11
Task 4: Bid-to-Bill Analysis	-	-	-	-	-	-	-	-
Task 5: Review of Rules and Manuals	-	-	-	1	-	1	-	2
Total								21

The Market Auditor reported the issues to the PEM Audit Committee and to PEMC Management by submitting Progress Reports. In these reports, the following were identified:

- one instance of ‘**non-compliance**’ that was assessed as **high** risk for the audit period;
- two instances of ‘**non-compliance**’ that were assessed as **low** risk for the audit period. Of these non-compliance issues, one was resolved prior to 25 December 2014, and the other two remained outstanding. The Market Auditor assessed these breaches as low risk in light of the action taken by PEMC; and
- other issues ranging from **high** to **low** risk where internal controls in relation to the operation of the WESM can be improved.

In total, there were 21 issues identified. Out of these, the significant issues are provided below:

Findings	PEMC's Response
<p>WESM members trading while suspended   </p>	
<p>Observation It was noted that WESM members SORECO I, SORECO II, BATELEC II and CASURECO II were suspended during our audit period, but these members continued to trade within the WESM. This is a non-compliance with the WESM Rules Clause 2.7.2. Through discussions with PEMC, it was advised that the PEM Board was made aware of each of the matters on a regular basis, as well as the impact on the WESM, if PEMC were to proceed with the issuance of disconnection notices given the circumstances. Discussions and decisions made by the PEM Board were verbal and therefore the Market Auditor was unable to sight evidence of decisions made and the justification advised.</p> <p>Risk The non-restriction of trading activities of suspended participants may impact the WESM Member's confidence in PEMC as a market operator and may further cause financial and legal damages for the collection and settlement of defaulted receivables. Additionally the lack of documentation and audit trail for key decisions that may result in a non-compliance with WESM Rules exposes PEMC with the inability to justify decisions made with evidence and PEMC's rationale.</p> <p>Recommendation</p> <ul style="list-style-type: none"> • Ensure Notices of Disconnection are distributed to the NGCP upon issuance of Notice of Suspension to a WESM Member; • Where a decision is made by the PEM Board to not proceed or advice is provided by the DOE, documentation should be kept on file to enable an audit trail of the decision made and it should be communicated to the market; and • As the current WESM Rule does not mandate the NEA to act as a guarantor for purchases of electricity by electricity cooperative or small distribution utility to 	<p>PEMC coordinated with the relevant agencies to emphasize the role of the National Electrification Administration (NEA) as the guarantor for purchases of electricity in the WESM by electric cooperatives or small distribution utilities.</p> <p>PEMC cannot amend the rules to mandate the NEA to act as a guarantor as it will result in an inconsistency with the Electric Power Industry Reform Act 2001.</p> <p>The proposal for the inclusion of disconnection policy in the WESM Rules has been submitted to the Rules Change Committee (RCC).</p> <p>Timeframe Completed</p>

<p>support their credit standing, the Market Auditor recommended a rule change that mandates this.</p>	
<p>Development of Central Registration Body Performance Standards and Annual Reporting L 1</p>	
<p>Observation</p> <p>It was noted that PEMC has not published a report on the performance of the Central Registration Body since the commencement of the commercial operations of RCOA on the 26 June 2013. This results in a technical breach of the Retail Rules Clauses 1.4.2.3 and 1.4.2.5.</p> <p>Risk</p> <p>Without performance reporting and performance standards established for the RCOA, there is risk that the MO may not be aware of instances where market performance expectations are not being met and action is not being taken to continually improve market performance.</p> <p>Recommendation</p> <p>Develop performance standards for the Central Registration Body and the standards should be approved and implemented with reporting mechanisms in place as required under the Retail Rules.</p> <p>It was also recommended that an audit be conducted on the report published to provide Retail Market participants confidence in the performance of the Central Registration Body against the approved performance standards.</p>	<p>The Central Registration Body Performance Standards was included in the revised MOPS and was submitted to PEM Board last January 22, 2015, and thereafter to the DOE for its approval.</p> <p>The implementation of the standards will depend upon the approval of the revised MOPS by the DOE.</p> <p>Timeframe Completed</p>
<p>Payment of registration fee and inconsistency between the WESM Rules and the Internal Business Procedures L 1</p>	
<p>Observation</p> <p>It was noted that the requirements of the Internal Business Procedure (IBP – CPC.PRC.01) were not consistent with the WESM Rules – Clause 2.5.1. The inconsistency was specific to the payment of the registration fee. The IBP requires the registration fee to be paid “if the application is approved” whereas the WESM rules require</p>	<p>PEMC will propose the restructuring of the market fees to take into account the related fees on WESM application.</p> <p>Timeframe On-going</p>

<p>payment of registration fee with the application itself, regardless of approval. As result of the inconsistency, it was noted that there were 39 new registrations within the audit period where the registration fee was both billed and paid following the notice of approval.</p> <p>Risk</p> <p>With inconsistencies between the IBP and the WESM Rules, there is a risk of not complying with WESM rules by following the direction under the IBP.</p> <p>Recommendation</p> <p>Revise the IBP to ensure consistency in the application with WESM Rules Clause 2.5.1 and registration fees are collected once WESM applications are received.</p>	
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The Market Auditor also made a follow-up on the action taken by PEMC for all issues reported within the 4th Market Operations Audit report. The table below summarizes the status of the issues reported as of December 2014.

Audit Area	Number of PEMC Actions	Resolved	Outstanding	Partially Completed
Market Software	14	7	7	-
IT Systems	8	5	-	3
Market Documentation	4	1	3	-
Process and Compliance	14	9	4	1
Bid-to-Bill Analysis	7	1	6	-
Total	47	23	20	4

Of the prior issues outstanding, the following were assessed as **high** risk, and these have been considered by the Market Auditor in the basis for forming their conclusion.

Issue 6.4.10 (4th Market Operations Audit Report): Breaches in the area of Prudential Requirements as PEMC does not have any effective means of enforcement. The Market Auditor's follow-up procedures indicated the following:

- There has been no review of the policies to facilitate immediate disconnection of participants who have been non-compliant with collection and payment obligations or prudential requirements. It was noted that during the audit period there were four participants identified still trading during the audit period.

- There has been no enforcement of real-time EFT facilities and it is noted that a number of participants still pay their settlement invoices by cheque. The Market Auditor noted that 1 out of 24 Trading Participants payments had not been cleared by November 26, 2013 resulting in a default due to late receipt of cheques; and
- The Customer Registration and Settlement System (CRSS) is still to be implemented; as such there has been no change to the monitoring of actual exposure from a monthly basis to a weekly basis.

Issue 5.1.3 Load Forecasting (Requirement of System Operator Audit) (4th Market Operations Audit Report) – Nodal forecasts have poor accuracy. Nodal load forecasts had unacceptably high errors with significant proportion of nodal forecasts having absolute percentage errors outside the 3%, 10% and 50% tolerance bands. It was recommended that the System Operator initiate a review of its SCADA system and the processes used to update real-time information with a view to investigating how the accuracy of their real-time data can be improved. The System Operator should also be subjected to an audit/review similar of the Market Operator, where compliance with the WESM Rules is assessed and IT systems and business process are examined.

Issue 5.1.2 Market Network Model (4th Market Operations Audit Report) - The inclusion of MERALCO's sub-transmission assets that connect Market Trading Nodes (MTN) in the Market Network Model (MNM) has a significant impact on dispatch and pricing in the WESM. While PEMC has completed its necessary actions to resolve this issue, due to the lack of information and data received from MERALCO, the Market Operator opined that the issue and risk still exists from an industry and market perspective. The Market Auditor was informed that the DOE is currently expediting MERALCO's provision of real-time snapshot data of its sub-transmission and distribution network to PEMC and the NGCP for the achievement of this undertaking. The status of this issue should be followed up with all outstanding issues within the 6th Market Operations Audit.

Interface with the System Operator

This section was provided by the Market Auditor to provide PEMC with additional information, including a high level background on SO interfaces with PEMC and reliance placed on the SO in operating the WESM.

The Market Auditor obtained an understanding of the types of input data received, the consistency of the data received and how the data is managed by PEMC. Based on the analysis conducted it was evident that PEMC is reliant on critical inputs required to operate the market and there are limited controls due to the interface in some cases being direct phone communication.

To perform its operational functions as the Market Operator, PEMC is dependent on the provision of correct and timely data from the System Operator. In this regard, the Market Auditor

acknowledged and stressed the recommendation in the 4th Market Operations Audit for the conduct of an audit of the System Operator.

The Market Auditor also noted that as a separate organization, PEMC does not have transparency or comfort on the adequacy of the controls of the System Operator. A reasonable assurance audit of the System Operator will provide the whole electricity industry with a level of assurance on the processes and internal controls of the System Operator.

To further discuss the interface, the Market Auditor compared PEMC with other jurisdictions in respect to whether the markets operated with a joint Market Operator and System Operator or separate, and whether compliance audits were conducted of the System Operator. The comparison is summarized below:

Jurisdiction	MO/SO Structure	Audit Conducted
1. Australia (Eastern)	Joint	Combined MO and SO Audit
2. Australia (Western)	Separate (Policy to Merge)	SO Audit Conducted
3. New Zealand	Separate	SO Audit Not Conducted
4. Singapore	Separate	Could not be determined based on public information.
5. Great Britain	Separate	SO Audit Conducted
6. United States (PJM)	Joint	Combined MO and SO Audit
7. United States (California)	Joint	Combined MO and SO Audit
8. United States (Texas)	Joint	Combined MO and SO Audit*
9. United States / Canada (Mid Continent ISO)	Joint	Combined MO and SO Audit*
10. United States (New York)	Joint	Combined MO and SO Audit*
11. United States (New England)	Joint	Combined MO and SO Audit*
12. Canada (Ontario)	Joint	Combined MO and SO Audit*
13. Canada (Alberta)	Joint	Combined MO and SO Audit*
14. Northern Ireland	Joint (Run as Joint Venture)	Combined MO and SO Audit*

**Audit conducted by Internal Compliance Division within the Operator (however, independent from Operations)*

Based on the comparison it can be noted that in the majority of the jurisdictions, the System Operator was subjected to an independent audit, whether combined with the Market Operator audit or separately audited.

VI. Conclusion

The Market Auditor reached a conclusion on the two broad aspects of the 5th Market Operations Audit, summarizes below:

1. A reasonable assurance conclusion was given for Task 1.

Task 1 covers the Certification of the Market Dispatch Optimisation Model (“MDOM”) and Billings, Settlement and Metering (“BSM”) System. It was certified that the software is used in manner intended and is provided with correct input data, the MDOM Software and BSM Software used by PEMC will perform substantially in compliance with WESM Rules as amended by Department of Energy (“DOE”) Department Circulars up to and including DC2014-03-0008 and RCOA Rules, together with the associated WESM and Retail Manuals.

2. A qualified limited assurance conclusion was given for Tasks 2 to 5.

The limited assurance conclusion of the Market Auditor has been qualified to reflect the overall exposure on the WESM. The main reasons for the Market Auditor in issuing a qualified review conclusion are the following:

- a. One **high risk level one** non-compliance issue; two **low risk level one** non-compliance issues; and other issues ranging from **high risk** to **low risk** where internal controls in relation to the operation of the WESM have been identified;
- b. A scope limitation existed with respect to procedures that were intended to be performed on critical IT controls, which resulted in the inability to obtain appropriate evidence; and
- c. Prior audit issues 6.4.10 (breaches in the area of prudential requirement) and 5.1.3 (poor nodal forecasts) were assessed as **high risk**.

The PAC during its meeting on 18 August 2015 fully accepted the findings and recommendations of RSMBC as provided in the Final Report of the Market Auditor.

VII. Next Steps

Anent the above findings, the PAC, in coordination with the Office of the President will continuously monitor the Market Operator’s compliance with the management plans, and provide assessment and advice on its development and implementation. In this regard, the

PEMC shall be submitting an updated Action Plan together with committed timelines to address the audit findings and recommendations.

VIII. Endorsement to the PEM Board

Prepared and Submitted By:

PEM AUDIT COMMITTEE

(signed)

Prof. Felixberto U. Bustos, Jr.
Chairman

(signed)

Eduardo Alejandro O. Santos
Member

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Christian M. Orias
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