

**FOURTH VERIFICATION OF THE
SANTA ANA HYDROELECTRIC PLANT**
(UNFCCC REGISTRATION REF. N°: 0275)

Empresa de Acueducto y Alcantarillado de Bogotá (EAAB)
(COLOMBIA)
EDF Trading Limited
(United Kingdom)
MGM Carbon Portfolio, S.a.r.l.
(Northern Ireland)

VERIFICATION PERIOD:
2008 08 01 TO 2009 07 31

REPORT N°.
CDMVER-021-01

SEPTIEMBRE, 2010

	VERIFICATION REPORT	
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<i>Date of first issue:</i>	2010 04 23	<i>Project No.:</i>	0275 (UNFCCC webpage)
<i>Approved by:</i>	<i>Internal Technical reviewer of ICONTEC</i>	<i>Organizational unit:</i>	Instituto Colombiano de Normas Técnicas y Certificación – ICONTEC Carrera 37 52-95 Phone: +57-1-6078888 Bogotá - Colombia
<i>Client:</i>	Empresa de Acueducto y Alcantarillado de Bogotá (EAAB). Address: Av. Calle 24 No. 37 - 15 Bogotá – Colombia Phone: + 57-1 – 3447058	<i>Client ref.:</i>	CR 0275

The Instituto Colombiano de Normas Técnicas y Certificación - ICONTEC, carried out the fourth verification period of the GHG emissions reduction due to Santa Ana Hydroelectric Plant project in Bogotá, Colombia, by reviewing the findings of the project from 2008 08 01 to 2009 07 31.

Santa Ana Hydroelectric Plant is a small run-of-river type hydroelectric plant, introduced into the municipal potable water supply system of Bogotá – Colombia, located on the outskirts of the city. It was scheduled to begin operations in the second semester of 2005.

We carried out a Verification plan that included: i) planning, ii) desk review and investigation of secondary sources of information, iii) on-site assessment and iv) reporting, as follows:

- March 12, 2010: Planning meeting for the verification at the headquarters of the EAAB.
- March 18 and 19, 2010: Desk review and investigation of secondary sources of information.
- March 21 and 22, 2010: On-site Visits: Santa Ana Hydroelectric Plant, Usaquén Substation and Control center.
- April 23, 2010: Reporting. A draft verification report was sent to the owner of the project for comments. The documentation of the project was reviewed to verify the correction made of the Monitoring report.
- June 19, 2010: New version of the Monitoring report was submitted by the Project participant
- July 27, 2010: Draft Final verification report was written and sent for comments to the project participant.
- September 17, 2010: Final Verification report was assessment by internal technical reviewer for QA/QC.
- September 23, 2010: The documentation of the verification process included the final verification report was submitted by UNFCCC webpage in front to EB.

For the verification ICONTEC used as reference the Article 12 of the Kyoto Protocol and CDM modalities and procedures according to the Marrakech Agreement, the criteria of the CDM Executive Board and the host country, as well as the operational and technical monitoring criteria specific for this type of project.

2010-04-23

	VERIFICATION REPORT	
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The verification team applied the recommendations of Validation and Verification Manual (Ver 1.2) of EB-UNFCCC, addressed to the identification of risks associated to the verification process. In this case we did not identify potential risks.

Documentation review, interviews and on-site visits allowed us to collect enough evidence to completely assess the verification criteria and determine that the emissions reduction were correctly calculated based on PDD, monitoring plan and appropriate application of Appendix B of the Simplified M&P for Small Scale CDM Project Activities (see option a) (taking into account the decision / amendments to Appendix B of EB 12)).

Based on the above issues, ICONTEC is able to certify that the GHG emissions reduction of Santa Ana Hydroelectric Plant in Bogotá, during the crediting period assessed from 2008 08 01 to 2009 07 31, amounted 14,725 tonnes /CO₂ equivalent.

Report No:	CDMVER 021-01	Subject Group:	Verification	Indexing terms:
Report title: Fourth Verification Report of Santa Ana Hydroelectric Plant				Climate Change; Kyoto Protocol; verification; Clean Development Mechanism, Small scale

Work carried out by	Eng. Juan Alberto Gracia (AL) Eng. Fernando Gómez (EE) Eng. Francy Ramirez (Auditor in training)		
Work verified by	Internal Technical reviewer of ICONTEC	<input checked="" type="checkbox"/> No distribution without permission from the Client or responsible organizational unit <input type="checkbox"/> Limited distribution <input type="checkbox"/> Unrestricted distribution	
Date of this revision	23-09-2010		
Rev. No.:	01		
Number of pages:	42		

This report should not be read without reference to the annexed Verification Protocol.

Abbreviations

EAAB	Empresa de Acueducto y Alcantarillado de Bogotá (Owner of the Project activity)
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CERs	Certified emission reductions
CLA	Clarification Request
CO ₂	Carbon Dioxide
CO ₂ eq	Carbon dioxide equivalent
CREG	Regulatory entity of energy sector in Colombia (Comisión de Regulación de Energía y Gas).
DNA	Designated National Authority
DOE	Designated Operational Entity
DR	Document Review
EE	Energy Sectoral Expert
CODENSA	Commercializer, Distributor of Energy and Grid Operator
ERPA	Emission Reductions Purchase Agreement
GHG	Greenhouse Gases
CAM	Compañía Americana de Multiservicios (Maintenance and calibration company)
ICONTEC	Colombian Institute of technical standards and certification (Instituto Colombiano de Normas Técnicas y Certificación)
IPCC	Intergovernmental Panel on Climate Change
MoV	Means of verification
MP	Monitoring Plan
NEON	It is an information service about the Colombian Wholesale Power Market that allows the market agents to obtain, in an interactive way, information of the operational process and the results of the liquidation of the transactions done in the Power Block Market.
PDD	Project Design Document
EMGESA	Empresa Generadora de Energía Eléctrica S.A. (Electricity Market Agent)
UNFCCC	United Nations Framework Convention for Climate Change
XM	“XM” (Experts Market) is a company of the ISA Group providing integral services. (www.xm.com.co).

	Contents	Page
1.	INTRODUCTION	6
1.1	Objective	6
1.2	Scope	6
1.3	GHG Project Description	7
2.	VERIFICATION METHODOLOGY	9
2.1	Introduction	9
2.2	Verification Team	9
2.3	Desk Review and investigation of secondary sources of information	10
2.4	On-site visit	11
2.5	Assessment	11
2.6	Resolution of findings	12
2.7	Internal Quality Control	13
3.	VERIFICATION FINDINGS	13
3.1	Remaining issues, CARs, FARs from previous Validation	13
3.2	Project implementation	14
3.3	Completeness of the monitoring plan	14
3.4	Emission reduction Calculation	18
3.5	Accuracy of Emission reduction calculation	19
3.6	Quality of evidence to determinate emission reductions	19
3.7	Management System and Quality Assurance	20
4.	PROJECT SCORECARD	21
5.	Verification statement	22
6.	References	24
	ANNEX A. INICIAL AND PERIODIC VERIFICATION PROTOCOL	26
	ANNEX B. CVs of VERIFICATION TEAM MEMBERS	39

	VERIFICATION REPORT	6 of 42
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1. INTRODUCTION

Empresa de Acueducto y Alcantarillado de Bogotá (EAAB) has commissioned an independent verification by ICONTEC of its reported greenhouse gas (GHG) emission reductions from the Santa Ana Hydroelectric Plant project. ICONTEC have reviewed the GHG data collected from the period 01-08-2008 to 31-07-2009. This report contains the findings of the verification and the certification statement for the certified emission reductions.

ICONTEC has reviewed the GHG data collected for the verification period from 01-08-2008 to 31-07-2009.

The verification has been performed on the basis of UNFCCC criteria referred in Article 12 of the Kyoto Protocol and CDM modalities and procedures according to the Marrakech Agreement, the criteria of the CDM Executive Board and the Host country, as well as criteria given for consistent project operations, monitoring and reporting.

1.1 OBJECTIVE

According to CDM Modalities and Procedures (Decision 17/CP.7) the purpose of this verification process is the periodical independent review and ex-post determination of the monitored reductions which have occurred as a result of the registered CDM project activity during the verification period.

As a result of this process a written certification of the emission reduction achieved and verified will be prepared by the DOE for the specified time period.

The objective of an initial verification is to verify that the project is implemented as planned, to confirm that the monitoring system is in place and fully functional, and to assure that the project will generate verifiable emission reductions.

ICONTEC has carried out this verification according to the Validation and Verification Manual of UNFCCC (version 1.2), with a risk-based approach on the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of CERs.

1.2 SCOPE

The scope of this verification included the following activities:

- To determine whether the project has been implemented as planned
- To determine whether the project documentation provided is in compliance with the requirements of the registered project design document, relevant provisions of decision 17/CP.7 and relevant decisions of the COP/MOP

2010-04-23

	VERIFICATION REPORT	7 of 42
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- To conduct on-site assessment, including a review of performance records, interviews with project participants and local stakeholders, measurements, compliance of established practices and testing of the accuracy of monitoring equipment.
- To identify whether actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan
- To review monitoring results and verify that the monitoring plan is in place and fully functional and their documentation is complete and transparent.
- To confirm that the project generates verifiable emission reductions
- To verify whether reported GHG emission data is sufficiently supported by evidence, i.e. monitoring records
- To recommend to the project participants the appropriate changes to the monitoring plan, if necessary.
- To determine the reductions in anthropogenic GHG emissions by sources that would not have occurred in absence of the CDM project activity, using calculation procedures according to the registered Project Design Document and the Monitoring Plan.
- To confirm that GHG emission reduction data are “free” of material misstatements.
- To identify and inform the project participants of any concerns related to the actual project activity and its operation compliance with the registered project design document. Project participants shall address the concerns and supply relevant additional information.
- To provide a verification report to the project participants, the parties involved and the CDM Executive Board. The report shall be made publicly available.

ICONTEC based on its ethics code and internal procedures for carrying out validation, verification and certification audits of CDM project activities (the internal procedures are based on the Validation and Verification Manual (VVM (Ver 1.2) of EB of UNFCCC) focused on the identification of significant risks for CER generation, and verification of the mitigation.

Verification does not mean to provide any consulting for the project participants. However, stated requests for clarifications and/or corrective, forward actions may have provided input for improvement of the project design.

1.3 DESCRIPTION OF THE PROJECT ACTIVITY

Project Parties : Empresa de Acueducto y Alcantarillado de Bogotá -
EAAB (Colombia)
EDF Trading Limited (United Kingdom)
MGM Carbon Portfolio, S.a.r.l. (Northern Ireland)

Title of project activity : Santa Ana Hydroelectric Plant

	VERIFICATION REPORT	8 of 42
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UNFCCC registration No : 0275

Project Entity : Santa Ana Hydroelectric Plant is part of Empresa de Acueducto y Alcantarillado de Bogotá E.S.P.
Official Contact:
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Location of the project activity : Latitude 110360 North, longitude 105800 East Bogotá, Colombia

Project's crediting period : 10 Years

Verification period : 01-08-2008 to 31-07-2009

Projects starting date: : 2005 08 01

The project activity involves:

Santa Ana Hydroelectric Plant is a small run-of-river type hydroelectric plant, introduced into the municipal potable water supply system of Bogotá – Colombia, located on the outskirts of the city. It was scheduled to begin operations in the second semester of 2005.

Santa Ana Hydroelectric Plant project has installed at the base of the Usaquén Alternate tunnel a power house with hydroelectric power conversion equipment, that turbines the water passing from the Wiesner water treatment plant into the distribution / storage system of the city, producing clean electricity to be placed into the Colombian National Interconnected Grid, following local existing electricity market regulations and required environmental and operational permits. Its exact location corresponds to the coordinates 110324.65 North and 105849.56, at north of Bogotá

A key objective of the project is to reduce Greenhouse Gas Emissions that would have otherwise been generated by the National Interconnected System of Colombia.

The energy generation of Santa Ana Hydroelectric Plant is transmitted to the national grid through a short 34.5 kV line connecting the power plant with the Usaquén Electrical Substation, owned by the local operator CODENSA. Just before this point, in the same location, there is a step down transformer 34.5/11.4 kV, owned by EAAB, where the power is adjusted to the voltage level required for connection to Usaquén Electrical Substation of CODENSA. Besides that, in Usaquén EAAB installations there are two meters (main one and backing one) used for EAAB to verify and validate measurements of Santa Ana

2010-04-23

	VERIFICATION REPORT	9 of 42
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Hydroelectric Plant input registered by the meters of commercial frontier in Usaquén Electrical Substation of CODENSA.

2. VERIFICATION METHODOLOGY

2.1 Introduction

The verification consists of the following four phases:

1. Desk review and investigation on secondary sources of information,
2. On-site assessment
3. Resolution of findings
4. Issuance of the final verification report with the conclusion on the emission reduction achievements

As mentioned in clause 1.2 of this report ICONTEC, based on its ethics code and internal procedures, carries out validation, verification and certification audits of CDM project activities (which, in turn, are based on the validation and verification manual) focused on the identification of significant risks for CER generation, and verification of the mitigation.

Findings established during the verification can be seen as:

- a non-fulfillment of verification protocol criteria, or
- an identified risk to the fulfillment of the project objectives

The findings could take the form of a Corrective Action Request (CAR), Forward action Request (FAR) or a Clarification Request (CLA).

The verification protocol resulting from the verification of Santa Ana Hydroelectric Plant Project is enclosed in Annex A of this report.

2.2 Verification Team

The verification team consists of the personnel described in Table 1:

Table 1. Verification team

Role/Qualification	Last Name	First Name	Country
Lead Auditor	Gracia	Juan Alberto	Colombia
Energy Sectorial Expert	Gómez	Fernando	Colombia

2010-04-23

	VERIFICATION REPORT	10 of 42
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Auditor in training	Ramírez	Francy	Colombia
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The verification team is qualified in accordance with ICONTEC qualification scheme for CDM validation and verification. (See in the Annex B the Verification team members CVs):

2.3 Desk Review and investigation of secondary sources of information

In order to carry out the desk review, the following documents were requested to the project participants:

Validation report 2006 04 03 rev 1.

Last version of PDD and attached documents (including the last version of the monitoring plan, Version 2).

Verification report No. CDMVER 003-05 of October, 2008.

Monitoring report ver 02, 03 and ver 04 of verification period.

Reports and records of daily, monthly and annual monitoring data on the items defined in the monitoring plan and the Monitoring Report for the fourth Verification period from 01-08-2008 to 31-07-2009.

Quality Assurance Procedures like procedures for plant operation and maintenance, as well as for measuring equipment calibration, and information of training for the personnel of the operation and Maintenance Company.

Information on the applicable environmental regulations (see the clause 6. References).

Specifications for the Plant equipment.

Communications with the project stakeholders.

The whole documentation was reviewed and a verification audit plan was carried out completely during the verification activities.

The monitoring report of the fourth verification period was made publicly available in UNFCCC web site on 2010 03 05.

2010-04-23

2.4 On-Site Visits

Between, March 21st to 22nd the project was visited at the following facilities:

Santa Ana Hydroelectric Plant (Calle 119 No. 0-10 Este, Bogotá).
Control Center (Av. Calle 22 No 80 A 81, Bogotá),
EAAB Headquarter Office (Av. Calle 24 No. 37 – 15, Bogotá),
Usaquén Electrical Substation of CODENSA (Calle 110 No. 9-80, Bogotá)
Usaquén Electrical Substation of EAAB (Calle 110 No. 9-80, Bogotá)

Interviews were conducted to the plant's personnel and to EAAB Directors and Technical Supervisor (see list below). Other project stakeholders were also interviewed (CAM, CODENSA, EMGESA).

During on-site visit the following personnel were interviewed:

Table 2. Interview with personnel and Stakeholders of the project

Entity	Name	Position
EAAB	Dr. Humberto Triana	Environmental Corporate Manager
EAAB	Dr. Mauricio Jiménez	Network Matrix Aqueduct Director
EAAB	Ms. Martha Patricia Cruz	CDM Team Leader of Environmental Corporate Management Office.
EAAB	Mr. Juan Carlos Sánchez	Power Negotiator of Electromechanical Services Direction.
EAAB	Mr. Gino Gonzalez	Planning and Control Division Chief of Network Matrix Aqueduct Direction.
EAAB	Mr. José Gilberto López	Quality Coordinator of Network Matrix Aqueduct Direction.
EAAB	Mr. Mauricio Velástegui	Control Center Division Chief of Network Matrix Aqueduct Direction.
EAAB	Mr. Alfonso Cubillos	Professional of Electromechanical Direction
EAAB	Ms. Magda Ivonne Castaño	Specialist Professional of Quality and Process Direction.

2010-04-23

	VERIFICATION REPORT	12 of 42
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EAAB	Mr. José Javier Jiménez	Professional of Quality and Process Direction.
CAM	Mr. Mauricio Bermudez	Telemeasurement Supervisor
EMGESA	Ms. María del Pilar Díaz	Trading Coordinator Expert Zone

2.5 Assessment

ICONTEC performed the verification by:

- interviews with relevant personnel of CDM project and stakeholders
- reviewing project documentation;
- on-site inspections, including review of plant installations, performance records, and interviews with project participants;
- collecting measurements, observing established practices and verifying the accuracy and liability of monitoring equipment;
- cross-checking measurements;
- reviewing monitoring results and checking the correct application of monitoring methodologies, and quality control of the data collection and its report, and
- setting the GHG emissions reductions.

The verification assessment included the following aspects:

- Implementation of the monitoring plan and follow up, including verification of:
 - all data on project emissions reduction and follow up of indicators of sustainable development;
 - responsibilities and related authorities;
 - monitoring frequency;
 - accuracy and liability of the equipment used for monitoring, control and calibration;
 - consistency of results, their approval and revision;
 - Controls to prevent, detect, and correct any errors or omissions during the monitoring.
- Materiality of the project information including assessment of the absence of:
 - inconsistencies in the use of formulae in spreadsheets and their connections;
 - inappropriate use of the methodology approved;
 - errors in data due to failures during the typing process;
 - inappropriate use of data.
- Verification of consistency of data resulting from the project operation regarding the baseline.
- Analysis of potential risks to the project.

2010-04-23

e) Quality assurance and management system

The verification process was carried out using the verification protocol included in Annex A. The use of this checklist ensures a complete verification process, and demonstrates how emission reductions have been verified and how the verification findings have been reached.

2.6 Resolution of Findings

Corrective and forward action and clarification requests raised by ICONTEC, presented to the project participants were resolved through communication and meetings between EAAB S.A. E.S.P. and ICONTEC. To guarantee the confidence and transparency of the verification process, the concerns raised and the response provided by the project participants are documented in more detail in the verification protocol. (See the Annex A, Table A5).

2.7 Internal Quality Control

This report that includes the verification findings underwent a internal technical review before being submitted to the project participants.

The internal technical review and the quality control of the process was performed by an internal technical reviewer in accordance with ICONTEC internal procedures for carrying out validation, verification and certification audits of CDM project activities. The technical reviewers are qualified in accordance with ICONTEC qualification scheme for CDM validation and verification.

3. VERIFICATION FINDINGS

3.1 Remaining issues, CARs, FARs from previous Validation

There are no remaining open issues, CLA, CARs or FARs from validation or previous verification.

3.2 Project implementation

In our opinion the individuals responsible for the project have implemented all the activities according to the PDD and the monitoring plan. Additionally, and under responsibility of EAAB, social and environmental benefits have been implemented particularly by using the guidelines of the Environmental Management Plan submitted by EAAB and approved through Order 1913 on 2000-11-23 by Corporación Autonoma Regional – CAR (Environmental Authority).

As established in the PDD of Santa Ana Hydroelectric Plant, according to the Monitoring Methodology as specified under the relevant M&P for small scale CDM project activities related

2010-04-23

to renewable electricity connected to a grid, the monitoring shall consist of metering the electricity generated by the renewable technology, that is the Santa Ana Hydroelectric Plant. In addition, the table included in the PDD states that the “Data variable” to be considered is “electricity generated, provided to the Colombian National Interconnected System at the bus bar of commercial transactions”.

As a matter of fact, EAAB Quality Plan, as far as the Power Generation Procedure is concerned, establishes that electricity provided to the national grid generated by Santa Ana Hydroelectric Plant is measured at Usaquén.

Electrical Substation of CODENSA, under the following statement:

“In order to obtain generated power data, the Empresa de Acueducto y Alcantarillado de Bogotá and the entity in charge of commercialization have stated that the meter located in the land of Usaquén Electrical Substation will be the equipment of reference for measuring generated power” (frontier electricity meter).

This statement sharply matches the PDD Monitoring Plan requirement, above mentioned.

A cross-checking between energy measurements at the point where Santa Ana Hydroelectric Plant generation enters to the grid in Usaquén Electrical Substation of CODENSA, and those in power plant site was made. The small differences found in the series compared are consistent with energy losses in the very short line connecting the two points. Site measurements are taken using the meter S/N 014600821, installed in the Usaquén electrical substation, which is referenced in the reviewed documentation.

Based on the above considerations, ICONTEC considers that the power received at the arrival point of the transport line connecting Santa Ana Hydroelectric Plant and Usaquén Electrical Substation in the distribution system of CODENSA adequately represents the renewable power that effectively originates the emissions reduction.

3.3 Completeness of Monitoring

The physical conditions related to the plant capacity described in the PDD were verified in order to establish the validity of the basic parameters used in power and energy calculations. In fact, it was found that the technical characteristics of the turbine and generator correspond exactly to those specified in the PDD: capacity of the turbine 13.43 MW, net design head 105.9 m, as the plates exhibit; (the net head of 105.9 m. corresponds to a gross head of 120 m, as explained in the plant design document, revised by the verification team). With a design flow of 13.5 m³/s, as mentioned in the PDD, the application of the known formula $P = g \cdot h \cdot q \cdot \eta$ produces the 13.43 Mw value for installed capacity. Real operation water flows during the verification period are near to 6.0 m³/s, as a monthly average, which means that the power plant was used near to 44% of its capacity.

In order to establish the correspondence between the power registered at Usaquén Electrical Substation of CODENSA and the power generated by Santa Ana Hydroelectric Plant, the

2010-04-23

	VERIFICATION REPORT	15 of 42
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connection between them was physically verified according to the single line diagram, which is part of the connection contract, referred ahead.

The Verification Team checked during the onsite assessment that there were not other electrical connections, different from the main connection, through which there could be energy feedback counted from other systems. This verification was based on a review of electrical connections inside the power plant room control. In fact, ICONTEC found that additional to the main connection two auxiliary outputs exist: one for providing auxiliary services to the Hydroelectric Plant and the other one as substitution for the Wiesner drinking water treatment Plant. The Verification Team verified that, in both cases, neither the equipment nor the control system installed allow this type of operation, thus assuring that there is no feed back energy accounted as energy generated by the Santa Ana Hydroelectric Plant.

These issues allow us to affirm that the metering carried out at that substation of the power delivered by this circuit appropriately represents the power generated to be considered for GHG emission reduction calculations, as claimed by the Monitoring Plan.

As far as obtaining, recording and verification operations of the measurement in Usaqué Electrical Substation of CODENSA are concerned, these are included in the instructive 8SA2015054001 "Measurement and Data Analysis" related in the procedure 1SA20150540 "Power Generation".

The Verification Team established that this procedure complies with the operational and commercial scheme prevailing in Colombia, and that it strictly fulfils the regulatory requirements about this topic, especially those included in the Orders CREG 024 of 1995 (by which the commercial aspects are regulated regarding Wholesale Power Market in the national interconnected system which are part of the Operation Regulations) and CREG 006 of 2003 (by which the following aspects are adopted: standards on record of commercial frontiers and contracts, information supply and report, and liquidation of commercial transactions in the Wholesale Power Market), according with the following demonstration:

a) Technical Operation of Santa Ana

In operational terms, the power generated by Santa Ana is delivered to the distribution system in the city of Bogotá through the Grid Operator CODENSA, at Usaqué electrical substation according to the Contract of Connection 9-99-25400-566-2004 signed by CODENSA and EAAB on December 23, 2004, in which the parties commit themselves to comply with the Grid Code (Order CREG 025 of 1995) and the Distribution Regulations (Order CREG 070 of 1998).

As per the Technical Attachment to the Contract two power meters were installed, the main one and the supporting one, with identical SIEMENS features, with accuracy of 0.2 IEC, which directly and reliably calculate the power for each phase, with four (4) impulse transmitters to three wires free from potential to carry pulses to the CLD, anti-retrogression device with non-volatile memory. These meters are assembled in the cell identified as C05, "Aguadora" which is connected to row 3 at 11.4 kV and its use is exclusive for Santa Ana power generation plant.

2010-04-23

	VERIFICATION REPORT	16 of 42
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In the on-site visit to Usaquén Electrical Substation of CODENSA to establish the operational features and conditions of the metering systems above mentioned, ICONTEC found that these systems fairly adjust to the Contract of Connection.

In order to verify the reliability and accuracy of the metering, Tests Certificates were checked with their relevant Protocols corresponding to potential transformers (PT), current transformers (CT) and power meters, and the following results were found:

Potential Transformers:

Manufacturer: AREVA, Serial number: MK-77620, Type ME-1505

Tests performed at the manufacturer's laboratories as per the standard IEC 44-2, on July 22, 2005.

Tests performed: Dielectric tests, partial discharges measurement, and accuracy verification.

Test results: Satisfactory.

Current Transformers:

Manufacturer: AREVA, Serial number: MK-77750, Type KIG-24

Tests performed at the manufacturer's laboratories as per the standard IEC 44-2, on August 2, 2005.

Tests performed: Dielectric tests, partial discharges measurement, and accuracy verification.

Test results: Satisfactory.

Power Meters

Manufacturer: SIEMENS

Serial number: Main Meter, 30031; Supporting Meter, 30029. Type 3F4H, Model: 99-SWB, Accuracy Class 0.2S

Calibration certificates: CAM- IM0806-000778 issued on June 26, 2008; and CAM-IM0807-003322 issued on June 27, 2008.

Tests performed at the Meters Laboratory of CAM, as per the Colombian Technical Standard NTC 4856.

Tests were performed: Accuracy tests, Constant verification test, and operation without charge.

Test results: CONFORM

2010-04-23

	VERIFICATION REPORT	17 of 42
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The Meters Laboratory of the American Company of Multiservices (Compañía Americana de Multiservicios, CAM) has Accreditation 10165 issued on May 18, 2004, extended with the Order 5899 issued on March 9, 2006, of the Superintendence of Commerce and Industry of Colombia.

Based on the above mentioned visits and certifications, ICONTEC provides positive opinion on the reliability and accuracy of the metering. And this calibration records evidence the continue confidence about the meters.

As EAAB direct metering is concerned, this is executed using AMETEK meters installed in Usaqué Electrical Substation of EAAB. ICONTEC verified that the main meter (No. 14600821) and the backing meter (No. 14600822) have protocols testing issued by the manufacturer and calibration certificates: CAM-IM0806-003273 and CAM-IM0806-003274 issued on June 26, 2008 (These power meters are using for cross-checking process).

b) Commercial Operation of Santa Ana

In commercial terms, power produced by Santa Ana is delivered to the power generating and commercializing company EMGESA, as per the power sale contract No. 1-99-26300-671-2005 signed by the Company and EMGESA for three years from December 1, 2005. Thus, EMGESA is the representative of Santa Ana Plant in the Wholesale Power Market. Therefore, the crediting period object of the current verification, August 1, 2008 to July 31, 2009, is covered by the commercial contract No. 1-99-26300-671-2005.

The record of the power bought and sold by the commercializing agents in the Wholesale Power Market in Colombia, and which is the basis for the execution of power sale contracts, is officially kept by the Company XM Experts Market (company of the ISA Group providing integral services of operation, administration and development of wholesale power markets), based on the information of the meters installed in the commercial frontiers.

According to the communication 010916-1 of June 9, 2005 addressed to EMGESA by ISA (Head Company of the Administrator of the Commercial Interchange System – SIC, later merged into XM Market Experts), the commercial frontier of Santa Ana Hydroelectric Plant was officially registered in the Wholesale Power Market, with an effective capability of 8 MW, under the following features:

SIV CODE	METER SERIAL NUMBER	EXPORTER	IMPORTER	VOLTAGE LEVEL (kV)	METER CLASS	CR	START
ESNT 1001	30031	EMGESA	CODENSA	11,4	0.2	CR21	2005-06-09 0:00
CR:	Collection center (where the meter data are reported).						
START	Date from which the frontier is registered in SIC.						

2010-04-23

	VERIFICATION REPORT	18 of 42
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Through a telephonic system located in the Usaquén Electrical Substation of CODENSA, and with the support of a GPRS (Global Packet Radio System) system the company CAM is questioning daily the commercial frontier meter of Santa Ana installed at Usaquén Electrical Substation of CODENSA, about the power delivered. This information is daily store.

Daily transmission of the information to XM is done by CAM via Internet using the digital and coded mechanisms defined for all the agents of the Wholesale Power Market. The databases for recording the operations of the Colombian market are managed on the NEON platform (information service about the Colombian Wholesale Power Market) operated by XM.

c) Cross checking

The personnel from EAAB in charge of verification and validation of data acquired, transmitted and recorded within this framework is the Power Negotiator at the Control Center, by an automatically and electronically remote reading, of the power meter AMETEK No. 14600821 which is in the Usaquén Electrical Substation, owned by the EAAB-ESP. The Power Negotiator, supervised by the Director of Electromechanical Services, was appointed as interlocutor with external entities for these concerns, as per official communications subscribed by the Corporative Manager of Technology.

Soundness of the monthly power sale reports submitted by EMGESA to the Company was verified by direct consultation of the NEON platform databases, performed by the Verification Entity. These reports provide the information on a daily basis in accordance with the monitoring methodology.

Besides that, the DOE revised the cross checking method used by EAAB, based in comparison of frontier measurements with their own measurements (in AMETEK meters), using an excel worksheet. The method itself is considered adequate and the results of comparisons match fairly well.

d) Analysis of deviations

ICONTEC carried out the comparison of actual generation of 33,526 MWh during the period from August 2008 to July 2009 with the estimation of 47,000 MWh/year established in the PDD and found the following explanation of differences:

As explained by the interviewed personnel, these reductions are due to changes in the behavior of the consumption of water in the city of Bogotá; these changes are mainly the result of governmental campaigns for saving water and control of water leaks in the water distribution system. In any case, the generation data recorded, used to calculate GHG emission reductions, discussed later on, are consistent with these reduced water flows.

On these bases, the DOE considers that the Monitoring Report reliably shows the measurement of the power delivered to the grid by Santa Ana Hydroelectric Plant, added on a monthly basis that corresponds to a value of 33,526 MWh during the crediting period. Reduced emissions were calculated by multiplying the power delivered in MWh by the emissions reduction factor of 0.4392 kg of CO_{2e} per kWh officially approved in Colombia in 2005 for small-scale renewable power projects

2010-04-23

	VERIFICATION REPORT	19 of 42
---	---------------------	----------

connected to the national grid (AMS I.D). Emission reduction for this verification period is 14,725 tonnes CO₂eq.

ICONTEC could establish that for the period between August 2008 and July 2009, the Network Matrix Aqueduct Direction executed the following activities, which changed the scenario of operation of the Santa Ana Hydroelectric Plant and decreased inflow to the turbine:

1. Inspection and assessment of pipelines Santa Ana - Usaquén, by Network Matrix Aqueduct Direction. This line was kept out of operation since May 6, 2008 until March 8, 2009. This condition produced a pattern of operation in which the tank in Santa Ana and Santa Ana-Usaquén driving went out of service and unable to regulate service areas at the Usaquén station controller.

Under this new scheme of operation is not possible to supply drinking water through the Santa Ana tank, decreasing the flow entering the Santa Ana complex about 2.1 m³/s.

2. Restoration and structural reinforcement of the Santa Ana tank, by Network Matrix Aqueduct Direction. Work was completed on May 31, 2008. However, the tank was kept out of operation for the remainder of 2008 for work performed in the Santa Ana-Usaquén described in the preceding paragraph. The tank works were completed but there was no line of distribution.

3. Maintenance Chingaza tunnels, by the Water Supply Direction. Such maintenance was carried out in two periods. The first maintenance was conducted between November 13, 2008 and January 19, 2009, during which the Wiesner plant operated with pumping from the San Rafael reservoir and left the city to supply a flow of 1.2 m³/s, compensating flow Tibitoc plant. Standardization of service delivery from the system Chingaza began January 22, 2009 but the flow available for generation is not normalized by the restriction generated by the maintenance of the tank and the line Santa Ana Santa Ana - Usaquén out.

The second maintenance began July 13, 2009 and ended on September 17, 2009, and like the previous maintenance Wiesner plant operated with the pumping San Rafael reservoir, and during that period failed to provide the city 1 m³/s, which offset the plant flow Tibitoc.

Maintaining Chingaza tunnels was made in two periods of less than three months for a year, owing to considerations of supply and demand compensation volume of the San Rafael reservoir, seasonal climate periods that affect the execution of civil works and contractual considerations associated with the scope of the work of lining the tunnels.

4. Works for the rehabilitation of concrete channels raw water conveyance, as well as columns, walls and floor of the Wiesner tank.

Other events that reduced the generation were intermittent faults occurring on power circuits operating CODENSA. These unforeseen events totaled 508 hours left in which to generate energy for the national interconnected system.

For all the above, DOE verified that for the fourth project crediting period, generating power Santa

2010-04-23

	VERIFICATION REPORT	20 of 42
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Ana Hydroelectric Plant was reduced by 29% compared to the estimated annual generation in the Project Design Document (PDD).

3.4 Accuracy of Emission Reduction Calculations

Regarding the maintenance and calibration of the meters, described in section 3.3 a), and the procedures for data transmission and recording, described in section 3.3 b), ICONTEC may assure the accuracy and certainty of energy generation data, used to calculate the Emissions Reduction due to the Project.

On these bases, the DOE considers that Table 3 of the Monitoring Report, transcribed ahead, reliably shows the measurement of the power delivered to the grid by Santa Ana Hydroelectric Plant, added on a monthly basis that corresponds to a value of 33,526 MWh during the crediting period. Emissions reduction of 14,725 tonnes CO₂e were calculated by multiplying the power delivered in MWh by the ex-ante emissions reduction factor of 0.4392 kg of CO₂e per kWh, officially approved in Colombia in 2005 for small-scale renewable power projects connected to the national grid.

Based on the data monitored and application of the emission factor of the national interconnected grid, 0.4392 kg CO₂e per kWh, factor defined by Resolution 181421, 2005 for the Unit of Planning Miner and Power (UPME) of Ministry of Mines and Energy, the Table 3 presents the monitoring report of CO₂e emissions reduced monthly during the third period of accreditation of the project.

The daily monitoring report is on file "*Emissions Reduction of CO₂e - Santa Ana (1-08-08 to 31-07-09).xls*".

**ELECTRICITY DELIVERED TO THE NATIONAL INTERCONNECTED
GRID AND ESTIMATION OF CO₂e EMISSIONS REDUCED
AUGUST 1, 2008 – JULY 31, 2009**

PERIOD	ELECTRICITY (MW/h)	EMISSIONS REDUCED (Ton CO ₂ e)
Aug-08	2,465	1,083
Sep-08	2,575	1,131
Oct-08	1,961	861
Nov-08	2,437	1,070
Dec-08	2,016	886
Jan-09	1,395	613
Feb-09	3,014	1,324
Mar-09	3,708	1,628
Apr-09	3,450	1,515

2010-04-23

PERIOD	ELECTRICITY (MW/h)	EMISSIONS REDUCED (Ton CO ₂ e)
May-09	4,130	1,814
Jun-09	3,555	1,562
Jul-09	2,819	1,238
Total	33,526	14,725

Regarding the measurement record and storage, which is based on the procedures for data transmission and recording of the Wholesale Power Market, and according to previous description (see 3.3 b)) and the control described below about the continue maintenance and calibration of the equipment, we may assure the data's accuracy and certainty.

The power meter calibration SIEMENS No. 30031 and 30029 complies with all the provisions in the CREG resolutions 070 of 1998 and 006 of 2003 and the Technical Colombian Standard NTC - ISO / IEC 17025. This meter has a Calibration Certificate No. CAM-IM0806-000778 of June 26, 2008 and CAM-IM0807-03322 of June 27, 2008. The CLA 1 was identified in order to the power meter of support was included in the Monitoring report of this verification period due at during the calibration process is necessary disconnect the principal power meter and the data of the energy generation is support for this meter.

The verification and validation of the daily measurement that makes the power meters SIEMENS 30031 and 30029 are done by the EAAB through interrogation, automatic and electronic, of the power meter AMETEK, Model JemSTAR, which is in the Usaquén Electrical Substation, owned by the EAAB.

The power meter AMETEK has protocols testing and calibration certificates issued by the manufacturer. It does not have the formality of registration with the ASIC and therefore is under full responsibility of the EAAB. These meters have a Calibration Certificate No. CAM-IM0806-003273 of June 26, 2008 and CAM-IM0806-003274 of June 26, 2008.

3.5 Quality of Evidence to Determine Emission Reductions

Santa Ana Hydroelectric plant provided enough evidence of maintenance and calibration of the equipment, as well as data collection and analysis which allows ICONTEC to rely on the information and data presented during the verification.

Internal technical verifications are made to the operation of Santa Ana Plant by interdisciplinary teams, which ensure an appropriate control of power generation, and there also are detailed preventive plans for electrical, electronic and mechanical maintenance of the plant that assure its reliability. The Scheduled Maintenance of electrical, electronic and mechanical components equipment of the plant was carried out by the Electromechanical Services Direction. This

2010-04-23

	VERIFICATION REPORT	22 of 42
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maintenance is part of a Service Agreement signed between the Network Matrix Aqueduct Direction and the Electromechanical Services Direction.

3.6 Management System and Quality Assurance

EAAB is implementing a quality management system based on the Standard ISO 9001:2008 in the project, and its structure guarantees that documentation and records are within a control scheme ensuring reliability of the information provided during the verification.

In the internal audit in November 2008 there were closed the comments of the previous audit and was programmed the external audit for the month of December 2008 in order to expand the scope of the Quality Management System for Conduction and Distribution of Drinking Water in Matrix Networks and to include the power generation activities.

In December 2008 was making the certification audit. This certification was obtained in January 2009, under ISO 9001:2008, and its scope is: "Planning, Design and Construction Management, Operation, Control and Maintenance of Water Utility Systems for the Conduction and Distribution of Drinking Water in Mains Pipes and Clean Development Mechanism (CDM) Management for the Main Water System".

The following processes, procedures and instructions were modified to include the activities of power generation and thus to comply with numerals of the standard ISO 9001:2008:

Process: Investment Planning.

Process: Operation and Maintenance Planning.

Process: 0SA201505 "System Operation".

Process: 0AF101005 "Preventive Maintenance of Matrix System Structures".

Process: 0AF101015 "Corrective Maintenance".

Procedure: 1SA20051005 "Operation Planning".

Procedure: 1SA20051010 "Maintenance Planning".

Procedure: 1SA20150505 "Coordination of the Operation".

Procedure: 1AF10101510 "Repairing Matrix System Structures".

Procedure: 1SA20150540 "Power Generation".

Procedure: 1AF10100525 "Preventive Maintenance of Santa Ana Hydroelectric Plant".

Instructions: 7SA2015050502 "Santa Ana Station Routine".

Instructions: 7SA2015054001 "Start-up and Operation of Small Hydroelectric Plant".

Instructions: 8SA2015054001 "Measurement and Data Analysis".

Instructions: 8SA2015054002 "Conciliation of Results".

Instructions: 7SA2015054002 "Load Rejection".

Verification Team consider that in the futures internal audit the project participant should be consider as a audit criteria the CDM requirements for the project activity in order to verify continuous conformity with that requirements.

2010-04-23

4. PROJECT SCORECARD

The conclusions on this scorecard are based on the Monitoring report version dated on 2010 03 05 :

Table 4. Project Scorecard

Risk Areas		Conclusions			Summary and findings and comments
		Baseline Emissions	Project Emissions	Emissions Reductions	
<i>Completeness</i>	<i>Source coverage / Boundary definition</i>	✓	✓	✓	All the relevant areas are covered by the monitoring plan and the boundaries of the project are defined correctly and transparently.
<i>Accuracy</i>	<i>Physical Measurement and analysis</i>	✓	✓	✓	The technology is applied in an appropriate manner.
	<i>Data calculation</i>	✓	✓	✓	The emissions reductions are correctly calculated.
	<i>Data Management & Reporting</i>	✓	✓	✓	Data management and reporting were found to be satisfactory.
<i>Consistency</i>	<i>Changes in the project</i>	✓	✓	✓	Results are consistent with underlying raw data.

	<p>VERIFICATION REPORT</p>	<p>24 of 42</p>
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5. VERIFICATION STATEMENT

Reporting period: From 2008 08 01 to 2009 07 31

Verified emissions in the above reporting period: Emission reductions: 14,725 Tonnes of CO₂ equivalent.

5.1 Introduction

ICONTEC has been engaged by EAAB Project Developer to examine the greenhouse gas (GHG) emission reductions reported from the Santa Ana Hydroelectric plant for the corresponding period, equating to 14,725 tonnes of CO₂ equivalent.

DOE consider that the project's GHG emissions and resulting GHG emissions reductions reported in the Monitoring Report version 04 are fairly stated. Monitoring Report version 2 was publicly available of 2010 03 05, and it was necessary submit a new version (version 4) due at finding was identified during verification process.

5.2 Responsibilities of EAAB Project Management and ICONTEC

The Management of the Santa Ana Hydroelectric Plant is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring and Verification Plan.

The Management of Santa Ana Hydroelectric plant is responsible for developing and keeping records and reporting procedures in accordance with the Monitoring plan.

ICONTEC is responsible to set an independent GHG verification opinion on the GHG emissions from the project and approved baseline for the same period.

In a planned way ICONTEC got the information and asked for explanations we deemed necessary to provide enough evidence that the amount of GHG emission and the calculation of the GHG emission reductions, based on the Monitoring Report, are fairly stated for the reporting period.

5.3 Basis for GHG Verification Opinion

Our verification approach was based on the Kyoto Protocol requirements, Marrakech Agreement, as well as those defined by the CDM Executive Board.

ICONTEC approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate them. Our examination includes assessment, on a test basis, of evidence relevant to the amounts and disclosures in relation to the project's GHG emission and the calculations of GHG emission reductions for this reporting period.

2010-04-23

	VERIFICATION REPORT	25 of 42
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5.4 Opinion

ICONTEC is able to state that the monitoring plan is in accordance with the approved methodology applied by the proposed project activity. All the variables that are showed in the Monitoring Plan were verified and in the clauses 3.3, 3.4 and in the literals D.1 and D.2 (see Periodic Verification Protocol) are showed how they were verified and compliance with parameters established in the Monitoring Plan.

ICONTEC is able to certify that the emission reduction from the Santa Ana Hydroelectric Plant during the period from August 1st, 2008 to July 31st, 2009 equals to 14,725 tonnes of CO₂ equivalent.

Bogotá, September 23, 2010



Fabio Tobón
Executive Director
ICONTEC

	VERIFICATION REPORT	26 of 42
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6. REFERENCES

Documents provided by the project proponent that relate directly to the project

- /1/ PDD registered version 2
- /2/ Monitoring Plan Annex of the PDD
- /3/ Validation report REV 1 2006 04 03
- /4/ Monitoring Report 2010 02 25 (version 2), Monitoring report 2010 03 26 (version 3) and 2010 05 31 (version 4).
- /5/ Measuring records 2008 – 2009
- /6/ Legal documentation:
 - Purchasing Monthly Reports – Power Sale and Representation of Santa Ana Hydroelectric plant, August, 2007 – July, 2008
 - Copy of the Sale Contract of Santa Ana Minor Plant Power Contract No. 1-99-26300-941-2007. Duration: 1 year.
 - Santa Ana hydroelectric plant contract No. 1-99-26300-671-2005 signed by the Company and EMGESA for three years and seven months from December 1, 2005
 - Order CREG 024 of 1995, by which the commercial aspects are regulated regarding Wholesale Power Market in the national interconnected system which are part of the Operation Regulations.
 - Grid Code, Order CREG 025 of 1995
 - Distribution Regulations, Order CREG 070 of 1998
 - Contract of Connection 9-99-25400-566-2004 signed by CODENSA and EAAB on December 23, 2004, in which the parties commit themselves to comply with the Grid Code (Order CREG 025 of 1995) and the Distribution Regulations (Order CREG 070 of 1998).
 - Order CREG 006 of 2003, by which the following aspects are adopted: standards on record of commercial frontiers and contracts, information supply and report, and liquidation of commercial transactions in the Wholesale Power Market
 - Ministry of Mines and Energy Order UPME 181421 of 2005, by which establishes the Colombian official emissions factor for small scale CDM projects.
- /7/ Were established the following procedures and instructions:

2010-04-23

Process: Investment Planning.
Process: Operation and Maintenance Planning.
Process: 0SA201505 "System Operation".
Process: 0AF101005 "Preventive Maintenance of Matrix System Structures".
Process: 0AF101015 "Corrective Maintenance".
Procedure: 1SA20051005 "Operation Planning".
Procedure: 1SA20051010 "Maintenance Planning".
Procedure: 1SA20150505 "Coordination of the Operation".
Procedure: 1AF10101510 "Repairing Matrix System Structures".
Procedure: 1SA20150540 "Power Generation".
Procedure: 1AF10100525 "Preventive Maintenance of Santa Ana Hydroelectric Plant".
Instructions: 7SA2015050502 "Santa Ana Station Routine".
Instructions: 7SA2015054001 "Start-up and Operation of Small Hydroelectric Plant".
Instructions: 8SA2015054001 "Measurement and Data Analysis".
Instructions: 8SA2015054002 "Conciliation of Results".
Instructions: 7SA2015054002 "Load Rejection".

- /8/ Validation and verification Manual (Ver 1.2)
- /9/ Methodology of the project: AMS I.D version 7

Annex A

Periodic Verification Protocol

VERIFICATION OF THE SANTA ANA HYDROELECTRIC PLANT

TABLE A1 - INITIAL VERIFICATION CHECKLIST

Objective	Comments	Conclusion
A. Opening Session		
A.1. Introduction to audits	N/A	NA
A.2. Clarification of access to data archives, records, plans, drawings etc.	N/A	NA
A.3. Contractors for equipment and installation works	N/A	NA
A.4 Actual status of installation works; the project installation should be finished at time of initial verification in so far as the project should be ready to generate emission reductions afterwards.	N/A	NA
B. Open issues indicated in validation report.		
B.1. Missing steps to final approval	N/A	NA
C. Implementation of the project		
C.1. Physical components	N/A	NA
C.2. Project boundaries	N/A	NA
C.3. Monitoring and metering systems	N/A	NA
C.4. Data uncertainty	N/A	NA
C.5. Calibration and quality assurance	N/A	NA

Objective	Comments	Conclusion
C.6. Data acquisition and data processing systems	N/A	NA
C.7. Reporting procedures	N/A	NA
C.8. Documented instructions	N/A	NA
C.9. Qualification and training.	N/A	NA
C.10. Responsibilities	N/A	NA

TABLE A2: DATA MANAGEMENT SYSTEM/CONTROLS

The project operator's data management system/controls are assessed to identify reporting risks and to assess the data management system's/control's ability to mitigate reporting risks. The GHG data management system/controls are assessed against the expectations detailed in the following table. A score is assigned as follows:

- Full - all best practice expectations are implemented.
- Partial - a proportion of the best practice expectations is implemented
- Limited - this should be given if little or none of the system components is in place.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including Clarification and Corrective/forward Action Requests)
A.1 Defined organizational structure, responsibilities and competencies		
A.1. Position and roles <i>Position and role of each person in the GHG data management process is clearly defined and implemented, from raw data generation to submission of the final data. Accountability of senior management must also be demonstrated.</i>	Full	All the Roles and Responsibilities of the personnel involved in the project are clearly defined in Santa Ana Hydroelectric Plant and Empresa de Acueducto y Alcantarillado de Bogotá - EAAB.

<p>A.2. Responsibilities</p> <p><i>Specific monitoring and reporting tasks and responsibilities are included in job descriptions or special instructions for employees.</i></p>	Full	All the Roles and Responsibilities of the personnel involved in the project are clearly defined in Santa Ana Hydroelectric Plant and Empresa de Acueducto y Alcantarillado de Bogotá - EAAB.
<p>A.3. Competencies needed</p> <p><i>Competencies needed for each aspect of the GHG determination process are analyzed. Personnel competencies are assessed and training program is implemented as required.</i></p>	Full	Documentation and records of all the personnel involved in the Project were verified. In particular the competence of the contractors of operation and maintenance and calibration was verified.
B. Project Implementation in accordance with the registered project document		
<p>B.1 Requirement to be verified</p> <p><i>All physical features of the proposed CDM project activity proposed in the registered PDD are in place and that the project participants has operated the proposed CDM project activity as per the registered PDD. If an on-site visit is not conducted, the DOE shall justify the rationale of the decision.</i></p>	Full	We carried out on-site visit and verified that the project is technically being handled well. The entire operation is evidence of a preventive periodic maintenance of key equipment and measures in accordance with the monitoring plan.
C. Compliance of the monitoring plan with the monitoring methodology		
<p>C.1 Reporting procedures</p> <p><i>The DOE shall verify that the validated monitoring plan is in accordance with the approved methodology applied by the proposed CDM project activity.</i></p>	Full	The Monitoring Report that was presented, which had to be aligned with the Monitoring Plan, is consistent with the presentation of data taken and the documents control, according to the internal procedures of the company. The MP is in line with the requirements of the applied approved methodology.
<p>C.2 Necessary Changes</p> <p><i>If the monitoring plan is not in accordance with the monitoring methodology, the DOE shall request a revision to the monitoring plan prior to concluding its verification and making its certification decision. The DOE may request for</i></p>	Full	It was not necessary to do changes to the Monitoring Plan.

revision of the monitoring plan covering the monitoring period under verification, for approval by the CDM Executive Board. ⁵⁷		
D. Compliance of monitoring with the monitoring plan		
D.1 Monitoring plan <i>Monitoring of reductions in GHG emissions to result from the proposed CDM project activity is implemented in accordance with the monitoring plan contained in the registered PDD or the accepted revised monitoring plan.</i>	Full	<p>The measurements and calculations were performed according to the PDD monitoring plan.</p> <p>Were considered key variables and assumptions required in calculating emission reductions.</p>
D.2 Parameters monitored <i>All parameters stated in the monitoring plan have been including:</i> <i>(i) Project emission parameters;</i> <i>(ii) Baseline emission parameters;</i> <i>(iii) Leakage parameters;</i> <i>(iv) Management and operational system: the responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan.</i>	Full	<p>The measurements and calculations were performed according to the PDD monitoring plan.</p> <ul style="list-style-type: none"> - Emission Factor - Amount of electricity generated by the power unit <p>ICONTEC verified that data is kept electronically in the system, and back up is available and all the measurements are in according with the Monitoring plan..</p>
D.3 Accuracy of equipment <i>The accuracy of equipment used for monitoring is in accordance with the relevant guidance provided by the CDM Executive Board and is controlled and calibrated in accordance with the monitoring plan;</i> <i>(i) Monitoring results are consistently recorded as per approved frequency;</i> <i>(ii) Quality assurance and quality control procedures have been applied in accordance with the monitoring plan.</i>	Full	<p>In accordance with the defined PDD all calculations can be done.</p> <p>The Order 181421 of 2005 that defined the Colombian emission factor for Small Scale Projects is in force.</p> <p>The frontier power meters 30031 (main) and 30029 (supporting) used for the project have security labels.</p>
E. Assessment of data and calculation of greenhouse gas emission reductions		

E.1 Calculation <i>GHG emission reductions achieved by/resulting from the proposed CDM project activity shall be calculated applying the selected methodology.</i>	Full	Documentation is available and although it has restricted access for recording, it can be verified at the web page and also in physical documents.
E.1 Requirements <i>a) A complete set of data for the specified monitoring period is available.</i>	Full	The owner of the project included in the monitoring report all data resulting from monitoring the project variables during the period to verify.
<i>b) Information provided in the monitoring report has been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis</i>	Full	Other sources were reviewed for cross-checking of information was provided by the PP. XM data as the official source were collated and checked against those of MR.
<i>c) Calculations of baseline emissions, proposed CDM project activity emissions and leakage, as appropriate, have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document</i>	Full	All calculations of emission reductions were made with the formulas approved by the methodology used and the emission factor that applies to the project activity.
<i>e) Appropriate emission factors, IPCC default values and other reference values have been correctly applied, these are validated and periodically evaluated to ensure their ongoing appropriateness and accuracy, particularly following changes to circumstances, equipment etc. Validation and periodic evaluation of this are documented.</i>	Full	<p>In accordance with the defined PDD all calculations can be done.</p> <p>The Order 181421 of 2005 that defined the Colombian emission factor for Small Scale Projects is in force.</p> <p>The frontier power meter used for the project has the number 30031 and security labels. A supporting meter, number 30029, is available.</p>
<i>d) Any assumptions used in emission calculations have been justified.</i>	Full	The necessary assumptions were taken for calculating emission reductions.
E.3 Information/process flow <i>An information/process flow diagram, describing the entire process from raw data</i>	Full	

<i>to reported totals is developed.</i>		All the procedures are implemented in the Santa Ana Hydroelectric Plant. The EAAB is implementing the Quality Management System based on ISO 9001:2008 for Conduction and Distribution of Drinking Water in Matrix Networks and broaden its scope to include the power generation activities.
<p><i>E.4 Data transfer</i></p> <p><i>Where data is transferred between or within systems /spreadsheets, the method of transfer (automatic / manual) is highlighted - automatic links/updates are implemented where possible. All assumptions and the references to original data sources are documented.</i></p>	Full	<p>A control is used for the project equipments, which is automatically managed from a console, and collection of performance data of the plant is done it on-line. The data is saved in the System in magnetic files or in hard disks and also the cross-checked is done in order to establish possible deviations of the energy generation register. This data is transferred on the website page of XM (www.xm.com.co).</p> <p>All data sources are clearly referenced.</p>
<p><i>E.5 Data trails</i></p> <p><i>Requirements for documented data trails are defined and implemented and all documentation is physically available.</i></p>	Full	Documentation is available and although it has restricted access for recording, it can be verified at the web page and also in physical documents. There is an internal procedure for document control and Measurement and analysis of data.
<p><i>E.6 Internal verification</i></p> <p><i>Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.</i></p>	Full	<p>The electromechanical team of EAAB carries out the periodical preventive maintenance to the equipment and the infrastructure of the Santa Ana Hydroelectric Plant.</p> <p>Periodic inspections and measurements are carried out by CAM which ensures reliable measurements.</p>
<p><i>E.7 Internal validation</i></p> <p><i>Data reported from internal departments should be validated visibly (by signature</i></p>	Full	Internal validations reports and all the technical records related to the

or electronically) by an employee who is able to assess the accuracy and completeness of the data. Supporting information on the data limitations, problems should also be included in the data trail.

operational activities of the plant have been signed by qualified personnel under supervision of the Chief and the top management, which demonstrates their commitment to the project.

Internal quality audit was carried to the project in order to establish the effective implementation of the procedures and quality controls. Santa Ana Plant was included in the QMS and was certificate with ISO 9001:2008.

E.8 Data protection measures

Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).

Full

There is control of the project data records and the key information of the processes is kept with confidentiality. There is an internal procedure documents and records control. They keep a back up of the data records.

E.9 IT systems

IT systems used for GHG monitoring and reporting should be tested and documented.

Full

It is used for the project equipments, which is automatically managed from a console, and collection of performance data of the Plant is done it on-line.

F. Additional verification activities (as applicable)

F.1 Request for validation

If the project participants have deviated from the provisions of the registered monitoring plan, the DOE shall submit a request for deviation and provide complete, clear, and precise assessment and a description of the impact of the deviation on the emission reductions from the project activity.

A request for deviation is appropriate only if a change in the procedures for estimating or monitoring emissions was required due to a change in the conditions or circumstances of the proposed CDM project activity after it was registered as a proposed CDM project activity.

A request for deviation is not suitable if:

(a) The monitoring plan is not in accordance with the monitoring methodology applied by the project activity; submission of a request for revision of the

NA

N/A

NA

NA

<p>monitoring plan would be more appropriate;</p> <p>(b) The request would result in revisions to the approved methodology;</p> <p>(c) The request would result in a change in default parameter values other than those given in the approved methodology.</p> <p>A request for deviation that is approved by the CDM Executive Board applies only to the monitoring period under verification. If the deviation from the provisions contained in the project documentation is to continue in future monitoring periods, the DOE shall submit a request for revision of the monitoring plan.⁶⁴</p> <p>The verification report shall determine whether and how the monitoring report reflects the application of the approved guidance from the CDM Executive Board regarding the request for deviation.</p>	<p>NA</p> <p>NA</p>	
<p>If the monitoring plan is not in accordance with the monitoring methodology applied to the registered CDM project activity and/or does not reflect the actual monitoring activity based on the registered PDD, the DOE shall submit a request for revision of the monitoring plan..</p> <p>The DOE shall ensure that the level of accuracy and completeness in the monitoring and verification process will not be reduced as a result of the proposed revision. The DOE shall, using objective evidence, assess the accuracy and completeness of each proposed revision to the monitoring plan including the frequency of measurements, the quality of monitoring equipment (e.g. calibration requirements, and the quality assurance and quality control procedures).</p> <p>The verification report shall determine whether and how the monitoring report reflects the application by the project participants of the approved guidance from the CDM Executive Board regarding the request for revision of the monitoring plan.</p>	<p>NA</p> <p>NA</p> <p>NA</p>	

TABLE A3: GHG CALCULATION PROCEDURES AND MANAGEMENT CONTROL TESTING

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
<p>Potential risks have been identified for the evaluation of procedures for estimating the emissions reduction.</p>	<p>The on-line measurement of the power generation of the plant is being implemented, which will allow an easy cross-check with the frontier meter.</p> <p>A risk analysis has been done to the whole system including Santa Ana Plant and measures to be taken to minimize any potential risks were taken into account, starting with the design. A low risk installation was considered.</p>	<p>There are no areas of residual risk.</p>

TABLE A4: DETAILED AUDIT TESTING OF RESIDUAL RISK AREAS AND RANDOM TESTING

Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including <i>Forward Action Requests</i>)
There are no areas of residual risk.	<p>Simple cross-checking of data logged by hand data to online data will be improved.</p> <p>There is not legislation about emissions control of CO2 that is in development for government entities.</p>	EAAB had continued automating its metering systems in order to have available the back up elements that allow doing internal verifications of the plant generation, as well as accountability verifications of the billing of energy sold to the wholesale market.

TABLE A5. RESOLUTION OF FORWARD ACTION, CORRECTIVE ACTION AND CLARIFICATION REQUESTS

Draft report clarifications and corrective action requests by Verification team	Ref. to checklist question in Table 1.	Summary of project owner response	Verification team conclusion
<p>CLA 1.</p> <p>Because during the process of calibration and maintenance of the meters is necessary to disconnect one after the other, it is necessary to include backup meter data in the Monitoring report of the verification period as a measure of support for data taken.</p>	<p>D.2</p>	<p>Project Owner Response:</p> <p>The power meters SIEMENS No. 30031 and 30029 and its respective Calibration Certificates No. CAM-IM0806-000778 of June 26, 2008 and CAM-IM0807-03322 of June 27, 2008, were included in de version 3 of the Monitoring report.</p> <p>The owner of the project change de format of the MR according with the EB54 Annex 34 and for this reason the last version of the MR of this verification period is version 4.</p>	<p>Verification Team Response</p> <p>The MR (Ver 4) was adjusted include the identification and calibration certificates of the both power meters.</p> <p>Verification Team Conclusion:</p> <p>Closed the CLA.</p>

Lead Auditor
Eng. Juan Alberto Gracia

Chemical Engineer. National University of Colombia (1991)
Environmental Management Specialist – Libre University (Colombia)
DQS and EOQ Register of Environmental Auditor (Germany)

1992 – 1998

Responsible for Standardization Technical Committees in the areas of chemical products, paint products, food products (fresh and processed); Quality air test, quality water test, quality soil test, solid waste management, hazard material, Environmental Management systems (ISO 14000 series).

1998 - 2006

Administrative and technical management of Certification Staff for supporting to Department Director, especially in Environmental Certification ISO 14001 services.

Qualify as a Quality Lead auditor and Environmental Lead auditor; besides, ISO 9001 and ISO 14001 audits as lead auditor.

Performing of more than 200 audits of ISO 9001 and 150 audits of ISO 14001 in chemical, food, oil, petrochemical industrial sectors and waste disposal in landfill.

2003 - 2006

Coordination, structuring, implementation and criteria definition related to the service of validation and verification of CDM project activities.

Fellowship in Prototype Carbon Fund of World Bank about CDM procedures and methodologies (Washington and Geneva).

Conduction of validation and verification audits, being part of the DNV audit team, of the CDM Project Activities for: Río Amoya, La Vuelta y La Herradura, and Jepirachi.

2006 - 2010

Conduction as a GHG Leader auditor of:

- Verification of three verification periods of Santa Ana Hydroelectric plant project
- Verification of two verification period of Agua Fresca Multipurpose and Environmental Services Project
- Verification of Río Azul landfill gas project
- Verification of two verification periods of La Vuelta and la Herradura Hydroelectric Project
- Verification of Rio Amazon Woods residues power plant
- Verification of Cristalino small hydroelectric power plant project
- Verification of Faxinal small hydro project in Faxinal dos Guedes

- Validation of El Bote small hydroelectric plant project Verification of Monomeros Nitrous Oxide Abatement Project
- Validation of Cueva Maria Hydroelectric Project
- Validation of Methane Gas Capture and Fuel Switching at Compañía Argentina de Levaduras S.A.I.C. Plant Project
- Validation of Installation of a high-pressure/high-efficiency bagasse boiler to cogenerate heat and power
- Validation of Paysandú Clean Energy project

Sectoral Specialist

Eng. Fernando Gómez Gómez

Electrical Engineer. Universidad Nacional of Colombia (1967)
 Master of Power Systems - Instituto Tecnológico de Monterrey (Mexico) (1970)
 EAFIT Financial Specialist (Colombia) (1984)

ECONOMETRÍA S.S. - Technical Advisory
 Technical Advisory to Unidad de Planeación Minero Energética to incorporate international electrical interconnections into the Colombian electrical planning carried by UPME, October 2002 - March 2003 (including use of SUPEROLADE, MPODE, NEPLAN and REAL models).

ECOENERGIA S.S. ESP - Founding Member and Manager
 Management of private projects of generation, distribution and commercialization of power.

Unidad de Planeación Minero Energética - UPME-: Elaboration of Catalog of Generation Projects for National Energy Plan, October 1996 - October 1997.

AUDITORES ENERGÉTICOS - AENE LTDA
 Advisory to the company in the application of the new regulatory scheme of Colombian electrical sector to private and public entrepreneurial management through the following studies:

Development of competent rate models, October 1994 - March 1995

CORELCA: Determination of marginal costs and development of innovative rate structures for power generation companies and big industrial customers, October 1994 - March 1995.

CORELCA: Development and application of rate models to prepare proposal on power sale in the wholesale market, July 1995 - September 1995.

EMPRESA DE ENERGIA DE BOGOTÁ - EEB

Positions:

Chief of the Department of generation planning, interconnection and sub-transmission, 1978 - 1979.

Chief of Electric Planning Division, 1979 - 1986.

Assistant for Technical Sub-management, 1986 - 1987

Chief of Special Projects Division, 1987

Chief of expansion and Development Division, 1987 - 1994

Management Advisor, 1994

INTERCONEXIÓN ELÉCTRICA S.A - ISA
 1976 - 1978

Engineer Specialist in electric planning Research and development of models for planning and operation of electric systems.

National Coordinator of Colombian electric system planning in the project "Study of Electric Power Sector (Estudio del Sector de Energía Eléctrica), ESEE" winner of the National Award of Engineering.

Experience in CDM activities:

2006 – 2010

Participation as an Energy expert in:

- Verification of three verification periods of Santa Ana Hydroelectric plant project
- Verification of two verification period of Agua Fresca Multipurpose and Environmental Services Project
- Verification of two verification of La Vuelta and la Herradura Hydroelectric Project
- Verification of one verification period of RIMA Fuel switch in Bocaiúva plant project
- Verification of one verification period of La Venta II project
- Verification of Rio Amazon Woods residues power plant
- Verification of Cristalino small hydroelectric power plant project
- Verification of Faxinal small hydro project in Faxinal dos Guedes
- Validation of El Bote small hydroelectric plant project
- Validation of Cueva Maria Hydroelectric Project
- Validation of Installation of a high-pressure/high-efficiency bagasse boiler to cogenerate heat and power