



PERIODIC VERIFICATION REPORT

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

**EMPRESA DE ACUEDUCTO Y ALCANTARILLADO DE BOGOTÁ (EAAB)
(COLOMBIA)**

VERIFICATION PERIOD:
2005-08-01 TO 2006-07-31

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Instituto Colombiano de Normas Técnicas y Certificación – ICONTEC Carrera 37 52-95 Bogotá - Colombia	www.icontec.org.co Tel: +57-1- 6078888 ext 1314/1301 Fax: +57-1- 2221435
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Empresa de Acueducto y Alcantarillado de Bogotá – Santa Ana Hydroelectric Plant	CR 0275
Approved by:	Verification Team Leader:
CDM Certification Committee of ICONTEC	Eng. Juan Alberto Gracia
Summary:	

The Instituto Colombiano de Normas Técnicas y Certificación, ICONTEC, verified the GHG emissions reduction due to Santa Ana Hydroelectric Plant in Colombia by reviewing the results of the project from 2005-08-01 to 2006-07-31.

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 some preparatory meetings, desk review and on-site assessment, as follows:

- January 31, 2007: Preparatory meeting for the verification at the headquarters of the Company.
- February 1, 2007: Desk review and previous visit to the Plant.
- March 7, 8 and 9, 2007: On-site Visit and verification of the documentation requested in previous visits. Visit to the project, Usaquén sub-station and EAAB offices. Interview with the project participants, the stakeholder's delegates of CODENSA, EMGESA and CAM. Documental analysis was performed on 2007-03-15.

On-site visits to the project were conducted on March 7, 8 and 9, 2007, period during which there was interaction with the project participants and the stakeholders, such as CODENSA, EMGESA AND CAM. Documents and other information, needed to make the verification were collected on-site and a report was elaborated and sent to the project participants. Finally, required adjustments were done to send the report to the CDM Executive Board.

For the verification we 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.

The verification team applied the recommendations of IETA/PCF Validation and Verification Manual, 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 2005-08-01 to 2006-07-31, amounted 23960 tons /CO₂ equivalent.

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Periodic Verification report of Santa Ana Hydroelectric Plant in Bogotá - Colombia			
Work carried out by:			
Eng. Juan Alberto Gracia (AL) Eng. Fernando Gómez (EE) Eng. Martha Lucia Castro (Auditor in training)			
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Abbreviations

ICONTEC	Instituto Colombiano de Normas Técnicas y Certificación
DNA	Designated National Authority
CER	Certified Emission Reduction (s)
CODENSA	Comercializador y Distribuidor de Energía Eléctrica S.A.. (Grid Operator)
EMGESA	Empresa Generadora de Energía Eléctrica S.A. (Electricity market Agent)
FAR	Forward Action Request
CDM	Clean Development Mechanism
CO2	Carbon Dioxide
DOE	Designated Operational Entity
GHG	Greenhouse Gases
MP	Monitoring Plan
PDD	Project Design Document
UNFCCC	United Nations Framework Convention for Climate Change

AL	Lead Auditor
EE	Energy Sector Expert
EAAB	Empresa de Acueducto y Alcantarillado de Bogotá
AT	Auditor in Training
XM	“XM” (Expert Market) is a company of the ISA Group providing integral services. (www.xm.com.co). It is an information service about the Colombian Wholesale Power Market that allows the company 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.
NEON	
CAM	Compañía Americana de Multiservicios (Maintenance and calibration company)
CREG	Comisión de Regulación de Energía y Gas (Regulatory entity of energy sector in Colombia)
CAEMA	Centro Andino para la Economía en el Medio Ambiente (Consultant)

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1 INTRODUCTION

The Empresa de Acueducto y Alcantarillado de Bogotá has commissioned an independent verification by ICONTEC of its reported greenhouse gas (GHG) emission reductions from the Santa Ana Hydroelectric Plant project. The verifiers have reviewed the GHG data collected to date for the period from 2005-08-01 to 2006-07-31. This report contains the findings from the verification and certification statements for the certified emission reductions.

1.1 Objective

According to CDM Modalities and Procedures (Decision 17/CP.7) the purpose of the verification is the periodic independent review and ex-post determination by the DOE of the monitored reductions in anthropogenic GHG emissions by sources that have occurred as a result of a registered CDM project activity during the verification period.

Certification is the written assurance by the DOE that, during a specified time period, a project activity achieved the reductions in anthropogenic GHG emissions as verified.

Taking into account that the methodology AMS-I.D. ver. 7 - Renewable electricity generation for a grid monitoring methodology included in the PDD for this project is based on the measurement of the power generated, the verification was mainly focused on establishing both the validity of the procedure followed to obtain and record this measurement and its reliability and quality.

1.2 Scope

The verification aims:

- 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;
- To conduct on-site inspections, 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 review monitoring results and verify that the monitoring plan has been correctly applied and their documentation is complete and transparent.
- 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 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 Executive Board. The report shall be made publicly available.

The verification does not provide consultancy service to the client. ICONTEC, based on its ethics code and internal procedures for validations, verifications and certification of CDM project activities (which, in turn, are based on the IETA validation and verification manual) focused on the identification of significant risks for CER generation, and verification of the mitigation

1.3 Description of the Project Activity

Project Parties:	Empresa de Acueducto y Alcantarillado de Bogotá (Colombia)
Title of project activity:	Santa Ana Hydroelectric Plant in Bogotá - Colombia
UNFCCC registration No:	UNFCCC registration No. 0275
Project Entity:	Santa Ana Plant is part of Empresa de Acueducto y Alcantarillado de Bogotá Official Contact: Oscar Garcia Poveda Corporate Manager of the Master System Address: Calle 22 C 40-99 Bogotá – Colombia ogarcia@acueducto.com.co phone: + 57-1 – 3447111 fax: + 57-1- 3447441
Location of the project activity:	Latitude 110360 North, longitude 105800 East Bogotá, Distrito Capital Colombia
Project's crediting period	10 years
Verification period	2005-08-01 to 2006-07-31
Projects starting date	August 1st, 2005

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 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 System, following local existing electricity market regulations and required environmental and operational permits.

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.

2 METHODOLOGY

2.1 General

2.1.1 Verification team

The verification team is composed of the following staff:

Mr. Juan Alberto Gracia ICONTEC Team Leader, Lead Auditor

Mr. Fernando Gómez ICONTEC Energy sector expert

Ms. Martha Lucia Castro ICONTEC Auditor in training

Ms. Josefina Baldrich ICONTEC Internal verifier (CDM Certification Committee)

2.1.2 Verification Schedule

Preparation: From 2007-01-31 and 2007-02-02

On-site verification: From to 2007-03-7, 8 and 9

Reporting: From 2007-03-22

2.2 Review of Documentation

In order to be able to carry out the documentation preliminary 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 1).
- Reports and records of monthly and annual monitoring data on the items defined in the monitoring plan and Monitoring Report from 2005-08-01 to 2006-07-31.
- Quality Assurance Manual and procedures for internal audit, and plant operation and maintenance, as well as for measuring equipment calibration, and information security.
- Information on the applicable environmental regulations (see 5. References).
- Specifications for the Plant equipment.
- Communications with the project stakeholders.

Every document was reviewed and a verification audit plan was structured and sent to the project participants.

The monitoring report and the verification and certification report were made publicly available and sent to the CDM Secretariat.

2.3 On-site Visits

Between February 2 and March 7 to 9 the project was visited at the following facilities:

- Santa Ana Hydroelectric Plant (Calle 119 No. 0-10 Este Bogotá).
- Administrative Office and Usaquén Substation of EAAB (Calle 110 No. 9-80 Bogotá)
- Usaquén Substation of Codensa (Calle 110 Cra 9 Bogotá)

Interviews were conducted to the plant's personnel and to EAAB Directors (see list below). The project stakeholders were also interviewed.

During on-site visit the following personnel were interviewed:

Entity	Name	Position
EAAB	Mr. Juan Carlos Sánchez	Chief of Electrical Services Division
EAAB	Mr. Mauricio Jiménez	Director of Aqueduct Matrix Grid
EAAB	Mr. Rousvelt Apache	Director of Electromechanical Services
EAAB	Ms. Martha Cruz	Specialist Professional of Environmental Management
EAAB	Ms. Claudia Vargas	Quality Coordinator of

		Aqueduct Direction	Matrix	Grid
EAAB	Ms. Magda Castaño	Specialist of Quality and Process	Professional Direction	
CAEMA	Mr. Yohany Acosta	Monitoring Advisor		
CAEMA	Mr. Thomas Black	Executive Director		
CAM	Mr. Jairo Niño	Telemetry Chief		
EMGESA	Mr. Luis Eduardo Ríos	Commercial Coordinator		Zone

2.4 Assessment

ICONTEC performed the verification by:

- reviewing project documentation;
- on-site inspections, including review of plant installations (reservoir, water conduction system, power generation and transformation), performance records, and interviews with project participants;
- collecting measurements, observation of established practices and verifications of the accuracy of monitoring equipment;
- cross-checking measurements of plant generation;
- reviewing monitoring results and checking the correct application of monitoring methodologies, and
- setting the GHG emissions reductions.

The verification assessment included the following aspects:

a) Implementation and follow up to the monitoring plan, including verification of:

- all data on project emissions reduction and follow up indicators of sustainable development;
- responsibilities and related authorities;
- monitoring frequency;
- accuracy 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 in the monitoring guidelines.

b) Precision of the project information (materiality) assessing the absence of:

- inconsistencies in the use of formulas in spreadsheets and their connections;
- inappropriate use of the methodology approved;
- errors in data due to failures during the digitizing process;
- inappropriate use of data.

c) Verification of consistency of data resulting from the project operation regarding the baseline.

d) Analysis of potential risks to the project.

e) Quality assurance and management system

The verification process was guided by this checklist, which ensures a transparent verification process, demonstrates how emission reductions have been verified and how the verification findings have been reached.

2.5 Reporting of Findings

There are not FARs for the project.

3 VERIFICATION FINDINGS

3.1 Project Implementation

Our first concern was about the general layout of the power plant facilities. So we did an on-site verification of the project description by visual inspection of reservoir, intake, water conduction and machines house. Based on these observations, we confirmed the object and scope of our Verification.

As mentioned at the beginning of this report, 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 Resolution 1913 on 2000-11-23 by Corporación Autónoma Regional (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 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 hydropower plant”. In addition, the table included in the PDD states that the “Data variable” to be considered are “Electricity generated, provided to the Colombian National Interconnected System at the bus bar of commercial transactions”.

As a matter of fact, EAAB Quality Plan (Form: 3MC050504-01), as far as the Power Generation Procedures are concerned, establishes that electricity provided to the national grid generated by Santa Ana power plant is measured at Usaquén substation, 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 power substation be the equipment of reference for measuring generated power”.

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

A cross checking between energy measurements at the point where Santa Ana power plant generation enters to the grid in Codensa substation and those in power plant site was made. The small differences founded 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 014600825, installed in the plant control house, which is referenced in the documentation reviewed.

Based on the above considerations, the Verification Entity considers that the power received at the arrival point of the transport line connecting Santa Ana Plant and Usaquén sub-station in the distribution system of CODENSA adequately represents the renewable power that effectively originates the emissions reduction.

3.2 Completeness of Monitoring

Firstly, 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, as the plate exhibits; net design head 105.9 m, as showed in the plant design document revised by the verification team. (As explained in that document the net head of 105.9 m. corresponds to a gross head of 120 m.). 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 have

been historically in order of 7.0 m³/s, which means that the power plant is being used near to a half of its capacity. As explained by interviewed personnel, these reductions are due to changes in pattern use of water in the city of Bogotá. In any case, the generation data recorded, used to calculate GHG emission reductions, discussed later on, are consistent with these reduced water flows.

In order to establish the correspondence between the power registered at Usaquén substation and the power generated by Santa Ana Plant, the connection between them was physically verified according to the unifilar diagram, which is part of the connection contract, referred ahead.

Besides, a checking was made to verify that no feed back energy flows from the substation are eventually considered as generated by the power plant. This verification was based on a review of electrical connections inside the control house. It was clear that either the equipment or the control system installed allow this type of operation, thus assuring that there is no feed back energy accounted as energy generated by the plant.

These issues allow us to affirm that the metering carried out at that sub-station 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 Codensa Usaquén substation are concerned, these are included in the procedure "Measurement and Analysis of data" of the process "Power Generation" (Code 1NM101505 - 01).

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 Resolutions 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 Usaquén 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 (Resolution CREG 025 of 1995) and the Distribution Regulations (Resolution 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.

ICONTEC performed an inspection visit to Usaquén sub-station to establish the operational features and conditions of the metering systems abovementioned, and found that these ones 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-IM0506-000786 and CAM-IM0506-000785 issued on July 1, 2005.

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

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

Test results: CONFORM

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 Resolution 5899 issued on March 9, 2006, of the Superintendence of Commerce and Industry of Colombia.

Based on the abovementioned visits and certifications, the Verification Entity provides positive opinion on the reliability and accuracy of the metering.

b) Commercial Operation of Santa Ana

In commercial terms, the 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. Previously, between June 9 (date of the official registration of the commercial frontier of Santa Ana in SIC) and November 30 of 2005, the commercial relation was managed through the contract of mandate between the same two entities, under similar conditions. The crediting period object of the current verification, August 1, 2005 - July 31, 2006, is covered by these two commercial contracts in which EMGESA has been the representative of Santa Ana Plant in the Wholesale Power Market.

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 Market Experts (company of the ISA Group providing integral services of operation, administration and development of wholesale power markets), and it is 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 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	2005-08-09 0:00
CR:	Collection center (where the meter data are reported).						
START	Date from which the frontier is registered in SIC.						

In the case of the commercial frontier of Santa Ana installed at Usaquén sub-station, the time questioning of the meter and the daily storage of the information are carried out by EMGESA, through the company CAM, using the telephonic system with the support of GPRS (Global Packet Radio System) system installed in the cell. 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.

The person in charge of verification and validation of data acquired, transmitted and recorded within this framework is the Plant Engineer at the power plant site, supervised by the Director of Master Network Unit at EAAB, as previewed in the Monitoring Plan. Engineer in charge of the Plant (Plant Engineer) has been 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.

ICONTEC was able to verify that measurements are performed as follows:

Monitoring Report reliably shows the measurement of the power delivered to the grid by Santa Ana Plant, added on a monthly basis, and the corresponding reduced emissions. Reduced emissions were calculated by multiplying the power delivered in kWh by the emissions reduction factor of 0.4392 kg of CO_{2e} per kWh officially approved in Colombia since 2005 for small-scale renewable power projects connected to the national grid.

Based on the studies carried out and analyzed, presented in this Verification Report, ICONTEC was able to determine that Santa Ana generation plant, during the crediting period from August 1, 2005 to July 31, 2006 showed a reduction of 23.960 tons CO_{2e}

3.3 Accuracy of Emission Reduction Calculations

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 3.2) and the control described in 3.1 about the maintenance and calibration of the equipment, we may assure the data accuracy and certainty.

3.4 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 (see 3.2).

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.

3.5 Management System and Quality Assurance

EAAB is implementing a quality management system based on the Standard ISO 9001:2000 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.

Besides, the Verification Entity analyzed the certainty, on a long term, that Santa Ana maintains reducing GHG emissions due to power generation. On one hand, official projections of water consumption in the city are in continuous growing, assuring in this way the availability of the primary natural resources. On the other hand, maintenance and operation quality policies ensure a fair long term operation of the Santa Ana Power Plant. Additionally, the company has a clear strategy looking for continuing generating electrical energy, not only from this power plant, but also from other similar small scale renewable hydro projects immersed into the water distribution system of Bogotá City.

It was relevant that Quality Management System was completely implemented for this Project, which will ensure a complete control of the plant's management even though it is not a mission activity of EAAB.

3.6 Remaining Issues, CARs, FARs from Previous Validation or Verification

There are no remaining open Issues, CARs, from previous validation.

4. Verification Statement

Reporting period: From 2005 08 01 to 2006 07 31

Verified emissions in the above reporting period:

Emission reductions 23960 tons of CO₂ equivalent.

4.1 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 23930 tons of CO₂ equivalent.

We consider that the project's GHG emissions and resulting GHG emissions reductions reported in the Monitoring Report version 01 of 2006-10-27 are fairly stated.

4.2 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. .

In a planned way we 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.

4.3 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.

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

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.

4.4 Opinion

ICONTEC is able to certify that the emission reduction from the Santa Ana hydroelectric plant during the period from August 01, 2005 to July 31, 2006 equals to 23960 tons of CO2 equivalent.

[Bogotá D.C., July 5th, 2007]



Fabio Tobón/ Executive Director
ICONTEC

5. REFERENCES

- /1/ PDD registered version 2
- /2/ Monitoring Plan Annex of the PDD
- /3/ Validation report REV 1 2006 04 03
- /4/ Monitoring Report 2006 10 27
- /5/ Measuring records 2005 – 2006
 - Improvement Opportunity: Automated collection of data.
 - Purchasing Monthly Reports – Power Sale and Representation of Santa Ana, August 2005 – July 2006
 - EMGESA 0004741 communication issued on August 28, 2006
 - CODENSA 00447688 communication issued on September 26, 2006
 - Copy of the Sale Contract of Santa Ana Minor Plant Power 1-99-26300-671-2005
 - Resolution 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, Resolution CREG 025 of 1995
 - Distribution Regulations, Resolution CREG 070 of 1998
 - Resolution 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
 - Resolution Ministry of Mines and Energy 181421 of 2005, by which establishes the Colombian official emissions factor for small scale CDM projects.
- /6/ Internal Procedures:

- 1NM101505-01 Measurement and analysis of data
- 1NM101510-01 Conciliation of Results
- Quality Plan
- 1NM 101010-01 PCH operation procedure
- EAAB, Quality Plan for the process of Power Generation, Form: 3MC050504-01

/7/ International Emission Trading Association(IETA) & the World Bank's Prototype Carbon Fund (PCF): Validation and Verification Manual
<http://www.vvmanual.info>

ANNEX 1
PERIODIC VERIFICATION CHECKLIST

ANNEX 1 PERIODIC VERIFICATION CHECKLIST (F0104-0099-5)
SANTA ANA PROJECT HYDROELECTRIC PLANT
BOGOTÁ - COLOMBIA

Table 1: 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 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 component is in place.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
1. Defined organizational structure, responsibilities and competencies		
1.1. 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	Responsibilities for the project are clearly defined both in Santa Ana Plant and Empresa de Acueducto y Alcantarillado de Bogotá EAAB, with an identification of all personnel involved in the project.
1.2. Responsibilities <i>Specific monitoring and reporting tasks and responsibilities are included in job descriptions or special instructions for employees.</i>	FULL	Responsibilities for the project are clearly defined both in Santa Ana Plant and Empresa de Acueducto y Alcantarillado de Bogotá EAAB, with an identification of all personnel involved in the project.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
1.3. Competencies needed <i>Competencies needed for each aspect of the GHG determination process are analyzed. Personnel competencies are assessed and training programme implemented as required.</i>	FULL	<p>The evidences about the internal qualification of the personnel were reviewed.</p> <p>Documentation and records of all the personnel involved were verified and also their particular training and education were verified. (Documents like training in operation, measuring, monitoring procedures, list of participants for all the trainings were provided.).</p>
2. Compliance with monitoring plan		
2.1. Reporting procedures <i>Reporting procedures should reflect the monitoring plan content. Where deviations from the monitoring plan occur, the impact of this on the data is estimated and the reasons justified.</i>	FULL	<p>The Monitor's 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.</p>
2.2. Necessary Changes <i>Necessary changes to the monitoring plan are identified and changes are integrated in local procedures as necessary.</i>	FULL	<p>It is not necessary to do changes to the Monitoring Report.</p>
3. Application of GHG determination methods		

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
3.1. Methods used <i>There are documented description of the methods used to determine GHG emissions and justification for the chosen methods. If applicable, procedures for capturing emissions from non-routine or exceptional events are in place and implemented.</i>	FULL	<p>Methodology defined in the PDD is used for calculating the emissions reduction.</p> <p>Methods are supported by the information included in the internal procedure, i.e. Quality plan of Generation Process</p>
3.2. Information/process flow <i>An information / process flow diagram, describing the entire process from raw data to reported totals is developed.</i>	FULL	<p>Procedures and records needed to describe the whole plant operation and the way in which the different parameters are measured have been developed. In the Monitoring the plan description of the process is included.</p>
3.3. Data transfer <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>	FULL	<p>The data is saved in the System in magnetic files or in hard disks and also in physical form by the commercialization staff. This data is transferred by website page of XM (www.xm.com.co). All data sources are clearly referenced.</p>
3.4. Data trails <i>Requirements for documented data trails are defined and implemented and all documentation are physically available.</i>	FULL	<p>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 1NM101505-01, Measurement and analysis of data.</p>
4. Identification and maintenance of key process parameters		

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
4.1. Identification of key parameters <i>The key physical process parameters that are critical for the determination of GHG emissions (e.g. meters, sampling methods) are identified.</i>	FULL	All parameters are defined and supported by the internal documentation.
4.2. Calibration/maintenance <i>Appropriate calibration / maintenance requirements are determined.</i>	FULL	Maintenance and verification of the equipment used in the measurements are assured. The Electromechanical team of EAAB carries out the periodical preventive maintenance to the equipment and the infrastructure of the Santa Ana hydroelectric plant.
5. GHG Calculations		
5.1. Use of estimates and default data <i>Where estimates or default data are used, these are validated and periodically evaluated to ensure their ongoing appropriateness and accuracy, particularly following changes to circumstances, equipment etc. The validation and periodic evaluation of this is documented.</i>	FULL	In accordance with the defined PDD all calculations can be done. The resolution 181421 of 2005 defined the Colombian emission factor for Small Scale Projects. The frontier power meter used for the project has the number 30031 and security labels. A supporting meter, number 30029, is available.
5.2. Guidance on checks and reviews <i>Guidance is provided on when, where and how checks and reviews are to be carried out, and what evidence needs to be documented. This includes spot checks by a second person not performing the calculations over manual data transfers, changes in assumptions and the overall reliability of the calculation processes.</i>	FULL	All the procedures are documented; the company is implementing the Quality Management System based on ISO 9001:2000.

Expectations for GHG data management system/controls	Score	Verifiers Comments (including <i>Forward Action Requests</i>)
5.3. Internal verification <i>Internal verifications include the GHG data management systems, to ensure consistent application of calculation methods.</i>	FULL	<p>Periodic inspections and measurements are carried out by CAM which ensures reliable measurements.</p> <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>
5.4. Internal validation <i>Data reported from internal departments should be validated visibly (by signature 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.</i>	FULL	<p>Internal verification reports and all the technical records related to the 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.</p>
5.5. Data protection measures <i>Data protection measures for databases/spreadsheets should be in place (access restrictions and editor rights).</i>	FULL	<p>There is control of the project data records and confidentiality is kept of the key information of the processes. There is an internal procedure "1NM101510 Conciliation of results". They keep a back up of the data records.</p>
5.6. IT systems <i>IT systems used for GHG monitoring and reporting should be tested and documented.</i>	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 being adjusted in order for it to be done on-line.</p>

Table 2: GHG calculation procedures and management control testing

Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks
<p><i>Potential risks have been identified for the evaluation of procedures for estimating the emissions reduction.</i></p>	<p>The on-line measurement of the power generation of the plant is being implemented, which will allow to easily 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 3: 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>)
<i>There are no areas of residual risk.</i>	➤ Simple cross checking of data logged by hand data to online data will be improved.	EAAB shall continue 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.