

FINAL VERIFICATION REPORT

“78 MW AKOCAK HYDROELECTRIC POWER PLANT”



RINA

RINA Services S.p.A.

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Summary:

RINA Services S.p.A. (RINA), commissioned by Akenerji Elektrik Uretim A.S., has verified the greenhouse gas emission reductions reported for the project activity “78 MW Akocak Hydroelectric Power Plant” in Turkey, VCS Registration Reference N° 535, for the period 01/07/2010 to 31/07/2012, with regard to the relevant requirements for CDM and VCS activities.

The objective of the verification is to have an independent review ex post determination of the monitored reductions in GHG emission reductions, reported for the “78 MW Akocak Hydroelectric Power Plant” project in Turkey for the period 01/07/2010 to 31/07/2012.

Verification was conducted using RINA procedures in line with the requirements specified in the VCS Version 3 Requirements, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques. The verification consisted of desk review, on-site assessment and the resolution of outstanding issues and the issuance of the final verification report and certification.

The verification shall ensure that reported emission reductions are complete and accurate in accordance with applicable VCS Version 3 requirements, which refer to CDM rules, in order to be certified.

In conclusion, it is RINA's opinion that the project activity “78 MW Akocak Hydroelectric Power Plant”, in “Turkey”, as described in the Monitoring Report version 05 of 10/12/2012, meets all relevant requirements for VCS and CDM activities and all relevant host Party criteria and correctly applies the baseline and monitoring methodology “ACM0002”, “Consolidated baseline methodology for grid-connected electricity from renewable sources”, version 10 of 28/05/2009. Hence, RINA is able to certify that the emission reductions from the project during the monitoring period 01/07/2010 to 31/07/2012 amount to 169,531 tCO₂e.

Table of Contents	Page
1 Introduction	4
1.1 Objective	4
1.2 Scope and Criteria	4
1.3 Level of assurance	4
1.4 Summary Description of the Project.....	5
2 Validation Process, Findings and Conclusion.....	5
2.1 Validation Process	5
2.2 Validation Findings.....	6
2.2.1 Gap Validation	6
2.2.2 Methodology Deviations	6
2.2.3 Project Description Deviations.....	6
2.2.4 New Project Activity Instances.....	7
2.3 Validation Conclusion.....	7
3 Verification Process.....	7
3.1 Method and Criteria.....	7
3.2 Document Review	8
3.3 Interviews.....	10
3.4 Site Inspections.....	10
3.5 Resolution of Any Material Discrepancy.....	10
4 Verification Findings	12
4.1 Project Implementation Status.....	12
4.2 Accuracy of GHG Emission Reduction or Removal Calculations	12
4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals.....	19
4.4 Management and Operational System.....	19
5 Verification conclusion	20

Appendix A: VCS Verification Protocol

1 INTRODUCTION

1.1 Objective

The objective of the verification is to have an independent review ex post determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered VCS project activity during a defined monitoring period. Certification is the written assurance by the DOE that, during a specific time period, a proposed VCS project activity achieved the reductions in anthropogenic emissions by sources of GHGs as verified.

The objective of this verification/certification was to verify and certify emission reductions and effective implementation of the monitoring of sustainable development indicators and mitigation measures, reported for the “78 MW Akocak Hydroelectric Power Plant” project in Turkey for the period 01/07/2010 to 31/07/2012.

1.2 Scope and Criteria

The verification scope is:

- to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan;
- to evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement;
- to verify that reported GHG emission data is sufficiently supported by evidence;
- to evaluate whether all the mitigation measures have been effectively put in place according to the monitoring plan and that all the sustainable development indicators have been correctly monitored.

Verification shall ensure that reported emission reductions are complete and accurate in accordance with applicable VCS Version 3 requirements, which refer to CDM rules, in order to be certified.

UNFCCC criteria for CDM refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and the subsequent decisions by the CDM Executive Board.

Verification is not meant to provide any consultancy towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring.

1.3 Level of assurance

All the revisions of the verification report, before being submitted to the client, were subjected to an independent internal technical review to confirm that all verification activities had been completed according to the pertinent RINA instructions.

The technical review was performed by a technical reviewer(s) qualified in accordance with RINA's qualification scheme for VCS and CDM validation and verification. The verification team and the technical reviewers consist of the following personnel:

Role/Qualification	Last Name	First Name	Country
VCS Team Leader – VCS Verifier – Technical Expert	Timuroglu	Isil	Turkey
Technical Reviewer	Valoroso	Rita	Italy
Technical Reviewer in Training	Alfieri	Felice	Italy

1.4 Summary Description of the Project

The project consists of two weirs. Erikli weir is located on Alcak Brook that is branch of Karadere River at 1,339 meters river elevation. Akocak weir is located on Karadere River at 1,328 meters river elevation. The water collected at Erikli weir is connected with a 3 meter diameter, circular section, derivation tunnel of 3,250 meters long to the upstream of Akocak weir. The Akocak weir transmits the collected waters to a surge tank through a 6,150 meters long transmission tunnel. The penstock extending from the surge tank to the powerhouse is 1,842 meters long, with an average diameter of 1.82 meters. In the power house, 2 vertical axis Pelton turbines are installed with a total capacity of 81 MWe. The generated electricity is transmitted to the National Electricity System through Arsin Substation, with a 154 kV and 32 km long energy transmission line.

The main information of the project is summarized in the table below.

Project Participant(s)	Akenerji Elektrik Uretim A.S. / Global Tan Energy Ltd.		
Project Title	78 MW Akocak Hydroelectric Power Plant		
Location of the project	East Black Sea Region, Arakli District, Trabzon Province of Turkey		
Methodology(ies)	ACM0002", "Consolidated baseline methodology for grid-connected electricity from renewable sources", version 10 of 28/05/2009 /6/		
Sectoral Scope(s)	1	RINA's Technical Area(s)	1.2
Registered VCS PD	Version 03 of 20/07/2010		
VCS Registration Reference No	535		
Starting date of the crediting period	01/07/2010 (as confirmed through the Temporary Acceptance Protocol /14/)		
Project's crediting period	01/07/2010 and 30/06/2020		
Monitoring period	01/07/2010 to 31/07/2012 (both days included)		
Project documentation link	https://vcsprojectdatabase2.apx.com/myModule/Interactive.asp?Tab=Projects&a=2&i=535&lat=40%2E606611&lon=39%2E9515&bp=1		

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

The project was validated by Bureau Veritas (Validation Report of 26/07/2010) and it was registered under the VCS registration reference N° 535.

2.2 Validation Findings

2.2.1 Gap Validation

The project was validated by Bureau Veritas (Validation Report of 26/07/2010) and it was registered under the VCS registration reference N° 535.

2.2.2 Methodology Deviations

There is not any deviation in the applied methodology to the project activity.

2.2.3 Project Description Deviations

In the registered VCS PD for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 03 of 20/07/2010 [/1/](#), the power density has been calculated based on the only reservoir area of Erikli weir. To be on the conservative side, the reservoirs both of Erikli and Akocak have been taken into consideration and power density is calculated accordingly in the Monitoring Report Version 01 of 13/08/2012 [/2/](#). The power density is still higher than 10 W/m²; therefore, project emissions are neglected.

In the registered VCS PD for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 03 of 20/07/2010 [/1/](#), the source of the net electricity generation is defined as “Monthly Meter Reading Protocols” which is signed by TEIAS and plant manager. However, since TEIAS started to monitor electricity remotely, Monthly Meter Reading Protocols are no longer available. Electricity Market Balancing and Conciliation body has declared that all readings would be carried out remotely as of 01/02/2012 based on an amendment in the law on Electricity Market Balancing and Conciliation (Clause 81) [/24/](#). However, the facility has settled the remote reading system on 20/12/2011 with TEIAS earlier than the change was enforced. The electricity generation figures are based on the Monthly Meter Reading (OSF) Forms [/33/](#) and the PMUM records [/19/](#) are used for crosscheck from July 2010 to November 2011. The electricity generation figures are based on the PMUM records [/19/](#) and Monthly Facility Reports [/32/](#) are used for crosscheck from December 2011 to July 2012.

In the registered VCS PD for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 03 of 20/07/2010 [/1/](#), the installed capacity is defined as 78 MW. However, the installed capacity is increased to 81 MWe as confirmed through the Generation License [/13/](#) and Temporary Acceptance Protocols [/14/](#) [/15/](#). The current annual generation is 257.440 GWh as per the Generation License [/13/](#), which is same with the registered VCS PD [/1/](#). The additionality of the project activity is demonstrated by applying investment analysis registered VCS PD [/1/](#). The annual electricity generation used in the investment analysis that is 257.440 GWh has remained same. Therefore, this change does not affect the additionality of the project activity.

These changes are permanent during the crediting period and have been assessed as per the “Clean Development Mechanism Validation and Verification Standard”, version 02.0 of 25/11/2011 [/5/](#) and “Project Standard”, version 01.0 of 25/11/2011 [/26/](#). The additionality of the project activity is demonstrated by applying investment analysis as per the validated VCS PD [/1/](#). Therefore, this change does not affect the additionality of the project activity. It has been confirmed that this change does not affect the applicability/application of baseline methodology. Also, the scale of the VCS project remains the same.

2.2.4 New Project Activity Instances

Not applicable.

2.3 Validation Conclusion

The project was validated by Bureau Veritas (Validation Report of 26/07/2010) and it was registered under the VCS registration reference N° 535.

In the registered VCS PD for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 03 of 20/07/2010 [/1/](#),

- the power density has been calculated based on the only reservoir area of Erikli weir. To be on the conservative side, the reservoirs both of Erikli and Akocak have been taken into consideration and power density is calculated accordingly in the Monitoring Report Version 01 of 13/08/2012 [/2/](#). The power density is still higher than 10 W/m²; therefore, project emissions are neglected. Please refer to the Verification Protocol in Appendix A of this report.
- the source of the net electricity generation is defined as “Monthly Meter Reading Protocols” which is signed by TEIAS and plant manager. However, since TEIAS started to monitor electricity remotely, Monthly Meter Reading Protocols are not available. Therefore, the source of the parameter is defined as “Market Financial Settlement Center (PMUM) records which are the basis of the invoices.
- the installed capacity is defined as 78 MW. However, the installed capacity is increased to 81 MWe as confirmed through the Generation License [/13/](#) and Temporary Acceptance Protocols [/14/ /15/](#). The additionality of the project activity is demonstrated by applying investment analysis registered VCS PD [/1/](#). The annual electricity generation used in the investment analysis that is 257.440 GWh has remained same. Therefore, this change does not affect the additionality of the project activity.

Thus, the requirements of the VCS Standard Version 3 [/4/](#) were satisfied and RINA confirms that the project conforms to the validation criteria for projects, in accordance with ACM0002 version 10 of 28/05/2009 [/6/](#).

3 VERIFICATION PROCESS

3.1 Method and Criteria

Verification was conducted using RINA procedures in line with the requirements specified in the VCS Version 3 Requirements, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques.

The verification consisted of the following three phases:

- Document review;
- On-site assessment;
- The resolution of outstanding issues and the issuance of the final verification report and certification.

3.2 Document Review

The monitoring report version 05 of 10/12/2012 and previous versions /2/, the emission reduction calculations provided in the form of a spreadsheet “Akocak verification_10122012.xls” version 03 of 10/12/2012 and previous versions /8/, the approved baseline and monitoring methodology ACM0002 version 10 /6/ and all the documentation provided to support the monitoring period /01 – 38/ were assessed as part of the verification. In addition, the VCS Project Description (VCS PD) /1/, in particular as regards the baseline estimations and the monitoring plan, and the Validation Report of 26/07/2010 /7/ for the project, were reviewed.

The following table lists the documentation that was reviewed during the verification.

/1/	Global Tan Energy Limited (GTE): VCS PD for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 03 of 20/07/2010
/2/	Global Tan Energy Limited (GTE): Monitoring Report for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 01 of 13/08/2012 Global Tan Energy Limited (GTE): Monitoring Report for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 02 of 08/10/2012 Global Tan Energy Limited (GTE): Monitoring Report for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 03 of 30/10/2012 Global Tan Energy Limited (GTE): Monitoring Report for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 04 of 16/11/2012 Global Tan Energy Limited (GTE): Monitoring Report for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 05 of 10/12/2012
/3/	VCS Verified Carbon Standard: VCS Program Guide, VCS Version 03, v3.4 of 04/10/2012
/4/	VCS Verified Carbon Standard: VCS Standard, VCS Version 03, v3.3 of 04/10/2012
/5/	CDM Executive Board: Clean Development Mechanism Validation and Verification Standard, version 02.0 of 25/11/2011
/6/	CDM Executive Board: Baseline and monitoring methodology “ACM0002”, “Consolidated baseline methodology for grid-connected electricity from renewable sources”, version 10 of 28/05/2009
/7/	Bureau Veritas Certification Holding SAS: Validation Report for “78 MW Akocak Hydroelectric Power Plant” of 26/07/2010
/8/	Global Tan Energy Limited (GTE): Emission Reduction Calculation Spreadsheet “Akocak verification_13082012.xls” version 01 of 13/08/2012 Global Tan Energy Limited (GTE): Emission Reduction Calculation Spreadsheet “Akocak verification_08102012.xls” version 02 of 08/10/2012 Global Tan Energy Limited (GTE): Emission Reduction Calculation Spreadsheet “Akocak verification_10122012.xls” version 03 of 10/12/2012
/9/	VCS Verified Carbon Standard: VCS Verification Report Template Version 3.2 of 04/10/2012
/10/	CDM Executive Board: Methodological Tool “Tool to calculate the emission factor for an electricity system”, version 02 of 16/10/2009
/11/	Turkish Electricity Transmission Company (TEIAS): First Index Protocol of 27/05/2010
/12/	Turkish Electricity Transmission Company (TEIAS): Meter Test Report of Actaris Meter Serial Number 53064405, 53064406, 53064407, 53064408 of 06/05/2010
/13/	Energy Market Regulatory Authority: Generation License numbered EU/582-5/590 of 23/11/2005
/14/	The Ministry of Energy and Natural Resources: Temporary Acceptance Protocol of 30/06/2010 (Unit 1)
/15/	The Ministry of Energy and Natural Resources: Temporary Acceptance Protocol of

	29/07/2010 (Unit 2)
/16/	Voith Siemens Hydro Power Generation: Technical Specification of Turbines of Rev. 0 of 11/12/2008
/17/	Ada Muhendislik: General Layout Plan of Akocak HEPP of June 2011
/18/	Arsel Petrol: Diesel Oil Invoices Diesel Oil Invoice of 24/01/2012 (435 liter) Diesel Oil Invoice of 02/02/2012 (429 liter)
/19/	Market Financial Conciliation Center (PMUM): All Monthly PMUM Records with in the Monitoring Period (from 01/07/2010 to 31/07/2012)
/20/	The Turkish Ministry of Trade and Industry: Regulation of Metering and Testing of Metering Systems of 24/07/1994
/21/	Turkish Energy Market Regulatory Authority: Communiqué for Measurement Devices used in the Electricity Market of 22/03/2003
/22/	VCS Verified Carbon Standard: VCS Monitoring Report Template Version 3.2 of 04/10/2012
/23/	Website: https://vcsprojectdatabase2.apx.com/myModule/Interactive.asp?Tab=Projects&a=2&i=535&lat=40%2E606611&lon=39%2E9515&bp=1 Argument: VCS Project Database Language: English; Retrieved on: 08/08/2012
/24/	The Energy Market Regulatory Authority: Electricity Market Balancing and Settlement Regulation of 14/04/2009
/25/	CDM Executive Board: Methodological Tool "Tool for the demonstration and assessment of additionality", version 05.2 of 26/08/2008
/26/	CDM Executive Board: Project Standard, version 01.0 of 25/11/2011
/27/	Akenerji Elektrik Uretim A.S.: Erikli Regulator Diesel Generator Weekly Maintenance form of 04/09/2012
/28/	Akenerji Elektrik Uretim A.S.: Akocak Regulator Diesel Generator Weekly Maintenance form of 03/09/2012
/29/	Akenerji Elektrik Uretim A.S.: Power House Diesel Generator Weekly Maintenance form of 11/09/2012
/30/	Akenerji Elektrik Uretim A.S.: Valve Room Diesel Generator Weekly Maintenance form of 03/09/2012
/31/	John Deere: Installation, Use and Maintenance Manual for Generator
/32/	Akenerji Elektrik Uretim A.S.: Monthly Facility Reports for Electricity Generation from December 2011 to July 2012
/33/	Turkish Electricity Transmission Company (TEIAS): Monthly Meter Reading (OSF) Forms from July 2010 to November 2011
/34/	Akenerji Elektrik Uretim A.S.: Akocak HEPP General Lay out of June 2011
/35/	Turkish Electricity Transmission Company (TEIAS): Remotely Reading System Deliver Record of 20/12/2011
/36/	CDM Executive Board: Methodological Tool "Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion", version 02.0 of 02/08/2008
/37/	Website: http://www.tupras.com.tr/detailpage.tr.php?strProductKey=403&lRedirectPageID=145 Argument: Density of Diesel Oil Language: Turkish; Retrieved on: 11/12/2012
/38/	Turkish Statistical Institute: UNFCCC Turkey National Inventory Report 2010
/39/	Intergovernmental Panel on Climate Change: 2006 IPCC Guidelines for National

	Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.2 “Default Net Calorific Values (NCVs) and Lower and Upper Limits of the 95% Confidence Intervals”
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3.3 Interviews

The Plant Manager was interviewed during the site visit. To see how the monitoring procedures were implemented, the whole process was explained to the verification team during the site visit. The carbon consultant was interviewed about the monitoring report and related parameters. Whole process related emission reduction calculation was explained.

The key personnel interviewed and the main topics of the interviews are summarized in the table below.

	Date	Name and Role	Organization	Topic
/a/	06/09/2012	Zeren ERIK <i>Carbon Consultant</i>	GTE Global Tan Energy Limited	Monitoring plan Monitoring methodology
/b/	06/09/2012	Zeynep SOLAK <i>Strategic Plannning Assistant Specialist</i>	Akenerji Elektrik Uretim A.S.	Monitoring data Implementation status of the project
/c/	06/09/2012	Ali Osman KAMBUROGLU <i>Plant Manager</i>	Akenerji Elektrik Uretim A.S.	Monitoring equipments and operation Calibration certificates Emission Reductions calculation

3.4 Site Inspections

On 06/09/2012, RINA visited the wind power plant located in Arakli District, Trabzon province of Turkey. During the on-site assessment of the project, all the equipments and the systems were accessible. RINA assessed the implementation and operation of the proposed project activity, reviewed the information flows for generating, aggregating and reporting the monitoring parameters, interviewed key personnel of the plant to confirm the operational and data collection procedures, cross-checked between information provided in the monitoring report and data plant, checked the monitoring equipment including calibration performance, reviewed calculations and assumptions made in determining the GHG data and emission reductions, checked the quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

3.5 Resolution of Any Material Discrepancy

The objective of this phase of the verification is to resolve any outstanding issues, which need to be clarified for RINA's positive conclusion on the monitoring report and emission reductions.

To guarantee transparency a verification protocol has been customized for the project. The protocol shows in a transparent manner the requirements, means of verification and the results from verifying the identified criteria. The verification protocol consists of three tables; the different columns in these tables are described in the figure below (see Figure 1). The completed verification protocol is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;

- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impair the estimate of emission reductions;
- Issues identified in a FAR during validation to be verified during verification have not been resolved by the project participants.

A clarification request (CR) is raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements, which refer to CDM rules, have been met.

CARs, CRs identified are included in the verification protocol in Appendix A of this report.

Figure 1 Verification protocol tables

Verification Protocol, Table 1 - Requirement checklist					
Checklist Question	Ref.	MoV	Comments	Draft Conclusion	Final Conclusion
Checklist questions organized in seven different sections.	Makes reference to documents where the answer to the checklist question or item is found.	Explain how conformance with the checklist question is investigated. Examples are document review (DR), interview or any other follow-up actions (I), cross checking (CC) with available information relating to projects, (N/A) means not applicable.	The discussion on how the conclusion is arrived at and the conclusion on the compliance with checklist question so far.	For CAR, CR and FAR see the definitions above.	OK is used if the information and evidence provided is adequate to demonstrate compliance with VCS requirements, which refer to CDM rules.

Verification Protocol, Table 2: Resolution of Corrective Action Requests and Clarification			
Corrective action requests and/or clarification requests	Reference to Table 1	Response by project participants	Verification Conclusion
The CAR and/or CRs raised in table 1 are repeated here.	Reference to the checklist question number in Table 1 where the CAR or CR is explained.	The responses given by the project participants to address the CARs and/or CRs.	The verification team's assessment and final conclusion of the CARs and/or CRs.

Verification Protocol, Table 3 - Forward Action Requests		
Forward action request	Reference to Table 1	Response by project participants Verification Conclusion
The FAR raised in table 1 is repeated here.	Reference to the checklist question number in Table 1 where the FAR is explained.	Response by the project participants on how forward action request will be addressed.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

It was verified during the site visit conducted on 06/09/2012 that the proposed project activity has been implemented and it is in operation in accordance to the project activity described in the registered VCS PD /1/.

The project activity has been implemented in 2 phases. On 30/06/2010, the power plant has started operation with 1 turbine and on 29/07/2010 the remaining 1 turbine has been commissioned. Each commissioning date was confirmed through the Temporary Acceptance Protocols /14/ /15/. The carbon crediting period and therefore the monitoring starts when the plant commences electricity generation. Therefore, the crediting period starts on 30/06/2010.

The project activity consists of 2 vertical axis Pelton turbines, each with an 40.5 MWe capacity and making the total installed capacity of 81 MWe as confirmed through the Technical Specification of Turbines /16/ and Generation License /13/. The project boundary in the registered VCS PD /1/ is in line with the actual project boundary. The generated electricity is fed to the national grid. The generated electricity is transmitted to the National Electricity System through Arsin Substation, with a 154 kV and 32 km long energy transmission line. The geographic coordinates of the project activity is confirmed through the technical drawings /17/.

The deviations have been occurred during this monitoring period of 01/07/2010 to 31/07/2012, which are permanent during the crediting. The project description deviations are explained under Section 2.2.3 of this report. These changes are permanent during the crediting period and have been assessed as per the "Clean Development Mechanism Validation and Verification Standard", version 02.0 of 25/11/2011 /5/ and "Project Standard", version 01.0 of 25/11/2011 /26/. The additionality of the project activity is demonstrated by applying investment analysis as per the validated VCS PD /1/. Therefore, this change does not affect the additionality of the project activity. It has been confirmed that this change does not affect the applicability/application of baseline methodology.

Based on the onsite inspection and checking the above documents, RINA confirms that the project activity has been implemented and it is in operation as described above in accordance with the project activity in the registered PDD /1/.

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

The emission reduction calculations provided in the spreadsheet /8/ have been verified to be correct and in line with the registered VCS PD /1/.

According to the applied methodology "ACM0002", "Consolidated baseline methodology for grid-connected electricity from renewable sources", version 10 of 28/05/2009 /6/, the emission reductions have been calculated based on the following formula:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

BE_y = Baseline emissions in year y (tCO₂e/yr)

PE_y = Project emissions in year y (tCO₂e/yr)

LE_y = Leakage emissions in year y (tCO₂e/yr)

Baseline emissions

The baseline emissions include the CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, multiplying the electricity supplied to the grid (MWh) with the combined margin CO₂ emission factor for grid connected power generation in year.

$$BE_y = EG_y \times EF_y$$

Where:

EG_y = Net electricity delivered to the grid by the project activity in year y excluding transmission losses of the grid (MWh)

EF_y = Combined margin grid emission factor (tCO₂/MWh)

Project emissions

Project emissions from reservoir has been assumed to be 0 since the power density is larger than 10 W/m² as per the ACM0002 version 10 of 28/05/2009 [/6/](#) as defined in the validated VCS PD [/1/](#). In the registered VCS PD for “78 MW Akocak Hydroelectric Power Plant” in Turkey, version 03 of 20/07/2010 [/1/](#), the power density has been calculated based on the only reservoir area of Erikli weir. To be on the conservative side, the reservoirs both of Erikli and Akocak have been taken into consideration and power density is calculated accordingly in the Monitoring Report [/2/](#). The power density is still higher than 10 W/m²; therefore, project emissions are neglected.

Project emissions from fossil fuel consumption is calculated as per the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” version 02.0 of 02/08/2008 [/36/](#). CO₂ emissions from fossil fuel combustion for process are calculated based on the quantity of fuels combusted and the CO₂ emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

Where:

PE_{FC,j,y} : The CO₂ emissions from fossil fuel combustion in process j during the year y (tCO₂/yr)

FC_{i,j,y} : The quantity of fuel type i combusted in process j during the year y (mass/volume)

COEF_{i,y} : The CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)

i : The fuel types combusted in process j during the year y

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Where:

NCV_{i,y} : The weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)

EF_{CO2,i,y} : The weighted average CO₂ emission factor of fuel type i in year y (tCO₂/GJ)

$FC_{i,j,y}$ is verified through the weekly maintenance form of generators and maintenance manual of generators. The operating hours of generators during the monitoring period has been confirmed through the weekly maintenance form of generators [/27/](#) [/28/](#) [/29/](#) [/30/](#). The hourly consumption of generator has been confirmed through the maintenance manual of generators [/31/](#). Total fuel consumption during monitoring period is 32,788.45 liter.

$NCV_{i,y}$ which is applied as 0.043 GJ/tonnes is confirmed through the "Default Net Calorific Values (NCVs) and Lower and Upper Limits of the 95% Confidence Intervals" of IPCC 2006 Guidelines [/39/](#). The density (0.845) of the diesel oil is confirmed through the product information of Turkish Petroleum Refineries Co. [/37/](#).

$EF_{CO_2,i,y}$ is calculated based on the carbon conversion unit (20 t C/TJ) given in the Turkey's National Inventory Report [/38/](#).

Project emissions during this monitoring period have been calculated as 87.217 tCO₂e.

Leakage emissions

The leakage emissions are assumed to be zero as per the ACM0002 version 10 of 28/05/2009 [/6/](#) as defined in the registered VCS PD [/1/](#).

The data presented in the monitoring report [/2/](#) were assessed by reviewing in detail project documentation, collection of monitored data, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. Sufficient evidence was presented and verified by RINA for the reported emission reductions.

Parameters Available at Validation and Data Fixed Ex-ante

DATA/PARAMETER	Source of data	Reported value for the project period	Assessment/Observation
EF _{grid,CM,y} Baseline emission factor	TEIAS statistics	562 tCO ₂ /GWh	According to the approved methodology ACM0002 version 10, the combined emission factor has been determined using the ex-ante option and so it is not requested to monitor and recalculate the emission factors during the crediting period. The combined emission factor is determined to be 562 tCO ₂ /GWh in the VCS PD /1/ and validation report /7/ .

Parameters and Data Monitored

DATA/PARAMETER	EG _{facility,y}
Data Unit	MWh
Description	Net Electricity generated and delivered to the grid by 78 MW Akocak HEPP in year y
Source of data to be used	Monthly Meter Reading Protocols Monthly Facility Reports for Electricity Generation Monthly Meter Reading (OSF) Forms
Value data for the monitoring period	301,812 MWh
Measuring and reporting frequency; recording procedure	Continuously monitoring and monthly recording
Type of monitoring equipment and its accuracy	Two unit electricity meters (two main meters and two backup meters) are installed at the project site. The main meters are ACTARIS SL761 A071 with serial number 53064405 and 53064407. The backup meters are ACTARIS SL761 A071 with serial number 53064406 and 53064408. The meters have the accuracy of 0.5s as confirmed through the first index protocol /11/ and test reports /12/ . The accuracy class of the meters complies with the "Communiqué for Measurement Devices used in the Electricity Market" /21/ .
Calibration frequency/interval	TEIAS is responsible for calibration and maintenance of the meters as per the registered VCS PD /1/ . The project owner has no control on the meters since the meters are sealed by the TEIAS as confirmed during the site visit. If any major discrepancy occurs between the two meters, TEIAS performs necessary calibration. The meters were calibrated by the TEIAS on 06/05/2010 as confirmed through the test reports /12/ . Also, the meters were tested by the electricity transmission company at the project site on 27/05/2010 after the meters were installed /11/ . As per the "Regulation of Metering and Testing of Metering Systems" /20/ , the meters shall be calibrated every 10 years, therefore the calibration of meters is deemed appropriate and in compliance with the national regulation. During on-site assessment, it was confirmed that the meters are in place and functions well. During the monitoring period, no brake down has been recorded.
How were the values in the monitoring report verified and cross-checked?	The electricity generation figures are based on the Monthly Meter Reading (OSF) Forms /33/ and the PMUM records /19/ are used for crosscheck from July 2010 to November 2011. The electricity generation figures are based on the PMUM records /19/ and Monthly Facility Reports /32/ are used for crosscheck from December 2011 to July 2012.
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions?	The electricity generation and consumption is measured in line with the TEIAS rules and requirements /24/ . The electricity generation supplied to the grid and electricity consumption from the grid is stored by PMUM on the web site. The Project owner has an ID and password to access

	this data on the web site. The collected data during the monitoring period will be kept by the project owner at least two years after end of the last crediting period as stated in the registered VCS PD /1/ and monitoring report /2/ in line with the ACM0002 version 10 of 28/05/2009 /6/.
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data were available for the whole monitoring period.

DATA/PARAMETER	Cap _{PJ}
Data Unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data to be used	Generation License and Letter for Approval of Commissioning
Value data for the monitoring period	81,000,000 W
Measuring and reporting frequency; recording procedure	Yearly
Type of monitoring equipment and its accuracy	The parameter is monitored through the Generation License and Letter for Approval of Commissioning; therefore, measurement equipment is not used.
Calibration frequency/interval	NA
How were the values in the monitoring report verified and cross-checked?	The parameter is monitored through the Generation License /13/ and Letter for Approval of Commissioning /14/ /15/ .
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions?	NA
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data were available for the whole monitoring period.

DATA/PARAMETER	A _{PJ}
Data Unit	m ²
Description	Area of the reservoir measured on the surface of the water, after the implementation of the project activity, when the reservoir is full
Source of data to be used	Technical drawing
Value data for the monitoring period	Erikli Weir: 33,877.016 m ² Akocak Weir: 38,543.722 m ²
Measuring and reporting frequency; recording procedure	Yearly
Type of monitoring equipment and its accuracy	The parameter is monitored through the technical drawing; therefore, measurement equipment is not used.
Calibration frequency/interval	NA
How were the values in the monitoring report verified and cross-checked?	The parameter is monitored through the technical drawing /17/ .
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions?	NA
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data were available for the whole monitoring period.

DATA/PARAMETER	FC _{i,j,y}
Data Unit	Mass or Volume unit per year
Description	Quantity of fuel type i combusted in Diesel power generator during the year y
Source of data to be used	Diesel generator
Value data for the monitoring period	32,788.45 liter
Measuring and reporting frequency; recording procedure	Yearly
Type of monitoring equipment and its accuracy	NA
Calibration frequency/interval	NA
How were the values in the monitoring report verified and cross-checked?	The consumed fuel is verified through the weekly maintenance form of generators and maintenance manual of generators. The operating hours of generators during the monitoring period has been confirmed through the weekly maintenance form of generators /27/ /28/ /29/ /30/ . The hourly consumption of generator has been confirmed through the maintenance manual of generators /31/ .
Does the data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions?	NA
If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	All the data were available for the whole monitoring period.

Emission Reductions Achieved

The emission reductions calculation reported in the Monitoring Report version 05 of 10/12/2012 [/2/](#) and calculation spreadsheet "Akocak verification_10122012.xls" version 03 of 10/12/2012 [/8/](#) have been verified to be correct.

The emission reductions from the project for the monitoring period from 01/07/2010 to 31/07/2012 (25 months) as reported in the Monitoring Report version 05 of 10/12/2012 [/2/](#) is equivalent to 169,531 tCO₂e (on average 6,781 tCO₂e per month). According to the registered VCS PD [/1/](#), the estimated emission reductions are equivalent to 144,681 tCO₂e annually, on average 12,057 tCO₂e per month. The reported averaged emission reductions are 44% lower than the estimated average emission reduction.

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

The generated electricity monitored continuously by two unit meters that were sealed by TEIAS. Two unit electricity meters (two main meters and two backup meters) are installed at the project site. The main meters are ACTARIS SL761 A071 with serial number 53064405 and 53064407. The backup meters are ACTARIS SL761 A071 with serial number 53064406 and 53064408. The meters have the accuracy of 0.5s as confirmed through the first index protocol [/11/](#) and test reports [/12/](#). The accuracy class of the meters complies with the “Communiqué for Measurement Devices used in the Electricity Market” [/21/](#).

TEIAS is responsible for calibration and maintenance of the meters as per the registered VCS PD [/1/](#). The project owner has no control on the meters since the meters are sealed by the TEIAS as confirmed during the site visit. If any major discrepancy occurs between the two meters, TEIAS performs necessary calibration. The meters were calibrated by the TEIAS on 06/05/2010 as confirmed through the test reports [/12/](#). Also, the meters were tested by the electricity transmission company at the project site on 27/05/2010 after the meters were installed [/11/](#). As per the “Regulation of Metering and Testing of Metering Systems” [/20/](#), the meters shall be calibrated every 10 years, therefore the calibration of meters is deemed appropriate and in compliance with the national regulation. The calibration frequency has been respected.

The electricity generation figures are based on the Monthly Meter Reading (OSF) Forms [/33/](#) and the PMUM records [/19/](#) are used for crosscheck from July 2010 to November 2011. The electricity generation figures are based on the PMUM records [/19/](#) and Monthly Facility Reports [/32/](#) are used for crosscheck from December 2011 to July 2012. The records and emission reduction calculation spreads sheet [/8/](#) are consistent.

4.4 Management and Operational System

The electricity generation and consumption is measured in line with the TEIAS rules and requirements [/24/](#). The electricity generation supplied to the grid and electricity consumption from the grid is stored by PMUM on the web site. The Project owner has an ID and password to access this data on the web site. The installed capacity of the hydro power plant after the implementation of the project activity is monitored through the Generation License [/13/](#) and letter for approval of commissioning [/14/ /15/](#).

The responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan presented in the in the registered VCS PD [/1/](#) as confirmed through the interviews. Plant Manager is responsible for running the HEPP plant and compliance with VER monitoring plan. Accounting Manager is responsible for keeping data about power sales, invoicing and purchasing. Global Tan Energy is responsible for emission reduction calculations and preparing monitoring report.

The collected data during the monitoring period will be kept by the project owner at least two years after end of the last crediting period as stated in the registered VCS PD [/1/](#) and monitoring report [/2/](#) in line with the ACM0002 version 10 of 28/05/2009 [/6/](#).

During the site visit, the suitability of the management system for monitoring and reporting has been assessed and found acceptable and in line with the monitoring plan presented on Monitoring Report version 05 of 10/12/2012 [/2/](#).

5 VERIFICATION CONCLUSION

RINA Services Spa (RINA) has performed verification of the emission reductions reported for the project activity “78 MW Akocak Hydroelectric Power Plant” in Turkey, VCS Registration Reference N° 535, for the period 01/07/2010 to 31/07/2012, with regard to the relevant requirements for CDM and VCS activities.

It is RINA's opinion that the GHG emission reductions stated in the Monitoring Report version 05 of 10/12/2012 for the “78 MW Akocak Hydroelectric Power Plant” project in Turkey for the period 01/07/2010 to 31/07/2012 are fairly stated. The GHG emission reductions were calculated correctly, on the basis of the approved monitoring methodology “ACM0002”, “Consolidated baseline methodology for grid-connected electricity from renewable sources”, 10 of 28/05/2009 and the monitoring plan contained in the registered VCS PD.

Hence, RINA is able to certify that the emission reductions from the project during the monitoring period 01/07/2010 to 31/07/2012 amount to 169,531 tCO₂e.

GHG Emission Reductions or Removals	tCO ₂ e
Baseline Emissions	169,619
Project Emissions	87.217
Leakage	0
Net GHG emission reductions or removals	169,531

APPENDIX A

VERIFICATION PROTOCOL

TABLE 1 REQUIREMENTS CHECK LIST

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
A Monitoring Report						
A.1	Does the used project title clearly enable the reader to identify the unique VCS activity? Is there an indication of a revision number, the date of the revision and the monitoring period?	/1/ /2/ /7/ /23/	DR, CC	The title of the project activity is given as “78 MW Akocak Hydroelectric Power Plant” in the Monitoring Report version 01 dated 13/08/2012 /2/ , which is enable the reader to identify the unique VCS activity. The title is also in line with the registered VCS PD /1/ and Validation Report /7/ . The version and issuance date of report are available at cover page of Monitoring Report version 01 dated 13/08/2012 /2/ . Also, the project ID is defined as 535 that is available at the VCS Project Database /23/ .		OK
A.2	Does the project comply with the applicable requirements for completing the Monitoring Reports (latest version available)?	/2/ /3/ /4/ /22/	DR	The project complies with the applicable requirements for completing the Monitoring Reports.		OK
A.3	Does the MR comply with the template available (latest version)?	/2/ /3/ /4/ /22/	DR	The following issues does not comply with the VCS Monitoring Report Template /22/ . - Monitoring report title and preparers' name, logo and contact information more prominently on the title page must be completed using Arial 11pt, black, regular font. - All sections must be completed using Arial 10pt, black, regular (non-italic) font. However, the texts are gray in the Monitoring Report version 01 /2/ . Please review “Table of Contents” Section.	CAR-1	OK
B Description of Project Activity						
A.1	Title of the project activity, revision number and	/1/ /2/ /7/	DR,	The title of the project activity is given as “78 MW		OK

¹ MoV: DR document review, I interview, CC cross checking

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
	date of Monitoring Report		CC	Akocak Hydroelectric Power Plant" in the Monitoring Report version 01 dated 13/08/2012 /2/. The title is also in line with the registered VCS PD /1/ and Validation Report /7/.		
A.2	Is the actual implementation and operation of the proposed project activity in accordance with the project activity in the registered VCS-PD?	/1/ /2/ /13/ /16/ /17/	DR, CC	The project activity consists of 2 vertical axis Pelton turbines, each with an 40.5 MWe capacity and making the total installed capacity of 81 MWe as confirmed through the Technical Specification of Turbines /16/ and Generation License /13/. In the registered VCS PD /1/, the installed capacity is defined as 78 MW. However, the installed capacity is increased to 81 MWe as confirmed through the Generation License /13/ and Temporary Acceptance Protocols /14/ /15/. The project boundary in the registered VCS PD /1/ is in line with the actual project boundary. The generated electricity is fed to the national grid. The generated electricity is transmitted to the National Electricity System through Arsin Substation, with a 154 kV and 32 km long energy transmission line. The geographic coordinates of the project activity is confirmed through the technical drawings /17/.		OK
A.3	Methodology applied for the registered project activity	/1/ /2/ /6/	DR	The registered project activity applies the approved baseline and monitoring methodology ACM0002 version 10 of 28/05/2009 /6/.		OK
B Monitoring						
B.1 Monitoring Plan						
B.1	Is the actual implementation and operation of the proposed project activity in accordance with the project activity in the registered VCS-PD?	/1/ /2/ /13/ /16/ /17/	DR, CC, I	In the registered VCS PD for "78 MW Akocak Hydroelectric Power Plant" in Turkey, version 03 of 20/07/2010 /1/, - the power density has been calculated based on the only reservoir area of Erikli weir. To be on the conservative side, the reservoirs both of Erikli and Akocak have been taken into consideration and power density is calculated accordingly in the Monitoring Report Version 01		OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
				of 13/08/2012 /2/. The power density is still higher than 10 W/m²; therefore, project emissions are neglected. - the source of the net electricity generation is defined as “Monthly Meter Reading Protocols” which is signed by TEIAS and plant manager. However, since TEIAS started to monitor electricity remotely, Monthly Meter Reading Protocols are not available. Therefore, the source of the parameter is defined as “Market Financial Settlement Center (PMUM) records which are the basis of the invoices. - the installed capacity is defined as 78 MW. However, the installed capacity is increased to 81 MWe as confirmed through the Generation License /13/ and Temporary Acceptance Protocols /14/ /15/. The additionality of the project activity is demonstrated by applying investment analysis registered VCS PD /1/. The annual electricity generation used in the investment analysis that is 257.440 GWh has remained same. Therefore, this change does not affect the additionality of the project activity. Thus, the requirements of the VCS Standard Version 3 /4/ were satisfied and RINA confirms that the project conforms to the validation criteria for projects, in accordance with ACM0002 version 10 of 28/05/2009 /6/.		
B.2	In case of deviation between the registered project and the actual implementation/operation, do they comply with the requirements of the Project Standards?	/1/ /2/ /7/ /13/ /14/ /15/	DR	There some minor changes in the monitoring plan which does not affect the project design and implementation. - In the registered VCS PD /1/, the power density has been calculated based on the only reservoir area of Erikli weir. To be on the conservative side, the reservoirs both of Erikli and Akocak have been taken into consideration and power	CL-1	OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
				density is calculated accordingly in the Monitoring Report Version 01 of 13/08/2012 /2/. The power density is still higher than 10 W/m²; therefore, project emissions are neglected. - In the registered VCS PD /1/, the source of the net electricity generation is defined as "Monthly Meter Reading Protocols" which is signed by TEIAS and plant manager. However, since TEIAS started to monitor electricity remotely, Monthly Meter Reading Protocols are not available. Therefore, the source of the parameter is defined as "Market Financial Settlement Center (PMUM) records which are the basis of the invoices. However, the date of starting to read remotely is not defined in the Monitoring Report. Also, the document for crosschecking electricity generation is not defined in the Monitoring Report. - In the registered VCS PD /1/, the installed capacity is defined as 78 MW. However, the installed capacity is increased to 81 MWe as confirmed through the Generation License /13/ and Temporary Acceptance Protocols /14/ /15/. The current annual generation is 257.440 GWh as per the Generation License /13/, which is same with the registered VCS PD /1/. The additionality of the project activity is demonstrated by applying investment analysis registered VCS PD /1/. The annual electricity generation used in the investment analysis that is 257.440 GWh has remained same. Therefore, this change does not affect the additionality of the project activity.		
B.3	For project activity that consist of more than one site: - describe the status of the implementation	/1/ /2/ /7/ /14/ /15/	DR, CC, I	The project activity consists of one site and has been implemented in 2 phases. On 30/06/2010, the power plant has started operation with 1 turbine and on 29/07/2010 the remaining 1 turbine has been		OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
	and starting date of operation of each site; For project activity with phased implementation: - describe the progress of the proposed project activity achieved in each phase number; - if the phased implementation is delayed, described the reasons and the expected implementation dates.			commissioned. Each commissioning date has been confirmed through the Temporary Acceptance Protocols /14/ /15/. The carbon crediting period and therefore the monitoring starts when the plant commences electricity generation. Therefore, the crediting period starts on 30/06/2010.		
B.4	Methodology and methodological tool applied for the registered project activity	/1/ /2/ /6/ /7/ /10/		The registered project activity applies the approved baseline and monitoring methodology ACM0002 version 10 of 28/05/2009 /6/. Also, the following methodological tools are applied for the registered project activity: "Tool for the demonstration and assessment of additionality, Version 05.2 of 26/08/2008" /25/ "Tool to calculate the emission factor for an electricity system, Version 02 of 16/10/2009" /10/		OK
C Compliance of the monitoring activities with the registered monitoring plan / Compliance of the monitoring plan with the monitoring methodology and methodological tool						
C.1 Monitoring plan						
C.1.1	Does the monitoring plan included in the registered VCS project activity comply with the applied methodology?	/1/ /2/ /6/ /7/	DR, CC	The monitoring plan of the registered VCS project activity complies with the applied methodology ACM0002 version 10 of 28/05/2009 /6/.		OK
C.1.2	Does the monitoring comply with the monitoring plan in the registered VCS-PD?	/1/ /2/ /7/	DR, CC	The monitoring complies with the monitoring plan presented in the registered VCS PD /1/. The following parameters should be monitored as per the monitoring plan in the registered VCS-PD: - Net Electricity generated and delivered to the grid by the Akocak Hydroelectric Power Plant, $EG_{facility,y}$ - Installed capacity of the hydro power plant after the implementation of the project activity, Cap_{PJ} - Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full, A_{PJ}		OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
				The necessary monitored parameters are included into the monitoring report. Also, emissions from diesel generator is included to the monitoring report.		
C.2 Data and parameters fixed ex-ante or at renewal crediting period						
C.2.1	Which parameters were available at validation and how were they verified?	/1/ /2/ /6/ /7/	DR, CC	As per the approved methodology ACM0002 version 10, the combined emission factor has been determined using the ex-ante option, therefore it is not requested to monitor and recalculate the emission factors during this crediting period. The combined emission factor is determined to be 562 tCO ₂ /GWh in the registered VCS PD /1/ and validation report /7/ .		OK
C.2.2	What default data were selected and applied?	/1/ /2/ /6/ /7/	DR, CC	Please refer to Section C.2.1 of this protocol.		OK
C.3 Data and parameters monitored ex-post						
C.3.1	Which parameters have been monitored during the monitoring period?	/2/ /8/ /13/ /14/ /15/ /17/ /18/ /19/	DR, CC, I	Net electricity generated and delivered to the grid by Akocak HEPP in year y ($EG_{facility,y}$): The parameter is measured in MWh and it is monitored by two units electricity meters that are located at the project activity. The net electricity generation is based on the PMUM records /19/. The net electricity generation during monitoring period is calculated as 301,812 MWh based on the PMUM records /19/. However, the March 2011 PMUM record could not be justified since the figures are not clearly read. Installed capacity of the hydro power plant after the implementation of the project activity (Cap_{PJ}): The parameter is measured in W. The installed capacity of the hydro power plant after the implementation of the project activity is 81,000,000 W as confirmed through the Generation License /13/ and letter for approval of commissioning /14/ /15/.	CAR-2	OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
				Area of the reservoir measured on the surface of the water, after the implementation of the project activity, when the reservoir is full (A_{PJ}): The parameter is measured in m^2. The project activity includes two reservoir areas. The reservoir area after implementation of project activity when reservoir area is full is defined as 33,877.016 m^2 as confirmed through the technical drawing of the project activity /17/ for Erikli weir. The reservoir area after implementation of project activity when reservoir area is full is defined as 38,543.722 m^2 as confirmed through the technical drawing of the project activity /17/ for Akocak weir. However, the reservoir area of Akocak is defined as 38,853.722 m^2 in the monitoring report, which does not match with the reference document. Project emissions from fossil fuel consumption ($PE_{FF,y}$): The project emission from diesel oil consumption is monitored through the fuel purchasing invoices. The monitoring period starts from 01/07/2010; however, the submitted two invoices belong to January and February 2012 /18/, which does not include whole monitoring period.		
C.3.2	Is the measurement equipment described? Is the accuracy of the measurement equipment addressed and deemed appropriate?	/2/ /11/ /12/ /13/ /14/ /15/ /21/	DR, CC	Net electricity generated and delivered to the grid by Akocak HEPP in year y ($EG_{facility,y}$): Two unit electricity meters (two main meters and two backup meters) are installed at the project site. The main meters are ACTARIS SL761 A071 with serial number 53064405 and 53064407. The backup meters are ACTARIS SL761 A071 with serial number 53064406 and 53064408. The meters have the accuracy of 0.5s as confirmed through the first index protocol /11/ and test reports /12/. The accuracy class of the meters complies with the "Communiqué for Measurement Devices used in the Electricity Market" /21/.		OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
				Installed capacity of the hydro power plant after the implementation of the project activity (Cap_{PJ}): The parameter is monitored through the Generation License /13/ and letter for approval of commissioning /14/ /15/. Therefore, measurement equipment is not used. Area of the reservoir measured on the surface of the water, after the implementation of the project activity, when the reservoir is full (A_{PJ}): The parameter is monitored through the technical drawing issued by General Directorate Of State Hydraulic Works (DSI) /17/. Therefore, measurement equipment is not used. Project emissions from fossil fuel consumption ($PE_{FF,y}$): The project emission from diesel oil consumption is monitored through the fuel purchasing invoices /18/. Therefore, measurement equipment is not used.		
C.3.3	Is the measuring/reading/recording frequency adequate for all monitoring parameters? Is it in line with the registered monitoring plan?	/1/ /2/ /6/	DR, I	Net electricity generated and delivered to the grid by Akocak HEPP in year y ($EG_{facility,y}$): The electricity generation supplied to the grid and electricity consumption from the grid is monitored continuously by two unit meters and recorded monthly as verified during the site visit. Monitoring frequency is in line with the applied methodology /6/ and registered VCS PD /1/. Installed capacity of the hydro power plant after the implementation of the project activity (Cap_{PJ}): The parameter is monitored yearly in line with the applied methodology /6/ and registered VCS PD /1/. Area of the reservoir measured on the surface of the water, after the implementation of the project activity, when the reservoir is full (A_{PJ}):		OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
				The parameter is monitored yearly in line with the applied methodology /6/ and registered VCS PD /1/. Project emissions from fossil fuel consumption (PE_{FF,y}): The project emission from diesel oil consumption is monitored through the fuel purchasing invoices /18/. Therefore, measurement equipment is not used.		
C.4 Calibration requirements						
C.4.1	Are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate?	/1/ /2/ /11/ /12/ /20/	DR, CC	TEIAS is responsible for calibration and maintenance of the meters as per the registered VCS PD /1/. The project owner has no control on the meters since the meters are sealed by the TEIAS as confirmed during the site visit. If any major discrepancy occurs between the two meters, TEIAS performs necessary calibration. The meters were calibrated by the TEIAS on 06/05/2010 as confirmed through the test reports /12/. Also, the meters were tested by the electricity transmission company at the project site on 27/05/2010 after the meters were installed /11/. As per the "Regulation of Metering and Testing of Metering Systems" /20/, the meters shall be calibrated every 10 years, therefore the calibration of meters is deemed appropriate and in compliance with the national regulation.		OK
C.4.2	Does the calibration cover the monitoring period?	/2/ /11/ /12/ /20/	DR, CC	The meters were calibrated by the TEIAS on 06/05/2010 as confirmed through the test reports /12/. Also, the meters were tested by the electricity transmission company at the project site on 27/05/2010 after the meters were installed /11/. As per the "Regulation of Metering and Testing of Metering Systems" /20/, the meters shall be calibrated every 10 years, therefore the calibration of meters is deemed appropriate and in compliance with the national regulation. The calibration of the meters covers the monitoring period.		OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
C.4.3	Has the calibration frequency been respected?	/2/ /11/ /12/ /20/	DR, CC	The meters were calibrated by the TEIAS on 06/05/2010 as confirmed through the test reports /12/ . Also, the meters were tested by the electricity transmission company at the project site on 27/05/2010 after the meters were installed /11/ . As per the "Regulation of Metering and Testing of Metering Systems" /20/ , the meters shall be calibrated every 10 years. The calibration of meters is deemed appropriate and in compliance with the national regulation. The calibration frequency has been respected.		OK
C.4.4	In case of delay, describe the applied maximum permissible error	/2/ /11/ /12/ /21/	DR, CC	Please refer to Section C.4.3 of this protocol.		OK
C.5 Monitoring of the sustainable indicators						
C.5.1	Is the monitoring of sustainable development indicators/environmental impacts warranted by legislation in the Host Country?	/1/	DR	The monitoring of sustainable development indicators is not requested by the legislation in the Host Country. The project has Environmental Impact Assessment Positive certificate as confirmed through the registered VCS PD /1/ .		OK
C.6 Management system and quality control						
C.6.1	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/ /2/	DR, I	An on-site inspection has been performed on 06/09/2012 and it has been confirmed that the monitoring arrangements in the monitoring plan are feasible within the project design.		OK
C.6.2	Are procedures identified for day-to-day record handling (including what records to keep, storage area of records and how to process performance documentation)? Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/ /2/ /6/ /24/	DR, CC, I	The electricity generation and consumption is measured in line with the TEIAS rules and requirements /24/ . The electricity generation supplied to the grid and electricity consumption from the grid is stored by PMUM on the web site. The Project owner has an ID and password to access this data on the web site. The collected data during the monitoring period will be kept by the project owner at least two years after end of the last crediting period as stated in the		OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
				registered VCS PD /1/ and monitoring report /2/ in line with the ACM0002 version 10 of 28/05/2009 /6/ .		
C.6.3	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/ /2/	DR, I	The generated electricity is measured by two meters that were sealed by TEIAS. The project owner has no control on the meters. The electricity generation supplied to the grid and electricity consumption from the grid is stored by PMUM on the web site. The Project owner has an ID and password to access this data on the web site. The project owner also archives a hardcopy of these protocols, scanned and stored electronically. Also, The collected data during the monitoring period will be kept by the project owner at least two years after end of the last crediting period.		OK
C.6.4	Are the responsibilities and authorities for monitoring and reporting in accordance with the responsibilities and authorities stated in the monitoring plan?	/1/ /2/	DR, I	The responsibilities and authorities for monitoring and reporting are in accordance with the responsibilities and authorities stated in the monitoring plan presented in the in the registered VCS PD /1/ as confirmed through the interviews. Plant Manager is responsible for running the HEPP plant and compliance with VER monitoring plan. Accounting Manager is responsible for keeping data about power sales, invoicing and purchasing. Global Tan Energy is responsible for emission reduction calculations and preparing monitoring report.		OK
C.6.5	Does data management (from monitoring equipment to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions?	/1/ /2/	DR, I	The data management (from monitoring equipment to emission reduction calculation) ensures correct transfer of data and reporting of emission reductions.		OK
D.1 Assessment of data and calculation of emission reductions / Accuracy of emission reduction calculations						
D.1.1	How were the values in the monitoring report verified and cross-checked?	/2/ /8/ /13/ /14/ /15/ /17/ /19/		Net electricity generated and delivered to the grid by Uluabat HEPP in year y ($EG_{facility,y}$): The parameter is measured in MWh and it is monitored by two units electricity meters that are located at the project activity. The net electricity generation is	CL-2	OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
				based on the PMUM records /19/. However, the record for cross check is not defined clearly in the monitoring report and is not submitted. The PMUM record is used as main record for electricity generation hence the information given as below is not correct since: <i>"Data from metering devices is recorded by TEIAS monthly and form the basis for invoicing using the template formed by TEIAS. In addition to the two metering devices, generation of the Akocak HEPP can be cross checked from TEIAS – PMUM web site(http://pmum.teias.gov.tr) which is accessible using a password provided to electricity generation companies. Both the PMUM data and the facility/TEAIS records are taken into account for comparison and to identify any anomalies."</i> Installed capacity of the hydro power plant after the implementation of the project activity (Cap_{PJ}): The parameter verified through the Generation License /13/ and letter for approval of commissioning /14/ /15/. Area of the reservoir measured on the surface of the water, after the implementation of the project activity, when the reservoir is full (A_{PJ}): The parameter is verified through the technical drawing /17/.		
D.1.2	If only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	/1/ /2/ /6/ /8/	DR	The emission reduction calculations are based on the data measured using calibrated meters of adequate accuracy. Apart from the ex-ante emissions factor, no other assumption is used in these calculations in line with the ACM0002 version 10 of 28/05/2009 /6/ and registered VCS PD /1/.		OK
D.1.3	Emission reductions reported	/2/ /8/	DR	The emission reduction reported in the Monitoring Report could not be crosschecked. Please refer to C.3.1 of this validation protocol.	CAR-2	OK

Checklist Question		Reference	MoV ¹	Comments	Draft Conclusion	Final Conclusion
D.1.4	Difference between the emission reductions estimated in the registered VCS PD and the emission reductions reported for the monitoring period.	/2/ /8/	DR	The emission reduction reported in the Monitoring Report could not be crosschecked. Please refer to C.3.1 of this validation protocol.	CAR-2	OK

TABLE 2 RESOLUTION OF CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
CAR 1 The following issues does not comply with the VCS Monitoring Report Template /22/. - Monitoring report title and preparers' name, logo and contact information more prominently on the title page must be completed using Arial 11pt, black, regular font. - All sections must be completed using Arial 10pt, black, regular (non-italic) font. However, the texts are gray in the Monitoring Report version 01 /2/. Please review "Table of Contents" Section.	A.3	- The title page has been corrected. - No grey text could be determined. The table of contents has been updated and revised. 30/10/2012: - The version and date have been updated. - The heading of Section 2.2 corrected - The dates of the monitoring report in section 1.6 are corrected.	- Monitoring report title and preparers' name, logo and contact information have been completed using Arial 11pt, black, regular font in the Monitoring Report /2/. - All sections have been completed using Arial 10pt, black, regular (non-italic) font in the Monitoring Report /2/. However, The VCS PD has been revised based on the VCS Monitoring Template Version 3.2 /22/. - The version is defined as "01" and issuance date of report is defined as "13/08/2012" at cover page of Monitoring Report version 02 that has been submitted on 16/10/2012 /2/. The version and date of the report is not reasonable. This comment should be taken into consideration for following versions. - The title of section 2.2 which is defined as "Deviations from the Project Description" is not in line with the VCS Monitoring Report Template /22/. The crediting period is defined as 30/06/2010 and 29/06/2020 under section 1.6 of the VCS PD. However, the monitoring period starting date is defined as 01/07/2010. The revision of the monitoring report can not be considered satisfactory, thus <u>CAR 1 is not closed.</u>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
		16/11/2012 Crediting period has been revised as 01/7/2010-30/06/2010 for simplicity for monitoring and calculations.	<u>Review 2</u> - The version and issuance date of report is updated. - The title of section 2.2 is corrected in line with the VCS Monitoring Report Template /22/. It is stated under section 2.1 of the VCS PD as follows: “<i>The crediting period for the project is 10 years between 30/06/2010 and 29/06/2020 and will be renewable for 2 times.</i>” However, the monitoring period starting date is defined as 01/07/2010. Please clarify. It is stated under section 1.6 of the VCS PD as follows: “<i>Crediting period of the project is 10 years between 01/07/2010 and 31/07/2012.</i>” Please clarify The revision of the monitoring report can not be considered satisfactory, thus <u>CAR 1 is not closed.</u> <u>Review 3</u> The crediting period starting date is revised as 01/07/2010. The revision of the monitoring report can be considered satisfactory, thus <u>CAR 1 is closed.</u>
CAR 2 <i>Net electricity generated and delivered to the grid by Akocak HEPP in year y ($EG_{facility,y}$):</i> The net electricity generation during monitoring	C.3.1	- PMUM printscreen has been sent to DOE with this document where March 2011 data is shown clearly. - The reservoir value has been corrected.	<i>Net electricity generated and delivered to the grid by Akocak HEPP in year y ($EG_{facility,y}$):</i> PMUM screen shot belongs to 2012 year has been submitted. Therefore,

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
period is calculated as 301,812 MWh based on the PMUM records /19/. However, the March 2011 PMUM record could not be justified since the figures are not clearly read. Area of the reservoir measured on the surface of the water, after the implementation of the project activity, when the reservoir is full ($A_{P,j}$): The reservoir area after implementation of project activity when reservoir area is full is defined as 38,543.722 m² as confirmed through the technical drawing of the project activity /17/ for Akocak weir. However, the reservoir area of Akocak is defined as 38,853.722 m² in the monitoring report which does not match with the reference document. Project emissions from fossil fuel consumption ($PE_{FF,y}$): The project emission from diesel oil consumption is monitored through the fuel purchasing invoices. The monitoring period starts from 01/07/2010; however, the submitted two invoices belong to January and February 2012 /18/, which does not include whole monitoring period.		- The project emissions from diesel fuel generation has been calculated from the working hrs of the generators. The calculation is added in the excel and the related information is added in the monitoring report. The total working hrs and the max fuel consumption (from the generator manuals) are provided to the DOE with this document. 30/10/2012: - PMUM record for March 2011 is provided. - The power density calculation is corrected. - The calculations are revised in the VCS PD as well. The 41 liter/hr can be verified from the manual of the generators which was provided to the DOE before.	March 2011 figure could not be verified. Area of the reservoir measured on the surface of the water, after the implementation of the project activity, when the reservoir is full ($A_{P,j}$): The figure used for power density calculation has not been corrected. Power density calculation shall be revised. Project emissions from fossil fuel consumption ($PE_{FF,y}$): The project emission calculation has been revised in the excel sheet, however, the calculation is not revised in the monitoring report. Therefore, the excel sheet and monitoring report are not in line. The fuel consumption defined as 41 liter/hour for facility could not be justified. The revision of the monitoring report and the explanations provided by the PP can not be considered satisfactory, thus <u>CAR 2 is not closed.</u> Review 2 Net electricity generated and delivered to the grid by Akocak HEPP in year y ($EG_{facility,y}$): PMUM screen shot belongs to, March 2011 has been submitted and the figure has been verified. Area of the reservoir measured on the surface of the water, after the implementation of the project activity, when the reservoir is full ($A_{P,j}$): Power density calculation has been corrected accordingly.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
			Project emissions from fossil fuel consumption ($PE_{FF,y}$): The project emission calculation has been revised in the monitoring report. The revision of the monitoring report and the explanations provided by the PP can be considered satisfactory, thus <u>CAR 2 is closed.</u>
CAR 3 - “Data and Parameters Available at Validation” that is given under Section 3.1 of the Monitoring Report /2/ does not match with the registered VCS PD /1/. - The notation of “Net electricity generated and delivered to the grid by Akocak HEPP in year y” that is defined as EG_y is not in line with the registered VCS PD /1/. - It is stated under section 3.2 of the Monitoring Report /2/ as follows: Since the project is in implementation phase, the devices are not determined yet but as per the regulations, it should be in compliance with the regulation on meters issued by relevant government agencies”. Please clarify. Also, the section does not include the accuracy class of the meters. - The frequency of $FC_{i,j,y}$ is defined as once at the end of crediting period. Please clarify. Please also consider that this parameter is not presented in the monitoring plan presented in the registered VCS PD /1/.		Section has been updated in MR Notation updated Statement about meters updated and accuracy class added. FC monitoring frequency has been updated	- Data and Parameters Available at Validation” given under Section 3.1 of the Monitoring Report /2/ has been revised as per the VCS PD /1/. - The notation of “Net electricity generated and delivered to the grid by Akocak HEPP in year y” is revised in line with the registered VCS PD /1/. - The statement has been revised and the accuracy class of the meters are defined. - The frequency of $FC_{i,j,y}$ is corrected. The revision of the monitoring report and the explanations provided by the PP can be considered satisfactory, thus <u>CAR 3 is closed.</u>
CL 1 In the registered VCS PD /1/, the source of the net electricity generation is defined as “Monthly Meter Reading Protocols” which is signed by	B.2	The remote readings has been carried out since 20/12/2011. The related document is provided to the DOE with this document.	The source of the net electricity generation and crosschecking record is changed permanently since 20/12/2011. It is mentioned by the PP in this protocol that this situation is also indicated in the VCS PD under Section

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
TEIAS and plant manager. However, since TEIAS started to monitor electricity remotely, Monthly Meter Reading Protocols are not available. Therefore, the source of the parameter is defined as "Market Financial Settlement Center (PMUM) records which are the basis of the invoices. However, the date of starting to read remotely is not defined in the Monitoring Report. Also, the document for crosschecking electricity generation is not defined in the Monitoring Report.		Accordingly, the excel sheets are revised as follows: - July 2010-November 2011 electricity generation calculations are based on the meter readings (OSF) and the PMUM records are used for cross-check. - December 2011-July 2012 electricity generation calculations are based on the PMUM records. As cross-check Monthly Facility Reports will be used. These documents are provided to the DOE with this document: - OSFs (signed) for July 2010-November 2011 - Monthly Facility Reports for December 2011-July 2012 - All PMUM records for July 2010-July 2012 (was provided previously) This situation is also indicated in the VCS PD under Section 2.2 and 3.2. 30/10/2012: - Section 2.2 and 3.2 are revised to be in line. - PYS clarified - The dates with the change are clarified under section 2.2. - Section 2.2 is revised to be clearer.	2.2 and 3.2. However, the explanation given under section 2.2 and 3.2 of the VCS PD is not clear and the sections are not in line. It is stated under section 2.2 of VCS PD as follows: <i>"Based on the regulation of Electricity Market Balancing and Conciliation dated 01/01/2012, Electricity generation is measured and recorded by remote system and records are sent to PYS. Therefore, Generated electricity is shown only TEIAS-PMUM web site. Moreover, OSF forms for May, June, July 2012 could not been provided. PMUM data for these months has been used."</i> - Please clarify PYS. - Please justify the date, 01/01/2012. This date also does not match with the explanation (20/12/2011). - Please clearly define the source of the net electricity generation and the document for crosschecking electricity generation in the VCS PD as explained in the protocol. It is mentioned under section 3.2 of the VCS PD that an officer from TEIAS and the plant manager/electricity technician of the plant recorded the reading each month. The revision of the monitoring report can not be considered satisfactory, thus <u>CL 1 is not closed.</u> Review 2: - PYS is defined as Market Management

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
			System. - TEIAS started to monitor electricity remotely, Monthly Meter Reading Protocols are no longer available. Electricity Market Balancing and Conciliation body has declared that all readings would be carried out remotely as of 01/02/2012 based on an amendment in the law on Electricity Market Balancing and Conciliation (Clause 81) /24/. However, the facility has settled the remote reading system on 20/12/2011 with TEIAS earlier than the change was enforced. - The electricity generation figures are based on the meter readings (OSF) and the PMUM records are used for crosscheck from July 2010 to November 2011. The electricity generation figures are based on the PMUM records and Monthly Facility Reports are used for cross-check from December 2011 to July 2012. The revision of the monitoring report can be considered satisfactory, thus <u>CL 1 is closed</u>.
CL 2 Net electricity generated and delivered to the grid by Akocak HEPP in year y ($EG_{facility,y}$): The parameter is measured in MWh and it is monitored by two units electricity meters that are located at the project activity. The net electricity generation is based on the PMUM records /19/. However, the record for cross check is not defined clearly in the monitoring report and is	D.1.1	Please, see CL 1. The necessary clarifications are added in the VCS PD as well. 30/10/2012: All clarifications are added under section 2.2.	Please see CL 1. The revision of the monitoring report can not be considered satisfactory, thus <u>CL 2 is not closed</u>. Review 2: TEIAS started to monitor electricity remotely, Monthly Meter Reading Protocols are no

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Verification Conclusion
not submitted. The PMUM record is used as main record for electricity generation hence the information given as below is not correct since: <i>"Data from metering devices is recorded by TEIAS monthly and form the basis for invoicing using the template formed by TEIAS. In addition to the two metering devices, generation of the Akocak HEPP can be cross checked from TEIAS – PMUM web site(http://pmum.teias.gov.tr) which is accessible using a password provided to electricity generation companies. Both the PMUM data and the facility/TEAIS records are taken into account for comparison and to identify any anomalies."</i>			longer available. Electricity Market Balancing and Conciliation body has declared that all readings would be carried out remotely as of 01/02/2012 based on an amendment in the law on Electricity Market Balancing and Conciliation (Clause 81) /24/. However, the facility has settled the remote reading system on 20/12/2011 with TEIAS earlier than the change was enforced. The electricity generation figures are based on the meter readings (OSF) and the PMUM records are used for crosscheck from July 2010 to November 2011. The electricity generation figures are based on the PMUM records and Monthly Facility Reports are used for cross-check from December 2011 to July 2012. The revision of the monitoring report can be considered satisfactory, thus <u>CL 2 is closed</u>.