


CDM-PoA-VCR-FORM

 Verification and certification report form for CDM programme of activities (Version 03.0)		
Complete this form in accordance with the instructions attached at the end of this form.		
BASIC INFORMATION		
Title and UNFCCC reference number of the programme of activities (PoA)	Impact Carbon Global Safe Water Programme of Activities (PoA) UNFCCC Ref. No.9948	
Version number(s) of the PoA-DD(s) to which this report applies	7.0	
Version number of the verification and certification report	4.0	
Completion date of the verification and certification report	22/03/2021	
Monitoring period number and duration of this monitoring period	Monitoring Period Number: Third Monitoring Period: 23/05/2019-31/12/2019 (both days inclusive)	
Number and version number of the monitoring report to which this report applies	Version: 4.0 Monitoring Report Number: 1.0	
Coordinating/managing entity (CME)	Impact Carbon	
Host Parties	Host Parties of the PoA	Is this a host Party to a CPA covered in this report? (yes/no)
	Rwanda	No
	Uganda	No
	Nigeria	Yes
	Kenya	No
Applied methodologies and standardized baselines	Methodology: AMS-III.AV. Low greenhouse gas emitting safe drinking water production systems (Version 4.0) Standardized Baseline: Not Applicable	
Mandatory sectoral scopes	3: Energy Demand	
Conditional sectoral scopes, if applicable	Not Applicable	
Estimated amount of GHG emission reductions or GHG removals for this monitoring period in the included CPAs covered in this report	344,236 tCO ₂ e	
Certified amount of GHG emission reductions or GHG removals for this monitoring period for the included CPAs covered in this report	117,570 tCO ₂ e	
Name and UNFCCC reference number of the	Earthood Services Private Limited	

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DOE	E-0066
Name, position and signature of the approver of the verification and certification report	 Dr. Kaviraj Singh Managing Director

SECTION A. Executive summary

The PoA aims at distribution of the low carbon water purification technologies to households, communities and institutions in Rwanda, Nigeria, Kenya and Uganda. Thus, PoA through the dissemination of these technologies aims to address the issue of lack of access to safe drinking water.

In absence of the PoA, boiling water using fossil fuels / non-renewable woody biomass would have been the means of availing safe drinking water. The project Water Purification Systems (WPS) provides safe drinking water without the use of non-renewable biomass/ fossil fuel, thus leading to reduction in Green-house gas (GHG) emissions attributed to boiling in the baseline. This verification covers implemented CPAs 9948-P1-0003-CP1, 9948-P1-0005-CP1 to 9948-P1-0013-CP1 (10 CPAs).

The verification team confirms that the total emission reductions achieved under this monitoring period from 23/05/2019 to 31/12/2019 (inclusive of both days) are **117,570 tCO₂e**.

Scope of verification:

The verification is an independent and objective review, of ex-post determination of the monitored reductions in GHG emissions, by the DOE. The verification includes the implementation and operation of the PoA as set out in the revised accepted PoA-DD & CPA-DDs viz., 9948-P1-0003-CP1, 9948-P1-0005-CP1 to 9948-P1-0013-CP1 (10 CPAs) in the monitoring period.

The verification tests the data and assertions set out in the monitoring report prepared for this monitoring period by the CMEs and is based on the following:

- (i) The approved methodology AMS-III.AV. ver.4 Low greenhouse gas emitting safe drinking water production systems/6/ applied in the PoA-DD & CPA-DDs/1,2/
- (ii) The registered and revised accepted PoA-DD & CPA-DDs and monitoring plan/1,2/
- (iii) UNFCCC criteria referred to in the Kyoto Protocol criteria and the CDM modalities and procedures as agreed in the Bonn Agreement and the Marrakech Accords
- (iv) The CDM Validation and Verification Standard (VVS) for PoA version 2.0/9/
- (v) The CDM Project Standard (PS) /7/ and Project Cycle Procedure (PCP) for PoA version 2.0 /8/
- (vi) Relevant decisions, guidance and clarifications of the CMP and CDM Executive Board and any other information and references relevant to the project activity's reported emission reductions

The verification has considered both quantitative and qualitative aspects on stated/reported emission reductions. The monitoring report (all versions) and corresponding supporting documentation was assessed in accordance with the rules defined by UNFCCC, as appropriate to the PoA. The verification is not meant to provide any consulting or recommendations to the CME/others. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the monitoring activities.

Verification Process:

The verification process is conducted as per internal CDM Quality Manual, which includes the following steps;

- a) Contract with CME and appointment of verification team and technical review team (refer Section B.1 and B.2 of this report)
- b) Completeness check of Monitoring Report
- c) Publication of Monitoring Report at UNFCCC website
- d) Desk review (refer Section D.1 of this report) of Monitoring Report/13/ and corresponding ER sheet /4/ by verification team and planning of onsite audit (including sampling approach (refer Section D.4 of this report) to be applied)
- e) Remote Audit Survey (refer Section D.2 of this report) (physical implementation and interview with relevant stakeholders) by verification team consistent of Team Leader and all Technical Experts, as a minimum
- f) Follow up activities e.g., interviews (refer Section D.3 of this report)

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- g) Reporting and closure of findings (CARs/CLs/FARs) and preparation of draft verification report (refer Section D.5 of this report)
- h) Independent technical review (refer Section F of this report) of the draft verification report and final/revised documentation (e.g., Monitoring Report, corresponding ER sheet and [objective evidence](#))
- i) Reporting and closure of TR comments/findings (refer Section D.5 of this report) (CARs/CLs/FARs) and final approval for the decision made (refer Section G and H of this report).
- j) Issuance of final verification report to contracted CME (or authorized representatives) and submission of request for issuance, as appropriate.

Verification Conclusion:

Based on the outcome of the verification process of the registered/revised accepted PoA "Impact Carbon Global Safe Water Programme of Activities (PoA)" and its 10 CPAs (9948-P1-0003-CP1, 9948-P1-0005-CP1 to 9948-P1-0013-CP1) for the monitoring period 23/05/2019 – 31/12/2019 (including both dates) we confirm that the implementation of referenced registered/revised accepted PoA and CPAs is complying with applicable CDM rules and regulations as stated in the Monitoring Report (final) [Version 4.0 dated 19/03/2021](#)/13/. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodologies AMS-III.AV. ver.4 Low greenhouse gas emitting safe drinking water production systems/6/ and the monitoring plan contained in the revised accepted PoA-DD/1/.

Earthood Services Private Limited is able to certify that the emission reductions from the registered CDM PoA UN#9948 "Impact Carbon Global Safe Water Programme of Activities (PoA)" in Nigeria during the period 23/05/2019 – 31/12/2019 (including both days) amount to [117,570](#) tCO₂e. Therefore, this is being submitted for request for issuance, as per UNFCCC procedures

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team members

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection*	Interview(s)	Verification findings
1.	Team Leader	IR	Mahala	Deepika	Central Office	Y	N	Y	Y
2.	Verifier	IR	Vatsa	Vaishali	Central Office	Y	N	Y	Y
3.	Technical Expert	IR	Mahala	Deepika	Central Office	Y	N	Y	Y
4.	Methodology Expert	IR	Mahala	Deepika	Central Office	Y	N	Y	Y
5.	Local Expert	IR	Luka	Kumden	Central Office	Y	N	N**	Y

*Remote Audit Survey was conducted instead of on-site audit. Refer to section D.2 for details.

** Also, the interviews were conducted with the head of the institution of the schools who were well versed with the English language. They were able to understand and respond to our remote survey questions in English. Thus, no linguistic issue was faced during this remote survey.

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical Reviewer	IR	Gautam	Ashok	Central Office
2.	TA to TR	IR	Gautam	Ashok	Central Office

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3.	Approver	IR	Singh	Kaviraj	Central Office
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SECTION C. Application of materiality in conducting the verification

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Observational error by monitoring survey staff of CME/CPA implementer while recording the responses of users in relation to survey parameters	High	The survey is conducted for representative samples of population, which may impact the population significantly. Surveyors may be unsupervised at the site.	Verification team randomly selected the samples from CME surveyed WPS. The recorded survey forms by CME were checked with DOE remote audit survey observations. The verification team interviewed the monitoring staff and checked their training records.
2.	Calculation Errors	Med	The process in manual and therefore there is potential risk of errors / omissions/misstatements.	All calculations were checked by verification team with respect to applicable requirements under various documents viz., methodology, registered PoA DD/1/, CPA DDs/2/ etc.

C.2. Consideration of materiality in conducting the verification

In accordance with CDM VVS for PoAs, Version 02.0/9/ the prescribed thresholds for materiality for CDM PoAs are as under;

Type of PoA	PoAs comprising large-scale CPAs			PoAs comprising only small-scale CPAs	PoAs comprising only micro-scale CPAs
Emission Reductions (tCO ₂ e)/year	500,000 or more	300,001 to 499,999	300,000 or less		
Materiality Threshold	0.5%	1.0%	2.0%	5.0%	10.0%

The applicable materiality threshold is 5% as PoA comprises only small-scale CPAs.

Particulars / Monitoring Report	MR Version (Public)	MR Version (Revised/Final)
Emission Reductions Achieved (tCO ₂ e) in this monitoring period	245,803	117,570*
Applicable Threshold (%) as per CDM VVS for PoAs Version 02.0	5.0%	5.0%

*The verification team has identified the impact of errors observed and those have been corrected by CME during verification for all monitoring parameter at individual and aggregate level.

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Monitored Parameter (Symbol / Description)	Reporting Frequency	Number of Discrete Data* (Total)	Sample selected for verification Sample (100%)	Type of error identified	Impact on ERs	
		Total (100%)			ERs impacted (Sample)	ERs impacted (Population based on extrapolation)
9948-P1-0003-CP1, 9948-P1-0005 – 9948-P1-0013-CP1						
<u>For water purifier</u>						
QPW _y	Annual or at least biennial	10(calculated parameter for each CPA)	10(100%)	There were errors in calculation which have	All the errors have been	No extrapolation is required as 100%

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				been corrected (10).	corrected*	values checked and corrected.
nWB	Continuously or at least biennial	1	1	None	NA	NA
Tyi	Continuous	6,637 UltraFLO 738 UltraTAB 273 Multi-UV Barrier (7,648)	6,637 UltraFLO 738 UltraTAB 273 Multi-UV Barrier, Sales database/5/ was checked for the information. 11 WPS were checked during remote survey for cross check.	None	NA	NA
Nyi	Continuous	7,648	Entire sales database was checked for the information.	None	NA	NA
Water quality (WQ)	Annual or at least biennial	69	11 (based on acceptance sampling)	None	NA	NA
Operational Units _i	At least once per verification or biennially	74	11 (based on acceptance sampling)	None	NA	NA
fNRB	Continuously or at least biennial	1	1	None	NA	NA
EF _{projected_fossil_fuel}	Continuously or at least biennial	1	1	None	NA	NA
Existence of public distribution network of safe drinking water	Annual	69	11 (based on acceptance sampling)	None	NA	NA
EG _{PJ,j,y}	Annual	1	1	None	NA	NA

The ERs mentioned in MR (public) and the ER sheet were found to be different. An inconsistency/ calculation error was identified by the CME in the ER calculator after the MR was published for webhosting. Thus, CAR#01 was raised and resolved. Moreover, based on request for review feedback, the CME has applied a conservative approach to credit the systems for school operational days instead of duration of the monitoring period, which has led to reduction in the total ERs significantly. Based on the above table it can be confirmed that the actual individual and aggregated material error is determined for the registered PoA as per CDM VVS for PoA/09/. The applicable threshold for materiality in accordance with CDM PoA VVS Version 2 para 308(d)/9/ is 5%.

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SECTION D. Means of verification

D.1. Desk/document review

A desk review was conducted by the verification team that included:

- A review of data and information provided for its completeness.

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- b) A review of registered monitoring plan, monitoring methodologies including applicable tools, standards, and the applicable applied standardized baselines.

All the documents reviewed during the verification process are listed in the Appendix 3 of VCR.

D.2. On-site inspection¹

Duration of on-site inspection: NA*				
No.	Activity performed on-site	Site location	Date	Team member
1.	Interview of the monitoring personnel and CME representative	-	31/03/2020-01/04/2020	Deepika Mahala and Vaishali Vatsa
2.	Interview of the head institutions of the school related to the deployed project devices	-	31/03/2020-01/04/2020	Deepika Mahala and Vaishali Vatsa

*No site-visit was conducted, alternative means were adopted under which remote audit survey was conducted.

Mandatory Site-visit

A site-visit for the current verification was deemed mandatory (although this is second verification for these 10 CPAs) as these were being verified for the first time by Earthood, in-line to para 321 of VVS for PoA Version 2.0 /9/.

Planned Site-Visit

The site-visit was initially planned from 30th March, 2020 - 4th March, 2020. In view of the COVID-19 outbreak and increased exposure due to international travel and nation-wide lockdown in India (DOE office country), site-visit was not possible as per original plan. An advisory issued by Ministry of Health & FW on 19/03/2019 said that "No scheduled international commercial passenger aircraft shall take off from any foreign airport for any airport in India, after 0001 hrs GMT of March 22, 2020 (*i.e. 0531 hrs Indian Standard Time (IST) of March 22, 2020) - these instructions shall remain in force till 0001 hrs GMT of March 29, 2020"/43/.

Also, the Indian government has imposed 21-day lockdown. In an attempt to slow spread of the coronavirus with effect from 26/03/2020-15/04/2020. During this, period there is total ban on venturing out of the homes/43/. In such situation, conducting a site visit in a foreign country became an implausible activity for the verification team.

Issue with the postponement of Site-visit:

The on-site audit visit for this verification could not be postponed as the cases of coronavirus started rising suddenly with a very high number of death rates in many countries/43/. The Indian government also foresaw the same situation to happen in India. The lockdown was imposed across the country. By each passing day it was not clear whether the lockdown would get relaxed or extended. Delaying the site visit would lead to delayed issuance of the CERs. The CME relies upon the CER revenue generated from the project as the working capital of the project. It was clarified by the CME that along with the impact on the working capital of the project, the delay might also cause ERPA/35/ being cancelled. In light of the argument and evidence (CME Mail /34/) made available by the CME a clarification for the exemption of the onsite visit was sought from CDM EB.

Exemption by CDM EB

Due to the on-site visit exemption provided by the CDM-EB concerning the COVID-19 outbreak/44/, a checklist as per the ESPL CDM QMS was made available for the application of alternative means for verifying the project related details. A declaration (Checklist for alternative means for site-visit exemption in accordance with the ESPL CDM QMS) was submitted to the Technical Manager for approval.

Alternative means applied

Following alternative means have been used to verify the project details:

1. Remote Audit Survey including interviews of CME/CPA Implementer, end users and the personnel's involved in monitoring and preparation of the monitoring report and related documents via skype

¹ This table lists down the activities conducted during the remote survey

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meeting. Random samples for eleven WPS users (details on sampling provided in section D.3) were drawn from the sample survey sheet and interviewed through skype calls.

2. Photographic evidence of the water quality testing kits /30/, WPS with Unique Product IDs/27/, Water Quality Test Photographs /36/, Monitoring Survey (filled) Forms/18/.
3. Complaint Log (Scanned Sample) /37/
4. Monitoring personnel certificates/20/
5. Review of Other Documentary evidence (ER sheet/4/, Sample Size Calculation sheet, Monitoring Data sheet)
6. Videos of the 11 selected samples of WPS showing the WPS installed along with the basic information related to the installation (Purchase order/14/, Delivery Notes/21/) and the interview of the respective school representative.

D.3. Interviews²

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Brown	Julie	Impact Carbon	31/03/2020-01/04/2020	Sampling Surveys	Deepika Mahala, Vaishali Vatsa
2.	Neville	Tim	Impact Water	31/03/2020-01/04/2020	Implementation	Deepika Mahala, Vaishali Vatsa
3.	Akinyemi	Zacch	Impact Water Nigeria	31/03/2020-01/04/2020	Implementation, Sales records	Deepika Mahala, Vaishali Vatsa
4.	Obunaya	Samuel	Impact Water Nigeria	31/03/2020-01/04/2020	Database management	Deepika Mahala, Vaishali Vatsa
5.	Huelsenbeck	Mark	Impact Water Nigeria	31/03/2020-01/04/2020	Monitoring surveys	Deepika Mahala, Vaishali Vatsa
6.	Lohia	Rohit	Climate Secure India Private Limited	31/03/2020-01/04/2020	Monitoring Report, Sampling methodology, ER calculations	Deepika Mahala, Vaishali Vatsa
7.	-	Nihar	Climate Secure India Private Limited	31/03/2020-01/04/2020	ER calculation and Sampling	Deepika Mahala, Vaishali Vatsa
8.	I.A.	Badrudeen	Baptist Elementary School (Head Mistress)	01/04/2020	DOE Remote survey	Deepika Mahala, Vaishali Vatsa
9.	D.B.	Odegbenie	D.C. School (Head mistress)	01/04/2020	DOE Remote survey	Deepika Mahala, Vaishali Vatsa
10.	-	Anne	Kingdom Pearls International School (School Head)	01/04/2020	DOE Remote survey	Deepika Mahala, Vaishali Vatsa
11.	-	Hajia	Rahmat Islamic Nursery/Primary (Proprietress)	01/04/2020	DOE Remote survey	Deepika Mahala, Vaishali Vatsa
12.	-	Ayeni	Treasure Fountain School (Proprietress)	01/04/2020	DOE Remote survey	Deepika Mahala, Vaishali Vatsa
13.	-	Nnena	Daniella Montessori (Head Teacher)	01/04/2020	DOE Remote survey	Deepika Mahala, Vaishali Vatsa
14.	Olalekan	Alhaji Al-	Al-Maruf Nurser3y	01/04/2020	DOE Remote	Deepika

² Interviews were conducted via Skype Call

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		Mauruf	and Primary (Admininstrative Officer)		survey	Mahala, Vaishali Vatsa
15.	-	Prince	Topresh-Tee Private School (Academic Staff)	01/04/2020	DOE Remote survey	Deepika Mahala, Vaishali Vatsa
16.	Ohorumwemwu	Kenneth George	Sound Wisdom Nursery and Primary School (Proprietor)	01/04/2020	DOE Remote survey	Deepika Mahala, Vaishali Vatsa
17.	-	Iwan	Mak-David Nursery Primary School (Head Teacher)	01/04/2020	DOE Remote survey	Deepika Mahala, Vaishali Vatsa
18.	J O	Adurota	Sannyo Primary School (Head Teacher)	01/04/2020	DOE Remote survey	Deepika Mahala, Vaishali Vatsa

D.4. Sampling approach

CME Sampling approach

For the purpose of sampling, CME has followed the CDM guidelines for Sampling and surveys for CDM project activities and programmes of activities version 4.0/31/ and Standard for Sampling and surveys for CDM project activities and programmes of activities, Version 8.0/19/ which is in-line with the revised accepted PoA DD/1/. The CME has applied Stratified Random Sampling at PoA level for different monitoring parameters as per validated revised accepted/registered PoA DD /1/and registered CPA DDs/2/. 95/10 confidence precision was applied by CME in the sampling which is appropriate as per the single sampling covering 10 CPAs. Thus, CPA wide single sampling plan was used by the CME.

DOE Sampling approach

In order to meet the requirements of paragraph 28 of Standard for Sampling and surveys for CDM project activities and programmes of activities, Version 8/19/ the verification team applied acceptance sampling in the verification (in accordance with para 28).

According to para 30 of Standard for Sampling and surveys for CDM project activities and programmes of activities, Version 8/19/, The maximum errors associated with the determination have been kept at following level:

(a) A 10 per cent chance that the DOE will wrongly reject the project participants' or the coordinating/managing entity's records (i.e. reject a set of records of acceptable quality);

(b) A 10 per cent chance that the DOE will wrongly accept the project participants' or the coordinating/managing entity's records (i.e. accept a set of records which is unacceptable).

Verification team has applied following AQL and UQL level using its own judgement:

0.5% AQL- Acceptable quality level (AQL) or the level of assurance, that is the proportion of acceptable discrepancies between the project participants' or the coordinating/managing entity's sample records and the DOE sample records

20% UQL- Unacceptable quality level (UQL), that is the proportion of unacceptable discrepancies between the project participants' or the coordinating/managing entity's sample records and the DOE sample records.

The verification team selected the sample size as 11 WPS for the purpose of remote survey to check the acceptability of CME's sampling results or otherwise.

Sample Size:

CPA Ref No.	AQL	UQL	Producer Risk	Consumer Risk	Sample Size; Min	Acceptance No.
9948-P1-0003-CP1, 9948-P1-0005 to 9948-P1-0013-CP1	0.5%	20%	10%	10%	11	0

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The verification team selected the random samples of CME's sampled units to check the acceptability (or otherwise) of the monitoring data for each such record with CME's sample records, and determine if the CME's sample records meet the requirements.

The distribution breakup from sales database is as follows:

Type of WPS	No. of units
Ultra FLO	6637
Ultra Tab	738
Multi-Barrier UV	273

Since, the distribution ratio between the three categories is 6:2:1, the DOE's sample size of 11 units was also divided in a similar ratio. These 11 samples were chosen randomly (using website www.randomizer.org) out of total of 74 CME's monitored samples (as part of monitoring survey). As per plan 11 systems (WPS) were required and DOE surveyed 8 samples of Ultra FLO type and 2 samples of Ultra Tab type and 1 sample of Multi-UV barrier type. No inconsistency between the CME results and DOE's observations during the remote audit survey were found.

D.5. Clarification requests, corrective action requests and forward action requests raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
General	-	-	-
Compliance of the monitoring report with the monitoring report form	-	-	-
Remaining forward action requests from validation and/or previous verifications	-	-	-
CPAs considered for verification and covered in this report	-	CAR#04	-
Programme of activities	-	-	-
Compliance of the programme implementation with the registered PoA-DD	-	CAR#05	-
Implementation and operation of the management system	-	CAR#02	-
Post-registration changes	-	-	-
• Corrections	-	-	-
• Inclusion of a monitoring plan	-	-	-
• Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents ³	-	-	-
• Changes to the programme design	-	-	-
• Addition of CPA inclusion template	-	-	-
• Change of coordinating/managing entity	-	-	-
• Changes specific to afforestation and reforestation activities	-	-	-
Component project activities	-	-	-
Compliance of the CPA implementation with the included CPA design document	-	CAR#05, CAR#07	-
Post-registration changes	-	-	-
• Temporary deviations from registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents	-	-	-
• Corrections	-	-	-
• Changes to the start date-of the crediting period	-	-	-
• Inclusion of a monitoring plan	-	-	-
• Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized	-	-	-

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³ Other standards, methodologies, methodological tools, and guidelines (to be) applied in accordance with the applied(selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).

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baselines, or other methodological regulatory documents			
• Changes to the project design	-	-	-
• Changes specific to afforestation and reforestation activities	-	-	-
Compliance of the registered monitoring plan with applied methodologies and standardized baselines	-	-	-
Compliance of monitoring activities with the registered monitoring plan	-	-	-
• Data and parameters fixed ex ante or at renewal of crediting period	-	-	-
• Data and parameters monitored	CL#01 CL#04 CL#05 CL#06 CL#07	CAR#02 CAR#03 CAR#06 CAR#08	FAR#01 FAR#02
• Implementation of sampling plan	CL#02	CAR#03	-
Compliance with the calibration frequency requirements for measuring instruments	-	-	-
Assessment of data and calculation of emission reductions or net removals	-	-	-
• Calculation of baseline GHG emissions or baseline net GHG removals by sinks	CL#03	CAR#07	-
• Calculation of project GHG emissions or actual net GHG removals by sinks	-	-	-
• Calculation of leakage GHG emissions	-	-	-
• Summary of calculation of GHG emission reductions or net GHG removals by sinks	-	-	-
• Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included CPA	-	CAR#01	-
• Remarks on difference from estimated value in included CPA	-	-	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (please specify)	-	-	-
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SECTION E. Verification findings

E.1. General

E.1.1. Compliance of the monitoring report with the monitoring report form

Means of verification	The monitoring report form used is CDM-PoA-MR-FORM version 03.0/10/ which is an appropriate form and the latest version available at the time of verification/submission for request for issuance. All the sections of the aforesaid form were duly filled as per the guidelines and provided all the relevant details.
Findings	No findings were raised.
Conclusion	The final monitoring report /13/ is found to be in-line with the latest CDM-PoA-MR-form/10/ available and the instructions therein.

E.1.2. Remaining forward action requests from validation and/or previous verifications

No FAR was found to be raised during the validation of inclusion of CPAs/03/ or previous verification/40/.
Two FARs have been raised in this verification to be addressed for subsequent verifications. Please refer Appendix 4.

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E.1.3. CPAs considered for verification and covered in this report

Title and UNFCCC reference	Is the CPA	The date	Version of	Confirmation that
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number of the CPA included in the PoA as of the end of this monitoring period	considered for this verification? (yes/no)	when the CPA was included	the PoA-DD	a request for issuance including the CPA has been published for the previous monitoring period (Y/N)
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 1, Version: 3.0, 9948-P1-0001-CP1	No	01/05/2014	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 2, Version: 3.0, 9948-P1-0002-CP1	No	01/05/2014	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 3, Version: 1.3, 9948-P1-0003-CP1	Yes	08/05/2017	7.0	Yes
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 4, Version: 01.2, 9948-P1-0004-CP1	No	02/07/2017	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 5, Version: 5.0, 9948-P1-0005-CP1	Yes	04/10/2017	7.0	Yes
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 6, Version: 5.0, 9948-P1-0006-CP1	Yes	04/10/2017	7.0	Yes
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 7, Version: 5.0, 9948-P1-0007-CP1	Yes	04/10/2017	7.0	Yes
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 8, Version: 5.0, 9948-P1-0008-CP1	Yes	04/10/2017	7.0	Yes
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 9, Version: 5.0, 9948-P1-0009-CP1	Yes	04/10/2017	7.0	Yes
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 10, Version: 5.0, 9948-P1-0010-CP1	Yes	04/10/2017	7.0	Yes
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 11, Version: 5.0, 9948-P1-0011-CP1	Yes	04/10/2017	7.0	Yes
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 12, Version: 5.0, 9948-P1-0012-CP1	Yes	04/10/2017	7.0	Yes
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 13, Version: 5.0, 9948-P1-0013-CP1	Yes	04/10/2017	7.0	Yes
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 14, Version: 1.0,	No	21/11/2017	7.0	NA

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9948-P1-0014-CP1				
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 15, Version: 1.0, 9948-P1-0015-CP1	No	21/11/2017	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 16, Version: 5.0, 9948-P1-0016-CP1	No	21/11/2017	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 17, Version: 5.0, 9948-P1-0017-CP1	No	21/11/2017	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 18, Version: 5.0, 9948-P1-0018-CP1	No	21/11/2017	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 19, Version: 5.0, 9948-P1-0019-CP1	No	21/11/2017	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 20, Version: 5.0, 9948-P1-0020-CP1	No	21/11/2017	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 21, Version: 5.0, 9948-P1-0021-CP1	No	21/11/2017	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 22, Version: 5.0, 9948-P1-0022-CP1	No	21/11/2017	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 23, Version: 4.0, 9948-P1-0023-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 24, Version: 4.0, 9948-P1-0024-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 25, Version: 4.0, 9948-P1-0025-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 26, Version: 4.0, 9948-P1-0026-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 27, Version: 4.0, 9948-P1-0027-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 28, Version: 4.0, 9948-P1-0028-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 29, Version: 4.0, 9948-P1-0029	No	18/11/2018	7.0	NA
Impact Carbon Global Safe	No	18/11/2018	7.0	NA

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Water Programme of Activities (PoA): CPA 30, Version: 4.0, 9948-P1-0030-CP1				
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 31, Version: 4.0, 9948-P1-0031-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 32, Version: 4.0, 9948-P1-0032-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 33, Version: 4.0, 9948-P1-0033-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 34, Version: 4.0, 9948-P1-0034-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 35, Version: 4.0, 9948-P1-0035-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 36, Version: 4.0, 9948-P1-0036-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 37, Version: 4.0, 9948-P1-0037-CP1	No	18/11/2018	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 38 supported by Republic of Korea, Version: 2.0, 9948-P1-0038-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 39 supported by Republic of Korea, Version: 2.0, 9948-P1-0039-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 40 supported by Republic of Korea, Version: 2.0, 9948-P1-0040-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 41 supported by Republic of Korea, Version: 2.0, 9948-P1-0041-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 42 supported by Republic of Korea, Version: 2.0, 9948-P1-0042-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 43 supported by Republic of Korea, Version: 1.0, 9948-P1-0043-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe	No	26/04/2019	7.0	NA

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Water Programme of Activities (PoA): CPA 44 supported by Republic of Korea, Version: 1.0, 9948-P1-0044-CP1				
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 45 supported by Republic of Korea, Version: 1.0, 9948-P1-0045-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 46 supported by Republic of Korea, Version: 1.0, 9948-P1-0046-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 47 supported by Republic of Korea, Version: 1.0, 9948-P1-0047-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 48 supported by Republic of Korea, Version: 1.0, 9948-P1-0048-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 49 supported by Republic of Korea, Version: 1.0, 9948-P1-0049-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 50 supported by Republic of Korea, Version: 1.0, 9948-P1-0050-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 51 supported by Republic of Korea, Version: 1.0, 9948-P1-0051-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 52 supported by Republic of Korea, Version: 1.0, 9948-P1-0052-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 53 supported by Republic of Korea, Version: 1.0, 9948-P1-0053-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 54 supported by Republic of Korea, Version: 1.0, 9948-P1-0054-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 55 supported by Republic of Korea, Version: 1.0, 9948-P1-0055-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 56 supported by	No	26/04/2019	7.0	NA

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Republic of Korea, Version: 1.0, 9948-P1-0056-CP1				
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 57 supported by Republic of Korea, Version: 1.0, 9948-P1-0057-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 58 supported by Republic of Korea, Version: 1.0, 9948-P1-0058-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 59 supported by Republic of Korea, Version: 1.0, 9948-P1-0059-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 60 supported by Republic of Korea, Version: 1.0, 9948-P1-0060-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 61 supported by Republic of Korea, Version: 1.0, 9948-P1-0061-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 62 supported by Republic of Korea, Version: 1.0, 9948-P1-0062-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 63 supported by Republic of Korea, Version: 1.0, 9948-P1-0063-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 64 supported by Republic of Korea, Version: 1.0, 9948-P1-0064-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 65 supported by Republic of Korea, Version: 1.0, 9948-P1-0065-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 66 supported by Republic of Korea, Version: 1.0, 9948-P1-0066-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 67 supported by Republic of Korea, Version: 1.0, 9948-P1-0067-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 68 supported by Republic of Korea, Version: 1.0, 9948-P1-0068-CP1	No	26/04/2019	7.0	NA

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Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 69 supported by Republic of Korea, Version: 1.0, 9948-P1-0069-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 70 supported by Republic of Korea, Version: 1.0, 9948-P1-0070-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 71 supported by Republic of Korea, Version: 1.0, 9948-P1-0071-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 72 supported by Republic of Korea, Version: 1.0, 9948-P1-0072-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 73 supported by Republic of Korea, Version: 1.0, 9948-P1-0073-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 74 supported by Republic of Korea, Version: 1.0, 9948-P1-0074-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 75 supported by Republic of Korea, Version: 1.0, 9948-P1-0075-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 76 supported by Republic of Korea, Version: 1.0, 9948-P1-0076-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 77 supported by Republic of Korea, Version: 1.0, 9948-P1-0077-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 78 supported by Republic of Korea, Version: 1.0, 9948-P1-0078-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 79 supported by Republic of Korea, Version: 1.0, 9948-P1-0079-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 80 supported by Republic of Korea, Version: 1.0, 9948-P1-0080-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities	No	26/04/2019	7.0	NA

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(PoA): CPA 81 supported by Republic of Korea, Version: 1.0, 9948-P1-0081-CP1				
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 82 supported by Republic of Korea, Version: 1.0, 9948-P1-0082-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 83 supported by Republic of Korea, Version: 1.0, 9948-P1-0083-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 84 supported by Republic of Korea, Version: 1.0, 9948-P1-0084-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 85 supported by Republic of Korea, Version: 1.0, 9948-P1-0085-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 86 supported by Republic of Korea, Version: 1.0, 9948-P1-0086-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 87 supported by Republic of Korea, Version: 1.0, 9948-P1-0087-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 88 supported by Republic of Korea, Version: 1.0, 9948-P1-0088-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 89 supported by Republic of Korea, Version: 1.0, 9948-P1-0089-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 90 supported by Republic of Korea, Version: 1.0, 9948-P1-0090-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 91 supported by Republic of Korea, Version: 1.0, 9948-P1-0091-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 92 supported by Republic of Korea, Version: 1.0, 9948-P1-0092-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 93 supported by Republic of Korea, Version:	No	26/04/2019	7.0	NA

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1.0, 9948-P1-0093-CP1				
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 94 supported by Republic of Korea, Version: 1.0, 9948-P1-0094-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 95 supported by Republic of Korea, Version: 1.0, 9948-P1-0095-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 96 supported by Republic of Korea, Version: 1.0, 9948-P1-0096-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 97 supported by Republic of Korea, Version: 1.0, 9948-P1-0097-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 98 supported by Republic of Korea, Version: 1.0, 9948-P1-0098-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 99 supported by Republic of Korea, Version: 1.0, 9948-P1-0099-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 100 supported By Republic of Korea, Version: 1.0, 9948-P1-0100-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 101 supported By Republic of Korea, Version: 1.0, 9948-P1-0101-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 102 supported By Republic of Korea, Version: 1.0, 9948-P1-0102-CP1	No	26/04/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 103 supported By Republic of Korea, Version: 1.0, 9948-P1-0103-CP1	No	11/06/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 104 supported By Republic of Korea, Version: 1.0, 9948-P1-0104-CP1	No	11/06/2019	7.0	NA
Impact Carbon Global Safe Water Programme of Activities (PoA): CPA 105 supported By Republic of Korea, Version: 1.0, 9948-P1-0105-CP1	No	11/06/2019	7.0	NA

E.2. Programme of activities

E.2.1. Compliance of the programme implementation with the registered programme design document

Means of verification	<p>The PoA aims at disseminating water purification systems (WPS) technologies to target countries like Rwanda, Nigeria, Uganda, and Kenya for addressing the problem of safe drinking water. During this monitoring period, 9 CPA's of Type 2: Technologies for institutional water consumption, with no project emissions and 1 CPA of Type 3: Technologies for institutional water consumption, with project emissions have been covered under the MR. This monitoring period includes the implementation and monitoring of 10 CPAs from 9948-P1-0003-CP1, 9948-P1-0005-CP1 to 9948-P1-0013-CP1 in Nigeria. The coordinating and managing entity (CME) is Impact Carbon, and Impact Water is the CPA Implementer/15/. Their roles and responsibilities are defined in the signed agreement.</p> <p>In absence of the project activity, the water would have been boiled using non-renewable biomass/fossil fuels leading to release of GHG emissions in the baseline. The implementation of the technology helps in replacing the non-renewable biomass / fossil fuel for boiling with the WPS reducing amount of equivalent GHG emissions.</p> <p><u>The aforesaid CPAs involve dissemination of two types of water purification systems:</u></p> <ol style="list-style-type: none"> <u>Chlorination (UltraFLO/ UltraTab)</u> <u>Multi-Barrier UV</u> <table border="1"> <thead> <tr> <th>Description</th><th>UltraFLO</th><th>UltraTab</th><th>Multi-Barrier UV</th></tr> </thead> <tbody> <tr> <td>Size / Dimensions</td><td>Cartridge Length: ~12 cm Cartridge height: ~10 cm Cartridge circumference: ~22 cm</td><td>Strip size: ~13 cm X ~5.5 cm (100 tablets per packet)</td><td>System Height: ~44cm System Length: ~36 cm System Width: ~19 cm</td></tr> <tr> <td>Application</td><td>Piped water</td><td>Un-piped water</td><td>Piped water</td></tr> <tr> <td>Flow rate</td><td>20L/min</td><td>1 tablet treats 100 L</td><td>5-12 L/min</td></tr> <tr> <td>Capacity/lifespan</td><td>340,000 L / 5-year expiry</td><td>10,000 L / 5-year expiry</td><td>4,088,232 L / 7 years</td></tr> <tr> <td>Fixed or Portable</td><td>Fixed</td><td>Portable</td><td>Fixed</td></tr> <tr> <td>Removal of E. Coli</td><td>99 (2-log)</td><td>99 (2-log)</td><td>99 (4-log)</td></tr> <tr> <td>Watts/Voltage</td><td>Not applicable</td><td>Not applicable</td><td>14V</td></tr> </tbody> </table> <p><u>The WPS capacity/lifespan for UltraFLO and UltraTab has been verified from the CPA DD for CPAs 9948-P1-0005-CP1 to 9948-P1-0013-CP1 (section A.3., table on page 4, capacity) and found correctly specified in ER sheet and MR.</u></p> <p><u>The capacity / lifespan for Multi Barrier UV has been verified against the manufacturer's specification (as it was not found mentioned in the CPA DD for CPA 9948-P1-0003-CP1), and is found to be better than the minimum capacity/lifetime specified on page 03 of the CPA-DD for CPA03.</u></p> <p>All the deployed systems meet the eligibility requirements of the PoA DD, page 65/1/. The details of the systems were verified from the manufacturer's specification/28/ provided by the CME.</p> <p>Through the remote survey videos/38/ the installation of WPS claimed by the CME were checked and found to be in-line with the technical description provided in the registered PoA-DD/1/ and Monitoring report/13/.</p> <p>Also, the verification team checked the implementation status of the project activity through interviewing the CME, CPA implementer, Monitoring personnel and WPS User as defined in the registered PoA DD/1/, and MR/13/.</p> <p>Interview of the monitoring personnel via skype call involved in the QA/QC procedures revealed that the procedures mentioned in the PoA DD/1/ are being followed and the Training records/20/ regarding the trained personnel were checked.</p>			Description	UltraFLO	UltraTab	Multi-Barrier UV	Size / Dimensions	Cartridge Length: ~12 cm Cartridge height: ~10 cm Cartridge circumference: ~22 cm	Strip size: ~13 cm X ~5.5 cm (100 tablets per packet)	System Height: ~44cm System Length: ~36 cm System Width: ~19 cm	Application	Piped water	Un-piped water	Piped water	Flow rate	20L/min	1 tablet treats 100 L	5-12 L/min	Capacity/lifespan	340,000 L / 5-year expiry	10,000 L / 5-year expiry	4,088,232 L / 7 years	Fixed or Portable	Fixed	Portable	Fixed	Removal of E. Coli	99 (2-log)	99 (2-log)	99 (4-log)	Watts/Voltage	Not applicable	Not applicable	14V
Description	UltraFLO	UltraTab	Multi-Barrier UV																																
Size / Dimensions	Cartridge Length: ~12 cm Cartridge height: ~10 cm Cartridge circumference: ~22 cm	Strip size: ~13 cm X ~5.5 cm (100 tablets per packet)	System Height: ~44cm System Length: ~36 cm System Width: ~19 cm																																
Application	Piped water	Un-piped water	Piped water																																
Flow rate	20L/min	1 tablet treats 100 L	5-12 L/min																																
Capacity/lifespan	340,000 L / 5-year expiry	10,000 L / 5-year expiry	4,088,232 L / 7 years																																
Fixed or Portable	Fixed	Portable	Fixed																																
Removal of E. Coli	99 (2-log)	99 (2-log)	99 (4-log)																																
Watts/Voltage	Not applicable	Not applicable	14V																																

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	<p>The project location and coordinates shared by CME were verified using the "Google Map app" and found to be in-line with the registered PoA-DD/1/ and MR/13/.</p> <p>Further, based on the review of sales database (presented in ER sheet)/4/, remote audit survey observations and interview conducted during the remote audit survey, the verification team found that:</p> <ul style="list-style-type: none"> • The CPA(s) were implemented within the boundary of the PoA as described in the revised accepted PoA-DD/1/. • The CME is same as that mentioned in the revised accepted PoA-DD/1/ • The implementation and operation of the project activity has been conducted in accordance with the description contained in the revised accepted PoA-DD/1/ and included CPA-DDs/2/. • All physical features of the CPA proposed in the included CPA-DDs/2/ were in place • The project participants/CPA implementer has operated the CPAs as per the included CPA DDs/2/. <p>A remote audit survey was conducted by the verification team; 11 WPS (8 for Ultra FLO, 2 for Ultra TAB and 1 Multi-barrier UV units) were surveyed. The uniqueness of the system was identified from UID written on the units (either on UltraFLO cartridges or on UltraTAB box packs or Multi-Barrier UV device)/27/. Along with the unique ID the following details are also noted in the database:</p> <ol style="list-style-type: none"> a) Type of system (UltraFLO / UltraTAB / Multi-Barrier UV) b) Unique serial number of the units installed / distributed c) Date of installation / distribution d) Address and details of school and contact detail (if available) of representative e) Type of School (Boarding / Non-boarding) f) School population count (number of students / staff in boarding / non-boarding category) <p>The information of the installed device was also verified from the CME database/5/ which was cross checked for 11 WPS samples with the purchase orders/14/.</p> <p>The emission reductions being claimed during this monitoring period are lesser than the estimated emission reductions in the revised or included CPA-DDs/2/, as given in the table under section E.3.6.5. for comparable estimated ERs in the CPA DDs/2/ for the corresponding period.</p> <p>The CPAs are within the threshold limits of the applied methodology/6/.</p> <p>The monitoring report was compared and verified against the description provided in the revised accepted PoA-DD/1/ and found to be correct.</p>
Findings	CAR#05 was raised and resolved.
Conclusion	<p>In view of the information's verified through the remote audit survey and interviews, the verification team is able to confirm that all physical features (technology, project equipment, and monitoring and metering equipment) of the registered CDM program of activities were in place and that the CME has operated the project activity as per the registered PoA-DD/1/ during the concerned monitoring period.</p> <p>The emission reductions achieved during the current monitoring period are 117,570 tCO₂e. Justification for this has been assessed in further sections of report.</p>

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E.2.2. Implementation and operation of the management system

Means of verification	The verification team through interviewing the CME, CPA Implementer, Monitoring Personnel and WPS End-users and reviewing the selected sample videos assessed the management systems in place to implement the monitoring of the PoA. This included the roles and responsibilities, data collection, transfer and
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	<p>aggregation procedures, data storage and archiving for the monitoring system through physical inspection. The roles and responsibilities, data collection, transfer and aggregation procedures, data storage and archiving for the monitoring system have been provided in the MR /13/ and were verified through interviews with the CME and other people involved in the project.</p> <p>CPA implementers fill purchase order/14/ to note the details of the institution and provide delivery note/21/ at the time of installation (receipt of tablets in case of Ultra TAB). All the information is transferred to Salesforce software by the CME which was checked by interviewing the monitoring personnel to confirm that the management system is in place. The sales database was crosschecked with purchase order, delivery notes and Salesforce data to confirm that information for any system installed (unique ID) is consistent between the records. The unique ID code of WPS is combination of system type code, year code, country code and a serial number. The unique IDs of the WPS were checked for all the sampled systems surveyed during remote survey to ensure that no number is repeating in the database and the same system is not credited in any other CPA either, thus avoiding the double counting.</p> <p>The CME also has a customer care centre which contacts the schools to ensure if the cartridge replacement (UltraFLO) or new packets of tablets (UltraTAB) are required or not.</p> <p>For <u>monitoring</u> survey, a monitoring team has been organized by the CME consisting of trained monitoring staff, who conducted the Aquagenx tests (water quality tests) and Usage surveys. The monitoring manager at the CME is responsible for QA/QC of the data, analysis and reporting in the monitoring report. QA/QC procedures were found being <u>in place</u>, as confirmed from the CME during the interview via telephonic call. Scanned copies of purchase order /14/ and completed monitoring survey forms with test results/18/ were made available to the verification team for assessment of the information of institutions, <u>survey data</u> and test results, in the sales data and monitoring data mentioned in ER calculator/4/. Monitoring team staff were interviewed by the verification team regarding the monitoring procedures, using the water quality testing kits and filling the monitoring questionnaires. The staff explained the complete procedure followed for Aquagenx tests and the monitoring survey form filling. The evaluation of the water quality test is done in the main office. The verification team also checked training records of the monitoring & data recording personnel/20/.</p> <p>Thus, it can be confirmed that the Implementation and operation of the management system has been done in line with the registered PoA DD/1/ and CPA DDs/2/.</p>
Findings	CAR#02 was raised and resolved.
Conclusion	The verification team from the desk review and remote survey assessment confirms that the monitoring management system of the PoA is in place with the responsibilities properly identified and established.

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E.2.3. Post-registration changes

E.2.3.1. Corrections

No correction observed

E.2.3.2. Inclusion of a monitoring plan

N/A

E.2.3.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

N/A

E.2.3.4. Changes to the programme design

The request of approval of changes from the PoA as described in the registered PoA-DD was submitted by CME under the following request no. and approval date:

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PRC request number	Approval Status	Date of Approval	Reference Link
PRC-9948-002	Approved	03/07/2017	https://cdm.unfccc.int/PRCContainer/DB/prcp445611461/view
PRC-9948-001	Approved	08/05/2017	https://cdm.unfccc.int/PRCContainer/DB/prcp266525508/view

E.2.3.5. Addition of CPA inclusion template

N/A

E.2.3.6. Change of coordination/managing entity

N/A

E.2.3.7. Changes specific to afforestation and reforestation activities

N/A

E.3. Component project activities

E.3.1. Compliance of the CPA implementation with the included CPA design document

Means of verification	The registered PoA aims to provide safe drinking water to the institutions in Nigeria, Rwanda, Uganda and Kenya. The PoA is primarily designed to replace the existing fossil fuel / non-renewable woody biomass-based means of purifying water by installing low emission / emission free Water purification systems to provide safe drinking water. Impact Water is the implementer of the CPAs and has fully implemented the CPAs with the help of Sales and Distribution Partners (SDP). The same has been verified from the agreement between the CME and CPAI/15/. This monitoring period includes the implementation and monitoring of 10 CPAs- CPA 9948-P1-0003-CP1,9948-P1-0005-CP1 to 9948-P1-0013-CP1 in Nigeria.								Deleted:
	CPA no.	First WPS Installation date	Inclusion date	Crediting period	No. of units			Estimated ERs	ERs achieved
					FLO	TAB	Multi-barrier UV		
	9948-P1-0003-CP1	01/04/2017	08/05/2017	23/05/2017-22/05/2024	0	0	273	15,547	5.23 Deleted: 1
	9948-P1-0005-CP1	11/01/2018	04/10/2017	04/10/2017-03/10/2024	1,172	0	0	36,521	13.16 Deleted: 11,078
	9948-P1-0006-CP1	12/07/2018	04/10/2017	04/10/2017-03/10/2024	845	0	0	36,521	13.18 Deleted: 2
	9948-P1-0007-CP1	30/08/2018	04/10/2017	04/10/2017-03/10/2024	802	0	0	36,521	12.87 Deleted: 914
	9948-P1-0008-CP1	09/10/2018	04/10/2017	04/10/2017-03/10/2024	756	0	0	36,521	12.48 Deleted: 27,691
	9948-P1-0009-CP1	09/11/2018	04/10/2017	04/10/2017-03/10/2024	682	0	0	36,521	12.69 Deleted: 12,93727,740
	9948-P1-0010-CP1	07/12/2018	04/10/2017	04/10/2017-03/10/2024	556	0	0	36,521	11.88 Deleted: 12,63327,088
	9948-P1-0011-CP1	11/01/2019	04/10/2017	04/10/2017-03/10/2024	713	0	0	36,521	12.82 Deleted: 12,25026,266
	9948-P1-0012-CP1	13/02/2019	04/10/2017	04/10/2017-03/10/2024	631	262	0	36,521	12.51 Deleted: 12,45526,707
	9948-P1-0013-CP1	19/03/2019	04/10/2017	04/10/2017-03/10/2024	480	476	0	36,521	10.71 Deleted: 11,65724,997
		As checked from the delivery notes/21/	Checked from the UN website /12/	Checked from the UN website /12/	Checked from sales data base/5	Checked from sales data		Checked from the ER sheet/ 4/	Checked from the ER sheet/ 4/

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				/	base/ 5/			
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As per the registered PoA-DD page 59 "products deployed under the project activity are assumed be in operation as of the start of the next month following the date of sale". Thus, any installation in the month of Dec 2019 will be eligible for crediting only in the month of Jan 2020. Given, the current monitoring period is ending in 31 Dec 2019, therefore only the units installed upto Nov 2019 (up to 30 Nov-2019) are eligible for crediting under the concerned monitoring period. Thus, the CME has considered 30-Nov-2019 as the cut-off date of installation covered for this monitoring period.

It has been checked by the verification team from the ER sheet/4/ that the ERs achieved for the CPAs lies between 5,237 tCO₂e – 13,185 tCO₂e, which is below the threshold of type III small-scale activity. It has been confirmed that:

- Each of these CPAs achieves an annual emission reduction equal to or less than 60,000 tCO₂e per year thus complying with the applied methodology SSC threshold/6/,
- Each of the technologies installed under these CPAs achieves an annual emission reduction equal to or less than 3,000 tCO₂e per year (5% of the SSC limit) thus fulfilling the additionality criteria stated in the CPA DD/2/ and PoA DD/1/.
- Each of the independent subsystems/measures included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the applied methodology (i.e. not exceeding 600tCO₂e for SSC type III methodologies) thus fulfilling the additionality criteria stated in the CPA DD/2/ and PoA DD/1/.

The implementation of the CPA as mentioned above is within the geographical boundary of PoA-DD/1/, which constitutes the physical boundary as well. Impact Carbon is the CME of the CPA and Impact Water is the CPAI/15/.

The reference number and the inclusion date of CPAs have been checked and verified from the UN website/12/ and the details are found correct and consistent. The start date of CPAs was confirmed from the delivery notes/21/. The WPS are installed across Nigeria.

The aforesaid CPAs involve dissemination of two types of water purification systems:

- Chlorination (UltraFLO / UltraTab)
- Multi-Barrier UV

The technical description of the systems has been verified under E.2.1 of this report.

It is noteworthy, Multi-Barrier UV and UltraFLO systems are fixed type of water purification units and can only be installed when water is being procured through piped connection. These two WPS type can work only when they are mounted on a piped connection and water flows through them. Hence the CPA DDs (section A.3.) and monitoring report (section C.1) correctly mention that Multi-barrier UV and UltraFLO are fixed type systems and applicable on piped water.

The ER sheet, worksheet titled 'sales database', column P 'Primary water source' lists the source as surface water, wells etc. besides piped water. The term "piped" water under this column has been used for the schools which receive water from City Council / Government / Municipal Water Connections.

It shall be noted that water is transported from primary water sources such as wells, surface water and boreholes through pipes to water storage tanks in project schools. The multi barrier UV and Ultra-FLO systems installed on these pipes.

In absence of pipeline connection, Ultra Tabs are provided to the schools, which are designed for non piped applications.

During the remote site visit conducted for the current issuance request as well as during the physical site-visit conducted for previous batches, it was clearly noted by the verification team that UltraFLO and Multi barrier UV systems have only been installed on pipeline connections. when the primary water source is different from City Council / Government / Municipal water connection.

Thus, all the systems has been implemented in line with the registered CPA DDs/2/.

Findings CAR#05 was raised and resolved.

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Conclusion	<p>a) The verification team is of the opinion that physical features of the CPA have been implemented in accordance with the registered CPA-DD.</p> <p>b) No specific monitoring equipment had to be installed according to the monitoring plan.</p> <p>c) It is also confirmed, through the remote audit survey and review of the supporting documentation that physical features of the component CPA have been implemented in accordance with the CPA-DD.</p> <p>d) The CPA was also found to be completely operational in line with the CPA-DD.</p> <p>e) The information provided in the relevant sections of the monitoring report appropriately describes the implementation and operational status of the PoA</p>
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E.3.2. Post-registration changes**E.3.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents**

No deviations identified in the current verification and there exist no previously approved deviations for the CPAs under verification

E.3.2.2. Corrections

Corrections were identified in CPA 9948-005 to CPA 9948-0013. The corrections were approved on 02/05/2019.

<https://cdm.unfccc.int/PRCCContainer/DB/prcp52130222/view>

E.3.2.3. Changes to the start-date of the crediting period

No changes to the start date of crediting period.

E.3.2.4. Inclusion of a monitoring plan

Not Applicable

E.3.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

Not Applicable

E.3.2.6. Changes to the project design

Changes to the project design were identified in CPA 9948-005 to CPA 9948-0013. The changes were approved on 02/05/2019.

<https://cdm.unfccc.int/PRCCContainer/DB/prcp52130222/view>

E.3.2.7. Changes specific to afforestation and reforestation activities

Not Applicable

E.3.3. Compliance of the registered monitoring plan with applied methodologies and standardized baselines

Means of verification	The monitoring plan as contained in CPA-DDs/2/ were reviewed against the monitoring requirements of the applied methodology AMS-III.AV version 04 /6/ as well as PoA-DD/1/ with reference to the technology involved. Based on this review, it was found that the monitoring plan contained in the CPA DDs/2/ includes all the required parameters to be monitored in the context of the CPA design and description and allows proper determination of emission reductions in accordance with PoA DD/1/ and applied methodology AMS-III.AV version 04/6/.
Findings	No findings were raised
Conclusion	The monitoring plan is in line with the approved methodology AMS III A.V Ver.4/6/.

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that is included in the CPA-DDs/2/.

E.3.4. Compliance of monitoring activities with the registered monitoring plan

E.3.4.1. Data and parameters fixed ex ante or at renewal of crediting period

Case 1 or Case 2: Project activities implemented in rural or urban areas of countries with proportion of rural or urban population using an improved drinking-water source equal to or less than 60 % (Case1) or above 60% (Case2), Case1 or Case 2

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Means of verification	The CPAs located in Nigeria fall under Case 1. It was checked from CPA DDs/2/ and study report MICS 2016-2017/23/ which states that only 22.7% of the Nigerian population has access to clean drinking water, hence Case 1 is applied.
Findings	No findings were raised
Conclusion	The value applied is found to be consistent with the registered CPA-DDs/2/ which is correct and justified.

Specific Heat of water, WH, kJ/L °C

Means of verification	The value of the parameter is fixed at the time of validation and the value has been sourced from Methodology A.M.S.-III.AV Ver.4/6/. The value considered is 4.186 kJ/L °C and is found to be consistent with the CPA-DD/2/.
Findings	No findings were raised
Conclusion	The value in the MR/13/ and ER sheet /4/ are consistent with the registered PoA-DD/1/ & CPA-DDs/2/. The applied value is correct and justified.

Final Temperature, T_f, (°C)

Means of verification	The value of the parameter is fixed at the time of validation and the value is sourced from the methodology AMS-III.AV version 4.0/6/. The values as available in MR is 100 which is found consistent with the values in CPA-DD/2/.
Findings	No findings were raised
Conclusion	The value in the MR/13/ and ER sheet /4/ are consistent with the registered PoA-DD/1/ & CPA-DDs/2/. The applied value is correct and justified.

Initial Temperature, T_i

Means of verification	The value of the parameter is fixed at the time of validation and the value is sourced from the methodology AMS-III.AV version 4.0/6/. The value considered is 20 and is found to be consistent with the CPA-DD/2/.
Findings	No findings were raised
Conclusion	The value in the MR/13/ and ER sheet /4/ are consistent with the registered PoA-DD/1/ & CPA-DDs/2/. The applied value is correct and justified.

Latent heat of Water Evaporation, WHE, kJ/L

Means of verification	The value of the parameter is fixed at the time of validation and the value is sourced from the methodology A.M.S.III AV- version 4/6/. The value considered is 2,260 kJ/L and is found to be consistent with the CPA-DDs/2/.
Findings	No findings were raised
Conclusion	The value in the MR and ER sheet /13,4/ are consistent with the registered PoA-DD/1/ & CPA-DDs/2/. The applied value is correct and justified.

Leakage, L

Means of verification	The value of the parameter is fixed at the time of validation and the value is sourced from the methodology AMS-I.E version 5.0 /25/. The value considered is 0.95 and is found to be consistent with the CPA-DDs/2/.
Findings	No findings were raised
Conclusion	The value in the MR /13/and ER sheet /4/ are consistent with the registered PoA-

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	DD/1/ & CPA-DD/2/. The applied value is correct and justified.
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Average volume of drinking water per person per day, Ryi, Litres/Person/day

Means of verification	The value of the parameter is fixed at the time of validation and the value is sourced from the report WHO Minimum water quantity needed for domestic use in emergencies/24/. The value considered is 2 (for day schools) and 3.5 (for boarding schools, prisons) and is found to be consistent with the CPA-DD/2/.
Findings	No findings were raised
Conclusion	The value in the MR and ER sheet /13,4/ are consistent with the registered PoA-DD/1/ & CPA-DD/2/. The applied value is correct and justified.

Emission Factor for electricity generation for source j in year y, EF EL,j,y, tCO₂/MWh

Means of verification	The value of the parameter is fixed at the time of validation and the value is sourced from the "Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, Version 1.0"/39/. The value considered is 1.3 tCO ₂ /MWh and was found to be consistent with the CPA-DD/2/.
Findings	No findings were raised
Conclusion	The value in the MR and ER sheet /13,4/ are consistent with the registered PoA-DD/1/ & CPA-DD/2/. The applied value is correct and justified.

Average technical transmission and distribution losses for providing electricity to source j in year, TDLj,y, Fraction

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Means of verification	The value of the parameter is fixed at the time of validation and the value is sourced from the "Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, Version 1.0"/39/. The value considered is 20% which is a default value sourced from Tool 05 and was found to be consistent with the CPA-DD/2/.
Findings	No findings were raised
Conclusion	The value in the MR and ER sheet /13,4/ are consistent with the registered PoA-DD/1/ & CPA-DD/2/. The applied value is correct and justified.

E.3.4.2. Data and parameters monitored

Quantity of purified water in year y, QPWy (liters/year):

Means of verification	Criteria/Requirements	Assessment/Observations
	Measuring /Reading /Recording frequency	Annually
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes.
	Monitoring equipment	NA
	How were the values in the monitoring report verified?	<p>The value applied is 456,437,136.</p> <p>The parameter is a calculated parameter determined through following equation:</p> $QPW_y = \sum (T_{y,i} \times N_{y,i} \times R_{y,i} \times 365 \times \text{Water Quality}_i \times \text{Operational Units}_i)$ <p>The formula is correct and in line to the applied methodology/6/, PoA DD/1/ and CPA DDs/2/.</p>

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		<p>The installation <u>in</u> CPAs under the verification has been done between 01/04/2017-19/11/2019.</p> <p>As per the page 59 of revised approved PoA DD/1/, "The date of installation for each unit is used to determine the portion of the monitoring period during which the unit was active. Products deployed under the project activity are assumed be in operation as of the start of the next month following the date of sale, i.e. if the date of sale is April 1st, the start of operation is May 1"</p> <p>Thus, for all the systems installed in April 2019, ERs will be claimed in May 2019.</p> <p>The end date of the monitoring period is 31/12/2019.</p> <p><u>It shall be noted that the equation stated above, sourced from PoA DD, accounts for 365 days of crediting in a year (or for the duration of the monitoring period in case of shorter monitoring periods). However, the schools don't operate for 365 days in a year. Therefore, the CME has determined operational school days in the monitoring period, as per the academic school calendar issued by "Federal Ministry of Education, Nigeria"/42/ for ER calculations, excluding weekend and school holidays, as a conservative measure (ER sheet, Tab MP3 school days). The verification reviewed the Nigeria school academic calendars (2018-19 and 2019-20) issued by the Federal Ministry of Education and found them to be presenting school opening and closure dates covering the entire monitoring period. The Verification team confirms that the calculation of school days in the ER sheet/4/ is correct, in accordance with the relevant academic calendars and results in conservative calculation of ERs.</u></p> <p>The ER sheet/4/ was checked to confirm that the formula has been applied correctly.</p>
If applicable, has the reported data been cross-checked with other available data?	Yes. The equation used for the calculation is correct and is sourced from the paragraph 11 of the applied methodology/6/	
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	NA	

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	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	NA
Findings	CAR#01, FAR#02 and CAR#08 were raised and resolved	
Conclusion	<p>The parameter has been monitored appropriately, in accordance with the registered monitoring plan/1/ (as per measurement methods and procedures to be applied) and applied methodology/6/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/1/.</p> <p>FAR#02 has been raised for subsequent monitoring periods to ensure that QPW_v is determined accounting the operational school days (excluding holidays) instead of duration of the concerned monitoring period, as applicable.</p>	

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Efficiency of water boiling system being replaced, η_{wb} , fraction

Means of verification	Criteria/Requirements	Assessment/Observations
	Measuring /Reading /Recording frequency	Continuously
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
	Monitoring equipment	NA
	How were the values in the monitoring report verified?	<p>The parameter is determined by sourcing a default value from the applied methodology/6/ and multiplying it with the proportion of population of the institutions different type of stove.</p> <p>The GACC report for Nigeria, 2016/16/ was reviewed to confirm that all public institutions cook with wood on traditional three stone fire.</p> <p>Therefore, a value of efficiency for unimproved stove was applied.</p>
	If applicable, has the reported data been cross-checked with other available data?	Yes. Sampled number of entries (11) were surveyed. The head/deputy head of the institutions were interviewed to know the treatment method used in the absence of the WPS installation. All interviewed people replied that unsafe drinking water was used from boreholes/wells and boiling water would have been the cheapest option to get safe drinking water. No other means were deemed affordable by the institutions.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	NA
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM	NA

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	Project Standard?	
Findings	CL#01 was raised and resolved	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/1/ (as per measurement methods and procedures to be applied) and applied methodology/6/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/1/.	

Total distributed water purification systems, T_{y,i}, Number

Means of verification	Criteria/Requirements	Assessment/Observations
	Measuring /Reading /Recording frequency	Continuously
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
	Monitoring equipment	NA
	How were the values in the monitoring report verified?	<p>The total number of systems reported in the monitoring report are as following:</p> <p>6637 UltraFLO</p> <p>738 UltraTAB</p> <p>273 Multi-Barrier UV</p> <p>The CME keeps purchase order/14/, delivery notes/21/ and details of each system on salesforce as checked from the survey videos provided by CME.</p> <p>Each unit of Ultra FLO system has unique ID, which is listed in the database and has been claimed for ERs.</p> <p>For Ultra TAB system, the value of the parameter has been determined by considering each institution as a system. Therefore, for institutions with Ultra TAB, the number of tab systems is same as number of institutions.</p> <p>Again, each unit of for Multi-UV Barrier has a UID, each of which has been listed in the database and ERs have been claimed.</p> <p>The entries in database were checked to confirm the total number presented in the MR. 11 WPS samples were remotely surveyed also, to confirm that the details of the entries in the database/5/ are correct.</p>
	If applicable, has the reported data been cross-checked with other available data?	Yes. Sampled number of entries (11) were checked with the installation invoices/14/ and the delivery notes/21/.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes
	In case project participants have temporarily not monitored the	NA

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	parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	
Findings	CL#01, CL#06 were raised and resolved	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/1/ (as per measurement methods and procedures to be applied) and applied methodology/6/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/1/.	

The average population serviced by water purification systems, $N_{y,i}$, Persons/equipment

Means of verification	Criteria/Requirements	Assessment/Observations
	Measuring /Reading /Recording frequency	Continuously
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
	Monitoring equipment	NA
	How were the values in the monitoring report verified?	<p>At the time of installation, the purchase order form is filled by the CME. This form/14/ notes down the total number of students and staff in boarding/non-boarding schools.</p> <p>These numbers are mentioned for each school in the sales database. For the 11 WPS samples checked by the DOE during the remote audit survey, the same numbers were checked and found to be correct.</p> <p>The CME has also applied formula in the ER sheet/4/ to ensure that the $N_{y,i}$ multiplied by $R_{y,i}$ does not exceed the maximum output of the unit [per unit].</p> <p>An average value of all the adjusted $N_{y,i}$ has been used for ER calculation respective of each CPA. In general, the average of $N_{y,i}$ for all the CPAs was found to be 364 person/technology.</p> <p>The parameter value is noted at the time of installation by the CME and as the number of systems increases over the time, the value will change continuously. The institutions were checked to confirm that CME is recording this information in database and the implementation is in line with PoA DD/1/.</p> <p>As per the CPA DDs (9948-P1-0003, 9948-P1-0005-CP1 to 9948-P1-0013-CP1) page 15/2/, The value of $N_{y,i}$ is effectively the number of people in the institution. The number of people in the institution will be updated (at least biennially) to reflect change in the institution size over time. The value will be updated in the sales database</p>

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		<p>biennially.</p> <p>For the current monitoring, the value of the parameter was verified from the sales database /5/ and purchase orders/14/. This parameter is neither prescribed nor monitored by CME on sample basis as per registered monitoring plan. The parameter is monitored on absolute basis for each of the installation.</p>
	If applicable, has the reported data been cross-checked with other available data?	Yes. The values in the ER sheet were checked with remote survey observations by the DOE which was further cross-checked with the purchase orders/14/.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	NA
Findings	CL#07 was raised and resolved.	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/1/ (as per measurement methods and procedures to be applied) and applied methodology/6/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/1/.	

Water quality measurement, Water Quality, Proportion

Means of verification	Criteria/Requirements	Assessment/Observations
	Measuring /Reading /Recording frequency	Annually
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
	Monitoring equipment	Aquagenx testing kits
	Calibration details	Not Applicable.
	How were the values in the monitoring report verified?	<p>The CME conducted Aquagenx testing kits to monitor the E.Coli value for sampled institutions.</p> <p>The Head teachers/ Deputy Head teachers of the schools interviewed by the DOE during the remote survey confirmed that they were visited by monitoring team for the tests.</p> <p>The monitoring forms/18/, Aquagenx testing kits photographs showing achieved results /30/ for all the institutions were checked by the verification team to confirm the monitoring parameter value. It was found that all the tests gave positive results confirming safe drinking water</p>

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		except four sampled schools. Hence, the applied value of 0.95 was found acceptable.
	If applicable, has the reported data been cross-checked with other available data?	Photos of the test/30/ conducted during the monitoring were shared by the CME which confirmed the results in monitoring forms.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The staff conducting the tests were found to be trained as confirmed from training <u>evidence/20/</u> provided by the CME confirmed that the tests are conducted and evaluated by trained staff.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	NA
Findings	CL#01, CL#05 was raised and resolved	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/1/ (as per measurement methods and procedures to be applied) and applied methodology/6/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/1/.	

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Percent of the monitoring period in which the units are in use, Operational Units, Percentage

Means of verification	Criteria/Requirements	Assessment/Observations
	Measuring /Reading /Recording frequency	At least once per verification
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, <u>During the current MP and in all the previous monitored periods, the monitoring frequency followed is found to be adhering to the methodology requirements.</u> <u>Further, the verification team also assessed the PoA validation report CAR 07, page 80 of 106 which confirms that "atleast once per verification" is superseded by "biennial" and the methodology requirements prevails.</u> <u>However, to ensure that under no circumstances, the methodology requirement is compromised in future, FAR#01 has been raised to ensure that monitoring frequency of parameter "operational units", shall be at least biennial, in line with monitoring methodology requirements.</u>
	Monitoring equipment	NA
	How were the values in the monitoring report verified?	The sampled systems were checked by the CME's monitoring team to monitor the operational status of the WPS units installed in the institutions as checked from the monitoring survey forms/18/.

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		<p>The Head teachers/ dy. Head teachers of the schools visited by the CME representative during the monitoring survey were confirmed to the DOE through the remote audit survey that the monitoring team visits the school regularly for the monitoring.</p> <p>All the systems checked by the CME representative during the remote audit survey were found to be operational.</p> <p>Thus, the applied value of 93.75% was found acceptable.</p>
	If applicable, has the reported data been cross-checked with other available data?	Results presented in the ER sheet were checked with monitoring survey forms/18/ and remote survey visit videos.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The staff conducting the tests were found to be trained as confirmed from training evidence/20/ provided by the CME confirmed that the tests are conducted and evaluated by trained staff.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	NA
Findings	CAR#02, CL#01, CL#06, CAR#06 and CL#04 were raised and resolved.	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/1/ (as per measurement methods and procedures to be applied) and applied methodology/6/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/1/.	

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Fraction of woody bio-mass saved by the project activity in Year, fNRB, Fraction

Means of verification	Criteria/Requirements	Assessment/Observations
	Measuring /Reading /Recording frequency	Continuously
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
	Monitoring equipment	NA
	How were the values in the monitoring report verified?	<p>The parameter is determined by sourcing a default value from UNFCCC SSC WG 37th Meeting Report for Nigeria /26/ and multiplying it with the proportion of population of the institutions using different type of stove.</p> <p>The GACC report for Nigeria, 2016/16/ was reviewed to confirm that all public institutions cook with wood on traditional three stone fire.</p> <p>Therefore, a value 100% of efficiency</p>

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		<p>for unimproved stove was multiplied with default value of 0.93 UNFCCC SSC WG 37th Meeting Report for Nigeria /26/ to the final value = 0.93, which was applied in the ER calculation sheet/4/. The applied value was found to be correct.</p> <p>The value has been determined is in line with the PoA DD/1/ and CPA DDs/2/.</p>
	If applicable, has the reported data been cross-checked with other available data?	NA
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	NA
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	NA
Findings	CL#01 and CAR#03 was raised and resolved	
Conclusion	The values in the Monitoring Report /13/ and corresponding Emission Reduction Spreadsheet /4/ are consistent with the revised accepted PoA-DD/1/ and CPA-DDs/2/. The values applied for ER calculations/4/ in the relevant CPAs are correct and justified.	

Emission factor as per AMS-I.E. procedures when NRB is displaced or the emission factor of the fossil fuel substituted, EF projected_fossil fuel, tCO2/TJ

Means of verification	Criteria/Requirements	Assessment/Observations
	Measuring /Reading /Recording frequency	Continuously
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
	Monitoring equipment	NA
	How were the values in the monitoring report verified?	<p>The parameter is determined by sourcing a default value from AMS-I.E /25/ and multiplying it with the % population using non-renewable woody biomass / fossil fuel.</p> <p>The GACC report for Nigeria, 2016/16/ was reviewed to confirm that all public institutions cook with wood on traditional three stone fire.</p> <p>Therefore, a value 100% users using non-renewable woody biomass / fossil fuel was multiplied with default value of 81.6 sourced from AMS-I.E./25/ to give the final value = 81.6, which was applied in the ER calculation sheet/4/. The applied value was found to be correct.</p> <p>The value has been determined is in</p>

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		line with the PoA DD/1/ and CPA DDs/2/.
	If applicable, has the reported data been cross-checked with other available data?	Yes. The value sourced from AMS-I.E./25/ was also cross-checked from the IPCC greenhouse gas inventories report/22/.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	NA
Findings	CL#01 was raised and resolved	
Conclusion	The values in the Monitoring Report /13/ and corresponding Emission Reduction Spreadsheet /4/ are consistent with the revised accepted PoA-DD/1/ and CPA-DDs/2/. The values were found consistent with IPCC default values for fossil fuels /22/. The applied values are correct and justified.	

Existence of public distribution network of safe drinking water, Fraction, Existence of public distribution network of safe drinking water in year y, Fraction

Means of verification	Criteria/Requirements	Assessment/Observations
	Measuring /Reading /Recording frequency	Annually
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
	Monitoring equipment	NA
	How were the values in the monitoring report verified?	<p>The institutions of sampled WPS were visited by the CME's monitoring team to check the existing public distribution network with safe drinking water as checked from the monitoring survey forms/18/.</p> <p>The Head teachers/ dy. Head teachers of the schools visited by the CME representative during the monitoring survey were confirmed to the DOE through the telephonic interview that the monitoring team visits the school regularly for the monitoring.</p> <p>All the institutions of the sampled WPS visited by the CME representative during the remote audit survey were found to not have any access to public distribution network. Their source of water was found to be Borewell/ Well. Besides, review of other monitoring survey forms and sales database indicated that safe drinking water based public distribution network was not accessible to project schools.</p> <p>Thus, the applied value of 0 was found</p>

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		acceptable for the current verification.
	If applicable, has the reported data been cross-checked with other available data?	Results presented in the ER sheet were checked with monitoring survey forms/18/ and remote survey results.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The staff conducting the tests were found to be trained as confirmed from training <u>evidence/20/</u> provided by the CME confirmed that the tests are conducted and evaluated by trained staff.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	NA
Findings	CL#01 and CAR#03 was raised and resolved	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/1/ (as per measurement methods and procedures to be applied) and applied methodology/6/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/1/.	

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Quantity of electricity consumed by the project electricity consumption source j in year y, EC _{P,j,y}, MWh/yr

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Means of verification	Criteria/Requirements	Assessment/Observations
	Measuring /Reading /Recording frequency	Annually
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
	Monitoring equipment	NA
	How were the values in the monitoring report verified?	The <u>power rating</u> capacity of the <u>Multi-Barrier UV disinfection device</u> was found to be 14 watts as checked from the WPS manufacturer specification for Multi-barrier UV/28/. Thus, taking an assumption, <u>the</u> technology was considered to be operational for 24 hours a day and 365 days in a year. Thus, the applied value of 0.1226 was found to be conservative and acceptable for the current verification.
	If applicable, has the reported data been cross-checked with other available data?	Results presented in the ER sheet were checked with DOE remote survey end-users interviews.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	NA
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	NA

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Findings	CL#01 was raised and resolved
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan/1/ (as per measurement methods and procedures to be applied) and applied methodology/6/. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan/1/.

E.3.4.3. Implementation of sampling plan

Means of verification	<p>The monitoring has been carried out in accordance with the monitoring plan contained in the revised approved PoA DD/1/ and CPA DDs/2/.</p> <p>Sampling Design/Target Population/Sampling Frame/Reliability:</p> <p>The CME has applied single sampling plan for all of the 10 CPAs. According to the 'Sampling and Survey standards,' version 8.0/19/, the sampling plan applied by the PP for the following CPAs are found to be appropriate. As per the sampling plan stated in the PoA DD/1/, a minimum 90% confidence interval and a 10% margin of error requirement is achieved for the sampled parameters. When a single sampling plan covers a group of CPAs or when monitoring is conducted biennially (every two years), confidence/precision of 95/10 for the sample size calculation is applicable. Since the sampling has been done across the CPAs, the CME has taken 95/10 as the confidence precision levels which is found to be in line with the registered monitoring plan/1,2/.</p> <p>The target population for the parameters stated above are Water purification systems⁵ installed / distributed in institutions and recorded in the project sales database.</p> <p>Sampling Frame:</p> <p>There are three different type of units under the CPAs. 6637 UltraFLO units, 738 UltraTAB units and 273 Multi-barrier UV have been listed in the sales database. However, the parameters for monitoring are homologous (i.e., implemented in schools). Thus, the CME has applied a common sampling for all the parameters monitored which was found acceptable.</p> <p>Sampling Method and selection:</p> <p>The CME has applied Stratified Random Sampling by dividing the population into three strata (UltraFLO, UltraTAB, Multi-barrier UV). The samples have been chosen randomly from three of the strata's as checked from the excel sheets with random numbers/33/.</p> <p>Sample Size for Parameter of Interest:</p> <p>The sampling is applied to the following monitoring parameters:</p> <ul style="list-style-type: none"> • Water Quality- Aquagenx Tests • Operational Units • Existence of public distribution network of safe drinking water <p>The sample size is chosen using the equation inline to CDM guidelines for Sampling and surveys for CDM project activities and programmes of activities.</p> <p>In this regard, sample size calculation spreadsheet /4/ was checked and found correct as per registered monitoring plan. The complete details are given in E.3 section of Monitoring Report/13/.</p> <p>Implementation of Sampling Survey and Field Test Records:</p> <p>Based on interviews with the CME and surveyors during the the remote audit survey, in addition to simply asking this question to the end users, the surveyors</p>
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⁵ The definition of each system considered for ER is different for Ultra FLO and Ultra Tab. Each unit of Ultra FLO having unique ID as listed in the database, is considered as individual system for CER calculations. For Ultra TAB, the value of the parameter has been determined by considering each institution as one system. Therefore, for institutions with Ultra TAB, the number of TAB systems is same as the number of institutions.

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were also trained to evaluate to results of Aqua-genix tests. Therefore, the implementation of surveys and tests was considered reliable. The surveyors also took photos of the school names, test results which was shared by CME and were checked during the desk-review by the verification team.

Monitoring survey (by CME) duration:

The monitoring survey (field survey / tests) was carried out by CME representatives between following duration for the current monitoring period.

CPA Ref.No.	Technology	From	To
9948-P1-0003-CP1, 9948-P1-0005-CP1 to 9948-P1-0013-CP1	Water Purification systems	13/01/2020	05/02/2020

Reliability and precision calculation:

The verification team has verified the ER calculation spreadsheets /4/ with the monitored data, where the actual achieved precision is calculated against the Guidelines outlined under "Standard for sampling and surveys for CDM project activities and Programme of Activities" /19/ and confirms that the calculation of achieved reliability was done correctly.

All parameters of interest are included in the ER spreadsheet for the revised approved CPAs. These were checked for the input values as well as formula applied and were found consistent. The reliability (demonstration of precision achieved after the survey results) is depicted in the ER calculation sheets /4/ corresponding to final Monitoring Report /13/, which were also found correct. Thus, the verification team confirms that required precision has been met and the results are reliable.

Findings	CL#02 and CAR#03, was raised and resolved
Conclusion	The verification team has found out that the sampling plan applied is found to be in-line with the monitoring plan mentioned in the registered PoA-DD/1/ and CPA-DDs/2/ and Sampling and survey standards, ver.8/19/

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E.3.5. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	No monitoring equipment are used required as outline in the CPA-DDs/2/ and revised accepted PoA-DD/1/.
Findings	None.
Conclusion	The verification team has determined that no monitoring equipment has been used by the PP that requires calibration. Furthermore, there was no requirement of calibration in the CPA-DDs/2/. This was in accordance with the accepted monitoring plan and the applied monitoring methodology/6/.

E.3.6. Assessment of data and calculation of emission reductions or net removals

E.3.6.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	<p>The following equations were used to determine the baseline emissions as provided in the monitoring report /13/ and applied in the corresponding ER calculations sheet /4/. The expressions used were found consistent with the revised accepted PoA DD /1/, CPA DDs /2/ and the applied methodology AMSIII.AV, version 04 /6/:</p> $BE_y = QPW_y * SEC * f_{NRBy} * EF_{projected_fossilfuel} * 10^{-9}$ <p>Where,</p> <table border="1"> <tbody> <tr> <td>BE_y</td><td>Baseline emissions during the year y in (tCO₂e)</td></tr> <tr> <td>QPW_y</td><td>Quantity of purified water in year y (Liters/yr).</td></tr> <tr> <td>SEC</td><td>Specific energy consumption required to boil one litre of water (kJ/L)</td></tr> </tbody> </table>	BE _y	Baseline emissions during the year y in (tCO ₂ e)	QPW _y	Quantity of purified water in year y (Liters/yr).	SEC	Specific energy consumption required to boil one litre of water (kJ/L)
BE _y	Baseline emissions during the year y in (tCO ₂ e)						
QPW _y	Quantity of purified water in year y (Liters/yr).						
SEC	Specific energy consumption required to boil one litre of water (kJ/L)						

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$f_{NRB,y}$	<p>Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable.</p> <p>For biomass, the default values of f_{NRB} shall be used from EB67. A survey, national, or regional data is conducted to determine the mix of fuels (% of biomass, % of other fuels) used in the baseline. If a mixture of biomass and other fuels (e.g. fossil fuels) are used, a weighted average renewability factor shall be applied.</p>
$EF_{\text{projected_fossilfuel}}$	<p>Emission factor when NRB is displaced or the emission factor of the fossil fuel substituted</p> <p>Default emission factors from AMS-I.E as referenced in AMS-III.AV version 4 and IPCC shall be used. A survey, national, or regional data is conducted to determine the mix of fuels (% of biomass, % of other fuels) used in the baseline. If a mixture of woody biomass and fossil fuels are used in the absence of the project activity a weighted average value shall be applied, as described in parameter box in section E.2</p>

Calculation for CPA 9948-P1-0003-CP1 (as an example):

$$= 20,530,710 \times 3574.80 \times 0.93 \times 81.60 \times 10^{-9}$$

$$= 5,569 \text{ tCO}_2\text{e}$$

Specific energy consumption (SEC) i.e. energy required to boil one litre of water is calculated as

$$SEC = [WH \cdot (T_f - T_i) + 0.01 \cdot WHE] / n_{wb}$$

Where

WH	Specific heat of water (kJ/L °C)
T_f	Final temperature (°C)
T_i	Initial temperature of water (°C)
WHE	Latent heat of water evaporation (kJ/L)
n_{wb}	Efficiency of water boiling system being replaced (fraction)

Calculation for CPA 9948-P1-0003-CP1:

$$SEC = [4.186 \times (100 - 20) + 0.01 \times 2260] / 0.10$$

$$SEC = 3574.80 \text{ kJ/L}$$

And QPW_y is calculated through following equation:

$$QPW_y = \sum (T_{y,i} \times N_{y,i} \times R_{y,i} \times 365 \times \text{Water Quality}_i \times \text{Operational Units}_i)$$

Where:

QPW_y : Quantity of purified water for drinking for all technologies type i in year y (Liters)

$T_{y,i}$: Total distributed water purification system

$R_{y,i}$: Average volume of drinking water per person per day (Liters/person/day)

Water Quality_i: Proportion of units that meet water quality requirements

Operational Units_i: Percent of the monitoring period in which the units are in use

$N_{y,i}$: The average population serviced by water purification systems (Persons/equipment)

The installation for CPAs under the verification has been done between 01/04/2017-19/11/2019.

As per the page 59 of revised approved PoA DD/1/, "The date of installation for

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each unit is used to determine the portion of the monitoring period during which the unit was active. Products deployed under the project activity are assumed to be in operation as of the start of the next month following the date of sale, i.e. if the date of sale is April 1st, the start of operation is May 1"

Thus, for all the systems installed in November, ERs will be claimed in December 2019. The end date of the monitoring period is 31/12/2019.

The number of days for the current monitoring period is 223 days.

Number of days: The equation in CPA DDs uses 365 days (or the duration of monitoring period in case of less than annual monitoring period) for calculating QPW.

However, instead of using the duration of monitoring period, the CME has conservatively used operational school days determined as per academic school calendar issued by "Federal Ministry of Education, Nigeria"/42/, discounting weekend and school holidays, as a conservative measure/4/.

Calculation for CPA 9948-P1-0003-CP1:

$$QPW_y = 273 \times 2.32 \times 102 \times 356 \times 0.95 \times 93.75\%$$

$$QPW_y = 20,530,710 \text{ L}$$

Where,

$T_{y,i} = 273$ (number)

$R_{y,i} : 2.32$ (Litres/person/day)

Days: 102 (days)

Water Quality: 0.95 (fraction)

Operational Units: 93.75(%)

$N_{y,i} : 356$ (persons/equipment)

The number of operational school days has been determined as 106, against the duration of monitoring period (223 days). Refer ER calculator tab: MP3 Nigeria School days, cells I9:I10.

Accordingly, the systems in CPA-0003 are considered to be operational for only 102 days, during the monitoring period (attributed to progressive sales and applied adjustment factor) Refer ER calculator, tab: ER summary, cell E6 and MP3 Nigeria School days, cell I11.

The verification team has checked that the calculation for other CPAs (9948-P1-0005-CP1 to 9948-P1-0013-CP1) have also been done in the worksheet 'ERs Summary' /4/ in the same manner and is found correct.

Residual capacity considered in the ER sheet:

In the revised MP3 ER Calculator, the MP2 Sales database has been added (Tab: 'MP2 Sales data – reference only') by the CME. The verification team has verified that information in the revised ER Calculator, Tab: 'MP2 Sales data – reference only' is 100% consistent with the tab: 'Sales database' in the MP2 ER calculator/41/ available at https://cdm.unfccc.int/PoA/issuance/iss_db/poais63061347/view.

Further, in the revised ER calculator, tab 'MP3 Sales database' column AB, the residual capacity from previous MP has been found to be correctly linked with 'MP2 Sales data – reference only', column AK, thus establishing complete traceability.

The verification team has independently checked MP2 ER calculator from PoA page (9948-MP2-IRP4) and cross-verified the information in the revised ER Calculator, Tab: 'MP2 Sales data – reference only' and found it to be consistent.

In the revised ER calculator, 'MP3 sales database', column AB, for all systems newly installed, the 'residual capacity from previous MP' is also found to be correctly specified as "not applicable, new installation". Thus, 'residual capacity

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Where:
QPW_y: Quantity of purified water for drinking for all technologies type i in year y (Liters)
 $T_{y,i}$: Total distributed water purification system
 $R_{y,i}$: Average volume of drinking water per person per day (Liters/person/day)
Water Quality_i: Proportion of units that meet water quality requirements
Operational Units_i: Percent of the monitoring period in which the units are in use
 $N_{y,i}$: The average population serviced by water purification systems (Persons/equipment)

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QPW_y: Quantity of purified water for drinking for all technologies type i in year y (Liters)
 $T_{y,i}$: Total distributed water purification system
 $R_{y,i}$: Average volume of drinking water per person per day (Liters/person/day)
Water Quality_i: Proportion of units that meet water quality requirements
Operational Units_i: Percent of the monitoring period in which the units are in use
 $N_{y,i}$: The average population serviced by water purification systems (Persons/equipment)

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	<p>from previous MP' is confirmed to be calculated correctly in column AB of MP3 Sales database for all schools.</p> <p>Lastly, the residual capacity at the end of a given MP (column AL) is calculated as a function of Total daily consumption of drinking water and the duration by which a system's continuous running end date extends beyond the end date of monitoring period. This approach is equivalent to discounting the total available treatment capacity (in column AH) at the rate of daily water consumption (column AG) over the entire monitoring period duration to arrive at residual capacity at the end of the given MP (column AL).</p> <p>Given the credits are only being calculated for actual school days and not for entire duration of monitoring period, the aforesaid approach shall result in 'residual capacity remaining at the end of MP' (which gets carry forwarded to next MP as opening capacity) rendered most conservative.</p> <p>Continuous running end date (column AJ of 'MP3 sales database' in ER sheet/4/):</p> <p>The continuous running end date is merely a determinant to check compliance with the registered monitoring plan requirement. The continuous running end date is a calculated value based on the total available treatment capacity and the total water consumption per day and indicates the date by which the available capacity will get fully consumed. If the total daily water consumption is low, the available capacity will get fully consumed over a longer period of time which may extend as far as 2048 or beyond.</p> <p>The verification team confirms that this is merely a representation to objectively ensure that operational days remains lower of $(Ny.i * Ry.i)$ and available output (capacity) and is not linked with lifetime of the installed devices. The verification team has checked the capacity / lifespan of devices against CPA-DD (9948-P1-0005-CP1 to 9948-P1-0013-CP1 for UltraTAB / UltraFLO) and manufacturer specifications (for Multi Barrier UV) as applicable and confirms that no devices installed are expiring their lifetime before the end of the concerned monitoring period.</p> <p>Subsequent supplies:</p> <p>The subsequent supplies to any school are depicted under column AC of the worksheet titled "MP3 sales database". The subsequent supplies are required in cases where the residual capacity from the previous period is 0. If the residual capacity is high and sufficient for the current period, then no new supplies are required to be sent to the schools. The schools which have '0' residual capacity in the current MP, if 0 subsequent supplies have been provided, then no ERs have been claimed from it as can be seen under column AP of the same worksheet where number of operation days have been considered as 0 (cases with 0 residual capacity from previous MP and 0 subsequent supplies).</p> <p>The calculations for all the CPAs (9948-P1-0005-CP1 to 9948-P1-0013-CP1) were checked in the ER sheet/4/ and it was found that calculations have been done inline to the PoA DD/01/ and in accordance to the applied methodology/6/.</p> <p>All the parameters are assessed in detail under section E.3.4. of this report.</p>
Findings	CL#03 and CAR#07 were raised and resolved.
Conclusion	<p>The verification team confirms that</p> <ol style="list-style-type: none"> The complete data was available and is duly reported; As indicated above, the description with regard to cross-check of reported data is included under respective parameter above; Appropriate methods and formulae for calculating baseline GHG emissions or baseline net GHG removals were followed; Appropriate emission factors, IPCC default factors and other reference values

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Also, this approach limits the crediting of the system as the minimum of available capacity or total consumption over monitoring period whichever is lower and is accurate and robust.¶

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	were correctly applied.
	e) There is no pro-rata approach applied in the current monitoring period as entire monitoring period falls into period that is after the end of first commitment period of Kyoto Protocol.

E.3.6.2. Calculation of project GHG emissions or actual net GHG removals by sinks

Means of verification	<p>The project activity involves no emissions for type 2 CPAs as it involves dissemination of water purification systems and replaces the non-renewable woody biomass fossil fuel way of boiling water with the transitioned way of water purification by the chlorination technologies. The project emissions for type 3 CPAs were found to be calculated as follows:</p> $PE_y = T_{y,i} \times EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y})$ <p>For CPA 9948-P1-0003-CP1, $PE_y = 273 \times 0.1226 \times 1.3 \times (1 + 0.20)$ $= 53 \text{ tCO}_2\text{e}$</p>
Findings	None.
Conclusion	The project emissions have not been considered for Type 2 CPAs and have been considered for Type 3 CPAs. The approach is in line with the PoA DD/1/.

E.3.6.3. Calculation of leakage GHG emissions

Means of verification	<p>The PoA-DD/1/, CPA DDs/2/ and applied monitoring methodologies does not prescribe any leakage emissions to be considered. The remote survey and project design also did not reveal any potential source to be considered in this regard. However, the leakage adjustment factor that is required to adjust the baseline emissions has been duly accounted in baseline calculations.</p> <p>BE_y is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required. Therefore, the leakage is calculated as follows:</p> <p>Leakage = BE_y * (1-95%)</p> <p>Calculation for 9948-P1-0003-CP1 is as follows:</p> <p>LE = <u>5,569</u> * (1-0.95)</p> <p>LE = <u>279</u> tCO₂e</p> <p>The verification team has checked that the calculation for other CPAs (9948-P1-0005-CP1 to 9948-P1-0013-CP1) have also been done in the worksheet 'ERs Summary' /4/ in the same manner.</p> <p>The calculations for all the CPAs (9948-P1-0003-CP1, 9948-P1-0005-CP1 to 9948-P1-0013-CP1) were checked in the ER sheet/4/ and it was found that calculations have been done inline to the PoA DD/01/ and in accordance to the applied methodology/6/.</p> <p>The verified value of Leakage for all the CPAs is <u>6,196</u> tCO₂e. The value is mentioned CPA wise in the table presented under the next section.</p>
Findings	None.
Conclusion	No additional leakage emissions (other than what is already considered in baseline calculations) were required in accordance with the methodology AMS-III.AV, version 04 /6/.

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E.3.6.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks

Means of verification	<p>As elaborated above, the entire emission reductions from the PoA were based on baseline emissions. The calculations presented in this regard in the final monitoring report /13/ and corresponding ER calculations sheet /4/ were found appropriate and complying with the provisions prescribed in the registered monitoring plan of respective CPA-DDs/2/, PoA-DD/1/ and applied methodology/6/.</p> <p>The verification team confirms that from the remote survey where all the evidence and records that validated the stated figures were checked and found acceptable.</p>
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Findings	No findings were raised.
Conclusion	<p>The verification team confirms that</p> <p>a) The complete data was available and is duly reported;</p> <p>b) As indicated above, the description with regard to cross-check of reported data is included under respective parameter (refer Section E.5.4 of this report);</p> <p>c) Appropriate methods and formulae for calculating baseline GHG emissions or baseline net GHG removals, project emissions and leakage emissions were followed;</p> <p>d) The total number of ERs achieved (on account of water purifiers installation) during the current monitoring period were <u>117,570</u> tCO₂e.</p>

Title and UNFCCC reference number of the CPA	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	GHG emission reductions or net GHG removals by sinks (tCO ₂ e)		
				Amount achieved before 1 January 2013	Amount achieved from 1 January 2013	Amount achieved in the entire monitoring period
9948-P1-0003-CP1	5,569	53	279	0	5,237	5,237
9948-P1-0005-CP1	13,855	0	693	0	13,162	13,162
9948-P1-0006-CP1	13,880	0	695	0	13,185	13,185
9948-P1-0007-CP1	13,554	0	678	0	12,876	12,876
9948-P1-0008-CP1	13,143	0	658	0	12,485	12,485
9948-P1-0009-CP1	13,363	0	669	0	12,694	12,694
9948-P1-0010-CP1	12,507	0	629	0	11,881	11,881
9948-P1-0011-CP1	13,499	0	675	0	12,824	12,824
9948-P1-0012-CP1	13,173	0	659	0	12,514	12,514
9948-P1-0013-CP1	11,276	0	564	0	10,712	10,712
Total	123,819	53	6,196	0	117,570	117,570

E.3.6.5. Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included CPA

Means of verification	<p>Earthhood Services Private Limited is able to certify that the emission reductions from the CDM project activity 9948 "Impact Carbon Global Safe Water Programme of Activities (PoA)" in Nigeria for the monitoring period 23/05/2019-31/12/2019 (including both days) amount to <u>117,570</u> tCO₂.</p> <p>Verified and certified emission reductions as per commitment period:</p> <table> <tr> <th>Commitment period</th><th>Amount</th></tr> <tr> <td>Upto 31/12/2012 (1st commitment period)</td><td>0 tCO₂e</td></tr> <tr> <td>From 01/01/2013</td><td><u>117,570</u> tCO₂</td></tr> </table>	Commitment period	Amount	Upto 31/12/2012 (1 st commitment period)	0 tCO ₂ e	From 01/01/2013	<u>117,570</u> tCO ₂
Commitment period	Amount						
Upto 31/12/2012 (1 st commitment period)	0 tCO ₂ e						
From 01/01/2013	<u>117,570</u> tCO ₂						
Findings	CAR#01 was raised and resolved						
Conclusion	The actual ERs achieved in included CPAs are not higher than the estimated quantity of ERs in the CPA-DDs/2/. Accordingly, it was accepted by verification team.						

Title and UNFCCC reference number of the CPA	Actual values achieved by the CPAs during this monitoring period	Value estimated in ex ante calculation in the included CPA-DD(s)
9948-P1-003-CP1	5,237	15,547
9948-P1-005-CP1	13,162	36,521
9948-P1-006-CP1	13,185	36,521

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9948-P1-007-CP1	12,876	36,521
9948-P1-008-CP1	12,485	36,521
9948-P1-009-CP1	12,694	36,521
9948-P1-0010-CP1	11,881	36,521
9948-P1-0011-CP1	12,824	36,521
9948-P1-0012-CP1	12,514	36,521
9948-P1-0013-CP1	10,712	36,521
Total	117,570	344,236

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E.3.6.6. Remarks on difference from estimated value in included CPA

Means of verification	As verified and evident from the Monitoring Report /13/ and corresponding ER calculations sheet /4/, the actual emission reductions achieved for Water Purification systems for the CPAs under this verification in the current monitoring period were found less than the estimated quantity in the CPA-DDs/2/ for the comparable period. This is largely due to lower number of water purifiers that were sold. Considering, there is no increase in ERs no further verification effort was put in. The quantitative details of actual values of achieved ERs for the CPA and value estimated in the CPA- DDs/2/ is presented in the next table.
Findings	No findings were raised
Conclusion	The actual emission reductions achieved in any of specific CPAs are not higher than the estimated quantity of ERs in the CPA-DDs/2/. Accordingly, it was accepted by the verification team.

E.3.7. Assessment of reported sustainable development co-benefits

Means of verification	The coordinating/managing entity did not identify and establish the monitoring of the sustainable development benefits of the registered CDM PoA/1/ and no such document was developed and published on the UNFCCC CDM website/12/. Therefore, assessment is not required.
Findings	No findings were raised
Conclusion	The CME is not required to monitor the sustainable development benefits of the registered CDM PoA.

E.3.8. Global stakeholder consultation

Means of verification	The global stakeholder consultation was not found applicable because period under verification is 3rd monitoring period.
Findings	No findings were raised
Conclusion	The requirement is applicable for situations when global stakeholder consultation was carried out after the publication of first monitoring report. Therefore, this was not found applicable.

SECTION F. Internal quality control

The draft verification report that is prepared by verification team is reviewed by an independent technical review team (one or more members) to confirm if the internal procedures established and implemented by Earthood were duly complied with and such opinion/conclusion is reached in an objective manner that complies with the applicable CDM rules/requirements. The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scope the project activity relates to. All team members of technical review team are independent of the verification team

During the technical review process additional findings may be identified or the closed-out findings may be opened, which needs to be satisfactorily resolved before the request for issuance is submitted to UNFCCC. The independent technical reviewer may either approve the report as such or reject/return the same in such case providing the comments/findings/issues that needs to be resolved by the verification team. The decision taken by the Technical Reviewer is final and is authorized on behalf of Earthood Services Private Limited.

SECTION G. Verification opinion

Earthood Services Private Limited (ESPL), contracted by Impact Carbon (the CME for the PoA), has performed the second independent verification of the emission reductions for the registered CDM PoA 9948

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"Impact Carbon Global Safe Water Programme of Activities (PoA)" for the third monitoring period 23/05/2019-31/12/2019 (both days included) as reported in the Monitoring Report (final) Version 4.0 dated 19/03/2021/13/. The CME is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.

This verification report is for the PoA-9948 which was included at the UNFCCC webpage at the end of the current monitoring period.

ESPL confirms that the monitoring system is in place and the emission reductions are calculated without material misstatements. This verification report has been prepared using the latest available template/11/ specified by UNFCCC and complies with the instructions to follow of CDM VVS-PoA Version 02/9/.

The verification activities were conducted in accordance with ESPL's CDM Quality Manual System as per the steps indicated under Section A of this report. The verification process has resulted in conclusion that the included CPAs confirm to the revised accepted PoA-DD/1/ as well as comply with applicable CDM rules and regulations and in accordance with applied monitoring methodologies, AMS III.AV (Version 04)/6/.

As a result, it is confirmed that the emission reductions from the CDM PoA 9948 "Impact Carbon Global Safe Water Programme of Activities (PoA)" are correctly reported in the Monitoring Report, Version 4.0, dated 19/03/2021, and corresponding ER sheets for the monitoring period 23/05/2019-31/12/2019 (including both days) amount as 117,570 tCO₂e. Therefore, this will be submitted as part of request for issuance as per CDM PCP Version 02/8/.

SECTION H. Certification statement

The verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. ESPL planned and performed the verification by obtaining evidence and other information and explanations that ESPL considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions reported for the PoA for the monitoring period 23/05/2019 – 31/12/2019 (MP 03) are fairly stated in the Monitoring Report (final) Version 4.0 dated 19/03/2021,

ESPL, based on outcome of verification activities, certify in writing that, during the monitoring period 23/05/2019-31/12/2019 (including both days), the registered CDM PoA "Impact Carbon Global Safe Water Programme of Activities (PoA)" and the included CDM CPAs achieved the verified amount of 117,570 tCO₂e reductions in anthropogenic emissions by sources of greenhouse gases that would not have occurred in the absence of the CPAs.

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Appendix 1. Abbreviations

	Full texts
AMS	Approved Methodology for Small-scale
BE	Baseline Emission
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CH ₄	Methane
CL	Clarification Request
CME	Coordinating and Managing Entity
CO ₂	Carbon di oxide
CPA	Component Project Activity
CP	Crediting Period
DNA	Designated National Authority
DR	Desk Review
DOE	Designated Operational Entity
EB	Executive Board
ER	Emission Reduction
ESPL	Earthood Services Private Limited
FAR	Forward Action Request
GHG	Green House Gas
GSC/GSP	Global Stakeholder Consultation Process
GW	Giga Watt
GWh	Giga Watt hour
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
kW	kilo Watt
L/min	Litres per minute
LoA	Letter of Approval/Authorization
LSC	Local Stakeholder Consultation Process
MoC	Modalities of Communication
MoV	Means of Validation
MP	Monitoring Plan
MW	Mega Watt
MWh	Mega Watt hour
PCP	Project Cycle Procedure
PE	Project Emission
PoA DD	Programme of Activities Design Document
PP	Project Participant
PRC	Post Registration Changes
PS	Project Standard
QA/QC	Quality Assurance/Quality Control
tCO ₂ e	tonnes of Carbon di Oxide equivalent
UID	Unique Identification
UNFCCC	United Nations Framework Convention on Climate Change
V	Version
VVS	Validation and Verification Standard
WPS	Water Purification Systems

Appendix 2. Competence of team members and technical reviewers

Competence Statement			
Name	Deepika Mahala		
Country	India		
Education	M. Sc. (Environmental Management), GGSIP University B.Sc. Hons. (Chemistry), Sri Venkateshwar College, DU		
Experience	3 Years +		
Field	Climate Change		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	ACM0002, AMS.I.D., AMS.I.A, AMS.III.AV, AMS.II.G		
Local expert	YES (India)		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert	YES (TA 1.2 & TA 3.1)		
Reviewed by	Shreya Garg	Date	14/09/2018
Approved by	Anshika Gupta	Date	14/09/2018

Competence Statement			
Name	Vaishali Vatsa		
Education	M.Sc. (Environmental Studies and Resource Management), TERI University		
Experience	4 months		
Field	Climate Change		
Approved Roles			
Team Leader	NO		
Validator	Yes		
Verifier	Yes		
Methodology Expert	NO		
Local expert	NO		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (X.X)	NO		
Trainee	NO		
Reviewed by	Shreya Garg	Date	30/12/2019
Approved by	Anshika Gupta	Date	02/01/2020

Competence Statement	
Name	Kumden Nanbal Luka
Country	Nigeria
Education	B.tech. in Urban and Regional Planning

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Experience	1+ years		
Field	Environment; Urban-Rural planning		
Approved Roles			
Team Leader	No		
Validator	No		
Verifier	No		
Methodology Expert	No		
Local expert	Yes (Nigeria)		
Financial Expert	No		
Technical Reviewer	No		
TA Expert	No		
Reviewed by	Shreya Garg	Date	23/11/2018
Approved by	Anshika Gupta	Date	23/11/2018

Competence Statement			
Name	Ashok Gautam		
Country	India		
Education	M. Sc. (Environmental Sciences) M. Tech. (Energy & Environmental Management)		
Experience	16 Years +		
Field	Energy, Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Methodology Expert	AMS-I.D., AMS-I.A., AMS-I.C., AMS-I.E, AMS-II.D., AMS-II.G., AMS-III.E., AMS-III.H., AMS-III.Q, AMS-III.Z., AMS-III.AV., AM0029, AM0025, AM0056, ACM0001, ACM0002, ACM0004, ACM0012, ACM0006, AM0018, ACM0009, AM0034, AMS.I.B, ACM0003		
Local expert	YES (India)		
Financial Expert	YES		
Technical Reviewer	YES		
TA Expert	YES (TA 1.1, TA 1.2, TA 3.1, TA 13.1)		
Reviewed by	Shreya Garg	Date	23/10/2019
Approved by	Anshika Gupta	Date	23/10/2019

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	Impact Carbon	Registered PoA-DD Revised Approved PoA-DD (Version 6.1) Revised Approved PoA-DD (Version 7.0)	Dated:24/03/2014 Dated: 15/02/2017 Dated: 18/04/2017	CME
2	Impact Carbon	Registered CPA-DD-03 Registered CPA-DD-05	Version 1.3, Dated: 17/02/2017 Version 5, Dated: 22/03/2019	Other

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		Registered CPA-DD-06 Registered CPA-DD-07 Registered CPA-DD-08 Registered CPA-DD-09 Registered CPA-DD-10 Registered CPA-DD-11 Registered CPA-DD-12 Registered CPA-DD-13		
3	Carbon check India Pvt Ltd.	CPA Inclusion Report (9948-P1-0003-CP1, 9948-P1-0005-CP1 to 9948-P1-0013-CP1)	Version 3, Dated: 06/03/2017, Version 2, Dated: 22/09/2017	Other
4	Impact Carbon	ER sheet (Version 4.0)	Corresponding to the current monitoring period	CME
5	Impact Carbon	Sales Database	-	CME
6	UNFCCC	Methodology: AMS III A.V.	Version 4	Others
7	UNFCCC	PS for PoA	Version 2	Others
8	UNFCCC	PCP for PoA	Version 2	Others
9	UNFCCC	VVS for PoA	Version 2	Others
10	UNFCCC	CDM-PoA-MR-Form	Version 3	Others
11	UNFCCC	CDM-PoA-VCR-Form	Version 3	Others
12	UNFCCC	PoA UN webpage	https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/5J36IFUKQVNMRA00ZPGLH9C7STED1W/viewCPAs?s=0	Others
13	Impact Carbon	Monitoring Report (Final)	Version 4.0 dated 19/03/2021	CME
14	Impact Carbon	Purchase Orders	Various	CME
15	Impact Carbon	Agreement between CME and CPA Implementer	Dated: 09/06/2017	CME
16	GACC	GACC Analysis report (The Truth About Cooking Landscape Analysis, Nigeria)	Dated:14/10/2016	CME
17	DHS	DHS Report, Nigeria 2016	2016	CME
18	Impact Carbon	Monitoring forms (Scanned and filled)	Various (November 2019-December 2019)	CME
19	UNFCCC	Standards for Sampling and survey for CDM PoA	Version 8.0	Others
20	Impact Carbon	Training Records	-	CME
21	Impact Carbon	Delivery Notes	Multiple Dates	CME
22	IPCC	IPCC default values for fossil fuels	https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf	Other
23	MICS	MICS 2016-2017 survey report for Nigeria	https://www.unicef.org/nigeria/reports/multiple-indicator-cluster-survey-2016-17-mics	CME
24	WHO	WHO Technical Notes on Drinking -Water sanitation and Hygiene	https://www.who.int/water_sanitation_health/emergencies/WHO_TN_10_Hygiene_promotion_in_emergencies.pdf?ua=1	CME
25	UNFCCC	AMS-I.E.	Version 5.0	Other
26	UNFCCC	UNFCCC SSC WG 37 th Meeting Report for Nigeria	http://cdm.unfccc.int/Panels/ssc_wg/meetings/037/ssc_37_an14.pdf	CME
27	Impact Carbon	UID photographs of WPS	-	CME
28	Impact Carbon	Manufacturer's Specifications	Chlorination - Medentech UltraFLO/UltraTAB Specification Sheet - capacity and expiry Rotek Multibarrier UV specification - capacity	CME

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			Rotek Multibarrier UV- Lifespan certificate	
29	Impact Carbon	Evaluating household water treatment options: Health based targets and microbiological performance specifications" (WHO 2011)	https://www.who.int/water_sanitation_health/publications/2011/evaluating_water_treatment.pdf	CME
30	Impact Carbon	Photos of Aquagenx tests	-	CME
31	UNFCCC	Guidelines for sampling and surveys for CDM project activities and programme of activities	Version 4.0	Other
32	Stat Trek	Screenshot- Stat trek random number generator	-	CME
33	Impact Carbon	Random number -excel sheet	-	CME
34	Impact Carbon	Site-exemption Clarification Mail	16/03/2020	CME
35	Impact Carbon	Emission Reduction Purchase Agreement	2016-2020	CME
36	Impact Carbon	Water Quality test Photographs	-	CME
37	Impact Carbon	Complaint Log (Sample)	-	CME
38	Impact Carbon	Remote Survey Files Selected Sample Videos, Interview video of the school representative	17/03/2020-23/03/2020	CME
39	UNFCCC	Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	Version 1.0	Others
40	ESPL	Verification report for MP 2	Version 3.0	Other
41	CME	ER sheet for MP2 https://cdm.unfccc.int/PoAIssuance/iss_db/poais63061347/view	-	Other
42	Federal Ministry of Education, Nigeria	Academic school calendars	Calendar for 2018-2019 Calendar 2019-2020	CME
43	New York times Worldometer	https://www.nytimes.com/interactive/2020/world/asia/india-coronavirus-cases.html Status on Novel Coronavirus Cases in India URL: https://www.worldometers.info/coronavirus/country/india/	- Dated 21/01/2021	Other
44	UNFCCC	EB-106 Meeting report	-	Others

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Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FARs from validation and/or previous verification

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FAR ID	NA	Section no.	NA	Date : NA
Description of FAR				
NA				
Project participant response				Date : DD/MM/YYYY
NA				
Documentation provided by project participant				
NA				
DOE assessment				Date: DD/MM/YYYY
NA				

Table 2. CLs from this verification

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CL ID	01	Section no.	E.3.4.2	Date : 15/05/2020
Description of CL				
<div>1. Considering that η_{wb} is defined as data to be monitored and the question is also listed under monitored data worksheet (column P and Q), why the responses were not captured or reported? The parameter defines the default value depending upon the baseline device. How the type of baseline device was not identified as part of monitoring survey in spite of having question for that? Please clarify?</div> <div>2. Several parameters under Section E.2 define multiple frequencies as permitted by registered monitoring plan. However, it is not clear what has been following in the current monitoring period? para 263c of CDM PS PoA V2)</div> <div>3. Several parameters e.g., $EC_{pi,i,y}$ defines multiple sources of data viz., manufacturers' specifications, surveys or direct monitoring. Therefore, it is not clear which one(s) are/were used in the current monitoring period. (para 263d of CDM PS PoA V2)</div>				
Project participant response				Date : 21/05/2020
<div>1. The question listed under monitored data worksheet (column P and Q) captures the likelihood of project users boiling water after treatment by the project devices. If any of the sampled user is found boiling water after water treatment by project device, appropriate discounts need to be applied to emission reduction calculations (given boiling water after purification by project device will neutralize the baseline emissions avoided by the corresponding project device). No sample users were found boiling water after treatment with project device. Hence the columns P and Q don't show any response as they are only attributed to post project device treatment boiling cases.</div> <p>Additionally, please refer page number 82 and 115 of the registered PoA-DD which states the following:</p> <p><i>Default values as per AMS-III.AV combined with survey, national, or regional data to determine the percent of users using different types of water boiling systems in the baseline scenario.</i></p> <p>Thus, % users using unimproved biomass burning stove, other biomass burning stove and/or fossil fuel stove in Nigeria has been updated as the per the Global Alliance for Clean Cookstoves, Nigeria report and a weighted average value has been applied to determine η_{wb}. This remains the most recent national data available. Hence determination of η_{wb} value is in line with the registered PoA-DD.</p> <div>2. The monitoring frequencies under section E.2 of the MR have been revised as per the monitoring</div>				

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frequency followed for various monitoring parameters in the current monitoring period. The revised MR is being submitted.

3. The source of data of EC_{pi,y} and other monitoring parameters have been revised in the MR. Only the source of data used in the current monitoring period is mentioned under section E.2 of the revised MR. The revised MR is being submitted.

Documentation provided by project participant

PoA 9948_MP3_Norway 2 Nigeria MR ver 2.1_21052020

DOE assessment

Date: 01/06/2020

1. The parameter nwb is monitored to calculate the efficiency of baseline device and the discount factor is applied when the end-user is found to be using the baseline device along with the deployed project device. As per the GACC report it was confirmed that all the public institutions cook with wood on traditional three stone fire and in-line to the default value stated in the applied methodology 10% was used as the efficiency of traditional stove.

The question listed under column P and Q was found to be appropriate for the users using boiling of water post the use of project device. From the monitoring survey forms it was also confirmed that none of the users were boiling water post the treatment from the project device. Thus, no responses were recorded under the respective columns which was found to be appropriate and correct.

CME would apply the weighted average value of the % users using unimproved biomass burning stove other biomass burning stove or fossil fuel stove in Nigeria so as to determine nwb value for the users using more than one baseline device in-line to the Source of data of the parameter mentioned on page 82 and 115 of the registered PoA-DD (Version 7.0). Thus, the clarification provided by the CME of using the default value for the monitored parameter as all the end-users were found using unimproved biomass burning stove as confirmed from the monitoring sheet as well as survey forms. The approach for the determination of nwb value was found to be in-line with the measurement methods and procedure mentioned in the registered PoA-DD (on page 83). (Closed)

2. The MR has been revised to mention only the chosen frequency. The frequency is in line with the applied methodology and registered PoA DD. Thus, the revisions to the MR were found to be correct and were accepted by the verification team.
3. The MR has been revised to mention only the chosen source of the parameter. The source now mentioned in the MR was provided to the verification team as an evidence. The source is in line with the applied methodology and registered PoA DD. Thus, the revisions to the MR were found to be correct and were accepted by the verification team.

Thus, CL#01 stands closed.

Deleted:

CL ID	02	Section no.	E.3.4.3	Date : 15/05/2020
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Description of CL

1. Sample size calculation worksheet the text mentioned in row 25 (column A to c) is not clear, given that the parameter discussed is Operational Units. Please clarify. The reported monitored value in MR is 94% for Operational Units, whereas the weighted average results in ER sheet is 93.75%. Please clarify. Similarly, the reported value of Water Quality in MR is 0.95, whereas the weighted average value in ER sheet is 95.17%. Please clarify.
2. Please clarify when was the sampling conducted in order to confirm whether the monitoring frequency for parameters monitoring through sampling are in accordance with the registered monitoring plan (of also refer e.g., CPA DD 05 Section B.5.3 para (a)) given the monitored data worksheet in the ER does not contain the date the survey was carried out. In MR, it is indicated that it was carried out in November and December 2019 without specifying the actual start date and end date. (para 263c of CDM PS PoA V2)
3. PP shall explain how vintage or age of devices has been considered in sampling by CME

Project participant response

Date : 21/05/2020

1. The text mentioned in row 25 (column A to C) of Sample Size Calculation worksheet has been revised as "Operational Units". The value of Operational Units has been revised in the MR as per the ER Sheet to be consistent with the ER Sheet. The value of parameter "Water Quality" has also been revised in the MR to be consistent with the ER Sheet. The revised MR and ER sheet are being submitted.
2. The duration of monitoring has been specified in section E.3 of the revised MR. The revised MR is

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<p>being submitted.</p> <p>3. CME has applied stratified random sampling for the current monitoring period on the basis of technology (UV, Ultra TAB, UltraFlo). The water purification systems (WPS) installed/distributed across different CPAs (as recorded in the sales database) were stratified based on technology and desired number of samples were drawn from each stratum. The registered monitoring plan does not mandate sampling based on the vintage or age of WPS unit.</p> <p>Further, the WPS technology installed/distributed in among various CPAs does not have age dependent performance hence, stratification on the basis of age is not deemed applicable.</p>
Documentation provided by project participant
PoA 9948_MP3_Norway 2 Nigeria MR ver 2.1_21052020 PoA 9948_MP3_Norway 2 Nigeria ER Sheet_ver 2.1_21052020
DOE assessment
Date: 01/06/2020
<p>1. PP has revised the values in the MR (Version 2.1) for both parameters 'Operational Units' (93.75%) and Water Quality (0.95) in-line to the ER sheet (Version 2.1). PP has also, revised the text mentioned in row 25 of the Sample Size Calculation worksheet as "Operational units". The information was found to be correct. (Closed)</p> <p>2. The CME has now included the dates of monitoring under section E.3 of the revised MR (version 2.1). The dates were checked with the survey forms and it was confirmed that the surveys have been conducted with the period mentioned in the revised MR.</p> <p>3. The installed project devices have been sampled by applying stratified random sampling for the current monitoring period on the basis of the technology distributed. As per the assessment of the CPA sales database sheet it was found out that a desired number of samples were drawn from each stratum of applied technology and in-line to the registered monitoring plan the sampling was based on the technology type and not based on age or vintage of WPS unit. Also, the applied methodology AMS-III.A.V version 4.0, does not have any provision to consider the vintage.</p> <p>Thus, the clarification provided by PP was found to be justified.</p> <p>Thus, the CL is closed.</p>

CL ID	03	Section no.	E.3.6.1.	Date : 08/09/2020
Description of CL				
<p>a. The "System's residual capacity at the end of monitoring period (Ltrs)" shown in column AL of sheet "Sales Database". The formula does not reflect the residual capacity at the end of the monitoring period, i.e. it does not subtract the total water consumption from the residual capacity from previous MP and any additional capacity.</p> <p>b. In light of issue (a) above, the "Residual capacity from previous MP (Ltrs)" shown in column AB of sheet "Sales Database", it is not clear whether the values have been correctly determined.</p> <p>c. It is not clear how the CME calculated the reliability/achieved precision. The formula used to calculate the reliability/achieved precision was not found to be correct. For example, it is observed that the formula does not include z-value but include a factor 0.5, and the formula compares the achieved precision with z-value.</p> <p>d. The CME is requested to clarify the ER calculation in particular for the cumulative treatment capacity. In column AH of Sales Database spreadsheet, the value of "Cumulative treatment capacity of the system based on # units installed / supplied (Ltrs)" does not reflect the actual installed unit. For example, it is observed that the S.No. 162 have installed 3 UltraFLO units (Ty,i = 3) respectively, but the respective cell under AG shows the cumulative treatment capacity only based on one unit.</p> <p>e. The "Total Distributed Water Purification Systems (Ty,i)" In column AD of Sales Database spreadsheet, the value for UltraTAB is always 1 regardless the number of units supplied shown under column E .</p> <p>f. The formula in column AD of Sales Database spreadsheet includes figures "3050" and "3185" which purpose is not explained.</p> <p>g. The CME has applied formula in the ER sheet to ensure that the Ny,i multiplied by Ry,i does not exceed the maximum output of the unit [per unit]" as per the same provision reported in the monitoring report page 20. However, it is not clear how and where such provision has been applied in the ER sheet.</p> <p>h. The operation days considered in the ER calculation includes non-school days. However, the ER calculation considers both boarding and non-boarding persons.</p>				
Project participant response				Date : 08/09/2020
<p>a. The "System's residual capacity at the end of monitoring period (Ltrs)" as shown in column AL of "Sales Database", duly incorporates the residual capacity from previous MP and any additional capacity as follows:</p>				

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- i. Firstly, the "Treatment capacity of a unit (based on residual/installation capacity + subsequent supplies (Ltrs))" has been calculated (column AH) in worksheet "Sales Database" considering the residual capacity per unit, at the end of previous monitoring period (column AB) and any additional capacity added (column AC) during the monitoring period.
 - ii. Thereafter, "System's Continuous running end date" (column AJ) has been determined based on treatment capacity of a unit (calculated in column AH as explained above) divided by total water consumption per unit (column AG) of worksheet "Sales Database".
 - iii. This "System's continuous running end date" is then used to determine the residual capacity of the system after the end of monitoring period in column AL. If the "System's continuous running end date" is before the end date of the monitoring period, the residual capacity is calculated as 0. If the "System's continuous running end date" is after the end date of monitoring period, the residual capacity, at the end of monitoring period, is calculated as the number of running days remaining after end of monitoring period * Total Volume of drinking water per day per unit (column AG).
- Thus, the aforesaid ensures that residual capacity at the end of monitoring period is correctly calculated.
- b. Although, the concerned monitoring period begins on 23 May 2019, however, there are significant number of systems that are in continued use from the previous monitoring period. For such systems, the residual (remaining) capacity of the system (determined at the end of the previous monitoring period following the same approach as that explained in a above) has been used as the starting capacity for the current monitoring period. This has been listed in column AB of worksheet "Sales Database". For new systems installed in current monitoring period (hence not having any residual capacity carrying forwarded from the previous monitoring period), the residual capacity at the end of previous monitoring period has been considered as 0 in column AB. The calculator showing residual capacity determined at the end of MP#2 is being submitted.
 - c. The formula in worksheet "Sample size calculation" cell D27, D50 and D73 have been rectified in line with eq. 42, page 89 of the Guideline: Sampling and surveys for CDM project activities and PoAs (v.4). Similarly, cell D28, D51 and D74 in the worksheet "Sample size calculation" have been rectified to compare the achieved precision with the applicable precision limit (10%). The revised ER Sheet and MR are being submitted.
 - d. In case of multiple units of UltraFlo or Multi Barrier UV systems installed in an institution, it is deemed that these units will be used simultaneously (or in parallel) to service different persons and areas in that institution. Thus, in such cases, $N_{y,i}$ has been calculated as number of persons serviced / unit (refer "Sales Database" for S. No. 160, excel row 162, where $AE162 = K162 / AD162$). Accordingly, in column AH of the worksheet "Sales Database", the "Treatment capacity of a unit (based on residual / installation capacity + subsequent supplies) (Ltrs)" has been determined for a singular unit. This ensures consistency wrt application of $N_{y,i}$ calculated in AE162 and for determining other values in cells AJ162 and AE162 which determine the number of days the systems are expected to run continuously, if used simultaneously (based on individual capacity of system and average number of persons serviced per unit system). The aforesaid approach has been incorporated in the ER sheet to ensure $(N_{y,i} * R_{y,i})$ per unit does not exceed the maximum output of a unit system for cases where multiple systems are used simultaneously as explained in question (g) below. Consideration of aggregate capacity of all systems in Cell AH162, would over-calculate the maximum output/system and would result in over-estimation of emission reductions. While "Sales Database" does focus on $N_{y,i}$ per unit, the "ER Summary" considers the total number of units from column AD of "Sales Database" to calculate $T_{y,i}$.
 - e. Please refer registered CPA-DDs 9948-P1-0005-CP1 To 9948-P1-0013-CP1, page 15, "Additional comment" under parameter table for $T_{y,i}$, which states the following:
*In case of Ultra tabs, parameter $T_{y,i}$ shall be the number of institutions where Ultra Tabs are being supplied. Thus, each school receiving Ultra tab will be counted as one unit, for the purpose of determining $T_{y,i}$. As Ultra tabs get consumed over time, institutions will receive regular supplies to ensure continuous disinfection. The total number of Ultra Tabs supplied to a given institution shall also be monitored and documented (to ensure capping of $N_{y,i} * R_{y,i}$ as explained in the following table for $N_{y,i}$).*
Thus, in line with aforesaid, the PP has monitored the total number of UltraTAB units initially supplied to an institution in column E and subsequent supplies in column R:AA. Further, in column AG, each institution receiving UltraTAB system has been counted as singular unit for determining $T_{y,i}$. This has been specified in additional comments section of parameter $T_{y,i}$ in MR, page 20.

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The aforesaid approach has been discussed (via a clarification request from CDM EB) and approved by CDM-EB during PRC-9948-003. Please refer document DOE clarification 8 – “FVR 599 CPA 5 to 13 PRC VR Nigeria 25.03.19 clean”, page 20 of 26, CAR 02 and 03 dated 18/02/2019 and 18/03/2019 respectively. (<https://cdm.unfccc.int/PRCContainer/DB/prcp52130222/view>)

- f. The emission reduction generated by each water purification system is limited to 600 tCO₂e / annum in line with the eligibility criteria #16 for inclusion of a CPA in the PoA. Thus, to ensure compliance with the aforesaid, the CPA-DDs have put a cap on $N_{y,i}$ as follows:

CPA number	Cap on $N_{y,i}$	Reference
9948-P1-0003-CP1	3,050	Page # 6 of included CPA-DD
9948-P1-0005-CP1 to 9948-P1-0013-CP1	3,185	Page # 6 of included CPA-DDs

Hence, the formula in column AE in worksheet “Sales Database” includes the aforesaid cap to ensure that no system generates more than 600 tCO₂e / annum in line with registered PoA/CPA-DDs.

- g. Please note, that the registered monitoring plan mandates to limit $N_{y,i} * R_{y,i}$ at maximum output of unit [per unit]. The $N_{y,i}$ (per unit) * $R_{y,i}$ (Average Volume of drinking water per person per day) has been calculated in column AG of worksheet “Sales Database”. The treatment capacity (per unit) has been calculated in column AH.

In Column AJ, continuous running end date of a system has been determined based on treatment capacity of a unit divided by ($N_{y,i}$ (per unit) * $R_{y,i}$). Thus, continuous running end date is then used to determine the residual capacity of the system after the end of monitoring period in column AL. A residual capacity of 0 indicates that the system was fully consumed before the end of monitoring period. This automatically ensures that $N_{y,i} * R_{y,i}$ never exceeds the maximum output capacity of the system. A non-zero residual capacity shows that the output capacity of the system is more than $N_{y,i} * R_{y,i}$ leaving some un-utilized capacity at the end of monitoring period.

Hence, in this way, it is ensured that $N_{y,i} * R_{y,i}$ never exceeds the maximum output of the unit [per unit].

- h. The CPAs supply safe drinking water to institutions (day schools, boarding schools, prisons etc.). The application of 365 days of operation for the project units is justified on the basis of the following:
- The number of days of operation is mentioned as 365 days in the registered PoA-DD (refer equation 1.a. on page 70 and page 101 of the registered PoA-DD). Similarly, the CPA-DDs also mention 365 days of operation in the ER formulae.
 - Besides, the number of days of operation is neither an ex-ante parameter nor an ex-post monitoring parameter as per the monitoring methodology or the registered monitoring plan in the PoA-DD.
 - The application of 365 days of operation per year for project units is also corroborated by the subsequent versions of the methodology (refer para 17 of AMS-III AV. Version 08.0).
 - Last but not the least, the applied methodology (AMS III.AV version 4.0) caps the volume of drinking water per person per day at 5.5L/capita/day. The PoA has applied a much conservative cap of 2L/person/day (for day school) and 3.5L/person/day (for boarding schools /prison). These limits are already attributed to minimum survival levels advocated by WHO (Minimum water quantity needed for domestic uses, Technical Note No. 9, WHO/SEARO Technical Notes for Emergencies). Table 1 of the referred document mentions that minimum survival allocation for domestic use (i.e. full day service deemed equivalent to boarding schools and prisons) as 7 l/capita/day (sustainable only for few days), out of which 3-4 ltr is attributed solely for drinking. For schools, it specifies 2 ltr per student per day as the minimum requirement. Also, Water, Sanitation and Hygiene Standards for Schools in Low-cost Settings, published by WHO specified a basic water requirement of 5 l/per/day for day / non-residential schools and 20 ltr/per/day for boarding schools (Page 18, Water, Sanitation and Hygiene Standards for Schools in Low-cost Settings, Indicators for Guidelines). Thus, a consideration of 2 ltr/per/day for day schools and 3.5 ltrs/per/day for boarding schools/prisons is

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already referring to minimum survival levels and is overly conservative and deemed applicable to entire year.

The aforesaid approach has been discussed (via a clarification request from CDM EB) and approved by CDM-EB during PRC-9948-003. Please refer document DOE clarification 8 – “FVR 599 CPA 5 to 13 PRC VR Nigeria 25.03.19 clean”, page 20 of 26, CAR 01 dated 21/01/2019. (<https://cdm.unfccc.int/PRContainer/DB/prcp52130222/view>).

Documentation provided by project participant

PoA 9948_MP3_MR1 Nigeria ER Sheet ver 3.0 08092020

PoA 9948_MP3_MR1 Nigeria MR ver 3.0 08092020

PoA 9948_MP2_MR4_Nigeria ER Sheet_ver 3.0 10082020 (for leftover residual capacity from previous MP)

DOE assessment

Date: 10/09/2020

- a. The system's residual capacity at the end of the monitoring period as mentioned in column 'AL' of the sales database worksheet is found to be dependent on the residual capacity from the previous monitoring period (MP2), additional capacity supplied during the monitoring period and the water consumption during the current monitoring period. The residual capacity of the systems at the end of MP2 has been cross-checked with the "MP2 residual capacity calculation sheet" shared by the CME and found to be correctly calculated.
The CME's approach of calculating the residual capacity of the system at the end of the monitoring period as a function of "system continuous running days", "duration of the monitoring period" and "total water consumption per unit per day" was evaluated and found to be correct. Besides, the same approach is consistent with the assessment of $(N_{y,i} * R_{y,i}) < \text{maximum output capacity of a unit}$ discussed in point g) below.
- b. The column AB of the sales database worksheet was checked to confirm that it correctly reflects system's leftover residual capacity (i.e. remaining capacity at the end of MP2 which is being carried forward from MP2 to MP3) and has been considered as the initial capacity for the current monitoring period.
Accordingly, for the systems installed in the current MP, the CME considered the value of residual capacity at the end of MP2 as zero because there was no leftover residual capacity in MP2. The residual capacity calculation for the system's in use from MP2 were cross-checked from the "MP2 residual capacity calculation sheet" shared by CME and were found to be correct as mentioned in the current sales database CERPD2 sheet under column AB.
- c. CME has rectified the formula in cell D27, D50 and D73 of the Sample Size calculation worksheet of ER sheet (Version 3.0). The rectification of formula in cell D27, D50 and D73 was found to be made in-line with the eq.42 (on page 89) of the Guideline: Sampling and surveys for CDM project activities and PoAs (v.4). Also, Cell D28, D51 and D74 of the 'Sample size calculation' sheet was found to be rectified and reflects the comparison of the achieved precision with the applicable precision limit of 10%.
The revisions in the sample size calculation sheet were found to be made in-line with the provisions stated in the appendix 4 of the Guideline: Sampling and surveys for CDM project activities and PoAs (v.4).
- d. The "Treatment capacity of a unit (based on installation + subsequent supplies) (Ltrs)" (in column AH of sales database) reflects treatment capacity for one unit only, in case of institutions with multiple units. This is deemed in sync with the parameter 'Ny,i' found to be calculated as Numbers of persons serviced / unit as verified from column AE of the 'Sales database sheet'.

The approach of calculating treatment capacity and number of persons serviced per unit by CME to ensure that the value of $(N_{y,i} * R_{y,i})$ does not exceed the maximum output of a unit system for cases where multiple systems are being used simultaneously, is found acceptable and correct. It is further confirmed that the aggregation of capacity (in column AH) of all the systems installed in an institution (for UltraFLO or Multi Barrier UV) would over-calculate the maximum output per system and would result in the over-estimation of ERs. Also, from the 'ER summary sheet' (Row=2) it has been verified, that CME has considered total number of units from column AD of 'Sales database' to calculate $T_{y,i}$ even though column AE of the 'Sales database' calculates $N_{y,i}$ per unit. Thus, the cumulative treatment capacity value of per unit under column AH of the ER sheet was found to be acceptable.

- e. The number of units (under column AC of sales database worksheet) distributed ($T_{y,i}$) for Ultra Tab system was found to be 1 for all the institutions. It is in line with the additional comment

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under parameter table of 'Ty,i' of the referred registered CPA-DDs 9948-P1-0005-CP1 To 9948-P1-0013-CP1, page 15 that in case of Ultra Tabs the value of parameter Ty,i shall be the number of institutions where the Ultra Tabs were being supplied i.e. each institutions to be counted as 1. Due to the consumption of the Ultra Tabs over time, CME ensured that there would be continuous disinfection through regular supplies of the Tablets to these institutions.

From the 'Sales database sheet' it was verified that CME has monitored the total number of units supplied to an institution initially under column E and the subsequent supplies were also found to be monitored and captured by the CME under column R:AA. Further, in case of UltraTAB, Column AH (Treatment Capacity = number of tablets supplied * 100 ltrs) of the Sales database Worksheet corresponds to this approach of Ultra Tab system received by the institution being counted as single unit for determining parameter Ty,i.

The approach of calculating parameter Ty,i for UltraTAB has already been discussed and approved by CDM-EB under PRC-9948-003 as verified from the 'DOE clarification- CCIPL 599 revised FVR'.

- f. The eligibility criteria #16 (De-bundling) for the inclusion of CPA in PoA, was found to state that the emission reduction generated by each Water purification system is limited to 600 tCO₂e/annum as verified from the registered CPA-DDs. CME has capped the value of Ny,i to be in compliance with the eligibility criteria #16.

The capped value for Ny,i was found to be 3050 persons /unit (for CPA-9948-P1-0003-CP1) and 3185 persons /unit (for CPA-9948-P1-0005-CP1 to 9948-P1-0013-CP1) as verified from page 6 of the respective included CPA-DDs.

So, CME's approach of applying these values in column AE of the sales database worksheet (of the ER sheet version 3.0) was found to be acceptable as it ensured that no system would generate more than 600 tCO₂e/annum in line with the eligibility criteria set in the registered CPA-DDs and PoA-DDs.

- g. As per the registered monitoring plan, the value of Ny_i*Ry_i should not exceed the maximum output of the unit (per unit). The calculation of Ny_i* Ry_i provides the total volume of drinking water consumption per day per unit under column AF of the Sales Database Worksheet.

In order to ensure that the system does not exceed maximum output of the unit, CME has calculated the treatment capacity of the system (per unit) under column AH. The treatment capacity value was then divided by the calculated value of (Ny_i (per unit) * Ry_i) of the unit to determine the continuous running end date of a system (under column AJ). The residual capacity of the system after the end of monitoring period is determined through the continuous running end-date. The residual capacity of 0 reflected the complete consumption of system ensuring Ny_i* Ry_i value has not been exceeded whereas the non-zero value were indicative of the un-utilized system capacity by the end of the monitoring period (as evident from the column AL of Sales database sheet).

Thus, this approach of CME was found to be acceptable as it ensured that Ny_i * Ry_i never exceeds the maximum output of the unit [per unit] which was found to be in-line with the registered monitoring plan.

- h. CME has applied the value of 365 for the number of days of operation for the project units, which was found to be acceptable because of following justifications provided:
- I. Both PoA-DD and the CPA-DDs mention 365 days as the number of days of operation as verified from page 70 and page 101 of PoA-DD and ER formulae of the CPA-DDs.
 - II. Again, days of operation, was neither found to be an ex-ante parameter nor to be an ex-post monitoring parameter as verified from the registered monitoring plan.
 - III. The subsequent versions of the applied methodology (AMS-III AV. Version 08.0) was reviewed and it was confirmed that value of 365 days for the days of operation has been applied in the applicable formulae and sample calculation shown in the methodology.

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- IV. The capped volume of drinking water per person per day of 2L/person/day (for day school) and 3.5L/person/day (in boarding school) in the PoA was found to be conservative as these value were found to be meeting the minimum survival levels set by WHO. As per Technical Notes for emergencies by WHO, the minimum survival capacity has been allocated as 7 l/capita/day (sustainable only for few days), out of which 3-4 ltr is attributed solely for drinking. For schools, it specifies 2 ltr per student per day as the minimum requirement. Also, minimum requirement for day schools were found to be 5l/person/day and 20l/person/day as verified from water sanitation and Hygiene standards for Schools in Low-cost settings by WHO.

Thus, following the above set levels CME's approach of considering 2 ltr/per/day for day schools and 3.5 ltr/per/day for boarding schools/prisons were found to be conservative and acceptable. This, approach has already been discussed and approved by CDM-EB as verified from DOE clarification 8 "FVR 599 CPA 5 to 13 PRC VR Nigeria 25.03.19 clean"

Thus, CL#03 stands closed.

CL ID	04	Section no.	E.3.4.2.	Date : 26/03/2020
Description of CL				
The CPA-DDs indicate the monitoring frequency for the parameter "operational units" as "At least once per verification or biennially as per the monitoring requirements in the methodology". The applied methodology (AMS-III.AV. ver. 04, paragraph 15) requires "at least once every two years (biennial)". The DOE shall provide further information how it verified that the monitoring plan complies with the applied methodology.				
Project participant response				Date : 17/11/2020
As per the applied methodology AMS-III.AV version 04.0 "Monitoring shall consist of checking of all appliances or a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating or are replaced by an equivalent in service appliance as per the relevant sampling requirements of AMS-I.E".				
The monitoring frequency of "at least once every two years", is deemed the maximum duration over which the parameter must be monitored at least once.				
The term "per verification", on the other hand is provisioned to cover cases when the verification is being conducted for a monitoring period which is less than two years. For example, refer the following:				
MP#	Duration	Start date of Monitoring	Justification	
2	23 May 2017 – 22 May 2019	12 Nov 2019	--	
3	23 May 2019 – 31 Dec 2019	13 Jan 2020	MP3 is less than 2 years, still monitoring done again in Jan 2020 despite monitoring done in MP2 in Nov 2019	
4	01 Jan 2020 – 21 Ma 2020	05 Aug 2020	MP4 less than 2 years since MP3, still monitoring done again in Aug 2020 despite monitoring done in MP3 in Jan 2020.	
This approach avoids application of values established in previous monitoring period (in above example, values determined in MP3), to the current monitoring period (MP4) without monitoring the parameter (because the monitoring frequency is once every two years). Thus, the monitoring frequency of "at least once per verification" applicable to shortened MPs results in yielding more representative and accurate results of monitoring parameter rather than applying the values established in the previous monitoring period.				
Further, the "biennial" monitoring frequency supersedes "per verification" and not the other way around. Thus, in case of a verification covering more than 2-year monitoring period, the PP shall need more than a singular monitoring event to ensure "at least biennial" monitoring frequency is met.				
Lastly, the monitoring period under concern as shown in table above still remains within the "biennial" monitoring frequency.				
Thus, the monitoring plan and the concerned monitoring report is compliant with the monitoring methodology.				
Documentation provided by project participant				
DOE assessment				Date: 19/11/2020

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The applied methodology AMS-III.A.V. version 4.0 prescribes the parameter to be monitored at least once every two years (biennial) to ensure that they are still operating or are replaced by an equivalent in service appliance.

The word 'atleast' in the required frequency atleast biennial does not refrain the CME to conduct the monitoring with a better frequency and a higher frequency (i.e. more than once in two years) is still in line with the requirement.

The CPA-DDs stating the monitoring frequency for the parameter "operational units" as "At least once per verification or biennially as per the monitoring requirements in the methodology" is still in line with the applied methodology AMS-III.A.V. version 4.0.

The CME has demonstrated in the table above that the parameter is monitored at a frequency higher than the minimum required frequency. The results from the sampling surveys conducted for every verification are deemed more accurate than following a at-least biennial monitoring frequency. Thus, the approach was found to be in line with the applied methodology and was accepted by the verification team.

Thus, the finding is closed.

CL ID	05	Section no.	E.3.4.2.	Date : 26/03/2020
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Description of CL

The registered CPA-DDs requires that the water quality will be tested as per paragraph 2(b) of AMS III.AV ver. 4 (i.e. Laboratory test report and/or official notifications (e.g. from national authority on health)). However, the monitoring report shows that Aquagenx testing kits were used to determine the water quality. The DOE shall elaborate how it verified compliance of monitoring with the registered monitoring plan in the included CPA-DDs.

Project participant response

Date : 25/11/2020

The CPA-DD (CPA05 for instance) on page 3,4 states the following:

"The application of technologies distributed under the CPA achieve compliance with "Interim or higher" performance target as per "Evaluating household water treatment options: Health based targets and microbiological performance specifications" (WHO 2011) or a comparable national standard or guideline, per the methodology AMS-III.AV Version 4. All technologies that are going to be distributed under this CPA, will be lab tested to ensure they adhere to these guidelines."

This has also been made an eligibility criterion (# 7, page 32 of CPA-DD) for inclusion of a technology in the CPA which states the following:

Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
The water purification technology/equipment must achieve compliance with either: a) A relevant national standard or b) The interim performance targets as per "Evaluating household water treatment options: Health based targets and microbiological performance specifications" (WHO, 2011)	Verifiable evidence: - Laboratory test report and/or official notifications (e.g. from national authority on health). - Technical specifications document(s)	The water purification technology/equipment are in compliance with the following: (b) The interim performance targets as per "Evaluating household water treatment options: Health based targets and microbiological performance specifications" (WHO, 2011) Supporting Evidence: - Technical specifications document(s)

Thus, the project technology (Ultra TAB, Ultra Flow or Multi Barrier UV) needs to demonstrate that they comply with WHO, 2011 interim performance targets as per aforesaid.

This has already been confirmed via the technical specifications listed in CPA-DD wherein Log 4 reduction is achieved by UV systems and Log 2 reduction is achieved by Chlorination systems (as mentioned in CPA 03 CPA-DD on page 4 and CPA 05 CPA-DD on page 5, respectively). Thus, the technology's compliance with interim measures has already been demonstrated.

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For ex-post water quality monitoring, the CPA-DD refers to the following:

"As per the World Health Organizations Guidelines⁶ it is more cost-effective and feasible to monitor indicator organisms such as E.coli. Monitoring of proxies such as E. Coli, faecal coliform counts, chlorine levels may be used to assess water quality. CPA implementer shall be responsible for conducting testing. Enumerators will be trained on proper testing procedures and the appropriate testing technology will be used. CPA implementer shall be responsible for conducting testing".

The CME has used Aquagenx Compartment Based Test (CBT) E.Coli / Total Coliform (ECTC) testing kits to monitor E.Coli as the indicator organism to test the quality of water. Aquagenx CBT ECTC testing Kits are used extensively across the globe in low resource areas. The Aquagenx Test is very effective testing method in terms of flexibility wrt transportation, for cases involving institutional and community engagement. The test kits detect and quantify E.Coli in 100 mL samples.

The water quality assessment using Aquagenx CBT ECTC testing kit follows a standard testing procedure. Each kit includes a sample collection Whirl-Pak Thio-bag and a powder growth medium pack. The powder growth medium has a glucose substrate called X-Gluc. When E. coli metabolize this substrate in Aquagenx's growth medium, the color of the water turns blue, indicating the presence of E. coli.

The Aquagenx CBT ECTC is a laboratory-based test with provisions for sample collection in the field directly. Given the project systems are installed in institutions, thus, the water quality sample collection can only be done in the field. The portable water sample collection bags provisioned in Aquagenx CBT ECTC testing kit, renders it as a preferred and viable option for testing water quality for project devices installed in institutions and schools under the PoA.

The following standard sample collection procedure is followed:

1. At the time of sample collection in the field - the Whirl-Pak Thio-bag is labeled with the name of the institution, date and time of sample collection and the unique SF ID for that institution.
2. After labelling the bag, it is filled with 100 ml of water from the project system being monitored.
3. The powder growth medium is added to the Whirl-Pak Thio bag. The Whirl-Pak seal is rolled down and the Thio-bag is closed shut. This ensures that the sample collections remain free from any external contamination.
4. The powder medium is dissolved by gently swirling the bag.

The sealed Thio bag is then incubated in the in-house lab in the Impact Water's office. The incubation is an ambient temperature incubation for 48 hours. The incubation for 48 hours ensures that even the trace presence of E.Coli gets detected in the water sample collected. The bags are incubated in controlled environment in the lab to prevent contamination and health hazard in the Impact Water's office.

After the incubation of 48 hours the results of the water quality test are read by the qualified lab technician. A blue/green color indicates presence of E.Coli in water sample. After the test is completed, chlorine tablets are added in the Thio bag and stranded for 30 minutes to ensure decontamination. The decontaminated water sample is then discharged in the in-house lab itself.

Thus, the water sample collection and testing have been conducted by trained staff with extensive prior experience of water quality testing using Aquagenx CBT ECTC testing kits. The same was cross verified by the Verification Team via interviews with the water quality testing staff wrt testing protocol, process of sample collection, testing procedure followed, test results assessment etc. The Verification Team also reviewed photographic evidence of water quality samples and test results to confirm the accuracy to results reported by the CME.

For details, refer the testing protocol is available at the following link:

<https://www.aquagenx.com/wp-content/uploads/2020/05/PA-CBT-ECTC-Instructions-DrinkingWater-May2020.pdf>

The use of Aquagenx CBT ECTC testing kit for determining water quality is therefore in line with the registered CPA-DDs as well as monitoring methodology. The tests have been conducted by trained staff with extensive prior experience of water quality testing.

Further, various studies conducted across many locations and environments around the world by academic institutions, national government agencies, international NGOs and United Nations agencies confirm that, the

⁶ WHO 'Guidelines for Drinking-water Quality, Fourth Edition Page 41.

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Aquagenx test a Compartment Bag Test (CBT) gives results comparable with more complicated, expensive and less portable tests conducted otherwise.

A paper published in "The American Journal of Tropical Medicine and Hygiene, Volume 96, Issue 4, 5 Apr 2017, p. 970 – 975⁷ states that:

....., and one sample using membrane filtration (MF) was analyzed by reference laboratories. There were no statistically significant differences in *E. coli* concentrations between the field and laboratory CBT results, or when compared with MF results. These results suggest that the CBT for *E. coli* is an effective method to quantify fecal bacteria in household drinking water. The CBT can be incorporated into DHS and other national household surveys as a direct measure of drinking water safety based on microbial quality to better document access to safe drinking water.

Thus, the testing technology deployed by the CME/CPAI is deemed accurate, credible and reliable.

Documentation provided by project participant

DOE assessment	Date: 26/11/2020
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The applied methodology requires the water quality to monitored following para 2(b) of the applied methodology.

As per paragraph 2(b) of the applied methodology:

"It shall be demonstrated based on laboratory testing or official notifications (for example notifications from the national authority on health) that the application of the project technology/equipment achieves compliance either with: (i) at a minimum the performance target as per "Evaluating household water treatment options: Health based targets and microbiological performance specifications" (WHO, 2011); or (ii) an applicable national standard or guideline"

As responded by CME above, they have used Aquagenx Compartment Based Test (CBT) E.Coli / Total Coliform (ECTC) testing kits to monitor E.Coli as the indicator organism to test the quality of water. The CME has also explained clearly that the test with its protocol (<https://www.aquagenx.com/wp-content/uploads/2020/05/PA-CBT-ECTC-Instructions-DrinkingWater-May2020.pdf>) qualifies as laboratory test and meets the compliance required by applied methodology.

The monitoring team was also interviewed during the remote audit, during which they confirmed the entire process they follow for collecting each sample, handling the sample, reading results etc. and also confirmed that they have received training before conducting the test.

Thus, the results from the Aquagenx tests conducted by the monitoring team were found to be reliable and meeting the conditions of the applied methodology.

The C#05 stands closed.

CL ID	06	Section no.	E.3.4.2.	Date : 26/03/2020
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Description of CL

The DOE shall provide further information on how it has crosschecked the operation of the project activity and continuous availability of safe drinking water as per paragraph 304 (c) of VVS for PoA, considering that the monitoring method was based on survey questionnaire alone (e.g. the question "When was the last time, a supply of cartridges/tablets were received?") and no information is provided regarding the crosschecking of the monitored data against other sources such as quantity of chlorine/No. of cartridges used during this monitoring period

Project participant response	Date : 17/11/2020
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Firstly, the monitoring methodology para 15 states:

"Monitoring shall consist of checking of all appliances or a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating or are replaced by an equivalent in service appliance as per the relevant sampling requirements of AMS-I.E".

Para 16(b) of the methodology states:

"The quantity of purified water in year y shall be derived from the capacity of the equipment established by

⁷ <http://www.ajtmh.org/content/journals/10.4269/ajtmh.15-0717>

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manufacturers' specifications and the number of functional project appliances as per paragraph 15"

Thus, the continuity of service (continuous availability of safe drinking water) is to be determined via ex-post sampling and if the project device is found functional during ex-post monitoring, the continuity of service is deemed being maintained over the entire monitoring period.

However, during the ex-post monitoring, the CME has taken additional measures to ensure continuous availability of safe drinking water as follows:

The monitoring survey form consists of the following questions:

Question pertaining to continuity/Maintenance:

- Has routine supply/maintenance been conducted for the IW System? (Yes/No).
- When was the last time supply/maintenance was conducted? (DD-MMM-YYYY).

Question pertaining to usage:

- Is the IW unit being used for water treatment? (Yes/No)
- Presence of other water treatment technologies / devices in the institution

The question pertaining to continuity /maintenance is intended to ensure that the user is receiving regular supplies / maintenance which ensures system's continuity. The date of last supply / maintenance serves as an objective evidence to cross-verify regular supplies/ maintenance being received by the user at the time of survey.

Further the date of last supply / maintenance provides the surveyor an option to check if last delivery has reached the user and have been put in use. This is achieved by physically cross verifying the product ID mentioned in the last delivery note / installation log with the system found installed on site (TAB packs available in case of UltraTAB and cartridge installed in case of UltraFLO). This also confirms that earlier supplies have been consumed, ensuring continuous availability of safe drinking water.

The questions related to usage confirms that the system is function as per para 16. Additionally, none of the monitored schools were found using any other form of water treatment technology / device. This further substantiates imperative use of project devices, given drinking water is a basic sustenance need, and continuity of use.

In addition to aforesaid the CME has the following system to ensure continuous availability of the safe drinking water in the institutions:

- At the time of installation/distribution of the water purification systems (WPS) in the institution, the CME train the institution staff on usage of the WPS to ensure that the project devices are put to use and any apprehension regarding their quality and safety is resolved.
- The CME Call Center in the country offices, regularly follow ups with the institution regarding operational status of the project system of their installed WPS as well as the expected date of next supply. The schools are supplied with reinforcements in time to ensure system's continuity.
- Additionally, the CME country office contact detail is available in the system Purchase Order and Delivery Notes available with institution and also pasted on the system tank or school wall in form of sticker. The institution can anytime call the CME office for the subsequent supply of the UltraTab pack or UltraFlo cartridge if needed, or as and when required. It has been verified by the DoE during remote assessment that schools are aware of the phone number to contact in case of needing maintenance / supplies.
- Lastly, the subsequent supply of the UltraTab packs and UltraFlo cartridges in the institution is recorded in the CME database management software (SalesForce). The information on each supply made during the monitoring period (product quantity and serial number) has been provided for each school as well as for each supply (refer ER calculator, worksheet "Sales database" column R:AA). The details of these supplies have also been cross verified against the delivery notes / installation records available at the CPAI office, by the DoE during remote assessment. Also, the DOE has cross verified the product ID reported in the last supply with the product ID found mentioned on the physical systems on site for sampled schools.

The above sales and monitoring provisions ensure as interrupted supply of safe drinking water in the institution

Documentation provided by project participant**DOE assessment****Date:** 19/11/2020

The continuous availability of safe drinking water is ensured by confirming the operational status of sampled systems and checking the provisions put in place by the CME other than the survey questionnaire.

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During the survey, the CME checks that continuous supply of cartridge/tablets, through the questions stated above as 'Question pertaining to continuity/Maintenance' and also checks the operational status through 'Question pertaining to usage' stated above.

The questions pertaining to continuity/maintenance ensures that the institution is receiving continuous supplies and questions pertaining to usage confirms that those supplies are being used. Any institution reporting the product as being functional, cannot be out of supplies.

All the institution heads of "DOE sampled systems" were interviewed by the verification team to confirm that the product installed in the school was currently in operational condition and they have been receiving continuous supply of cartridge/tablets thus, getting continuous supply of safe drinking water.

Additionally, the DOE checked the provisions in place to ensure continuous supply of safe drinking water

- The institution head confirmed during the interview that staff from the institution have received adequate training on the usage of the installed WPS. They can detect if they are running out of supplies(cartridge/tablets) and accordingly contact the CME/CPAI for subsequent supplies to ensure continuous availability.
- The CME representatives interviewed during the remote audit confirmed that they have a Call Centre in the country offices which regularly takes follow up calls with the institutions regarding usage and headcount to gauge the expected date of next supply.
- The copies of Purchase Order and Delivery Notes and the presence of customer care number/email for supply / repair on the system's tank or school wall in form of sticker were checked to confirm that the CME country office contact detail is available to the institution staff and they can contact the CME in case they find any problem with the product or need additional tablets / cartridges. Moreover, during the remote survey calls, the institution heads confirmed to the verification team that they are aware about the contact number to which they can register their complain regarding the product or their request for supplies.
- The CME provided a detailed sales database which records the subsequent supplies with their product IDs for each institution, which is presented in the ER sheet (refer ER calculator, worksheet "Sales database" column R:AA). The CME has provided scanned copies of delivery notes available at the CPAI office to the verification team for cross verification of the subsequent supplies made to an institution. The verification team had checked it for the sampled institutions. The evidence reviewed confirmed the quantities of supplies mentioned in the ER sheet.

Thus, the verification team confirms that all the institutions (with systems claiming emission reductions) have received continuous supply and provide continuous safe drinking water during the monitoring period.

Thus, the CL stands closed

CL ID	07	Section no.	E.3.4.2.	Date	26/03/2020	
Description of CL						
The CME/DOE shall provide information how it considered application of 365 days as appropriate for the calculation of the total quantity of water purified during the year y, considering that the CPA-DDs indicate that the quantity of purified water is based on the "average population serviced/system" while the systems do not service the population during periods when population (i.e. the students) are on holidays.						
Project participant response				Date		17/11/2020
The CPAs supply safe drinking water to institutions (day schools, boarding schools, prisons etc.). The application of 365 days of operation for the project units is justified on the basis of the following:						
<div>I. The number of days of operation is mentioned as 365 days in the registered PoA-DD (refer equation 1.a. on page 70 of the registered PoA-DD). Similarly, the CPA-DDs also mention 365 days of operation in the ER calculation formulae.</div> <div>II. Besides, the number of days of operation is neither an ex-ante parameter nor an ex-post monitoring parameter as per the monitoring methodology or the registered monitoring plan in the PoA-DD.</div> <div>III. The application of 365 days of operation per year for project units is also corroborated by the subsequent versions of the methodology (refer para 17 of AMS-III AV. Version 08.0).</div> <div>IV. Last but not the least, the applied methodology (AMS III.AV version 4.0) caps the volume of drinking water per person per day at 5.5L/capita/day. The PoA has applied a much more conservative cap of 2L/person/day (for days school) and 3.5L/person/day (for boarding schools /prison). These limits are already attributed to minimum survival levels advocated by WHO (Minimum water quantity needed for domestic uses, Technical Note No. 9, WHO/SEARO Technical Notes for Emergencies). Table 1 of the</div>						

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referred document mentions that minimum survival allocation for domestic use (i.e. full day service deemed equivalent to boarding schools and prisons) as 7 l/capita/day (sustainable only for few days), out of which 3-4 ltr is attributed solely for drinking. For schools, it specifies 2 ltr per student per day as the minimum requirement. Also, Water, Sanitation and Hygiene Standards for Schools in Low-cost Settings, published by WHO specified a basic water requirement of 5 l/per/day for day / non-residential schools and 20 ltr/per/day for boarding schools (Page 18, Water, Sanitation and Hygiene Standards for Schools in Low-cost Settings, Indicators for Guidelines). Thus, a consideration of 2 ltr/per/day for day schools and 3.5 ltrs/per/day for boarding schools/prisons is already referring to minimum survival levels and is overly conservative and deemed applicable to entire year.

- V. Lastly, the weighted average value if $R_{yi} = 2.05$ which is much less than a default value of 3 ltrs per person per day given by AMS III.AV. version 8.0 that is also at 365 days of crediting.

The aforesaid approach has been discussed (via a clarification request from CDM EB) and approved by CDM-EB during PRC-9948-003. Please refer document DOE clarification 8 – “FVR 599 CPA 5 to 13 PRC VR Nigeria 25.03.19 clean”, page 20 of 26, CAR 01 dated 21/01/2019. (<https://cdm.unfccc.int/PRCContainer/DB/prcp52130222/view>)

Documentation provided by project participant

DOE assessment

Date: 19/11/2020

The application of 365 days as the number of days of operation for the project units, was found to be acceptable because of following justifications provided.

- I. Both PoA-DD and the CPA-DDs mention 365 days as the number of days of operation as verified from page 70 of PoA-DD and ER formulae of the CPA-DDs.
- II. Again, days of operation, was neither found to be an ex-ante parameter nor to be an ex-post monitoring parameter as verified from the registered monitoring plan.
- III. The applied methodology (AMS-III AV. Version 04.0) and subsequent versions of the applied methodology (AMS-III AV. Version 08.0) were reviewed and it was confirmed that value of 365 days for the days of operation has been applied in the applicable formulae and sample calculation shown in the methodology.
- IV. The capped volume of drinking water per person per day of 2L/person/day (for day school) and 3.5L/person/day (in boarding school) in the PoA was found to be conservative as these values were found to be meeting the minimum survival levels set by WHO. As per Technical Notes for emergencies by WHO, the minimum survival capacity has been allocated as 7 l/capita/day (sustainable only for few days), out of which 3-4 ltr is attributed solely for drinking. For schools, it specifies 2 ltr per student per day as the minimum requirement. Also, minimum requirement for day schools were found to be 5l/person/day and 20l/person/day as verified from water sanitation and Hygiene standards for Schools in Low-cost settings by WHO. Thus, following the above, the CME's approach of considering 2 ltr/per/day for day schools and 3.5 ltrs/per/day for boarding schools/prisons were found to be conservative and deemed acceptable. This, approach has already been discussed and approved by CDM-EB as verified from DOE clarification 8 “FVR 599 CPA 5 to 13 PRC VR Nigeria 25.03.19 clean”

Hence, application of 365 days of crediting for a systems is deemed appropriate and in line with applied methodology and registered PoA/CPA-DD.

Thus, the CL stands closed.

Table 3. CARs from this verification

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CAR ID	01	Section no.	E.3.6.5	Date : 26/03/2020
Description of CAR				
<ol style="list-style-type: none"> Achieved ERs mentioned in the MR (Version 1.0) was found to be inconsistent with the ER sheet (Tab: ER summary; Cell: O21). Estimated ERs mentioned on cover page of MR version 1.0 as 572,602 tCO₂ was found to be inconsistent with the estimated ERs mentioned as 349,836 tCO₂ under section F.5 of MR Version 1.0. The start date of the monitoring period is 23/05/2019 as per the project webpage. However, the start date of the monitoring period mentioned under section E.3 of the MR version 1.0 is 23/05/2018. 				
Project participant response				Date : 29/04/2020

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1. The ERs volume have been rectified in the revised MR to be consistent with the ER Sheet. Revised MR is being submitted.
2. The estimated ERs have been rectified in the revised MR to be consistent with the ER Sheet. The revised MR is being submitted.
3. The start date of the monitoring period has been revised in section E.3 of the MR. The revised MR is being submitted.
Documentation provided by project participant
PoA 9948_MP2_Norway 1B Nigeria MR ver 2.0_29042020
PoA 9948_MP2_Norway 1B Nigeria ER Sheet_ver 2.0_29042020
DOE assessment
Date: 04/05/2020
1. PP has now consistently mentioned the achieved ERs in the MR (Version 2.0, Dated: 29/04/2020) and the ER sheet (Title: PoA 9948_MP2_Norway2 Nigeria ER sheet_ver 2.0_29042020). (Closed)
2. PP has now rectified the estimated ERs in the revised MR version 2.0, Dated:29/04/2020 and the ER sheet (Title: PoA 9948_MP2_Norway2 Nigeria ER sheet_ver 2.0_29042020). (Closed)
3. PP has now revised the start date of the monitoring period under section E.3 of the revised MR Version 2.0, Dated: 29/04/2020. (Closed)

CAR ID	02	Section no.	E.3.4.2, E.2.2	Date	26/03/2020	
Description of CAR						
1. For the parameter (Water Quality, Operational Units), The MRs for MP2 and MP3 mention that the monitoring was conducted on Nov 2019-Dec 2019 date. The previous period for MP2 is from (23/05/2017-22/05/2019 = 2years), the current MR is for MP3 (23/05/2019-31/12/2019= 7months, 8days. CME shall clarify how the frequency of biennial has been followed if the survey has been conducted only once for both the periods with same samples.						
2. The date of last time the cartridges were received for following schools were found to be inconsistent:						
a. MT Bizben International School (SF ID: N1836092) in monitoring survey form was found to be inconsistent with the date mentioned in the monitoring sheet (Title: PoA 9948_MP3_Norway 2 Nigeria, Tab: Monitoring Data, Cell: H11).						
b. The date of last time the cartridges were received for Adeola Memorial College (SF ID: N1836091) in monitoring survey form was found to be inconsistent with the date mentioned in the monitoring sheet (Title: PoA 9948_MP3_Norway 2 Nigeria, Tab: Monitoring Data, Cell: H10).						
c. The date of last time the cartridges were received for D.C. Elementary School (SF ID: N1826664) in monitoring survey form was found to be inconsistent with the date mentioned in the monitoring sheet (Title: PoA 9948_MP3_Norway 2 Nigeria, Tab: Monitoring Data, Cell: H63).						
Project participant response					Date	29/04/2020
1. Firstly, the monitoring for MP2 was conducted in Nov- Dec 2019 and that for MP3 has been conducted in Jan- Feb 2020. Please refer the survey records submitted for MP2 and MP3 where the date of survey is clearly mentioned. The MR has been rectified to reflect the correct monitoring survey duration in section E.3. Secondly, the sampling and monitoring for MP2 and MP3 have been conducted separately and the samples for MP2 and MP3 are different and not common. Kindly refer the ER calculator, monitoring data sheet where the survey samples for MP2 and MP3 are different.						
2. The date of last supply of cartridge/tablets mentioned in the worksheet "monitoring data" of ER sheet have been made consistent with the date of last supply of cartridge/tablets written in the survey forms. The revised ER Sheet is being submitted.						
Documentation provided by project participant						
PoA 9948_MP2_Norway 1B Nigeria ER Sheet_ver 2.0_29042020						
DOE assessment					Date: 04/05/2020	

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1. The sample survey records both for MP2 and MP3 were checked by the DOE and the samples were found to be different for each of the periods as referred by CME. Secondly, the monitoring survey for MP2 was conducted in Nov-Dec 2019 and for MP3 in Jan-Feb 2020 as verified from the monitoring survey forms. CME has conducted monitoring more frequently than the required annual/biennial frequency. Thereby, it has been accepted by the DOE as CME was found to follow the compliance of the applicable monitoring frequency. (Closed)

2. PP has now revised the last date of supply of cartridges/tablets in the worksheet "monitoring data" of ER sheet (Title: PoA 9948_MP2_Norway2 Nigeria ER sheet_ver 2.0_29042020) and have made it consistent with the Monitoring Survey Forms. (Closed)

CAR ID	03	Section no.	E.3.4.3, E.3.4.2	Date : 15/05/2020
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Description of CAR

1. Caption of Section E.3 of the MR is truncated. Please correct.
2. Given that the parameter $f_{NRB,y}$ is being defined as parameter to be monitored annually or at least biennial in the CPA DD, how the value applied from a source that dates 2012 is deemed appropriate. Please also consider the point (a) mentioned at <https://cdm.unfccc.int/DNA/fNRB/index.html> while responding to the issue.
3. The parameter "existence of PDN of SDW" is required to be monitored annually as per applied methodology AMS III AV V4 para 2(a) and 17. However, the CPA DD defines the monitoring frequency to be also biennial. Please clarify how the registered monitoring plan of the CPA is in line to methodology.

Project participant response

Date : 21/05/2020

1. Caption of section E.3 of the MR has been corrected.
2. The default value for $f_{NRB,y}$ for biomass ($=0.93$ sourced from EB97) has been fixed at the PoA level. Please refer page number 69 and 82 of the registered PoA-DD which states the following:
EB 67 Annex 22 Default Values for Fraction of Non-Renewable Biomass for Least Developed Countries and Small Island Developing States, combined with survey, national, or regional data to determine the percent of users using woody biomass and fossil fuel in the baseline scenario. Thus, the continuous or at least biennial monitoring, as per PoA-DD, refers to determining the % mix of fuels (% of beneficiaries using non-renewable biomass and/or other fossil fuels in the baseline) and updating the applicable weighted average $f_{NRB,y}$ as per the formula stated in the monitoring parameter table – Measurement Methods and procedures, on page 49 of the PoA-DD. The percentage of users using non-renewable biomass and percentage of users using fossil fuel in Nigeria has been updated as the per the Global Alliance for Clean Cookstoves, Nigeria report and a weighted average value has been applied to determine $f_{NRB,y}$. The GACC report remains the most recent data publicly available.
3. The included CPA-DDs defined the monitoring frequency for parameter "existence of PDN of SDW" as "Annual or at least biennial as per the monitoring requirements in the methodology". CME is monitoring the parameter "existence of PDN of SDW" annually and applying this annual value in ER calculations. Thus, the registered CPA-DD and the implemented monitoring plan and the monitoring frequency being followed are deemed in line with the methodology with respect to monitoring frequency.

Documentation provided by project participant

PoA 9948_MP3_Norway 2 Nigeria MR ver 2.1_21052020

DOE assessment

Date: 01/06/2020

1. Section E.3 caption has now been revised in the MR (Version 2.1). The caption is exactly same as the MR template present on UN website. Thus, the distortion in the template has been corrected now. (Closed)

2. The f_{NRB} value for biomass is determined by the the default value stated in EB 67 Annex 22 for LDC and SIDS combined with survey, national or regional data to determine the percent of users using woody biomass and fossil fuel in the baseline scenario. CME's approach for determining the f_{NRB} value was found to be in-line to the measurement methods and procedure of the parameter on page 49 of the PoA-DD.

The frequency of continuous or at least biennial under the parameter is required for determining the % mix of

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fuels and there by updating the fNRB value as per the applied formula for the parameter. The percent mix of fuel was found to be determined from the GACC Nigeria report which was found to be latest applicable national data available at the time of fNRB value being determined at PoA level (Closed)

3. The team has checked the monitoring survey to confirm that the CME is annually monitoring the parameter "existence of PDN of SDW". This is in-line with the monitoring frequency stated in the CPA-DD and the applied methodology. The monitoring frequency for the parameter in the revised MR (Version 2.1) now mentions 'Annually' making it consistent with the frequency stated in the CPA-DD and applied methodology and the value of the parameter obtained annually was found to be applied in the ER calculation. (Closed)

Thus, the CAR is closed.

CAR ID	04	Section no.	E.1.3.	Date : 15/05/2020
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Description of CAR

As per VVS for PoA para 335, it needs to be confirmed that a request for issuance of CERs for the previous monitoring period that included the particular CPA has been published.

However, the issuance of CERs for the previous monitoring period has not been submitted yet.

Project participant response	Date : 21/05/2020
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The VVS para 335, requires publishing of request for issuance of previous MP, to allow a verifying DOE confirm, that the monitoring period of CPAs covered in the concerned MR (MP3 MR1) are in continuation with the specified end date of monitoring period of these CPAs in the previous MR (MP2 MR4). Unless the request for issuance of previous MP is published, it is not possible for the verifying DOE, in general, to issue confirmation as required by VVS para 335.

However, in this case, in particular, the MP2 MR4 has also been verified by ESPL and request for issuance for MP2 MR4 is under process. Thus, ESPL can confirm that the CPAs covered in current Mp3 MR1 have their monitoring period continuous with that specified in previous MP2 MR4, without needing to wait for publication of request for issuance of MP2 MR4.

Documentation provided by project participant

DOE assessment	Date: 08/09/2020
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The justification does not comply with para 335 of VVS for PoA version 2.0. open

Project participant response	Date : 08/09/2020
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The RFI for MP2 for the CPAs covered under MP3 has now been published.

Documentation provided by project participant

DOE assessment	Date: 10/09/2020
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The RFI for the previous monitoring period (MP2) for the CPAs (9948-P1-0003-CP1 and 9948-P1-0005-CP1 to 9948-P1-0013-CP1) under consideration during the current MP (MP3) was found to be published as verified from the PoA-webpage.

Thus, CAR#04 stands closed.

CAR ID	05	Section no.	E.2.1, E.3.1	Date : 25/02/2021
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Description of CAR

The included CPA-DDs (Section A.3) and the monitoring report (Section C.1) indicate that two types (Multi-barrier UV and UltraFLO) of water purification devices implemented are fixed and applicable to piped water. However, the emission reduction spreadsheet (Tab "sales database" column Q) indicates the primary water source for more-than-700 institutions (applying these two types) other than piped water, i.e. surface water, wells and others. Therefore, the CME shall explain how the water purifiers are implemented in accordance with description contained in the included CPA-DDs, in particular with regard to the piped water application.

Project participant response	Date : 20/03/2021
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Please note that the water source is mentioned in column P of the worksheet and not column Q.

The "Piped Water" cited as the application in Section A.3 of the CPA-DDs for both Multi-Barrier UV and UltraFLO Chlorination water purification systems (WPS) refers to pressurized piped water connection that is a pre-requisite for these two types of WPS by virtue of their design. Thus, Both Multi-Barrier UV and UltraFLO systems can only be installed on piped applications only.

In the emission reduction spreadsheet, tab "MP3 Sales Database" Column P, on the other hand, refers to the

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water source from where the water is extracted instead (to add more transparency). In case of Multi-Barrier UV and UltraFLO WPS, primary water sources like the surface water, wells and other water sources have a piping connection installed to transport water from these primary sources to the point of installation of project device.

Please note that schools having Primary Water Source marked as "Piped" in Column P, refers to only City Council / Government / Municipal Water Piped Connection in the school as the Primary Water Source.

For further detail, please refer to the table below:

Source of Water	Institutions with UltraFLO	Institutions with Multi Barrier UV	Comments
Well	757	8	The wells are connected to drinking water storage tanks via pipes. The water is pumped from wells to the water storage tanks. The Multi-Barrier UV or UltraFLO Chlorination WPS is fitted in the tanks at the inlet to ensure that any water flowing in the tank is rendered safe for drinking. The outlet of the tank is connected to the taps to facilitate drinking of water by the institution students and staff.
Surface Water	2	-	There is a private piped connection used for transporting water from the nearest water body source to the drinking water storage tank in the institute premises. Multi-Barrier UV or UltraFLO Chlorination system are fitted onto these piping connection same as that explained above
Trucked Water	2	-	The trucked water is collected in a sump from where it is pumped, or otherwise, directly pumped to the drinking water storage tank, to which the Multi-Barrier UV or UltraFLO Chlorination system are fitted, same as that explained above.
Others	17	-	Similar to above, these schools have a combination of aforesaid water sources (well and surface), depending on ease of access to the school to which the Multi-barrier UV or UltraFLO WPS are connected.

This has been verified by the DOE during the on-site visit during the previous monitoring periods. This was also checked by verification team during the remote audit in the current monitoring period, wherein three DOE audit sampled schools with source of water referred as "wells" have been verified to have operational UltraFLO systems connected via piped connection to the drinking water storage tank. Thus, these WPS have been implemented in line with the description provided in the registered CPA-DDs / MR.

Documentation provided by project participant

PoA 9948 MP3 MR1 Nigeria ER Sheet ver 4.0 19032021

PoA 9948 MP3 MR1 Nigeria MR ver 4.0 19032021

DOE assessment

Date: 22/03/2021

Multi-Barrier UV and UltraFLO systems are fixed type of water purification units and can only be installed when water is being procured through piped connection. These two WPS types can work only when they are mounted on a piped connection and water flows through them.

Hence, the CPA DDs (section A.3.) and monitoring report (section C.1) correctly mention that Multi-barrier UV and UltraFLO are fixed type systems and applicable on piped water.

The ER sheet, worksheet titled 'sales database', column P 'Primary water source' lists the source as surface water, wells etc. besides piped water. The term "piped" water under this column has been used for the schools which receive water from City Council / Government / Municipal Water Connections. It shall be noted that water is transported from primary water sources such as wells, surface water and boreholes through pipes to water storage tanks in project schools. The fixed multi barrier UV and Ultra-FLO systems installed on these pipes.

During the remote site visit conducted for the current issuance request as well as during the physical site-visit conducted for previous batches, it was clearly noted by the verification team that UltraFLO and Multi barrier UV systems have only been installed on pipeline connections, with the primary water source different from City Council / Government / Municipal water.

Thus, the WPS have been implemented in line with the description contained in the included CPA DDs.

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CAR ID	06	Section no.	E.3.4.2.	Date : 25/02/2021
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Description of CAR

2) Refer to paragraph: paragraph 15 of the applied AMS-III.AV. ver. 04
The CME shall justify the compliance of the monitoring plan with the applied methodology, in particular the monitoring frequency of parameter "operational units", since the CPA-DDs states that the monitoring frequency for the parameter as "At least once per verification or biennially as per the monitoring requirements in the methodology", which could lead to possibilities whereby the monitoring frequency not meeting methodology requirement (i.e. at least once every two years) when the verification / monitoring period is conducted with a time gap of more than two years.

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Project participant response	Date : 20/03/2021
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Please note that the term "at least" is binding to both "once per verification" as well as "biennially as per the monitoring requirements in the methodology" and not to "once per verification" alone. Thus, under no circumstances, the monitoring frequency will extend beyond two years and shall remain compliant with the monitoring methodology requirement always. Further, please refer the PoA validation report, CAR 07, page 80 of 106 which states the following:

The PP revised the monitoring frequency to be "At least once per verification or biennially as per the monitoring requirements in the methodology" to ensure that the methodological requirements are met (at least biennial) and that each verification is based on relevant monitoring results.

Thus, this substantiates that "at least once per verification" was provisioned in the PoA-DD to prohibit the CME apply the value established in a given MP to the following MP (without monitoring it again) for cases where the combined length of two consecutive MPs is less than two years.

Please refer all previous monitoring periods for different batches where dedicated monitoring for each monitoring period has been conducted despite them being even less than one year duration. Also, for the first monitoring period, although the monitoring period was longer than 2 years (30/05/2014 – 22/05/2017) and was covered under single verification, the CME did not claim any ERs for the period 30/05/2014 – 21/05/2015 and followed the "at least biennially" monitoring frequency to ensure that methodology prevails over such cases.

Hence, the CME affirms that in no case the methodology requirements with respect to monitoring frequency would be compromised.

Documentation provided by project participant

PoA 9948_MP3_MR1_Nigeria_ER_Sheet ver 4.0 19032021
PoA 9948_MP3_MR1_Nigeria_MR ver 4.0 19032021

DOE assessment	Date: 22/03/2021
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The applied methodology AMS-III.AV. version 4.0, para 15, states that "Monitoring shall consist of checking of all appliances or a representative sample thereof, at least once every two years (biennial) to ensure that they are still operating or are replaced by an equivalent in service appliance".

The CPA DDs (9948-P1-003-CP1, 9948-P1-005-CP1 to 9948-P1-0013-CP1) mention under section B.5.1., that for the parameter 'Operational Units', the frequency is 'at least once per verification or biennially as per the monitoring requirements in the methodology'. For current issuance request, the frequency required by the applied methodology has been met.

As explained by CME and confirmed by the DoE, in the all the previous monitored periods, the monitoring frequency followed is found to be adhering to the methodology requirements.

Further, the DoE also assessed the PoA validation report CAR 07, page 80 of 106 which confirms that "atleast once per verification" is superseded by "biennial" and the methodology requirements prevails.

However, to ensure that under no circumstances, the methodology requirement is compromised in future, FAR#01 has been raised to ensure that monitoring frequency of parameter "operational units", shall be at least biennial in line with monitoring methodology requirements.

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Thus, the CAR is closed.

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CAR ID	07	Section no.	E.3.1. and E.3.6.1.	Date : 25/02/2021
Description of CAR				
<p>It is observed in the emission reduction spreadsheet that:</p> <p>a) <u>The residual capacities from previous MP (i.e. column AB of tab "Sales Database") are given without any elaboration by CME on how these values are derived, and whether the residual capacity is an assumed capacity or an actual remaining capacity considering the actual volume and quality of raw water purified at CPA locations;</u></p> <p>b) <u>The residual capacity of some purification devices indicates system continuous running until year 2048 or more (e.g. cell 'AJ3' of tab 'Sales Database'), which is even beyond the device lifespan as described (i.e. 5-to-7 years) in page 15 of the monitoring report;</u></p> <p>c) <u>The assumed capacities in tab "Assumptions" (i.e. one unit of UltraTab purifies 10000 liter water, one unit of UltraFlo purifies 340000 liter water and one unit of Multi-barrier UV purifies 4088232 liter water) refers to CPA-DDs whereas such values could not be traced in the respective CPA-DDs;</u></p> <p>d) <u>The device lifespan as described in the monitoring report (5-to-7 years) are also not consistent with the lifespan value in the CPA-DD (e.g. minimum capacity/lifespan: 219,000 L or 1 year in page 3 of the CPA-DD of CPA 9948-P1-0003-CP1).</u></p> <p>e) <u>Out of the 6025 schools using either UltraFLO or UltraTAB in the CPAs, 4125 schools indicate zero continuous supplies during this monitoring period (i.e. column 'AC' of tab 'Sales Database').</u></p> <p>Taking into account the above, the CME shall explain how the actual capacity of the devices (considering actual volume and quality of raw water purified at CPA location) are capable to continuously supply safe drinking water until the named system's continuous running end date indicated in column AJ of tab "Sales Database". In doing so, quantitative information and relevant evidence shall be provided, including but not limited to evidence confirming (a) the capacities of devices implemented, considering the quality of raw water at CPA locations; and (b) the correctness of device lifespans.</p>				
Project participant response				Date : 20/03/2021
<p>(a) For MP3, the system's 'residual capacity from previous monitoring period' (Sales Database, column AB) has been sourced from MP2 sales database submitted to UNFCCC as part of MP2 ER calculator, available at: https://cdm.unfccc.int/PoAIssuance/iss_db/poais63061347/view - Refer: additional documents). The CME extracted the above information from MP2 ER calculator (tab Sales database, Column AK) by applying the vlookup function, using School SF ID as a unique identifier, to call this information in MP3 Sales database, column AB. Given the vlookup function does not work externally, hence the CME had to remove the external links in the MP3 Sales Database, column AB, which otherwise would have returned #Ref error in excel, once shared with DoE / UNFCCC.</p> <p>In CL ID 03, the DOE has already confirmed the aforesaid and verified the information to be accurately transferred from MP2 to MP3 Sales database (refer CL ID 03, DoE final conclusion dated 10/09/2020, point b, page 54-55).</p> <p>The CME has now presented 'MP2 sales data' in revised MP3 ER calculator being submitted. The column AB of 'MP3 sales database' has been linked with column AK of 'MP2 sales data – reference only' to establish full traceability of values for 'residual capacity from previous MP'. For systems that are newly installed in MP3, column AB in tab 'MP3 Sales Database' now indicates, "not applicable, new installation" to avoid any confusion.</p> <p>(b) The "system's continuous running end date" is not depicting the lifetime/lifespan of the device (please refer c below for detail on lifespan). The "system's continuous running end date" is merely a determinant to check compliance with the following registered monitoring plan requirement:</p> <p><i>($N_{v,i} * R_{v,i}$) should not exceed the maximum output capacity of the system installed.</i></p> <ol style="list-style-type: none"> 1. The system's initial installation capacity or residual capacity from previous MP (as applicable) coupled with continuous supplies made during the monitoring period is used to calculate total treatment capacity per unit (in column AH). 2. The ($N_{v,i} * R_{v,i}$) provides the per day water consumption in school (in column AG). 3. System's continuous running end date (column AJ) is then determined as ratio of "Column AH" and "Column AG". 4. If the continuous running end date is falling before the end of monitoring period, this indicates that the ($N_{v,i} * R_{v,i}$) exceeds the system's maximum output capacity during the monitoring period. In such cases the operational days of the unit in that school (refer column BE) is limited within the monitoring period. 5. On the other hand, if this date is after the end date of monitoring period, this indicates that ($N_{v,i} * R_{v,i}$) does not exceed the maximum output capacity during the monitoring period and hence the system 				

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can provide continuous supply till the end of the monitoring period.

This functionality in the ER model ensures that $(N_{v,i} * R_{v,i})$ does not exceed the maximum output capacity for any school and operational days are calculated accordingly as per information column AK (corresponding to the monitoring period). In some cases the continuous running end date is a very forward date because the per day water consumption in the school is very low (due to low student + staff count) and hence the $(N_{v,i} * R_{v,i})$ does not exceed the treatment capacity for a very long time. As explained earlier this is a determinant and is not linked with lifetime/lifespan.

(c) The capacity of 340,000 L/unit (for UltraFLO) and 10,000L/unit (for UltraTAB) stated in tab "Assumptions" is consistent with latest version of registered CPAs 05-13 CPA-DDs page 4. The capacity of 4,088,232 L/unit (for Multi-barrier UV water) is sourced from Manufacturer technical specification document. The CME accepts oversight in ER spreadsheet assumption tab where the reference for the Multi-Barrier UV capacity is mentioned as CPA-DD. Revised ER sheet is being submitted.

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(d) The device capacity/lifetime specified in the CPA-DD 03 page 3 as 219,000 L / 1year is the minimum capacity/lifespan for a Multi Barrier UV system to be eligible in the CPA03. This is further substantiated by the fact that page 4 of CPA03 CPA-DD mentions the flow range of the example technology as 300-500 lph with 10-year lifetime. The Multi Barrier UV systems distributed under the CPA 03, therefore can have better capacity/lifetime limits specified in the CPA03 CPA-DD on page 3. The lifetime of Multi Barrier UV system has been cross verified from the manufacturer specifications by the DoE, as explained in point (c) above. For UltraFLO and UltraTAB the lifespan/expiry stated in MR is consistent with that specified in CPA 05-13 CPA-DDs page 4.

Additionally, the earliest UV units were installed in 2017. So, none of the installed UV systems are likely to expire during the concerned monitoring period. Besides, in case of Multi Barrier UV device, the UV bulb can be replaced to further extend the device lifetime after 7 years. Similarly in case of Chlorination, there is no limiting lifespan as these are consumables. The lifespan of the system is automatically deemed extended with every new supply which has an expiry of 5 years.

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(e) The 4125 schools that show zero continuous supplies were not supplied a cartridge (in case of ULtraFLO) or tablets (in case of UltraTAB) during the monitoring period. Please see the table below:

Schools with 0 Continuous Supplies (i.e. Column AC, tab 'MP3 Sales Database')			
Category	UltraFLO	UltraTAB	Total
(1) School with 0 residual capacity from previous MP	171	4	175
(2) School with residual capacity from previous MP	3,800	147	3,947
(3) New school installations in MP3	3	0	3
Total	3,974	151	4,125

For the 175 schools in (1) above, the operational days have been calculated as 0 because there is no residual capacity from previous MP, neither continuous supplies have been made to the school in the current monitoring period.

For schools in (2) above, although subsequent supplies were not made during the monitoring period, their "residual capacity from previous MP" provides for continuous safe drinking water during the current monitoring period. In case the 'residual capacity from previous MP' is not sufficient to last the entire monitoring period, the operational days (column AP) has been calculated accordingly and 'residual capacity at the end of monitoring period' – Column AK has been calculated as 0.

For schools in (3) above, given the systems are newly installed, they can provide clean drinking water by virtue of their initial installed capacity. Values in column AP and Column AK have been calculated accordingly for such systems.

Based on the aforesaid, it is substantiated that information presented in MR and ER spreadsheet is correct.

Documentation provided by project participant

PoA 9948 MP3 MR1 Nigeria ER Sheet ver 4.0 19032021

PoA 9948 MP3 MR1 Nigeria MR ver 4.0 19032021

DOE assessment

Date: 22/03/2021

ER spreadsheet:

a) CL ID03(b) in the FVR was raised and resolved with respect to this issue. It was confirmed that the values of 'residual capacity from previous MP' in MP3 ER spreadsheet (tab: "Sales data, column AB)

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were verified to be correctly calculated after cross-checking with MP2 ER calculator, the verification team further confirms the following:

In the revised MP3 ER Calculator, the MP2 Sales database has been added (Tab: 'MP2 Sales data – reference only') by the CME. The verification team has verified that information in the revised ER Calculator, Tab: 'MP2 Sales data – reference only' is 100% consistent with the tab: 'Sales database' in the MP2 ER calculator, available at:

https://cdm.unfccc.int/PoAIssuance/iss_db/poais63061347/view.

Further, in the revised ER calculator, tab 'MP3 Sales database' column AB, the residual capacity from previous MP has been found to be correctly linked with 'MP2 Sales data – reference only', column AK, thus establishing complete traceability.

The verification team has independently checked MP2 ER calculator from PoA page (9948-MP2-IRP4) and cross-verified the information in the revised ER Calculator, Tab: 'MP2 Sales data – reference only' and found it to be consistent.

In the revised ER calculator, 'MP3 sales database', column AB, for all systems newly installed, the 'residual capacity from previous MP' is also found to be correctly specified as "not applicable, new installation".

Thus, 'residual capacity from previous MP' is confirmed to be calculated correctly in column AB of MP3 Sales database for all schools.

Lastly, the residual capacity at the end of a given MP(column AL) is calculated as a function of Total daily consumption of drinking water and the duration by which a system's continuous running end date extends beyond the end date of monitoring period. This approach is equivalent to discounting the total available treatment capacity (in column AH) at the rate of daily water consumption (column AG) over the entire monitoring period duration to arrive at residual capacity at the end of the given MP (column AL).

Given the credits are only being calculated for actual school days and not for entire duration of monitoring period, the aforesaid approach shall result in 'residual capacity remaining at the end of MP' (which gets carry forwarded to next MP as opening capacity) rendered most conservative.

- b) The continuous running end date is merely a determinant to check compliance with the registered monitoring plan requirement. The continuous running end date is a calculated value based on the total available treatment capacity and the total water consumption per day and indicates the date by which the available capacity will get fully consumed. If the total daily water consumption is low, the total treatment capacity will get consumed over a longer period of time which may extend as far as 2048 or beyond.

The verification team confirms that this is merely a representation to objectively ensure that operational days remains lower of $(N_{y,i} * R_{y,i})$ and available output (capacity) and is not linked with lifetime of the installed devices. The verification team has checked the capacity / lifespan of devices against CPA-DD (9948-P1-0005-CP1 to 9948-P1-0013-CP1 for UltraTAB / UltraFLO) and manufacturer specifications (for Multi Barrier UV) as applicable and confirms that no devices installed are expiring their lifetime before the end of the concerned monitoring period.

- c) The WPS capacity is found correctly stated in ER sheet ('Assumptions' tab, F9:F10) for UltraFLO and UltraTab as verified from the CPA DD for CPAs 9948-P1-0005-CP1 to 9948-P1-0013-CP1 (section A.3., table on page 4, capacity). However, the capacity for Multi Barrier UV was verified against the manufacturer's specification as the capacity was not found mentioned in the CPA DD for CPA 9948-P1-0003-CP1. The cross-verification against manufacturer's specification has already been reported on page 21 of the FVR and appendix 3 of FVR. The ER sheet (tab: "Assumptions", cell F11) has been revised to mention the correct reference for Multi barrier UV capacity. Thus, it was accepted by the verification team.

- d) The device lifespan of UltraFLO and UltraTAB stated in MR section C.1 is found to be consistent with latest version of registered CPA-DDs (9948-P1-0005-CP1 to 9948-P1-0013-CP1), Section A.3 page 4. The device lifespan specified in the CPA-DD 03 page 3 as 219,000 L / 1year is the minimum capacity/lifespan for a Multi Barrier UV system to be eligible in the CPA. The capacity / lifespan of Multi Barrier UV systems distributed under the CPA 03, has been cross verified from the manufacturer specifications by the verification team, and is found to be better than the minimum capacity/lifespan specified on page 03 of the CPA-DD for CPA03. Hence, the WPS distributed under the CPAs are confirmed to be in compliance with the corresponding CPA-DDs (9948-P1-003-CP1 for

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Also, the continuous running end date and its use to calculate residual capacity at the end of MP has been verified and confirmed as conservative in (a) above. Also, this approach limits the crediting of the system as the minimum of available capacity or total consumption over monitoring period whichever is lower and is accurate and robust.¶

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Multi Barrier UV and 9948-P1-0005-CP1 to 9948-P1-0013-CP1 for UltraFLO / UltraTAB).

- e) The subsequent supplies to any school are depicted under column AC of the worksheet titled "MP3 sales database". The subsequent supplies are required in cases where the residual capacity from the previous period is 0. If the residual capacity is high and sufficient for the concerned monitoring period, then no new supplies are required to be sent to the schools. The schools which have '0' residual capacity in the current MP alongwith 0 subsequent supplies, were verified to have 0 operation days under column AP, thus substantiating that no ERs have been claimed for such cases. For other systems the operational days have been calculated accounting initial / residual capacity and subsequent supplies as applicable. The verification team has verified all corresponding calculations and found them accurate and correct. Thus, it was confirmed that the CME has followed the implementation plan stated in the CPA DDs and claimed ERs only for the systems that are rendering clean water during the current monitoring period.

Based on aforesaid and review of the following information/documents:

- Capacity / lifespan specified in CPA-DDs for Chlorination systems
- Capacity / lifespan as per manufacturer specifications for Multi Barrier UV systems
- Revised MP3 ER calculator with traceable residual capacity from previous MP
- Conservative calculation of residual days at the end of current MP
- Continuous running end date being a theoretical determinant and not representing the device lifetime

the verification team confirms that the capacity of the devices (installed actual capacity or residual capacity from previous MP and residual capacity at the end of current MP) have been correctly determined. The installed systems are capable of continuously supplying safe drinking water over the concerned monitoring period and ERs stated in the monitoring report and ER calculator are conservative, accurate, credible and additional to any that would have occurred in the baseline.

Thus, the CAR is closed.

CAR ID	08	Section no.	E.3.4.2.	Date : 25/02/2021
Description of CAR				
Refer to paragraph: paragraph 359(d) of VVS for PoA version 2				
The CME justify the appropriateness of applying the entire days covered by the monitoring period when calculating parameter QPW _y (i.e. quantity of purified water for drinking during the year y), given the facts that the systems do not service the entire population (i.e. the students) during the school holidays.				
Project participant response				Date : 20/03/2021
The number of days in ERs Summary tab, has been adjusted to correspond to only operational school days (106 days) instead of complete duration of the monitoring period (223 days). Please refer revised ER calculator, tab: MP3 Nigeria School Days, cell I11 for the adjustment fraction applied.				
As a conservative measure, the school academic calendar, as issued by the federal ministry of education, Nigeria has been used to determine the total school term days within the monitoring period. Subsequently, the CME has only considered weekdays (excluding weekends and public holidays for boarding and non-boarding users alike, although boarding students/staff will consume water during weekends) for determining the school days for which WPS should be credited as a conservative measure. The QPW _y has been discounted accordingly in ERs Summary by applying an adjustment factor in E6:N6.				
This results in reduction of emission reduction to 117,570 tCO ₂ e				
Documentation provided by project participant				
PoA 9948 MP3 MR1 Nigeria ER Sheet ver 4.0 19032021				
PoA 9948 MP3 MR1 Nigeria MR ver 4.0 19032021				
DOE assessment				Date: 22/03/2021
In the applied methodology / registered PoA-DD, CPAs do not have provision to account for school holidays. However, based on the request for review, the CME has discounted the school holidays (refer tab: MP3 Nigeria School days) from monitoring days on the basis of published and objectively verifiable government data (Academic school calendar). The school term duration and corresponding term holidays are found to be correctly calculated as per the submitted academic school calendars for the period 2018-2019 and 2019-20 (to cover the entire monitoring period from 23 May 2019 – 31 Dec 2019). Further, the CME has excluded all weekend days for day schools and boarding schools alike. The approach of not considering weekends for boarding staff and students is deemed highly conservative.				

Deleted: d) The device lifespan of UltraFLO and UltraTAB stated in MR section C.1 is found to be consistent with latest version of registered CPA-DDs((9948-P1-003-CP1, 9948-P1-005-CP1 to 9948-P1-0013-CP1)), Section A.3 page 4. ¶ The device lifespan specified in the CPA-DD 03 page 3 as 219,000 L / 1year is the minimum capacity/lifespan for a Multi Barrier UV system to be eligible in the CPA. The capacity / lifespan of Multi Barrier UV systems distributed under the CPA 03, has been cross verified from the manufacturer specifications by the DoE, as explained in point (c) above and is found to be better than the minimum capacity/lifetime specified on page 03 of the CPA-DD. Hence, the WPS distributed under the CPAs are confirmed to be in compliance with the corresponding CPA-DDs((9948-P1-003-CP1, 9948-P1-005-CP1 to 9948-P1-0013-CP1)).¶

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The discount factor applied has been checked and confirmed as correctly calculated. The revised achieved emission reductions in the current monitoring period are confirmed to be conservative, accurate and credible. Moreover, FAR#02 has been raised to ensure that QPW_y is based on operational school days (discounting holidays), in future verifications.

Thus, the CAR is closed.

Table 4 FARs from this verification

FAR ID	01	Section no.	E.3.4.2.	Date : 22/03/2021
Description of FAR				
DOE involved in subsequent verifications shall ensure that monitoring frequency of parameter "operational units" is atleast, biennial, in line the with monitoring methodology requirements.				
Project participant response				Date: DD/MM/YYYY
NA				
Documentation provided by project participant				
NA				
DOE assessment				Date: DD/MM/YYYY
NA				

FAR ID	02	Section no.	E.3.4.2.	Date	22/03/2021
Description of FAR					
DOE involved in subsequent verifications shall ensure that the parameter QPW _y is determined accounting the operational school days (excluding holidays) instead of duration of the concerned monitoring period, as applicable.					
Project participant response				Date: DD/MM/YYYY	
NA					
Documentation provided by project participant					
NA					
DOE assessment				Date: DD/MM/YYYY	
NA					

Document information

Version	Date	Description
03.0	31 May 2019	Revision to: <ul style="list-style-type: none"> Ensure consistency with version 02.0 of the "CDM validation and verification standard for programmes of activities" (CDM-EB93-A08-STAN); Make structural and editorial improvements.
02.0	29 December 2017	Revision to align with the requirements of the "CDM validation and verification standard for programme of activities" (version 01.0).
01.0	5 June 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: programme of activities, verifying and certifying		

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