



**Monitoring report form for CDM programme of activities
(version 01.0)**

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form for CDM programme of activities" at the end of this form.

MONITORING REPORT

Title of the programme of activities (PoA)	International Water Purification Programme	
UNFCCC reference number of the PoA	5962	
Version number(s) of the PoA-DD(s) applicable to this monitoring report	07	
Coordinating/managing entity (CME)	Pure Water Ltd.	
Version number of this monitoring report	01	
Completion date of this monitoring report	28/07/2017	
Monitoring period number and dates covered by this monitoring report	4 th monitoring period 01/06/2016- 30/04/2017	
Monitoring report number for this monitoring period	02	
Host Party(ies)	Host Party(ies) of the PoA	Is this a host Party to a specific-case CPA covered in this monitoring report?(yes/no)
	Uganda	No
	Ethiopia	No
	Gambia	No
	Kenya	Yes
	Madagascar	No
	South Africa	No
	Egypt	No
	El Salvador	No
	Mexico	No
	Nicaragua	No
	Chile	No
	Iran	No

	Vietnam	No
	Cambodia	No
	Malawi	No
Sectoral scope(s)	Sectoral scope 3 : Energy demand	
Selected methodology(ies)	AMS-III.AV. “Low greenhouse gas emitting safe drinking water production systems (Eversion 03)”	
Selected standardized baseline(s)	N/A	
Total amount of GHG emission reductions or net GHG removals by sinks for all specific-case-case CPAs in the PoA covered in this monitoring report	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0 tCO ₂ e	198,607tCO ₂ e

PART I - Programme of activities

SECTION A. Description of PoA

A.1. Brief description of the PoA

This PoA seeks to further the access of households and communities to clean and safe drinking water, by promoting low greenhouse gas emitting water purification technologies. This PoA is thus primarily designed for the long-term improvement of the living conditions of local people. The targeted users of such technologies will be households and/or communities. Examples of technologies include, but are not limited to, water filters (e.g. membrane, activated carbon, ceramic filters), solar technologies (Ultra violet disinfection devices, solar water disinfection SODIS), photocatalytic disinfection equipment, pasteurization appliances, chemical disinfection methods (e.g. chlorination), combined treatment approaches (e.g. Flocculation plus disinfection), etc.

The PoA reduces the use and demand for fossil fuels and non-renewable biomass that would have been used to boil water as a mean of water purification in the absence of the Programme of Activities. This directly leads to reduced greenhouse gas emissions.

A.1.1. Generic CPA(s)

Title, identification/reference number and/or version number of the generic CPA(s) of the PoA	Sectoral scope(s)	Applied methodology(ies) or combination of methodologies and/or standardized baseline(s)
International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	Sectoral scope 3 : Energy demand	AMS-III.AV. Low greenhouse gas emitting safe drinking water production systems (version 03) This methodology refers to the following methodology and tools: <ul style="list-style-type: none"> AMS-I.E. Switch from Non-Renewable biomass for thermal applications by the user (version 05)¹ Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 02)² Tool to calculate baseline, project and/or leakage emissions from electricity consumption (version 01)³

A.1.2. Specific-case CPA(s) covered in this monitoring report

Reference number of the specific-case CPA included in the PoA as of the end of this monitoring period	Title, identification/reference number and version number of the generic CPA to which the specific-case CPA applies	Crediting period dates of the specific-case CPA	Is this specific-case CPA covered in this monitoring report? (yes/no)
5962-0001 (CPA-1)	International water purification programme The approved PoA-DD (version 07, 13/04/2015):	01/11/2013 – 30/10/2020	No

¹ http://cdm.unfccc.int/filestorage/5/e/HSVPWKBG6X7Q8YEFMOT214IA3R0ZDL.pdf/EB%2068_repan22_Rev_AMS-I.E_ver05.0.pdf?t=Ykh8b2NnY2l4fDCp1ObgpFSWKljWx5gqydnj

² <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>

³ https://cdm.unfccc.int/Reference/tools/ls/meth_tool05_v01.pdf

	PART II. Generic component project activity (CPA)		
5962-0002 (CPA-2)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	17/07/2014 – 16/07/2021	No
5962-0003 (CPA-3)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	15/04/2015 – 14/04/2022	No
5962-0004 (CPA-5)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	19/11/2015 - 18/11/2022	No
5962-0005 (CPA-6)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	21/01/2016 – 20/01/2023	Yes
5962-0006 (CPA-7)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	21/01/2016 – 20/01/2023	Yes
5962-0007 (CPA-8)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	21/01/2016- 20/01/2023	No
5962-0008 (CPA-9)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	13/09/2016 – 12/09/2023	No
5962-0009 (CPA-10)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	13/09/2016 – 12/09/2023	No
5962-0010 (CPA-11)	International water purification programme The approved PoA-DD	13/09/2016-12/09/2023	No

	(version 07, 13/04/2015): PART II. Generic component project activity (CPA)		
5962-0011 (CPA-12)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	13/09/2016 – 12/09/2023	Yes
5962-0012 (CPA-13)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	13/09/2016 – 12/09/2023	Yes
5962-0013 (CPA-14)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	13/09/2016 – 12/09/2023	Yes
5962-0014 (CPA-4)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	01/01/2017 – 31/12/2023	No
5962-0015 (CPA-15)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	01/02/2017 – 31/01/2024	Yes
5962-0016 (CPA-20)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	01/02/2017 – 31/01/2024	Yes
5962-0017 (CPA-21)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	01/02/2017 – 31/01/2024	No
5962-0018 (CPA-22)	International water purification programme The approved PoA-DD (version 07, 13/04/2015): PART II. Generic component project activity (CPA)	01/02/2017 – 31/01/2024	No

A.2. Contact information of the coordinating/managing entity (CME) and/or responsible persons(s)/entity(ies)

Jessie Zhang, Pure Water Ltd. (CME), j.zhang@thesouthpolegroup.com

The detailed contact information of CME are provided in Appendix 1.

SECTION B. Implementation of PoA

B.1. Implementation of the management system of the PoA

The management system has been implemented as described in the validated PoA-DD ('Operational and management plan') and in accordance with applicable provisions on the implementation of the management system in the Project Standard. The PoA is managed by the CME (Pure Water Ltd.) with CPA Managers responsible for the coordination with the CPA Implementer (Evidence Action). Detailed roles and responsibilities of CME and CPA Implementer are described in the PoA-DD.

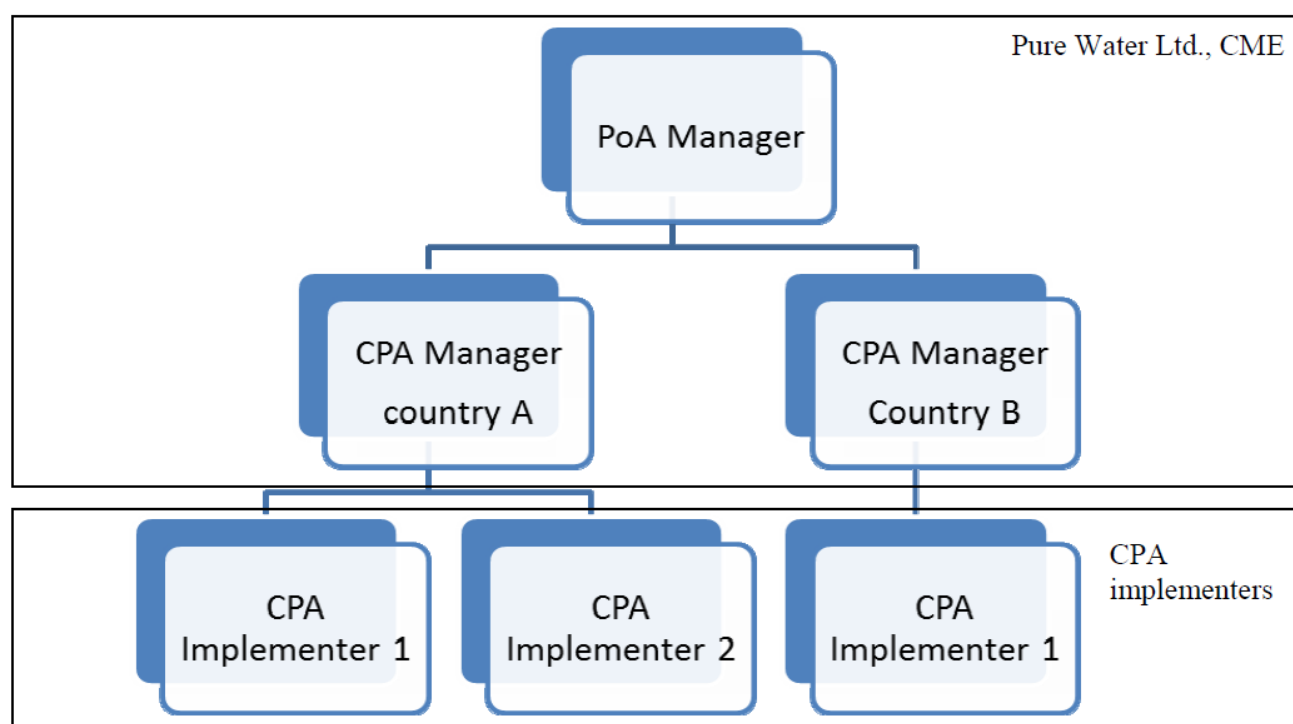


Figure: Overview of organizational structure

In order to ensure that CPAs comply with the double counting avoidance requirement stated in the PoA-DD, the CPA Manager checked every new CPA against the CPAs in the existing PoA database and the list of project activities that are under validation or registered at the UNFCCC.

All CPA-related data are stored electronically and/or in hard copy formats. The dispenser databases of CPA 6, 7, 12, 13, 14, 15 and 20 contain details about the unique waterpoint IDs, installation dates and administrative units in which the dispensers were installed.

B.2. Implementation of single sampling plan(s)

In this monitoring period the single sampling plan was implemented combined for CPA 6, 7, 12, 13, 14, 15 and 20 as the same technology has been used in the same host-country (see section G.3 of Part II).

SECTION C. Post-registration changes to the PoA (including the generic CPA(s))**C.1. Corrections**

No corrections were made to the registered PoA-DD (including the generic CPAs).

C.2. Inclusion of a monitoring plan to the registered PoA-DD (including its generic CPA-DD(s)), if a monitoring plan was not included at the time of registration

No monitoring plan was included to the registered PoA-DD.

C.3. Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline

No permanent changes were made to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline.

C.4. Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA

No changes were made to the programme design of the registered PoA-DD during the current monitoring period.

C.5. Types of changes specific to afforestation and reforestation activities

N/A

PART II - Specific-case component project activity(ies)

SECTION D. Description of specific-case CPA(s)

D.1. Brief description of implemented specific-case CPA(s)

The implementation of the project activities of following CPAs were carried out in accordance with the registered CPA-DDs, including:

- CPA 6 Chlorine Dispensers in Kenya (CDM# 5962-0005)
- CPA 7 Chlorine Dispensers in Kenya (CDM# 5962-0006)
- CPA 12 Chlorine Dispensers in Kenya (CDM# 5962-00011)
- CPA 13 Chlorine Dispensers in Kenya (CDM# 5962-00012)
- CPA 14 Chlorine Dispensers in Kenya (CDM# 5962-00013)
- CPA 15 Chlorine Dispensers in Kenya (CDM# 5962-00015) and
- CPA 20 Chlorine Dispensers in Kenya (CDM# 5962-0016)

Till 30/04/2017 a total chlorine dispensers installed within the defined project boundary are listed as below:

CPA No.	Total installed chlorine dispensers
CPA 6	1,739
CPA 7	2,200
CPA 12	1,718
CPA 13	1,148
CPA 14	1,745
CPA 15	1,591
CPA 20	803

In order to avoid double-counting each water source is given a unique ID. In addition, each dispenser casing is marked with a unique identification number on a scannable asset tag (barcode ID). The allocation of this barcode ID to the unique water point ID is recorded in a central database.

The CPA implementer is aware that the CPAs are subscribed to this present PoA and cedes the rights to claim and own emission reductions under the Clean Development Mechanism to the managing entity of this present PoA. The CPA implementer has warranted that the proposed CPAs are neither registered as individual CDM projects, nor are they part of another registered PoA, nor are they a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs.

Purpose of the project activity CPA 6, 7, 12, 13, 14, 15 and 20

The CPAs seek to further the access of households and communities to safe drinking water, using a low greenhouse gas emitting water purification technology, chlorine dispensers. The CPA reduces the use and demand of non-renewable biomass that would have been used to boil the water as a mean of water purification in the absence of the CPA. This directly leads to reduced greenhouse gas emissions.

Applicability of methodology

No events or situations occurred during the monitoring period that may have impacted the applicability of the applied methodology AMS-III.AV version 03.

Brief description of the installed technology and equipment

Chlorine dispensers have been installed in the project activity (CPA 6, 7, 12, 13, 14, 15 and 20).

Hardware specification	
Dispenser casing	Injection-molded HDPE tank produced in Kenya

Dispenser tank	Blow-molded HDPE tank produced in Kenya; capacity 3 liters
Dispenser tank valve	Imported from USA; delivers a precise 3 ml dose of chlorine
Marine padlock	Imported from China
Asset tag	Imported from USA
Chlorine	Sodium hypochlorite solution, 11.90 minimum pH, 1.2% \pm 0.1 available chlorine; in 5 liter container with tamper-resistant cap
Hardware lifetime	5 years
Load factor	28,800 L per day ⁴

Relevant dates for the project activity

Timeline CPA	
29/07/2011	Validation start date of IWPP (PoA)
16/11/2012	Registration of the PoA under the CDM of the UNFCCC.
09/10/2013	Emission Reduction Purchase Agreement signed between Pure Water Ltd. (the CME) and Evidence Action (implementer).
07/01/2015	Start date of IWPP CPA 7 in Bungoma North, Trans Nzoia and Uasin Gishu, Kenya. In total 2,200 dispensers were installed between 07/01/2015 and 29/02/2016 (see dispenser database for CPA 7).
06/05/2015	Start date of IWPP CPA 6 in Busia County, Kenya. In total 1,739 dispensers were installed between 06/05/2015 and 07/10/2015 (see dispenser database for CPA 6).
21/01/2016	CDM inclusion date of CPA 6 and 7.
13/09/2016	CDM inclusion date of CPA 12, 13 and 14.
01/02/2017	CDM inclusion date of CPA 15 and 20.
30/04/2017	Cut-off date PoA monitoring period#3: 1,739 chlorine dispensers installed (CPA 6), 2,200 dispensers installed (CPA 7), 1,718 dispensers installed (CPA 12), 1,148 dispensers installed (CPA 13), 1,745 dispensers installed (CPA 14), 1,591 dispensers installed (CPA 15) and 803 dispensers installed (CPA 20)

Achieved emission reductions

Total GHG emission reductions achieved during this monitoring period are **198,607 tCO₂e**.

CPA	Monitoring Period #4 (01/06/2016 – 30/04/2017)
CPA 6	49,840
CPA 7	37,634
CPA 12	31,614 ⁵

⁴ Assuming 30 seconds per dispensing over 12 hours per day

⁵ Only including CERs generated after CPA inclusion date (13/09/2016)

CPA 13	36,279 ⁶
CPA 14	29,668 ⁷
CPA 15	8,655 ⁸
CPA 20	4,917 ⁹
Total	198,607

D.2. Geographical references or other means of identification of the location of the specific-case CPA(s)

The physical boundary of CPA 6, 7, 12, 13, 14, 15 and 20 are the communities who use the water points where chlorine dispensers are installed. A database containing the GPS coordinates and unique IDs for all included chlorine dispensers can be made available.

CPA 6

- All dispensers are located within Busia county
Longitude: E 34.0412° – 34.4070°, Latitude: N 0.2271° - 0.7479°

CPA 7

- All dispensers are located within Bungoma, Trans Nzoia and Uasin Gishu counties
Longitude: E 34.4504° – 35.5711°, Latitude: N 0.0669° - 1.2847°

CPA 12

- All dispensers are located within Siaya County (involved divisions: Boro, Karemo, Uranga, Wagai, Yala)
Longitude: E 34.0694° – 35.5590°, Latitude: S 0.0758° – N 0.2148°

CPA 13

- All dispensers are located within Siaya County (involved divisions: Sigomere, Sihay, Ugunja, Ukwala)
Longitude: E 34.1089° – 34.4505°, Latitude: S 0.7754° – N 0.3108°

CPA 14

- All dispensers are located within Migori County (involved sub-counties: Kuria East, Kuria West, Migori and Uriri)
Longitude: 34.1915° – 36.3632°, Latitude: S 1.3837° – N 1.9590°

CPA 15

- All dispensers are located within Migori County (involved sub-counties: Awendo and Rongo) and Homabay County (involved sub-county: Ndhiwa)
Longitude: E 34.1000° – 35.1000°, Latitude: S 0.1600° – S 1.1000°

CPA 20

⁶ Only including CERs generated after CPA inclusion date (13/09/2016)

⁷ Only including CERs generated after CPA inclusion date (13/09/2016)

⁸ Only including CERs generated after CPA inclusion date (01/02/2017)

⁹ Only including CERs generated after CPA inclusion date (01/02/2017)

- All dispensers are located within Rachuonyo South sub-county and Rangwe sub-county of Homabay County
Longitude: E 33.4000° – E 35.3000°, Latitude: S 0.4000° – S 1.0000°

SECTION E. Post-registration changes to specific-case CPA(s)**E.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

No temporary deviations from registered monitoring plan or applied methodology were necessary for the involved CPAs since the start date of the project activities.

E.2. Corrections

No corrections were made to the registered CPA DDs.

E.3. Changes to the start date of the crediting period of the specific-case CPA(s)

N/A

E.4. Inclusion of a monitoring plan into the specific-case CPA(s) that was not included at registration

No monitoring plan was included into the specific-case CPAs that was not included at registration.

E.5. Permanent changes to the monitoring plan as described in the registered specific-case CPA-DD(s), applied methodology or standardized baseline

No permanent changes were made.

E.6. Changes to project design of the specific-case CPA(s)

No changes to project design of the specific-case CPAs were made.

E.7. Types of changes specific to afforestation and reforestation specific-case CPA(s)

N/A

SECTION F. Description of the monitoring system of specific-case CPA(s)

Evidence Action had the responsibility to monitor and record all relevant parameters for CPA 6, 7, 12, 13, 14, 15 and 20. The procedure is in line with the monitoring plan described in the CPA-DD section D.7.2. Details about the sampling design are given in section G.3 of this monitoring report.

Parameters to be monitored

- Existence of public distribution network supplying safe drinking water
(see *'interviews'* below)
- Number of functional chlorine dispensers (N_v)
(see *'dispenser spot-checks'* below)
- Average number of refills per functional dispenser (Refill#)
(see *'chlorine delivery records'* below)
- Fraction of delivered chlorine available for use in dispenser (Refill%)
(see *'surveys'* below)
- Fraction of water treated with the dispenser that is actually drunk (Drink%)
(see *'surveys'* below)
- Water quality
(see *'surveys'* below)

The data were collected through three main monitoring activities:

a) Chlorine delivery records (Refill# and N_y)

Refill#: Promoters collected chlorine in 5 L jerricans at the health centers. Each time chlorine was handed out to a promoter, it was recorded and kept at a logbook at the health center. Evidence Action collected chlorine usage data from health center and promoters.

Evidence Action regularly monitored the consumption of chlorine through the chlorine usage data to ensure the chlorine delivery/consumption is reasonable. Refill# is determined by adding up chlorine consumption at all chlorine dispensers functional during the monitoring period. Note: chlorine usage at non-functional dispensers was assumed to be always 0. The CME made a consistency check for the results.

The chlorine consumption was monitored and recorded by Evidence Action. In case of missing data, it is assumed that no chlorine was used.

N_y: Through random spot-checks the functionality of the chlorine dispenser was checked by Evidence Action field staff using a mobile phone-based recording format (dispenser spot-check). The records were uploaded to a master database on a central server and analysed by Evidence Action's MLIS team using the statistics software package 'Stata'. In case a dispenser was found to be non-functional, the status of the respective dispenser was recorded as "non-functional" in the respective CPA's dispenser database. Functionality is defined as: the dispenser releases 3 ml of chlorine when the valve is turned. In case the dispenser is empty, chlorine is added and the dispenser is checked again. The CME made a consistency check for the results.

b) Interviews (Existence of public distribution network supplying safe drinking water)

The regional water bureaus were visited by Evidence Action field staff to determine if a public distribution network supplying safe drinking water was constructed within the project area. Details are provided in a separate document.

c) Surveys (Refill%, Drink% and Water Quality)

Three parameters were quantified through surveys. Details about the surveys are given in section G.3 of this monitoring report.

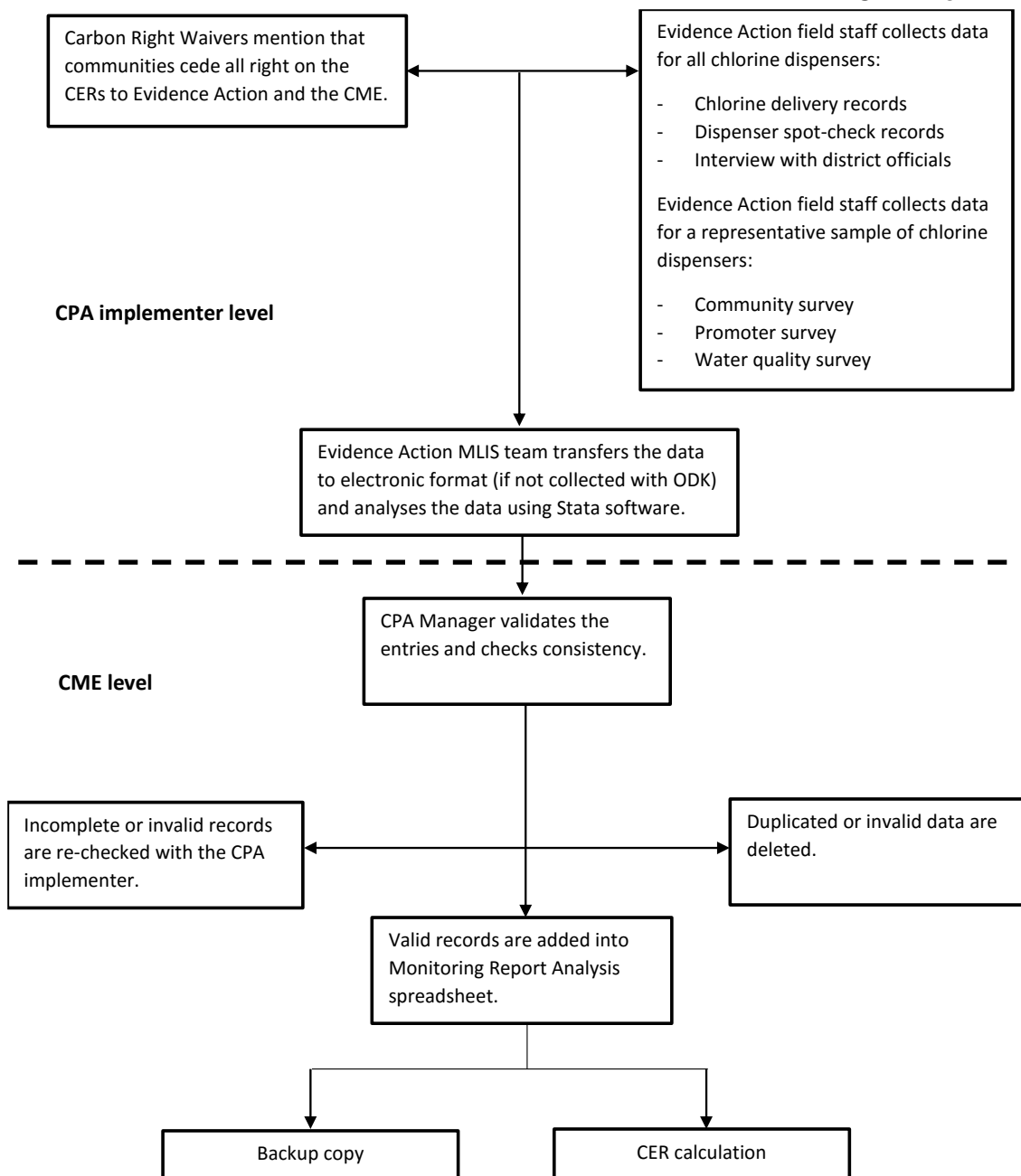


Figure: Records and documentation control process for CPA 6, 7, 12, 13, 14, 15 and 20

SECTION G. Data and parameters**G.1. Data and parameters fixed ex ante, at registration, inclusion or renewal of crediting period**

Data / Parameter	EF_{projected_fossilfuel}
Data unit	tCO ₂ /TJ
Description	Emission factor as per AMS-I.E procedures when NRB is displaced or the emission factor of the fossil fuel substituted
Source of data	AMS-I.E for NRB displacement, IPCC for other fossil fuel displaced
Value(s) applied	81.6
Choice of data or measurement methods and procedures	As per AMS-I.E, this value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis.
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	WH
Data unit	kJ/L °C
Description	Specific heat of water
Source of data	AMS-III.AV version 03
Value(s) applied	4.186
Choice of data or measurement methods and procedures	Default value
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	T_f
Data unit	°C
Description	Final temperature
Source of data	AMS-III.AV version 03
Value(s) applied	100
Choice of data or measurement methods and procedures	Default value. Boiling point of water at standard conditions.
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	T_i
Data unit	°C
Description	Initial temperature
Source of data	AMS-III.AV version 03
Value(s) applied	20
Choice of data or measurement methods and procedures	Default value
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	WHE
Data unit	kJ/L
Description	Latent heat of water evaporation
Source of data	AMS-III.AV version 03
Value(s) applied	2,260
Choice of data or measurement methods and procedures	Default value. The latent heat required to boil one liter of water for five minutes is assumed to be equivalent to latent heat for the evaporation of 1% of the water volume (WHO recommends a minimum duration of five minutes of water boiling) ¹⁰
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	η_{wb}
Data unit	-
Description	Efficiency of the water boiling system being replaced
Source of data	Baseline survey
Value(s) applied	10.25% (CPA 6), 13.58% (CPA 7) , 11.73% (CPA 12) , 10.36% (CPA 13) , 11.09% (CPA 14) , 11.20% (CPA 15) and 11.29% (CPA 20)
Choice of data or measurement methods and procedures	0.10 default value is used if the replaced system or the system that would have been used is a three stone fire or a conventional system for woody biomass lacking improved combustion air supply mechanism and flue gas ventilation system i.e. without a grate as well as a chimney; for the rest of the systems using woody biomass 0.20 default value will optionally be used. 0.50 default value will be used if the replaced system or the system that would have been used is a fossil fuel combusting system. Use weighted average values if more than one type of system is encountered.
Purpose of data	Calculation of baseline emissions
Additional comment	The water boiling systems and the fuel used in the baseline have been established ex-ante via a baseline survey.

Data / Parameter	f_{NRB}
Data unit	-
Description	Non Renewable Biomass factor
Source of data	EB 67 Report Annex 22
Value(s) applied	92%
Choice of data or measurement methods and procedures	Fraction of woody biomass used in the absence of the project activity in year y for Kenya as per https://cdm.unfccc.int/DNA/fNRB/index.html
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	L_p
Data unit	Liters/refill (chemical disinfection)
Description	Capacity of the water purification equipment
Source of data	Manufacturer's specifications / Water Point Verification
Value(s) applied	33,333 (CPA 6), 33,333 (CPA 7) , 30,276 (CPA 12) , 31,370 (CPA 13) , 31,267 (CPA 14) , 30,725 (CPA 15) and 32,331 (CPA 20)

¹⁰ WHO guidelines for Emergency Treatment of drinking water at point of the use

Choice of data or measurement methods and procedures	Manufacturer specifications of maximal amount of water treated based on one refill (5 liter chlorine solution) and dosage (3 ml dose treats 20 liters of water if turbidity is below 10 NTU and 6 ml if turbidity is above 10 NTU)
Purpose of data	Calculation of baseline emissions
Additional comment	For the sake of conservativeness the specifications are adjusted for chlorine losses during refills (Refill%) and chlorinated water used for other purposes than drinking (Drink%).

Data / Parameter	POP_P
Data unit	-
Description	Number of persons supplied with purified water from each of the functional project appliances
Source of data	Water Point Verification
Value(s) applied	135 (CPA 6), 102 (CPA 7) , 153 (CPA 12) , 228 (CPA 13) , 130 (CPA 14) , 110 (CPA 15) and 118 (CPA 20)
Choice of data or measurement methods and procedures	As part of the Water Point Verification conducted by Evidence Action prior to the dispenser installation, the number of households using each water point of each CAP was established as below ¹¹ . CPA 6: POP _P = 26.5 households * 5.1 people/household = 135 (round down) CPA 7: POP _P = 20.1 households * 5.1 people/household = 102 (round down) CPA 12: POP _P = 30.1 households * 5.1 people/household = 153 (round down) CPA 13: POP _P = 44.8 households * 5.1 people/household = 228 (round down) CPA 14: POP _P = 25.6 households * 5.1 people/household = 130 (round down) CPA 15: POP _P = 21.7 households * 5.1 people/household = 110 (round down) CPA 20: POP _P = 23.3 households * 5.1 people/household = 118 (round down)
Purpose of data	Calculation of baseline emissions
Additional comment	The project activity falls under Case 1 per paragraph 3(a) in AMS-III.AV version 03, therefore this parameter is determined ex-ante. The applied value is rounded to the closest integer.

Data / Parameter	DW_{POP}
Data unit	Liters/person/day
Description	Average volume of drinking water per person per day
Source of data	Official data, WHO, minimum water quantity needed
Value(s) applied	3.5
Choice of data or measurement methods and procedures	Official data used on average volumes of drinking water per person per day in emergency situation published by World Health Organization ¹² . Conservative value as according to AMS-III.AV Version 03 a value of 5.5 liters per person per day shall not be exceeded.
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	POP_{Boiling}
Data unit	-

¹¹ Kenya Integrated Household Budget Survey (executive summary and page 16)

¹² WHO SEARO, Minimum water quantity needed for domestic uses, 3 – 4 liters per person per day

http://ec.europa.eu/echo/files/evaluation/watsan2005/annex_files/WHO/WHO5%20-%20Minimum%20water%20quantity%20needed%20for%20domestic%20use.pdf

Description	Proportion of total population attended by the project that is serviced at households/buildings where water boiling would have been the purification practice.
Source of data	-
Value(s) applied	Only relevant for Case 2
Choice of data or measurement methods and procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	The project activity falls under Case 1 per paragraph 3(a) in AMS-III.AV version 03 and thus POP _{Boiling} does not need to be considered.

Data / Parameter	Ex-ante determined parameters for the project emissions from fossil fuel combustion
Data unit	-
Description	Parameters to be determined ex ante for the calculation of project emissions from fossil fuel combustion as per the tool.
Source of data	-
Value(s) applied	No consumption of fossil fuel by chlorine dispenser
Choice of data or measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	Ex-ante determined parameters for the project emissions from electricity consumption
Data unit	-
Description	Parameters to be determined ex ante for the calculation of project emissions from electricity consumption as per the tool
Source of data	-
Value(s) applied	No consumption of electricity by chlorine dispenser
Choice of data or measurement methods and procedures	-
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	Leakage
Data unit	-
Description	Fractional increase in NRB usage by households outside the project boundary
Source of data	AMS-I.E Version 5
Value(s) applied	0.95
Choice of data or measurement methods and procedures	-
Purpose of data	Calculation of leakage
Additional comment	

G.2. Data and parameters monitored

Data / Parameter:	QPW_y
Unit:	Liters

Description:	Quantity of purified water in year y
Measured/ Calculated / Default:	Calculated
Source of data:	Derived from the capacity of the equipment established by the manufacturers' specifications, the number of functional project appliances, average number of refills per functional dispenser and two adjustment factors of Refill% and Drink%. $QPW_y = L_P * N_y * Refill\# * Refill\% * Drink\%$
Value(s) of monitored parameter:	206,578,261 L [CPA 6], 206,665,351 L [CPA 7], 149,953,290 L [CPA 12], 151,983,994 L [CPA 13], 133,049,716 L [CPA 14], 39,201,600 L [CPA 15] and 22,451,012 L [CPA 20]
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	N/A
Calculation method (if applicable):	N/A
QA/QC procedures:	N/A
Purpose of data:	Calculation of baseline emissions
Additional comment:	QPW _y is subject to a cap derived from the population serviced by the project equipment POP _P multiplied by the average volume of drinking water per person per day based on official data. The calculation in the ER sheet shows QPW _y is smaller than cap for CPA 6, 7, 12, 13, 14, 15 and 20 during this monitoring period.

Data / Parameter:	N_y
Unit:	-
Description:	Number of functional chlorine dispensers in monitoring period
Measured/ Calculated / Default:	Measured
Source of data:	Periodical physical inspection of each device (spot-checks). N _y is derived from regular functionality checks. In case a dispenser was found to be non-functional, the status of the respective dispenser was recorded as "non-functional" in the central database. In addition, dispensers that had no reported chlorine deliveries were also assumed to be non-functional. N _y was determined by multiplying the total number of installed dispensers by the fraction of functional dispensers at the cut-off date (30/04/2017).
Value(s) of monitored parameter:	1,645 (CPA 6), 2,153 (CPA 7), 1,554 (CPA 12) , 1,076 (CPA 13) , 1,664 (CPA 14) , 1,480 (CPA 15) and 769 (CPA 20)
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Physical inspection of all dispensers in rotation.
Calculation method (if applicable):	N/A

QA/QC procedures:	In case a dispenser was not operating and has not been replaced at the cut-off date (30/04/2017), it was excluded from the emission reduction calculation for the whole monitoring period. Monitoring data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	Refill#
Unit:	-
Description:	Average number of refills per functional dispenser per year
Measured/ Calculated / Default:	Measured
Source of data:	Number of chlorine containers delivered to promoters (chlorine delivery records) When new chlorine is delivered to a promoter, the number of containers delivered and the number of containers in stock are recorded. Refill# was determined by adding up all chlorine used during the monitoring period. For calculating Refill# only dispensers recorded as 'functional' at the cut-off date were considered.
Value(s) of monitored parameter:	4.33 (CPA 6), 3.31 (CPA 7) , 3.66 (CPA 12) , 5.17 (CPA 13) , 2.94 (CPA 14) , 0.99 (CPA 15) and 1.04 (CPA 20) during this monitoring period.
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Chlorine is delivered to all dispensers in rotation.
Calculation method (if applicable):	Microsoft Excel (based on chlorine delivery records)
QA/QC procedures:	Monitoring data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	Refill%
Unit:	%
Description:	Fraction of delivered chlorine available for use in dispenser
Measured/ Calculated / Default:	Measured
Source of data:	Promoter survey. Survey question: "From the time that you receive the jerrican of chlorine to the time that the chlorine is put into the dispenser, is any chlorine lost?"
Value(s) of monitored parameter:	97.2%
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Annual
Calculation method (if applicable):	N/A

QA/QC procedures:	Monitoring data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	Drink%
Unit:	%
Description:	Fraction of water treated with the dispenser that is actually drunk
Measured/ Calculated / Default:	Measured
Source of data:	Interview question included into water quality survey. Survey question: "What is your primary use for chlorinated water?" and "How much of your chlorinated water is used for [primary use]?"
Value(s) of monitored parameter:	89.6%
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Annual
Calculation method (if applicable):	N/A
QA/QC procedures:	Monitoring data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	Existence of public distribution network supplying safe drinking water
Unit:	-
Description:	Existence of public distribution network supplying safe drinking water to the project boundary in year y
Measured/ Calculated / Default:	Interviews
Source of data:	Interview with regional Water Board
Value(s) of monitored parameter:	0 (no households need to be discounted)
Monitoring equipment:	N/A
Measuring/ Reading/ Recording frequency:	Annual
Calculation method (if applicable):	N/A
QA/QC procedures:	Emission reductions related to those households will be discounted accordingly considering the number of households linked to the network and the date the network became operational.
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	Water quality
Unit:	-
Description:	Water quality

Measured/ Calculated/ Default:	Measured
Source of data:	Sampling surveys
Value(s) of monitored parameter:	97.0%
Monitoring equipment:	Hach Color Wheel for Total Chlorine Residual (TCR) and IDEXX machine for E.coli
Measuring/ Reading/ Recording frequency:	Annual
Calculation method (if applicable):	The fraction of households with sufficient water quality was established as the number of water samples with E.coli below 10 CFU/100 ml divided by the number of water samples that tested positive for the presence of TCR ('users').
QA/QC procedures:	The fraction of water quality measurements providing water of insufficient quality shall be excluded from the calculation of emission reductions.
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	POP_y
Unit:	-
Description:	Number of persons supplied with purified water from each of the functional project appliances
Measured/ Calculated / Default:	Only relevant for Case 2
Source of data:	-
Value(s) of monitored parameter:	-
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	Calculation of baseline emissions
Additional comment:	Only relevant for Case 2. The project activity falls under Case 1 per paragraph 3(a) in AMS-III.AV version 03 and thus POP _y does not need to be considered.

Data / Parameter:	Monitoring parameters for the project emissions from fossil fuel combustion
Unit:	-
Description:	Parameters to be monitored for the calculation of project emissions from fossil fuel combustion as per the tool
Measured/ Calculated/ Default:	-
Source of data:	-
Value(s) of monitored parameter:	No consumption of fossil fuel by chlorine dispensers.

Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	Used to quantify project emissions
Additional comment:	To be considered only in the case the water purification devices consumes fossil fuels.

Data / Parameter:	Monitoring parameters for the project emissions from electricity consumption
Unit:	-
Description:	Parameters to be monitored for the calculation of project emissions from electricity consumption as per the tool
Measured/ Calculated/ Default:	-
Source of data:	-
Value(s) of monitored parameter:	No consumption of electricity by chlorine dispensers.
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	Used to quantify project emissions
Additional comment:	To be considered only in the case the water purification devices consumes electricity.

G.3. Implementation of specific-case CPA level sampling plan

As indicated in Section F of this monitoring report, three parameters were quantified through surveys: Water quality, Drink% and Refill%. The single sampling design was implemented in line with the validated CPA DD Section D.7.2:

(i) *Objectives and Reliability Requirements*

The objective was to obtain reliable and conservative estimates of the parameters listed in Section F obtained through surveys over the course of the monitoring period and meeting the indicated confidence/precision levels. The results were consolidated in one single value over the full monitoring period.

(ii) *Target Population*

The target population are the people with access to chlorine dispensers installed as a result of CPA 6, 7, 12, 13, 14, 15 and 20 under the IWPP PoA. Each dispenser casing is marked with a unique identification number on a scannable tag, which is part of the CPA dispenser database and linked to a unique water point ID. Each end user is linked to a cluster (water point with a dispenser) and each chlorine dispenser is assigned to a specific CPA. Surveys were conducted by Evidence Action field staff using mobile-based surveys (Open Data Kit).

(iii) *Sampling Method*

Grouping of CPAs was applied for this monitoring period (CPA 6, 7, 12, 13, 14, 15 and 20). Clustered sampling was undertaken for the water quality and Drink% monitoring, and simple

random sampling for Refill%. The sampling was done using Stata software to randomly select numbers corresponding to unique ID numbers of the clusters.

(iv) **Sample Size**

A 95/10 confidence/precision requirement has to be fulfilled. The number of visited dispensers is line with sample approach.

(v) **Sampling Frame**

The sampling frame for CPA 6, 7, 12, 13, 14, 15 and 20 consisted of all installed chlorine dispensers allocated to CPA 6, 7, 12, 13, 14, 15 and 20, represented by their unique identification numbers stored in the chlorine dispenser databases.

The following section describes the details of the implemented sampling design:

Water Quality & Drink%: The CPA 6, 7, 12, 13, 14, 15 and 20 dispenser dispenser databases with all dispensers were imported to Stata from dispenser databases. The field officers visit the households listed and tests their drinking water quality.

Refill%: Randomly selected promoters were interviewed during the monitoring period.

The collected data were summarized and analysed in an Excel spreadsheet. It is concluded the 95/10 confidence/precision level was met.

SECTION H. Calculation of GHG emission reductions or net GHG removals by sinks

H.1. Calculation of baseline emissions or baseline net GHG removals by sinks

$$BE_y = QPW_y * SEC * f_{NRB,y} * EF_{projected_fossilfuel} * 10^{-9} \quad (1)$$

$$= 54,087 \text{ tCO}_2\text{e [CPA 6]}$$

$$= 40,841 \text{ tCO}_2\text{e [CPA 7]}$$

$$= 34,307 \text{ tCO}_2\text{e [CPA 12]}$$

$$= 39,370 \text{ tCO}_2\text{e [CPA 13]}$$

$$= 32,197 \text{ tCO}_2\text{e [CPA 14]}$$

$$= 9,393 \text{ tCO}_2\text{e [CPA 15]}$$

$$= 5,337 \text{ tCO}_2\text{e [CPA 20]}$$

Where:

BE_y	Baseline emissions during the year y (tCO ₂ e)
QPW_y	Quantity of purified water in year y = 206,578,261 L (cap) [CPA 6] = 206,665,351 L (cap) [CPA 7] = 149,953,290 L (cap) [CPA 12] = 151,983,994 L (cap) [CPA 13] = 133,049,716 L (cap) [CPA 14] = 133,049,716 L (cap) [CPA 15] = 22,451,012 L (cap) [CPA 20]
SEC	Specific energy consumption required to boil one liter of water = 3,488 kJ/L [CPA 6] , 2,632 kJ/L [CPA 7] , 3,048 kJ/L [CPA 12] , 3,451 kJ/L [CPA 13] , 3,223 kJ/L [CPA 14] , 3,192 kJ/L [CPA 15] , 3,166 kJ/L [CPA 20] (SEC calculation below)
$f_{NRB,y}$	Fraction of non-renewable biomass = 92% (default value for Kenya)
$EF_{projected_fossilfuel}$	Emission factor = 81.6 tCO ₂ /TJ (default value)

The specific energy consumption required to boil one liter of water was calculated as follows:

$$SEC = [WH * (T_f - T_i) + 0.01 * WHE] / \eta_{wb} \quad (2)$$

Where:

WH	Specific heat of water = 4.186 kJ/L °C (default value)
T_f	Final temperature = 100 °C (default value)
T_i	Initial temperature of water = 20 °C (default value)
WHE	Latent heat of water evaporation = 2,260 kJ/L (default value)
η_{wb}	Efficiency of the water boiling systems being replaced = 10.25% [CPA 6], 13.58% [CPA 7] , 11.73% [CPA 12] , 10.36% [CPA 13] , 11.09% [CPA 14] , 11.20% [CPA 15] and 11.29% [CPA 20] (baseline survey)

The water quality was monitored on sample basis for contamination with Escherichia coli (E. coli). A presence of up to 10 E. coli CFU/100 ml shall be acceptable. The fraction of water quality measurements providing water of insufficient quality needs be excluded from the calculation of emission reductions and BE_y was adjusted accordingly.

$$54,087 \text{ tCO}_2\text{e} * 97.0\% = 52,464 \text{ tCO}_2\text{e} \text{ [CPA 6]}$$

$$40,841 \text{ tCO}_2\text{e} * 97.0\% = 39,615 \text{ tCO}_2\text{e} \text{ [CPA 7]}$$

$$34,307 \text{ tCO}_2\text{e} * 97.0\% = 33,278 \text{ tCO}_2\text{e} \text{ [CPA 12]}$$

$$39,370 \text{ tCO}_2\text{e} * 97.0\% = 38,189 \text{ tCO}_2\text{e} \text{ [CPA 13]}$$

$$32,197 \text{ tCO}_2\text{e} * 97.0\% = 31,230 \text{ tCO}_2\text{e} \text{ [CPA 14]}$$

$$9,393 \text{ tCO}_2\text{e} * 97.0\% = 9,111 \text{ tCO}_2\text{e} \text{ [CPA 15]}$$

$$5,338 \text{ tCO}_2\text{e} * 97.0\% = 5,176 \text{ tCO}_2\text{e} \text{ [CPA 20]}$$

(3)

(Adjustment for water with insufficient quality, rounded down)

H.2. Calculation of project emissions or actual net GHG removals by sinks

The operation of the chlorine dispensers does not involve the consumption of fossil fuels or electricity. Therefore, the project emissions are zero.

H.3. Calculation of leakage

Leakage relating to the non-renewable woody biomass is assessed as per the relevant procedures of AMS-I.E version 5 explained below: 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.

$$52,464 \text{ tCO}_2\text{e} * 0.95 = 49,840 \text{ tCO}_2\text{e} \text{ [CPA 6]}$$

(4)

$$39,615 \text{ tCO}_2\text{e} * 0.95 = 37,634 \text{ tCO}_2\text{e} \text{ [CPA 7]}$$

$$33,278 \text{ tCO}_2\text{e} * 0.95 = 31,614 \text{ tCO}_2\text{e} \text{ [CPA 12]}$$

$$38,189 \text{ tCO}_2\text{e} * 0.95 = 36,279 \text{ tCO}_2\text{e} \text{ [CPA 13]}$$

$$31,230 \text{ tCO}_2\text{e} * 0.95 = 29,668 \text{ tCO}_2\text{e} \text{ [CPA 14]}$$

$$9,111 \text{ tCO}_2\text{e} * 0.95 = 8,655 \text{ tCO}_2\text{e} \text{ [CPA 15]}$$

$$5,178 \text{ tCO}_2\text{e} * 0.95 = 4,917 \text{ tCO}_2\text{e} \text{ [CPA 20]}$$

Adjustment for leakage (2,624 tCO₂e [CPA 6], 1,981 tCO₂e [CPA 7], 1,664 tCO₂e (CPA 12), 1,910 tCO₂e (CPA 13), 1,562 tCO₂e (CPA 14), 456 tCO₂e (CPA 15), 259 tCO₂e (CPA 20), rounded up)

H.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks

Specific-case CPA reference number	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) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
5962-0005	52,464	0	2,624	0	49,840	49,840
5962-0006	39,615	0	1,981	0	37,634	37,634
5962-0011	33,278	0	1,664	0	31,614	31,614
5962-0012	38,189	0	1,910	0	36,279	36,279

5962-0013	31,230	0	1,562	0	29,668	29,668
5962-0015	9,111	0	456	0	8,655	8,655
5962-0016	5,176	0	259	0	4,917	4,917
Total	209,063	0	10,456	0	198,607	198,607

H.5. Comparison of GHG emission reductions or net GHG removals by sinks with estimates in the included CPA-DD(s)

Specific-case CPA reference number	Value estimated in ex ante calculation in the included CPA-DD(s)	Actual values achieved by the specific-case CPA(s) during this monitoring period
5962-0005(CPA 6)	54,086 ¹³	49,840
5962-0006(CPA 7)	38,386 ¹⁴	37,634
5962-0011(CPA 12)	33,066 ¹⁵	31,614
5962-0012(CPA 13)	36,742 ¹⁶	36,279
5962-0013(CPA 14)	30,715 ¹⁷	29,668
5962-0015(CPA 15)	8,738 ¹⁸	8,655
5962-0016(CPA 20)	8,208 ¹⁹	4,917
Total	209,941	198,607

H.6. Remarks on difference from the estimated value in the included CPA-DD(s)

For CPA 6, 7, 12, 13, 14, 15 and 20, the measured emission reductions during the monitoring period are lower than the estimated emission reductions in the CPA-DDs.

¹³ Estimated average annual emission reductions in CPA-DD (59,107 CERs) adjusted to 334 days

¹⁴ Estimated average annual emission reductions in CPA-DD (41,949 CERs) adjusted to 334 days

¹⁵ Estimated average annual emission reductions in CPA-DD (52,475 CERs) adjusted to 230 days

¹⁶ Estimated average annual emission reductions in CPA-DD (58,309 CERs) adjusted to 230 days

¹⁷ Estimated average annual emission reductions in CPA-DD (48,744 CERs) adjusted to 230 days

¹⁸ Estimated average annual emission reductions in CPA-DD (35,838 CERs) adjusted to 89 days

¹⁹ Estimated average annual emission reductions in CPA-DD (33,663 CERs) adjusted to 89 days

Appendix 1. Contact information of coordinating/managing entity and/or responsible persons/entities

Coordinating/managing entity and/or responsible person/entity	<input checked="" type="checkbox"/> Coordinating/managing entity <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Pure Water Ltd.
Street/P.O. Box	Technoparkstrasse 1
Building	-
City	Zurich
State/Region	-
Postcode	8005
Country	Switzerland
Telephone	+41 43 501 35 50
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Title	Managing Consultant
Salutation	-
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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.0	1 April 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report, programme of activities		