Approved baseline and monitoring methodology/ methodological tool clarification response form (Version 02.0)

INFORMATION TO BE COMPLETED BY THE SECRETARIAT OR PANEL/ WG	
Date and number of Panel/ WG meeting:	5–8 May 2014/SSC WG 44
Title/Subject of the request for clarification:	Clarification on the applicability of chlorination and soil purification technologies
Reference number of the request for clarification:	SSC_707
Exact reference (number, title and version) of the methodology or methodological tool to which the request for clarification applies:	AMS-III.AV “Low greenhouse gas emitting safe drinking water production systems --- Version 4.0”
Fast track or Regular track:	☐ Fast track ☒ Regular track

Summary of the request for clarification

Original text from CME:

Whave Solutions Limited is currently developing a PoA in validation “Secure safe water in developing countries” following the methodology Low greenhouse gas emitting safe drinking water production systems, AMS-III.AV, version 04.0.

The DOE has raised the following first round CAR/CL with regard to the first CPA:

"The PP shall explain/demonstrate how the proposed technology/system/ measure in this CPA qualifies to be a water purification system/technology".

The CPA engages with communities in rural Uganda who have no access to safe drinking water. It provides them either with a new or rehabilitated hand-pump, or a chlorination system, or both, and it ensures good hygiene throughout the safe water chain on a continuous basis. The water is quality tested on a regular basis in compliance with national standards to ensure there is no contamination and to ensure that the treatment is effective.

AMS.III.AV version 04.0 states that: "This methodology comprises introduction of low greenhouse gas emitting water purification systems to provide safe drinking water (SDW). Water purification technologies that involve point-of use (POU) or point-of-entry (POE) treatment systems for residential or institutional applications such as systems installed at a school or a community centre are included. The examples include, but are not limited to water filters (e.g. membrane, activated carbon, ceramic filters), solar energy powered ultraviolet (UV) disinfection devices, solar disinfection techniques, photocatalytic disinfection equipment, pasteurization appliances, chemical disinfection methods (e.g. chlorination), combined treatment approaches (e.g. flocculation plus disinfection). The methodology is also applicable to water kiosks that treat water using one or more of the following technologies: chlorination, combined flocculant/disinfection powders and solar disinfection. In case the water kiosk is using solar disinfection, project proponents need to implement measures to prevent recontamination (e.g. disinfecting containers, sealing containers and hygiene trainings)."

The issue is whether or not a hand-pump is water purification system, in cases where regular testing according to national and/or international standards, confirms that purified water is flowing consistently.

A hand pump is a device that takes advantage of the purifying filtration function of soil, and can therefore be considered a water purification system. Natural spring water is purified by soil filtration, and is considered a luxury.

As with many CDM technologies, the word system is understood to mean a combination of active and passive components, not all of which need to be introduced by the project. For example, a solar panel extracts energy from solar irradiation for heating water or generating electricity; the sun is passively there, the panel holds water. A wind turbine extracts energy from wind which is a passively there.

Water is purified by gravity-forced deep filtration in deep sub-surface soil, where biological and physical treatment takes place exactly as in table-filters which use gravity to filter through soil (clay) in the form of ceramics and/or biological action. The passive component is the soil, as with wind or sun, and an active component is needed, in this case the hand-pump which extracts the purified water from deep in the soil. As with solar panels, the combination of active and passive components make up a system, in this case a purification system.

Community who are currently without safe drinking water and need to boil the currently accessible surface water can choose between various water purification systems. A table-filter is one such example, and a system for exploiting soil purification is another. Both of these will reduce the emissions from boiling and are equally subject to the same quality testing procedures. The hand-pump soil purification system is equally subject to considerations of capital expense, servicing costs, and precautions/guidelines to ensure effectiveness, as is the table-filter. Ground water extraction is the most sustainable option for availability of safe water in many, if not most, deprived regions of the world where water is boiled for safety and its omission would divert from clean development sustainability in such areas. Chlorination is less sustainable and less effective in adoption, and so is necessary where quality testing indicates imperfect soil purification or lack of ground water availability, but is a significant diversion of sustainability opportunity where regular testing indicates good quality ground water.

The current methodology does not restrict the scope to a specific list of eligible systems, but rather gives examples of purification systems. The PP is of the opinion that the CPA's two systems (chlorination and soil purification) are both eligible as examples, and seeks clarification from the CDM.

Additional clarification requested 10-Apr-14

Could you expand on the type/criteria of hand pump/soil filtration applicable for the methodology - criteria could include freshly dug wells only, minimal depth, seal specifications, aquifer specifications/quality, etc.

Response from CME 29-Apr-14:

Hand-dug wells and drilled boreholes with hand pumps are both applicable to this methodology. Each must satisfy certain criteria to be acceptable (i.e. to produce clean water at the source in compliance with the national or international quality standards imposed by the CDM methodology followed). It is not necessary that they are freshly dug (e.g. old wells and boreholes can be rehabilitated), but if they are not then they would have to meet the same specifications.

To allow for a sufficient distance for adequate filtration, hand-dug wells must be sited where groundwater depth is at least 15 feet (a minimum depth of 10 feet is allowable in soil with a high clay composition). They require a seal of clay or cement behind a brick lining to prevent contaminated surface water entering the well. Further, a concrete apron, a drainage channel, a runoff diversion trench and a fence are required to protect the mouth of the well. Wells must be sited at least 150 feet distant to (or 240 feet if downhill of) latrines, soak-aways, septic tanks, graveyards, livestock pens, sites prone to open defecation, water dumping, or bathing facilities.

Siting rules do not apply to boreholes of depth greater than 100 feet. However, boreholes drilled to less than 100ft should follow the siting rules for hand-dug wells as given above. (In the case of Uganda for example, this in accordance with the Ugandan Government's Water Supply Design Manual 2013) In cases where national regulations and guidelines impose more stringent conditions, national guidelines and regulations should be followed.

The hand-pumps used to pump from wells or boreholes must meet national standards, or in the absence of national standards, international standards, which may be interpreted as specifications disseminated by credible international organizations or standards used in a country with advanced regulatory controls. For example, in Uganda the required standards are US 405:2002 (Shallow well CBMS hand pump-model U2/U3), US 403:2002 (Deep Well CBMS hand pump-model U3) and US 471:2002 (Deep Well Hand Pump).

Could you also expand on the water quality control needed - water-chain protection measures, water quality measurement at households (not well), frequency of water quality measurements and other measures, procedure to deal with below specs water (would PP be obliged to provide SDW quality, preventing use of less-than-safe water?)

Testing water quality at the source (pump mouth in case of borehole or well, central storage reservoir or tank where these are connected to the pump) is required at frequency defined by national standards (or in the absence of national standards, international standards, which may be interpreted as specifications disseminated by credible international organizations or as standards used in a country with advanced regulatory controls). Ensuring safe water at point-of-use is achieved by monitoring of the effectiveness of the water chain at every step which in the main should be done by assessment of hygiene practice (regular

washing out of containers, etc). Point-of-use household water testing should also be done on a sampling basis to comply with statistical validity requirements. Carbon credits cannot be claimed for the fraction of water usage in a project that fails the quality test. The procedure to deal with poor water quality results is to re-test immediately, and act on the strength of results confirmed by test protocol evaluation and at most three correct-protocol re-tests; to modify or introduce treatment techniques which correct the problem.

Description of requirements in national standards relevant to the construction of wells/hand pumps (e.g. specifications)

The Ugandan Ministry of Water and Environment (MWE)'s Water Supply Design Manual (Second Edition) gives several specifications for the construction of hand-dug wells and boreholes.

For dug wells, the location should be in an area with a high water table, which is not prone to flooding and pollution. A lining constructed of materials such as brick, stone, or concrete rings should be included, the upper part of the lining must be watertight, and an apron and drainage ditch should be constructed. The MWE's Framework and Guidelines for Water Source protection states that the well should not be located in a wetland or an area prone to flooding, within 50 metres (or 80 metres if downhill) of latrines, open defecation, soak-aways, septic tanks, graveyards, livestock pens, waste storage or dumping, livestock spaying/ dipping, bathing, or washing activities. A concrete apron and drainage channel should be constructed, and a fence should be constructed 3 metres from the apron and 60 cm from the drainage channel.

For borehole construction, a 72 hour pumping test must be carried out to identify aquifer yield. Borehole siting requires an experienced hydro-geologist, and should include aerial photographs, satellite images, maps and resistivity profiling to identify fracture zone, together with electrical profiling. Borehole construction has been 'fairly standardised' to include drilling with a final diameter of 150-300mm, a casing inserted to the depth of the un-weathered solid bedrock, and in unconsolidated sediments the installation of a continuous slot, wedge or wire screen in the aquifer together with a gravel pack. Further technical specifications are included for borehole construction relating to correct construction techniques; the manual does not include specifications of distance from possible contaminants.

Description of requirements in national standards relevant to water Quality

The Directorate of Water Development Water Quality Standards Maximum Allowable Concentrations for rural sources limits the necessary commissioning tests to total dissolved solids (1500mg/L limit), Turbidity (30 NTU), Faecal coliforms (50cfu/100ml), Flouride (4mg/L), Nitrate (50mg/L), Nitrite (3mg/L), ph Value (5-9.5), Iron (2mg/L), $CaCO_3$ (800mg/L), Manganese (2mg/L), Chloride (500mg/L) and Sulphate (500mg/L). The Ugandan National Standards for physiochemical factors (conductivity, colour/ Total Dissolved Solids, turbidity, taste, temperature and odour), Microbiological factors (faecal coliforms/ E. Coli, Clostridium Perfringens and Heterotrophic Plate Count), Chemical Factors (Flouride, Nitrate, Nitrite, pH Value, Aluminium, Iron, Ammonia, $CaCO_3$, Manganese, Chloride, Sulphate, CO_2, Alkalinity, Arsenic, Cadmium, Cyanide, Mercury and Lead).

The project proponent must be aware that the government may require all or some of the above tests at commissioning stage; if not required, faecal coliform and iron test should be nevertheless be carried out at commissioning stage.

On-going water quality monitoring of faecal coliforms should take place once a month (District Implementation Manual, Ministry of Water and Environment, 2007).

Details of hygiene treatment and training throughout the safe water chain (from wells to households)

Hygiene and sanitation promotion and training is a key part of ensuring a safe water chain. This includes general cleanliness (e.g. a clean compound and proper storage of food in the house to avoid infestations), freedom from open defecation, correct latrine facilities such as fly control lids, doors for privacy, rain-proof roofs and walls, functional hand-washing amenities and habituation, regular washing of containers for water transport and storage, use of caps and lids on storage containers, taps rather than scooping or habituation with hygienic scooping techniques. Training should be provided on an ongoing basis in each community.

Description of maintenance system of wells and hand pumps

In Uganda, the official maintenance system and hence baseline scenario for wells and hand-pumps is the Community-Based Management System, in which communities are given full responsibility for the Operations and Maintenance of their water source(s). Community Water Source Committees hire local Hand-Pump Mechanics to carry out O&M procedures. In the baseline scenario, preventive maintenance work is not commonly practiced, and is rarely carried out; typically faults occur frequently at which time money is collected for repairs involving down-time delays.

During the project period the introduction of regular preventative maintenance tasks is required, following manufacturer's instructions and advice from experienced pump mechanics. This includes for example monthly checks /repairs/ replacements for fences, bearings, and greasing and nut-tightening etc., quarterly for piston valve discs, plastic rod guides etc, annually for diaphragms, springs etc. Exact maintenance schedules differ for different hand pump types and different circumstances, though all are based on the principle of preventative maintenance, technical assessments, and scheduled renovation. This ensures minimal source down-time and optimised source life-cycles.
Clarification by the secretariat or Panel/ WG
The Small-Scale Working Group (SSC WG) of the Executive Board (hereinafter referred to as the Board) of the clean development mechanism (CDM) would like to thank the author for the submission. The current version of the methodology includes example list of eligible systems that is not exhaustive and requires that any project technology/equipment implemented by the the project achieves compliance either with: (i) at a minimum the interim 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. Therefore the SSC WG would like to clarify that: 1. Chlorination is applicable under AMS-III.AV (see footnote 3 of the methodology); 2. With reference to section "4.2 Water quality testing considerations" of "A toolkit for monitoring and evaluating household water treatment and safe storage programmes" (WHO – 2012) soil filtration is also applicable under AMS-III.AV if testing of water of water quality at the point of consumption shows that WHO standard cited above (or a comparable national standard) is met. The SSC WG further noted that the project proponent is implementing QA/QC procedures to ensure: (a) Hygiene throughout the safe water chain on a continuous basis to avoid contamination; (b) Water is quality tested on a regular basis as required by the methodology and following the CDM sampling standard where relevant; (c) Capacity building and behaviour change issues are addressed to ensure sustainability; (d) Rehabilitation and/or construction of the wells complies with relevant national and/or international standards and measure are taken to ensure that water and well are not contaminated; (e) Water that does not meet the quality standard above may not count towards emission reductions; (f) The project complies with all applicability criteria in the methodology.

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Document information

Version	*Date*	*Description*
02.0	18 July 2013	Revised to remove the row "Date and signature of the chair and vice chair of Panel/WG (in case of clarification by Panel/WG)"
01.0	4 July 2013	Initial publication. This document supersedes and replaces the following documents: • Recommendation Form for Small Scale Methodologies (F-CDM-SSCwg) (Version 01.1) • Recommendation Form for Small Scale A/R Methodologies and Procedures (F-CDM-SSC-AR) (Version 01.1)

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