SAHA

EXAMPLE DOCUMENT

Water Quality Safety Plan

For the Simple Surface Water Treatment Systems (SSWTS) in the Northern, Savanna, Oti and North-East Regions.

ORGANISATION	COVERAGE	REVIEW CYCLE
Saha Global	400+ water businesses	Annual

This is Saha's own Water Quality Safety Plan, in active use across its Simple Surface Water Treatment Systems. It is published as an example for partners, district assemblies and practitioners developing water safety plans of their own.

Contents

Key abbreviations

DQWSD	Director for Water Quality and Service Delivery
WSP	Water Safety Plan
GR	Government Relations
DOEP	Director of Operations, Expansions and Partnerships
SDM	Service Delivery Manager
GSA	Ghana Standards Authority
WHO	World Health Organization
SSWTS	Saha Surface Water Treatment System
SSC	Safe Storage Container

CHAPTER 1

Background

SAHA GLOBAL is a Non-Governmental Organization that provides clean potable water to the hardest-to-reach areas in Ghana. These areas are usually reliant on rivers, streams, wells, dugouts and in a few instances, boreholes. There are over 400 water businesses currently running under the Saha Surface Water Treatment System (SSWTS). A combination of methods will have to be employed to protect the safety of the drinking water at the various Saha Water Treatment Centers within the communities. These include:

- Source protection
- Control of the water treatment process
- Control and management of the water distribution process
- Management of water at consumer points

The understanding and application of healthy, hygienic practices make it easier to safely handle water from the production stage to the end user stage. This can be improved through education and conscientization, as well as continuous evaluation and improvements of Standard Operating Procedures (SOPs).

Similar to air, water contains a number of elements that, when present at unsafe levels, have a very serious negative influence on the health of everyone who comes in contact with it. Previously, water safety was limited to periodic water quality testing. Previously, the results of these tests were frequently not used to determine the cost of essential improvements in the medium and long term, their impact and risks on the user groups, or both. The development of water infrastructure may enhance coverage, but the projected improvements in health and reductions in poverty may only be realized if adequate care is taken to manage water safety for all water facilities. The major goal of water delivery systems must be the provision of adequate and safe drinking water. In the past, determining whether or not a supply of clean water is being delivered has only been done on an as-needed basis, with sporadic and incidental water quality testing. The National Drinking Water Quality Management Framework for Ghana (2015) makes reference to this strategy, although it is insufficient and unsustainable to guarantee secure community water supplies.

Saha Global seeks to implement a process of thorough water quality assurance, preventative risk assessment and management of community water systems, from catchment to end user, taking inspiration from the Water Safety Framework (2010) and the National Drinking Water Quality Management Framework for Ghana (2015). The Ghana Standards Authority (GSA) and World Health Organization (WHO) physicochemical and microbiological parameters for safe drinkable water have been adopted by Saha Global. By developing a Water Safety Plan (WSP) Saha can make sure that produced water complies with drinking water regulations, this requirement can be met.

1.1 Objective

The overall objective of WSP is to outline steps to identify the public health risks associated with the Water Treatment Centers operated by Saha Global. The WSP:

- Offers management techniques to reduce or eliminate risks found at every stage of the water cycle, from intake to consumer.
- Describes in detail the financial effects of the implementation's planned actions.
- Outlines the roles and duties of the parties engaged in implementing safe water management, as well as the procedures required for efficient coordination and collaboration in its execution.

The content of the Water Safety Plan includes:

Water Safety Planning Team	Identify and access Hazard, Risk Assessment and existing control measures
Develop and implement an incremental Improvement Plan	Monitor control measures and verify the effectiveness of WSP
Document and review WSP	Emergency response Plan
Resources and Feedback	

CHAPTER 2

Establishment of the WSP Team

To ensure quality and effective water delivery at the water treatment centers, it is necessary to put in place a planning and implementation team which would oversee the preparation and implementation of the Water Safety Plan.

2.1 Core team

In order to create ownership of the WSP, there was the need for active participation of the relevant stakeholders to ensure smooth implementation. The Water System Level Team, led by the Director of Water Quality and Safety and Service Delivery Manager, includes:

NAME	POSITION	ROLE IN WATER SAFETY PLAN TEAM
Kofi Duku	Director for Water Quality and Safety	Lead the WST in policy and technical direction
Jude Esang, Hamdia Shani	Service Delivery Manager	Carry out Water Safety Audits
Tijani Aisha, Dordoye Yaw Divine	Front Line Coordinators (rotates through different Coordinators annually)	Take the lead on risk identification, assessment and management; monitor plan implementation; supervise roles of water entrepreneurs; documentation and feedback; coordinate activities of WSPT to Saha Global
Francis Kounah, Rahana Abubakari	Front Line Supervisors (rotates through different Supervisors annually)	Identification of hazards; support monitoring of plan implementation on technical components of the system. Sensitize and communicate issues on water safety e.g. chlorination and contingency plan sensitization. Sanitary inspection around the treatment center.
Kate Cincotta	ED & Co-Founder	Oversight monitoring of WST
Gloria Ewurama Asenso-Kumi	Training Manager	Provide continuous training support
Refer to the Active Entrepreneurs list in Appendix	Water Entrepreneurs	Implementation of Water Safety Plan and recommendations
Seidu, Sadiq, Haruna, Alhassan, Frederica, Hussien, Latif, Thomas, Abdul Rahaman (AB), Comfort, Peter, Isaac	Water Quality Officer	Operational monitoring and reporting involving sampling and testing

The relevant stakeholders' active participation is required to guarantee successful implementation and foster ownership of the WSP. Select staff, comprising the Water Quality Officer, Frontline Staff, Operations Coordinator/Supervisors, Community Representatives, District Assembly Representatives (DEHO), and Assembly Members make up the Water System Level Team. The team would report to the Operations Coordinator/Supervisor and technical support would be provided by the Saha Global Team (RWST).

2.2 Extended water safety team

POSITION	ORGANISATION	ROLE ON THE WSP TEAM
Operations Coordinator and Supervisors	Saha Global	Carry out risk identification, assessment and management; monitoring of plan implementation; supervise roles of system staff; documentation and feedback; coordinate activities of WSPT to Saha Global
Frontline Staff	Saha Global	Identification of hazards; support monitoring of plan implementation on technical components of the system. Sensitize and communicate issues on water safety e.g. chlorination and contingency plan sensitization. Sanitary inspection around the treatment center.
Assembly man, Traditional Council Rep.	District Assembly, Traditional Authorities	Mobilization and education of community members and school children
Environmental Unit	District Assembly	Community sensitization on CLTS and HWTS

2.3 Roles of the field level team

- To carry out sanitary and contamination survey in the community for Water Safety development
- Resale of water treatment chemicals at wholesale prices
- Mobilize people for water safety implementation issues
- Sensitize community members on water safety issues
- Develop and review Water Safety Plans
- Monitor and implement Water Safety Plans
- Receive feedback on plan implementation on water safety
- Facilitate all water safety issues in the community

- Collaborate with other agencies in the implementation process

2.4 Protocol for Water Safety Plan team meetings

All WSP team meetings will be held NOT less than two (2) times in a year and the Water Safety Specialist will take minutes of meetings. The minutes of the meetings will provide the following information:

- Attendance
- The main discussions
- Outcomes and important follow-up actions

Saha Global will provide resources to carry out the Water Safety Planning process and implementation. There will be a review of the WSP annually but in case of an emergency (e.g. pandemic) the WSP can be reviewed accordingly.

CHAPTER 3

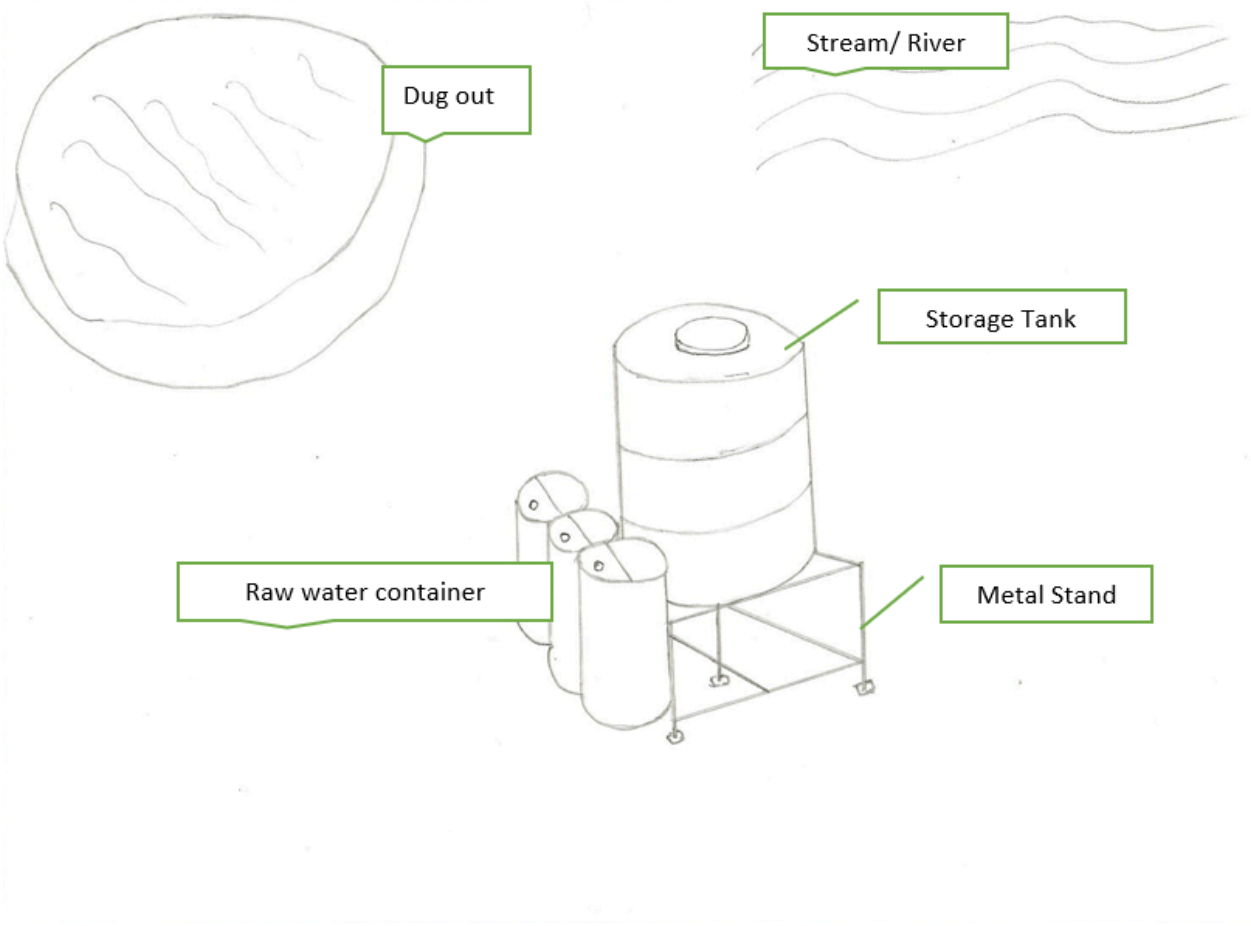
The Water Center and Production Process

A Saha treatment facility relies on surface water (dugouts, streams, rivers) for treatment to serve communities of about 7–90 households in rural hard to reach ("last-mile") communities. The treatment facility is made of three or more 200-L blue drums (for holding raw water), a storage tank (1400 litres capacity) for storing treated water and a metal stand for elevating and supporting the storage tank.

The SSWTS relies on a 3-step treatment process: 1. Sedimentation, 2. Filtration, 3. Chlorination. Raw water is collected from the dugout, streams, rivers into the three holding containers. Collection methods include women manually fetching water with 'gariwa'. Aluminium Sulphate is applied manually by the water operators at moderate levels using a guide until flocculation begins. The raw water is left overnight for all physical particles to settle so that the water becomes clear for filtration.

Filtration is done by scooping settled water gradually from the blue drums directly into the storage tank through a cloth filter. The cloth filter further prevents sand particles and other material from entering into the storage tank. Filtered water is then chlorinated by adding 1.67 g of chlorine tablet to every 200 litres of filtered water. This stage of treatment is biological only.

The treated water remains stored in the tank to prevent recontamination and sold out (distributed) at the center where Safe Storage Containers (SSCs) are used to collect and store water at the household level. Every family has received a SSC from Saha as part of the implementation of the water treatment facility. The SSC has a cover and a tap to help prevent re-contamination during collection and storage in the household.



Sketch of water center — labelled diagram of a water business setup indicating all major components and the water treatment process.

3.1 Within the Saha team

- The DWQSD would act as the co-ordinator of the team and provide technical assistance.
- The three (3) members of the team would meet to choose a leader.
- The membership of the team would be reviewed by the DWQSD periodically.

The role of the Saha team is to:

- Provide oversight function in the preparation, planning and implementation of the WSP.
- Verify and validate the effectiveness of the WSP.
- Provide technical assistance for risk assessment and management.
- Provide education and training on household water transportation and safe storage.

- Provide training in preparation, planning and implementation (capacity building).
- Facilitate the annual review of the WSP and make recommendations.
- Facilitate the development of incidental plans and implement contingency actions.

3.2 Capacity building

The DWQSD provided training for the Saha team. The training covered the three main areas, namely preparation, planning and implementation. These steps include education on water safety and the need for a safety plan, identification of hazards, risk assessment and their control and monitoring.

Annually, the DWQSD will work with the Training Manager to host an “ongoing WSP training” for all relevant members of the Saha team. The Training Manager and Director of Ghana Operations (DGO) will also coordinate to request professional development assistance from the DWQSD as it becomes necessary to grow the technical expertise of management, better serve Saha customers, and prepare for partnership-building opportunities. The DWQSD will also work with the Training Manager during the onboarding of new hires using the curriculum for all new Saha hires.

CHAPTER 4

Hazard Identification, Risk Assessment and Prioritisation

At each point on the water system, the team:

- Identified the possible dangers to water safety (i.e. hazards/hazardous events) that could impact water quality and community health.
- Assessed the effectiveness of any existing control measures that were in place to manage these risks, and
- Ranked (prioritized) the significance of each risk accordingly.

Based on the current/predicted climate considerations, the team considered the impact on existing hazards or hazardous events, and any new hazards or hazardous events that may arise from these predictions.

4.1 Risk assessment approach

The WSP team considered how likely a hazardous event was likely to occur and how serious it might be (given the effectiveness of the existing control measures), and then assigned a risk level. The result of the risk assessment will determine the level of precaution that needs to be taken.

Low Risk (L)

The activity or situation may be acceptable; however, review tasks to see if risk can be reduced further.

Medium Risk (M)

The activity or situation should only proceed with appropriate management authorization after consultation with specialist personnel and the assessment team. Where possible, the risk should be redefined to take account of the hazards involved, or the risk could be reduced further prior to task commencement.

High Risk (H)

Task must not proceed. It should be redefined or further control measures put in place to reduce risk. The controls should be reassessed for adequacy prior to task commencement.

To determine the Risk Level (RL), multiply the score of the Hazard Severity (S) by the score of the Likelihood of Occurrence (L). The resulting score gives the risk level, categorized as Low, Medium and High.

Likelihood guidelines

The likelihood of the event occurring is defined below. Often the likelihood of occurrence is fairly subjective and open to personal interpretation.

LIKELIHOOD	DEFINITION	SCORE
Very Unlikely	A freak combination of factors would be required for an incident to result.	1
Unlikely	A rare combination of factors would be required for an incident to result.	2
Possible	Could happen when additional factors are present but otherwise unlikely to occur.	3
Likely	Not certain to happen but an additional factor may result in an accident.	4
Very Likely	Almost inevitable that an incident would result.	5

Hazard severity guidelines

SEVERITY	DEFINITION	SCORE
Negligible	Negligible injury or health implications, no absence from work. Negligible loss of function or production with no damage to equipment or the environment.	1
Slight	Minor injury requiring first-aid treatment or headache, nausea, dizziness, mild rashes. Damage to equipment requiring minor remedial repair, loss of production or impact to the environment.	2
Moderate	Event leading to a lost time incident or persistent dermatitis, acne or asthma. Localized damage to equipment requiring extensive repair, significant loss of function or production, or moderate pollution incurring some restitution costs.	3
High	Involving a single death or severe injury, poisoning, sensitisation or dangerous infection. Damage to equipment resulting in production shutdown and significant production loss. Severe pollution with short-term localized implications incurring significant restitution costs.	4
Very High	Multiple deaths, lung diseases, permanent debility or fatality. Major pollution with long-term implication and very high restitution costs.	5

Risk assessment matrix and risk levels

LIKELIHOOD	NEGLIGIBLE	SLIGHT	MODERATE	HIGH	VERY HIGH
Very Unlikely	1	2	3	4	5
Unlikely	2	4	6	8	10
Possible	3	6	9	12	**15**
Likely	4	8	12	**16**	**20**
Very Likely	5	10	**15**	**20**	**25**

Risk level — Low (1–4), Medium (5–12), High (15–25).

RISK SCORE	RISK LEVEL	MEANING	NOTES
≥ 15	HIGH	Clearly a priority	Action needs to be taken to minimize the risk. Proposed actions should be documented in the improvement plan and implemented based on priorities and available resources.
5 – 12	**MEDIUM**	Medium priority	Currently no impact on drinking water safety, but requires attention in operation and/or possible improvement in the medium and long term to continue minimizing risk.
≤ 4	LOW	Clearly not a priority	Action may be taken but not a priority, or no action is needed this time. The risk should be revisited in the future as part of the WSP review process.

Hierarchy of controls

Controls should be chosen taking into account the following, which are in order of effectiveness:

1. Elimination
2. Substitution by something less hazardous and risky
3. Enclosure (enclose the hazard in a way that eliminates or controls the risk)

4. Safe system of work that reduces the risk to an acceptable level
5. Written procedures that are known and understood by those affected
6. Review the blend of technical and procedural control
7. Adequate supervision
8. Identification of training needs and the provision of information and instruction (signs, hand-outs); Personal Protective Equipment (last resort)

4.2 Hazard register

SYSTEM COMPONENT	HAZARDOUS / RISK EVENT	POSSIBLE HAZARD	CAUSE / EXISTING CONTROL	LIKELIHOOD	SEVERITY	RISK LEVEL
Catchment Area of Treatment	Sand winning around the dugouts	Microbial contamination, chemical contamination	Periodic monitoring of catchment zone; no buffer zones	Very likely (5)	High (4)	High (20)
Catchment Area of Treatment	Swimming and washing of cloth in dugouts and streams	Microbial contamination, chemical contamination	No monitoring; no buffer zones	Likely (4)	Moderate (3)	**Medium (12)**
Intake / point of fetching	Dirty surroundings with no defined fetching points	Microbial contamination	Irregular communal labour and sanitation bye-laws enforcement	Possible (3)	Moderate (3)	**Medium (9)**
Water Treatment Centre	Mode of water fetching allows the collection of fecal matter, debris, silt and clay. Materials collected promote the growth of bacteria and other microorganisms.	Microbial contamination	Irregular cleaning and weeding of the proximal surrounding of the intake; open source fetching	Likely (4)	High (4)	High (16)
Water Treatment Centre	Dirty surroundings	Microbial contamination	Irregular cleaning and weeding of the proximal surrounding of the monitoring	Likely (4)	Moderate (3)	**Medium (12)**

SYSTEM COMPONENT	HAZARDOUS / RISK EVENT	POSSIBLE HAZARD	CAUSE / EXISTING CONTROL	LIKELIHOOD	SEVERITY	RISK LEVEL
Blue Drums	Access holes around cover of blue drums	Chemical contamination, microbial contamination	Design flaw of blue drums	Possible (3)	Moderate (3)	**Medium (9)**
Filtration material	Wearing out of filtration cloth	Microbial contamination	No sterilization of cleaning filter cloth	Possible (3)	Moderate (2)	**Medium (6)**
Polytanks (PTs)	Unauthorized access and theft of polytank	Physical	Unsecured fencing in place	Possible (3)	High (4)	**Medium (12)**
Polytanks (PTs)	Access holes around hatches and air vent	Microbial and chemical infection	Lack of maintenance; blow away of covers by strong wind	Possible (3)	High (4)	**Medium (12)**
Addition of alum	Hardness nuisance	Chemical contamination	Non-adherence to the treatment SOP; human error	Possible (3)	High (4)	**Medium (12)**
Chlorination	Hardness nuisance	Chemical contamination	Non-adherence to water treatment SOP; underdosing; overdosing; irregular water quality monitoring	Possible (3)	High (4)	**Medium (12)**

SYSTEM COMPONENT	HAZARDOUS / RISK EVENT	POSSIBLE HAZARD	CAUSE / EXISTING CONTROL	LIKELIHOOD	SEVERITY	RISK LEVEL
Treatment	Under dosage of chlorine (< 0.2 mg/l)	Microbial contamination	No chlorine test kits for monitoring	Likely (4)	High (4)	**High (16)**
Treatment	Over dosage of chlorine (> 0.5 mg/l)	Aesthetic nuisance	No chlorine test kits for monitoring	Likely (4)	High (4)	**High (16)**
Polytanks (PTs)	Improper cleaning of polytanks with soap by water collectors and entrepreneurs	Microbial pathogens	Lack of monitoring; lack of education	Likely (4)	High (4)	**High (16)**
Safe Storage Container (SSC)	Safe storage containers are not cleaned and are also used for other purposes e.g. bathing, washing, storing other liquids or materials	Microbial pathogens	Lack of education	Likely (4)	High (4)	**High (16)**

4.3 Mitigation measures for risks and hazards

SYSTEM COMPONENT	NEEDS IMPROVEMENT	CONTROL MEASURE	ACTIVITY	WHERE	HOW	WHO	CRITICAL LIMIT
Production	Creation of buffer zones	Enforce sanitation bye-laws (prosecution of offenders); buffer zone enforcement	Sanitary inspection	Within the community, especially at abstraction point	Physical inspection and filling of sanitary inspection forms	Community Leaders; Entrepreneurs	No evidence of OD, swimming, indiscriminate refuse and liquid waste disposal
Polytank; Safe Storage Container	Residual chlorine	Regulate chlorine dosing to increase or decrease dosing in the event of underdosing and overdosing respectively; allow longer times in tank	Chlorination	Designated sampling points	Everyday testing using residual chlorine test kit	Water Quality Officer; FLS	**0.2 – 0.5 mg/l**
Catchment Area of Intake; Water Treatment Centre	Sanitation	Weed control	Weeding	Around the intake and Water Treatment Centre	Communal labour to weed with cutlass	FLS; FLC	Evidence of no overgrown weeds

CHAPTER 5

Monitoring, Review and Assessment

5.1 Supporting programmes to be carried out

- Capacity building for all staff on the Water Safety Plan
- Trainings for Water Quality Officer and Frontline Staff

5.2 Monitoring of control and mitigation measures

Periodic water testing will be the main form of monitoring aside from the site inspections that will be carried out. The water testing will be done in-house by the Saha team monthly and quarterly by a third party who will be selected after a rigorous selection process to ensure the

best form of service is obtained. The DWQSD will lead the team for both in-house and third-party testing campaigns.

5.3 Criteria for third-party water testing

The following points will be considered in selecting a third party to carry out the water quality analysis:

a. Are they a respected expert in the WASH sector in Ghana and abroad so that their results will be trusted by others?
b. Do they have established standard procedures for engaging with clients (Saha), for sampling, for testing, and for reporting that they can share with us? Does this process meet Saha's standards and make sense?
c. Is their lab certified in Ghana? Do they have the relevant ISO certifications?
d. Are they available when we need them and timely for both sampling, testing, and reporting?
e. Is their cost in line with others?
f. Do they have a reasonably prompt turn-around time?

5.4 WSP assessment template

District	
Water supply name	
Date of assessment	
Assessor(s)	
Water supply type (e.g. surface water, borehole)	
Primary contact for the water center (name, contact details)	
Overall WSP assessment summary	

#	QUESTION	ASSESSMENT	COMMENTS / AREAS FOR IMPROVEMENT
1	Is the WSP team list current?		
2	Is the center description accurate and up-to-date?		
3	Is the hazard identification, control measure assessment and risk assessment understood and thorough?		
4	Is the improvement plan up-to-date and being implemented?		
5	Is operational monitoring being carried out as per the plan?		
6	Is verification monitoring being carried out as per the plan?		
7	If in use, are standard operating procedures and emergency response plans appropriate and being followed?		
8	Is the awareness raising plan appropriate for the needs of the staff/community and being implemented?		
9	Are the WSP team meeting routinely and the WSP being revised as appropriate?		
10	Are climate considerations integrated appropriately into the relevant steps?		

CHAPTER 6

Resources for Activities and Expected Costs

ACTIVITY	RESOURCES NEEDED	BUDGETED COST
Sanitation and hygiene sensitization	Transport, projector and laptop	Staff time; GHS 2,000.00
Weeding around abstraction points and polytanks	PPEs, cutlasses, hoes, brooms	Staff time; GHS 2,000.00
Repairs and maintenance	PPEs, tools e.g. pick axe, shovel	Staff time; GHS 3,000.00
Water sampling	PPEs, sterilized sampling bottles or whirlpaks, masking tape, pen, insulated container with melting ice, mode of transport	Staff time; GHS 32,000.00
Residual chlorine monitoring	PPEs, chlorine test kits	Staff time; GHS 10,000.00
Cleaning of polytank	PPEs, ladder, long and short cleaning brushes, buckets, hypochlorite solution, clean water	Staff time; entrepreneur time

Sanitation Inspection Form — Pipe Stand & Piped Distribution

NAME OF VILLAGE OR TOWN

LOCATION AND/OR NAME OF STANDPIPE

DATE OF INSPECTION

#	SPECIFIC DIAGNOSTIC INFORMATION FOR ASSESSMENT	RISK (Y/N)
1	Is there any point of leakage on the top of the polytank?	
2	Is there any leak around the tap?	
3	Is the inside of the polytank clean?	
4	Are any air vents of the polytank unsanitary?	
5	Is the filtering cloth neat?	
6	Does water accumulate near the tap stand (requires improved drainage canal)?	
7	Are there rubbish damp or human excreta within 10 m of the tap stand?	
8	Is the polytank platform firm?	
	TOTAL SCORE OF RISKS / 8	

Contamination risk score: 6 and above = High; 3–5 = Medium; 2 and below = Low.

RECOMMENDATION

SIGNATURE OF SANITARIAN

Sanitation Inspection Form — Surface Source and Abstraction

NAME OF VILLAGE OR TOWN

LOCATION AND/OR NAME OF SURFACE SOURCE

DATE OF INSPECTION

#	SPECIFIC DIAGNOSTIC INFORMATION FOR ASSESSMENT	RISK (Y/N)
1	Is there any human habitation upstream, polluting the source?	
2	Are there any farm animals upstream, polluting the source?	
3	Is there any crop production or industrial pollution upstream?	
4	Is there a risk of landslide or mudflow (causing deforestation) in the catchment area?	
5	Is the intake point properly demarcated?	
6	Does the source water require a filter?	
7	If there is a filter used, is it functioning properly?	
8	Is the flow uncontrolled?	
	TOTAL SCORE OF RISKS / 8	

Contamination risk score: 6 and above = High; 3–5 = Medium; 2 and below = Low.

RECOMMENDATION

SIGNATURE OF SANITARIAN

References

- mWater Test Kit manual — www.mwater.co/kits
- Colilert Test Kit manual — idexx.com/en/water/water-products-services/colilert
- 2023 Saha Water Safety Audit — mWater dashboard

Annexes

Annex A · Annex B · Annex C · Annex D