### Water Safety Portal

#### Module 1: ASSEMBLE THE WSP TEAM

Establish a multidisciplinary team with the technical expertize needed to develop, implement and maintain an effective WSP. Appoint a strong team leader and clearly define the roles and responsibilities for each team member. Engage senior management to secure their support for development of the WSP and, where necessary, identify which external stakeholders and expertize may be required.

#### Module 2: DESCRIBE THE WATER SUPPLY SYSTEM

Provide a thorough and accurate system description of the complete water supply chain, from catchment to consumer, with sufficient detail to facilitate hazard identification, including:

- written description of all major process steps
- system flow diagrams / schematics
- description of intended users and uses of the water supply
- comparison of water quality standards or targets with water quality achieved in practice.

#### Module 3: IDENTIFY HAZARDS AND HAZARDOUS EVENTS AND ASSESS THE RISKS

For each step in the water supply chain, identify hazards and hazardous events that threaten the safety of the water supply, and assess the associated risks.

*Hazard*: A chemical, physical or microbial agent that can cause harm to public health.

*<u>Hazardous event</u>*: An event or situation that introduces hazards to, or fails to remove them from, the water supply.

<u>*Risk*</u>: The *likelihood* that a hazardous event will occur combined with the *severity of its consequence*s.

**Part 1 - Identify the hazards and hazardous events:** The description of the hazardous event should be specific, clearly describing what can happen to the water supply system and how it can happen (i.e. cause and effect). It may be useful to use the following basic formula when describing hazardous events:

X happens (to the water supply system) because of Y

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For example:

The source water is <u>faecally</u> contaminated (X) due to fertilizer use on crops and runoff during rains (Y)

*Part 2 - Assess the risks:* The risk associated with each hazardous event should be assessed to distinguish between significant and less significant risks.

*Important distinction* - This first (or 'initial') risk assessment does not consider any preventative control measures that are already in place. Consideration of existing control measures in the risk assessment takes place in Module 4.

Example of a table from a WSP to document hazards, hazardous events and the subsequent risk assessment:

			F	Risk ontr pla	if no ols in ace		
Process step	Hazardous event	Hazard	Likelihood	Severity	Score	Classification	
Catchment	Contamination of raw water due to cattle defecating in the river near the off-take point	Microbial Physical	5	5	25	H	
Treatment	Contamination arising from chlorine under- dosing due to failure of chlorine dose pump	Microbial	4	5	20	н	
Distribution/ Storage	Contamination of water due to vermin accessing the treated water storage tank	Microbial	3	3	9	М	
Household	Contamination of drinking-water due use of insanitary household water storage container	Microbial Chemical	3	5	15	М	

H - high; M - medium; L - low

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# Module 4: DETERMINE AND VALIDATE THE CONTROL MEASURES, REASSESS AND PRIORITIZE THE RISK

*Control measures*: Activities or processes to prevent or eliminate a water safety hazard, or reduce it to an acceptable level (also known as 'barriers' or 'mitigation measures').

*Validation*: The process of obtaining evidence that the control measures can effectively control the hazard.

*Part 1* - Identify the <u>existing</u> control measures for all hazardous events identified in Module 3 and validate their effectiveness.

*Important distinction* - Module 4 focuses on the *existing* control measures that are already in place, whereas Module 5 focuses on documenting *new or additional* control measures that are required.

**Part 2** - Reassess and prioritize the risks, taking into account the effectiveness of the <u>existing</u> control measures. This second (or 'residual') risk assessment considers the effectiveness of the existing control measures and allows the WSP team to determine clearly where additional control measures are required.

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Example of a table from a WSP used to identify and validate existing control measures, reassess and prioritize risks:

What could go wrong?			What is the initial risk?			ne (?	What are you doing about it and is it effective?				What is the residual risk?			Do we need to do more?				
			Risk if no controls in place			o in		Are the existing contro measures effective?			existing control res effective?	Risk with existing controls			Additional controls needed?			
Process step	Hazardous event	Hazard	Likelihood	Severity	Score	Classification	Existing control measure(s)	Yes	No	Somewhat	Basis	Likelihood	Severity	Score	Classification	Yes	No	lf yes, proposed controls?
Catchment	Contamination of raw water due to cattle defecating in the river near the off-take point	Microbial Physical	5	5	25	н	Stock exclusion fencing at raw water off-take			*	Fence is in bad condition Microbiological testing indicates occasional presence of <i>E. coli</i> in the raw water	4	4	16	н	¥		Communication protocol with farmer New fencing
Treatment	Contamination arising from chlorine under- dosing due to failure of chlorine dose pump	Microbial	4	5	20	н	None	-	-		n.a.	4	5	20	н	*		Stand-by pump On-line chlorine
Distribution/ Storage	Contamination of water due to vermin accessing the treated water storage tank	Microbial	3	3	9	м	Vermin proof screens on storage tank			~	Vermin proofing degraded over time and requires repairing	2	2	4	L	~		Vermin proof netting replacement
Household	Contamination of drinking-water due use of insanitary household water storage container	Microbial Chemical	3	5	15	м	Consumer education and awareness programme	*			Routine household visits by public health officer and microbiological testing demonstrates high level of sanitary compliance	2	4	8	м		*	n.a.

Detailed improvement plan needed where the residual risk level is unacceptable

H - high; M - medium; L - low

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# Module 5: DEVELOP, IMPLEMENT AND MAINTAIN AN IMPROVEMENT/UPGRADE PLAN

Develop, implement and maintain a detailed improvement/upgrade plan to address all significant risks that require additional control. Generally, some improvements can be implemented immediately at little or no cost, while other improvements may require significant resources and more time to implement. Improvement/upgrade plans should allow for "incremental improvement" i.e. step-by-step improvements in risk management, to allow time for planning and for the necessary funding to become available.

*Important distinction* - Module 5 focuses on documenting <u>new or additional</u> control measures that are required, whereas Module 4 focuses on <u>existing</u> control measures that are already in place.

#### Module 6: DEFINE MONITORING OF THE CONTROL MEASURES

Develop and implement operational monitoring plans to ensure that control measures continue to

**Operational monitoring**: Routine monitoring performed to confirm that control measures are working to protect water safety at key steps along the water supply chain

work effectively.

*Important distinction* – **operational monitoring** (Module 6) is different from **verification monitoring** (Module 7). Operational monitoring determines if individual control measures are operating effectively, whereas verification monitoring looks at the WSP as a whole, to determine if it is working effectively to provide a safe and reliable drinking-water supply.

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Example of an operational monitoring plan from a WSP:

Process step	Control measure	What?	Where?	When?	How?	Who?	Critical limit	Corrective action
Catchment	Fence around wellhead	Physical integrity	At well	Weekly	Visual inspection	Maintenance lead	Fence integrity compromised	Repair fence
Water treatment plant	Chlorine disinfection	Chlorine residual concentration	At plant outlet	4 x daily	Sampling and field testing	Operator	< 0.2 mg/L >1.0 mg/L	Adjust chlorine dose as per SOP
Distribution/ Storage	Vermin proof netting	Physical integrity	At treated water storage tank	1 x month	Visual inspection	Network operator	Damaged or missing vermin proof netting	Repair or replace vermin proof netting
Household	Consumer awareness/ education programme	Household drinking-water storage practices	Household	1 x household per week	Visual inspection	Public health officer	Observation of use of insanitary storage vessel and unhygienic handling	Inform household of appropriate water storage and handling practices

#### Module 7: VERIFY THE EFFECTIVENESS OF THE WSP

Demonstrate that water quality targets are being achieved (e.g. drinking-water quality standards), consumers are satisfied and the WSP is complete, up-to-date and implemented.

The three key actions for WSP verification monitoring:





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*Important distinction - verification monitoring* (Module 7) verifies that the WSP as a whole is working effectively, whereas *operational monitoring* (Module 6) determines if individual control measures are operating effectively.

#### Module 8: PREPARE MANAGEMENT PROCEDURES

Document management procedures to be followed during normal conditions, incident situations and emergencies. This typically includes both standard operating procedures (SOPs) for key operational activities and emergency response plans.

### Module 9: DEVELOP SUPPORTING PROGRAMMES

Develop supporting programmes that contribute to drinking-water safety. Examples of supporting programmes include operator training and development, consumer education and research and development.

### Module 10: PLAN AND CARRY OUT A PERIODIC REVIEW OF THE WSP

Ensure that the WSP is up-to-date and effective through regular review and, if necessary, revision. This will ensure that new risks threatening the production and supply of safe drinking-water are regularly assessed and addressed and that the WSP is continuously improved. Examples of events that may trigger a review of the WSP include new activities in the catchment, new water supply system infrastructure and updates to improvement/upgrade plans.

#### Module 11: REVIEW THE WSP FOLLOWING AN INCIDENT

Review and revise the WSP to reflect lessons learned from incidents and near misses. Consideration should be given to the cause of the incident, emergency or near miss and the adequacy of the response. This information should feedback into the revision of the WSP as part of continuous improvement.