

## Water Safety Plan Manual Step-by-step risk management

for drinking-water suppliers





International Water Association

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IWA's Bonn Charter for Safe Drinking Water promotes the application of Water Safety Plans (WSPs) as expressed in the WHO Guidelines for Drinking-water Quality. (Revisions to the WHO Guidelines will be taken as revisions to the Bonn Charter in as much as the Bonn Charter refers to the Guidelines). IWA promotes WSPs with WHO through a formal project collaboration agreement and associated programme of work lasting through 2015, and through its membership of water utilities, research institutes, industry, and individual professionals. IWA's work spans the continuum between research and practice, covering all facets of the water cycle. IWA is a registered charity in England (Company registered in England No. 3597005 Registered Charity (England) No. 1076690).



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## How to develop and implement a Water Safety Plan A step-by-step approach using 11 learning modules



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## Introduction

"The most effective means of consistently ensuring the safety of a drinking-water supply is through the use of a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumer. In these Guidelines, such approaches are called water safety plans (WSPs)".

### **Purpose of the Manual**

The words above open Chapter 4 of the Third Edition of the WHO Guidelines for Drinking-water Quality (2004) and capture the philosophy of the WSP approach. The chapter describes the principles of the WSP approach rather than being a guide to their practical application. The aim of this Manual is to provide that practical guidance to facilitate WSP development focusing particularly on organized water supplies managed by a water utility or similar entity.

## Points to consider when developing and implementing a WSP

The aim of a WSP is very straightforward:

To consistently ensure the safety and acceptability of a drinkingwater supply.

The development and implementation of the WSP approach for each drinking-water supply is as follows:

- Set up a team and decide a methodology by which a WSP will be developed;
- Identify all the hazards and hazardous events that can affect the safety of a water supply from the catchment, through treatment and distribution to the consumers' point of use;
- Assess the risk presented by each hazard and hazardous event;
- Consider if controls or barriers are in place for each significant risk and if these are effective;
- Validate the effectiveness of controls and barriers;
- Implement an improvement plan where necessary;
- Demonstrate that the system is consistently safe;

- Regularly review the hazards, risks and controls;
- Keep accurate records for transparency and justification of outcomes.

This systematic nature of the WSP strategy should never be lost or forgotten during implementation. The great advantage of the WSP strategy is that it is applicable to ensuring the safety of water in all types and sizes of water supply systems no matter how simple or complex.

The WSP approach should be considered as a risk management strategy or umbrella which will influence a water utility's whole way of working towards the continuing supply of safe water. Significant risks that are not currently controlled need to be mitigated. This may involve short-, medium- or long-term steps for improvement. **The WSP approach should be dynamic and practical and not merely another operating procedure.** It should not be viewed as a vehicle for generating bureaucracy and paperwork. If it just ends up as a rarely-used folder labelled 'WSP' on a shelf, it is almost certainly not an effective approach.

#### There is no one way to undertake the WSP approach.

The text in this Manual shows how the strategy can be implemented, with examples showing what has been effective for some water utilities. What is important is that the WSP approach fits in with the way a utility is organized and operates, otherwise it will not be accepted within the organization. Developing the WSP approach may show that certain ways of working introduce, or do not properly control risks, in which case the utility should alter its way of working. It should not alter its way of working just to comply with a recommendation from a manual or to reflect another utility's methodology.

Implementation of the WSP approach requires both financial support and encouragement from senior management within a utility. There will be financial and resource requirements and these need to be addressed at the outset but there should also

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be the understanding that proper implementation of the **WSP approach can save money** and better target resources in the longer term.

It is important that the WSP team has adequate experience and expertise to understand water abstraction, treatment and distribution and the hazards that can affect safety through the supply system. For small utilities, additional external expertise may be helpful. The team is vital to getting the WSP approach understood and accepted by everyone connected with water safety in the utility and those outside.

**A WSP cannot be done solely as a desk study**. It must involve site visits to confirm the knowledge, information and schematics available to the utility. Site visits need to include input from those who work at the sites or within catchments and have detailed local knowledge that may not have been captured within the utility's records. Assessment, updating, compiling or rewriting standard operating procedures is an integral part of the WSP strategy. Ideally, all procedures should be labelled as part of the WSP strategy or way of working which helps to gain recognition and acceptance across the utility.

The water utility will take the lead in the WSP approach but it should not do this in isolation. It is a prime purpose of the WSP approach to identify that others have responsibilities towards ensuring the safety of water and for them to work with the water utility on risk reduction. Examples are agriculture and forestry workers, landowners, industry, transport, other utilities, local government and consumers. It is probably not necessary for representatives of all organizations to be included in the WSP team but they should be part of a communication network and aware of the impact of their contributions to the WSP effort. It is important that the WSP is subject to regular external independent audit. This will retain the confidence of all stakeholders.

There can be a tendency for the identification of hazards to be limited to thinking about those direct inputs to the water supply system impacting microbial and chemical parameters, as these are important in terms of compliance with water quality standards. However, the approach to ensure safe water must go much wider, with consideration of aspects such as potential for flood damage, sufficiency of source water and alternative supplies, availability and reliability of power supplies, the quality of treatment chemicals and materials, training programmes, the availability of trained staff, service reservoir cleaning, knowledge of the distribution system, security, emergency procedures, reliability of communication systems and availability of laboratory facilities all requiring risk assessment. This list is by no means exhaustive. If a water utility considers that some of these areas fall outside of its WSP approach, then it does not have a comprehensive WSP strategy and has not fully understood the concept.

The obvious controls for identified risks are physical barriers or processes within water treatment plants such as filtration and disinfection, but consideration and assessment of controls needs to be much wider. Agreements with farmers and industry on chemical usage, livestock controls, use only of trained staff, pumping regimes, visual inspection, auto-shutdown or turnout, audit of, or quality agreements with, chemical suppliers and plant manufacturers, could all be considered controls as long as they can be validated as effective and monitored to demonstrate that they continue to provide protection. Again, this list is by no means exhaustive. **Starting out on the implementation of the WSP approach does not mean that every existing control has to be re-validated but it does require the robustness of existing data and reports to be evaluated.** 

It is important to assess risk before and after its control (or mitigation) where this exists because this will demonstrate that each hazard has been recognized and its control assessed for effectiveness. The risk assessment is likely to highlight a great many risks that are not considered significant to the safety of the water supply system. It is important, though, that all risks are clearly documented and understood by the utility. Even **more important is the need to prioritize and quickly put in place an improvement programme** where significant risks are identified.

Not all risks can be easily assessed using a methodology (e.g. a 'semi-quantitative' risk matrix), where a risk is estimated in terms of likelihood of the hazard occurring, and severity of the consequence should the hazard occur. Some risks do not lend themselves to be assessed via narrow definitions of likelihood (e.g. estimated occurrence is 'monthly') or consequence (e.g. estimated severity is 'moderate' public health impact). For example, potential negative feedback from consumers regarding issues that may not have a significant impact on health may be viewed as a significant risk to a utility's reputation and therefore should be addressed for the WSP. Sometimes, it may be more appropriate to assess risk in a simplified format (e.g. 'significant', 'non-significant' or 'uncertain') based on a group decision. Whatever method is used, it is imperative that the risk assessment methodology is sufficiently clear and detailed to allow consistency. This is a particular concern for a large utility, where the risk assessment is likely to be undertaken

## approach needs to be included from the planning stage of any improvements or new arrangements for a water supply system.

Compliance monitoring is an important part of the verification process to show that the WSP is working. It will show whether water at the point of compliance, which is often the consumers' tap, is meeting water quality standards; it does not make the water safe because by the time the results of compliance monitoring are available the water will have been drunk and used for other domestic purposes. Validation, to show that controls are capable of mitigating risks, and operational monitoring, to demonstrate that they continue to work effectively, are much more important tools in ensuring the safety of water because they focus on the processes that make water safe. **Operational monitoring is an integral part of the WSP approach.** 

## **Overcoming complacency**

Many elements of the WSP approach are already incorporated in existing water utility good operating practice. However, fully implementing the WSP will require all utilities to take a fresh look at everything that can affect the safety of water. **Nothing should be taken for granted.** If barriers are in place and



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