



## Guideline Executive summary

### Introduction

TECHNEAU work package 5.6 deals with operation and maintenance of urban water networks. Focus is on water quality issues. A BMP framework and procedures is developed under this work package, based on sensor measurements and water quality models. Sensors and models are possible input from other work areas and packages (WP3.5, WA4 and WP5.5). This work package develops the practical applicability of those results by showing how sensors and models can be implemented in the operational and maintenance management of drinking water networks.

Deliverables D5.6.1 and D5.6.2 have the objective to summarize the status on water quality related problems of networks and the management practice of some selected end-users. Based on this status, a sketch of best management practise is given.

### Importance

Hygienic threats in the network that do not origin from the water treatment are ingress of pollution and chemical, physical and microbiological in-pipe processes. Ingress is mainly related to low pressure, pipe condition and repairs. All potential situations are described in this report. In-pipe processes depend on water characteristics of the processed water, travel time to consumers, hydraulics in general and pipe materials.

In-pipe processes and risks of ingress are difficult to assess in a water network. There are established operational routines to maintain water quality and to avoid deterioration. These routines are mostly established from experience and in many cases only re-active measures are applied due to lack of knowledge.

### Approach

This report analyses the operational measures and maintenance schemes of 7 European utilities to map the current status and practice in these fields. There are huge differences in the conditions and challenges those utilities are facing and how they deal with them. Discussions and questions of the effectiveness of their measures are rised and there is a general interest in increasing knowledge and verification of methods.

The last chapter of this report addresses possible O&M solutions to water quality related problems, including risk management and models. This is the basis for the further work in this work package where all O&M solutions are mapped, evaluated and further developed.

### Result

The report builds the foundation for the further work in work package 5.6. All aspects of operation and maintenance of water networks regarding water quality changes are mapped and summarized. Future, advanced methods based on modelling and surveillance are outlined and will be further evaluated and elaborated in the project. End-user interviews showed a great

variety of operational network praxis, with different challenges and conditions. Advanced, online operation and surveillance has not yet found its way into daily praxis since many processes in the network are unclear to end-users.

### **More information**

D5.6.1 + D5.6.2: Operation and maintenance of water network - Best management praxis

Authors:

Sveinung Sægrov, Axel König (SINTEF);

Robert Pitchers, Paul Conroy (WRc);

Helena Alegre (LNEC);

Andreas Korth (TZW)

Contact:

Sveinung Sægrov, SINTEF

Phone: +47-73592349

Email: [sveinung.sagrov@sintef.no](mailto:sveinung.sagrov@sintef.no)

## TECHNEAU Knowledge Integrator (TKI) categorisation

### *Categorisation of Knowledge Packages*

Categorisation (i.e. classification, contains and constraints) of knowledge packages (KPs) can be carried out by 'checking' the appropriate boxes in the attached tables. For example, for a KP investigating point-of-use treatment suitable for a developing world country, the following might be checked:

*Classification:* Process chain – Tap (Customer) – Point-of-use (POU).

*Contains:* Report; Literature review.

*Constraints:* Low cost; Simple technology; No/low skill requirement; No/low energy requirement; No/low chemical requirement; No/low sludge production; Developing world location.

Note that only the lowest level classification needs to be checked, e.g. Point-of-use (POU) in the above example.

*Meta data* can be included under the 'More Information' section of the Executive Summary Report, i.e. Author(s), Organisation(s), Contact details (name and email), Quality controller (name and organisation) and Date prepared. (The TKI administrator can enter Source (= TECHNEAU), Date submitted (TKI) and Date revised (TKI)).

## TKI Categorisation

		<b>Classification</b>			
<b>Supply Chain</b>	<b>Process Chain</b>	<b>Process Chain (cont'd)</b>	<b>Water Quality</b>	<b>Water Quantity (cont'd)</b>	
<b>Source</b>	<b>Raw water storage</b>	<b>Sludge treatment</b>	<b>Legislation/regulation</b>		
- Catchment	- Supply reservoir	- Settlement	- Raw water (source)	- Leakage	x
- Groundwater	- Bankside storage	- Thickening	- Treated water	- Recycle	
- Surface water	<b>Pretreatment</b>	- Dewatering	<b>Chemical</b>		
- Spring water	- Screening	- Disposal	- Organic compounds	x	
- Storm water	- Microstraining	<b>Chemical dosing</b>	- Inorganic compounds		
- Brackish/seawater	<b>Primary treatment</b>	- pH adjustment	- Disinfection by-products		
- Wastewater	- Sedimentation	- Coagulant	- Corrosion		
<b>Raw water storage</b>	- Rapid filtration	- Polyelectrolyte	- Scaling		
- Supply reservoir	- Slow sand filtration	- Disinfectant	- Chlorine decay		
- Bankside storage	- Bank filtration	- Lead/plumbosolvency	<b>Microbiological</b>	x	
<b>Water treatment</b>	- Dune infiltration	<b>Control/instrumentation</b>	- Viruses	<b>Consumers / Risk</b>	
- Pretreatment	<b>Secondary treatment</b>	- Flow	- Parasites		
- Primary treatment	- Coagulation/flocculation	- Pressure	- Bacteria	<b>Trust</b>	
- Secondary treatment	- Sedimentation	- pH	- Fungi	- In water safety/ quality	x
- Sludge treatment	- Filtration	- Chlorine	<b>Aesthetic</b>	- In security of supply	x
<b>Treated water storage</b>	- Dissolved air flotation(DAF)	- Dosing	- Hardness / alkalinity		
- Service reservoir	- Ion exchange	- Telemetry	- pH		
<b>Distribution</b>	- Membrane treatment	<b>Analysis</b>	- Turbidity	- In regulations and regulators	
x			x	<b>Willingness-to-pay/acceptance</b>	
- Pumps	- Adsorption	- Chemical	- Colour	- For safety	
- Supply pipe / main	- Disinfection	- Microbiological	- Taste	- For improved taste/ odour	
x			x	- For infrastructure	x
<b>Tap (Customer)</b>	- Dechlorination	- Physical	- Odour	- For security of supply	
- Supply (service) pipe	<b>Treated water storage</b>				
x					



