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Service activities relating to drinking water supply, wastewater and stormwater systems — Guidelines for the implementation of continuous monitoring systems for drinking water quality and operational parameters in drinking water distribution networks

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Foreword

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This document was prepared by Technical Committee ISO/TC 224, *Service activities relating to drinking water supply, wastewater and stormwater systems*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Cases of drinking water contamination around the world have raised awareness of water utilities' exposure to risk. Contamination can arise from many causes, including societal mishaps, errors in operation, maintenance or management by the water utility, natural disasters, vandalism, sabotage, criminality and terrorist activity. The distributed nature of drinking water systems makes them especially vulnerable to contamination and can permit the rapid dispersion of a contaminant. The velocities and volumes of water in a drinking water distribution network can result in contamination affecting significant numbers of users in a short time (e.g. tens of minutes). Recognition of these risks has raised awareness of the need to consider the use of continuous monitoring systems to rapidly detect potential contamination events.

The occurrence of an event can rarely be predicted. However, the more frequently relevant data can be collected and examined, the greater is the chance of quickly detecting an event's occurrence. This supports consideration of the adoption of continuous monitoring systems to provide the data streams that can be used in event detection.

A contamination event can make a waterworks or a drinking water distribution network unusable for a time and require implementation of contingency plans. Such plans could involve, for example, accessing an alternative source water or providing an alternative water service other than via the drinking water distribution network.

To date, very few water utilities have installed continuous monitoring systems either in part or throughout their drinking water distribution network(s). This situation can result from a rational decision based on risk assessment and, in some cases, a cost-benefit analysis. However, it should be acknowledged that circumstances can change – gradually over time or rapidly in the face of events. Water utilities wishing to explore such an option can face uncertainties and gaps in their knowledge on how to proceed. In such circumstances water utilities typically face three main challenges:

— which types of measuring devices (MDs) to install in each continuous monitoring station;

— how many continuous monitoring stations to install per drinking water system;

— where to locate the continuous monitoring stations in the drinking water distribution network in order to achieve the best results.

The installation of continuous monitoring systems could reduce the risk to public health and mitigate the impact on users and other stakeholders during a contamination event. The value of continuous monitoring systems can be determined using appropriate risk assessment and cost-benefit analysis. Such an evaluation should take into account existing controls and establish the additional risk mitigation that might be achieved and likely costs.

Advances in MD technology have recently made the adoption and deployment of continuous monitoring more practicable. MDs are not limited to the measurement of drinking water quality alone. Continuous measurement of operational parameters such as water flow and water pressure can improve the water utility's capability to interpret results from the measurement of drinking water quality.

This document provides water utilities, their contractors, consultants and regulators with guidelines for the installation of continuous monitoring systems in drinking water systems, including guidance on their appropriate selection, maintenance and optimal calibration.

These guidelines can aid a water utility's processes for risk assessment and cost-benefit analysis. Taken together these can help a water utility's top management take informed, risk-based decisions on the worthwhileness of investment in a continuous monitoring system.

The guidance provided in this document is intended to be universally applicable, regardless of the structure and size of a water utility's drinking water system. An event detection process (EDP) that relies upon grab samples and intermittent data inputs could be implemented at lower cost. However, where a water utility's assets, finances, management system and technical capability make it practicable, the ability to provide continuous data streams offers advantages for event detection.

To gain experience, initial deployment could be limited to higher-risk areas within a wider drinking water system.