

TGN16 - QUALITY ASSURANCE OF ON-LINE WATER QUALITY MONITORING INSTRUMENTATION, USED FOR THE CONTROL AND MONITORING OF DISINFECTION PROCESSES.

Purpose

This document sets out the principles, to be considered by drinking water quality specialists, in drawing up suitable operational quality assurance procedures and practices; for on-line water quality monitoring instrumentation associated with disinfection.

Specific guidance is given relating to the measurement of chlorine and turbidity that are based upon the requirements of Regulation 16 (3) which applies to samples taken for compliance with parts 4 and 5 of the Water Supply (Water Quality) Regulations. Other approaches to quality assurance may also be applied by companies but are not detailed within this guidance note.

It is acknowledged that other parameters have an impact upon disinfection (e.g. pH), but these are not included within this guidance. Water companies should assure themselves that the risks associated with the monitoring of other parameters have been assessed and documented and where necessary appropriate steps have been taken to verify the readings from on-line monitors.

Background

1. The industry relies on and may from time to time provide the DWI with on-line water quality monitoring data, in order to demonstrate that the regulations around disinfection have been adhered to.
2. It is important that these data are fit for purpose and that companies can demonstrate that the robustness of these data are to a similar standard to that of other water quality data submitted to the DWI.
3. This will be achieved by the implementation of procedures, based on this guidance, to ensure that chlorine and turbidity data associated with primary disinfection on a particular site are traceable and auditable.

Methodology

1. Appropriate Standard Operating Procedures and suitable records to be developed and implemented by water companies for the operation of on-line turbidity and chlorine monitors at the point of disinfection and, where appropriate, at the point the water is supplied from a treatment works.
2. The procedures and records are readily available to the operator, other relevant staff and 3rd parties as appropriate.
3. For analytical quality control, an appropriate on-site comparative standard or comparison with an accredited on-site test should be used. This should be suitable for the instrument and analytical methodology and be fully traceable
4. Any standards that are prepared “in-house” should also be fully traceable.
5. The approach for chlorine is based on a direct comparison of the on-line instrument

reading with the result obtained from an accredited on-site test undertaken by a competent person.

6. Due to the sensitivity gap between on-site and on-line measurements of turbidity, an alternative approach of comparing the instrument reading with the value of a known standard is used. As with chlorine this activity should be undertaken by a competent person.
7. Companies should develop appropriate action and warning limits and procedures for reacting to these limits ensuring they are included in the Standard Operating Procedures.

Quality assurance method for chlorine

1. Undertake instrument suitability and AQC tests on the hand held device to ensure it is operating with its control limits and record as appropriate.
2. Collect a representative sample of the water supplying the on-line chlorine monitors and note the instrument chlorine reading at that time.
3. Determine the level of free chlorine using the hand held instrument
4. Subtract the on-site test result from the on-line monitor value recorded and plot on a difference chart.
5. If the result falls outside the calculated action or warning limits, investigate and record any corrective actions as appropriate.

Quality assurance method for turbidity

1. Due to the nature of the analytical methodology associated with on-line turbidity measurement, a suitable primary reference standard is to be used as the comparator for quality assurance purposes.
2. The reference standard will have been ascribed a known reference value. (NOTE: The reference standard used should be different from the standard used to calibrate the instrument.)
3. Test the reference standard as per manufacturer's instructions and record the measured value.
4. Subtract the measured value from the reference value and plot on a difference chart.
5. If the result falls outside the calculated action or warning limits, investigate and record any corrective actions as appropriate.

Results and Data Handling

1. The data produced when undertaking the comparative QA analyses will be recorded and plotted on difference charts, these will provide confidence in the on-line analytical measurements.
2. The initial AQC data collection (to set up the difference charts) will require that a minimum of 20 measurements are collected over a representative time frame that will

capture any seasonal variations. It is suggested these data are collected over the first 12 months.

3. The appropriate AQC frequency thereafter will be determined by each water company, according to the stability of measurement. It is anticipated that AQC will be conducted at least monthly but the frequency must be based upon sound science and enable the company to demonstrate that the monitor results are continually fit for purpose.
4. The difference charts will incorporate statistically calculated AQC control limits.

Response to Measurements Outside of Control Limits

1. Initial measurements which yield results outside of control limits will trigger actions to be undertaken by the operator, detailed within the instrument's Standard Operating Procedure.
2. Deviations which cannot be resolved by the operator will be passed to a more senior member of staff to determine the appropriate action.
3. Any deviations which may have an adverse impact on disinfection efficacy or confidence in the results produced by the on-line instrumentation will trigger an investigation by the water company. The outcome of these investigations will be used to ensure continual improvement.
4. Water companies should consider whether the impact on disinfection efficacy or confidence in the results needs to be reported to the Drinking Water Inspectorate in line with its obligations under the Water Industry (Suppliers Information) Direction.

Operator Training and Competency

1. Instrument operators to be provided with appropriate training and support to fulfil three criteria.
 - Underpinning knowledge and understanding the importance of the parameters being measured, the basis of the measurement methodology, the instrumentation being relied upon and requirements for analytical quality control.
 - Knowledge of the specific operational procedures, the manufacturer's instructions for specific instrumentation and any Standard Operating Procedures for undertaking Quality Assurance.
 - Continuing Professional Development or demonstration of on-going competence – regular audits and method witness.
2. The frequency of operator audits or method witnessing is determined by the water company but must be sufficient to maintain confidence in the competence of individuals responsible for undertaking these important tasks.