

# Technical Bulletin - Guidance on Water Matrices Definitions for Sampling and Testing to ISO/IEC 17025

7 May 2019

**Note:** This supersedes the 6 June 2014 Technical Bulletin - *Guidance on Water Matrices Definitions for Sampling and Testing to ISO/IEC 17025*.

It is an ISO/IEC 17025 requirement that methods shall be validated in the matrices to be tested. These matrices are detailed in the Materials/Products Tested column of UKAS accreditation schedules and historically, water matrices have been described in general terms which has led to a variety of different descriptors for similar water types. This can lead to confusion when searching for testing organisations who can undertake testing for specific matrices and a lack of clarity for the accredited organisations.

This technical bulletin is intended as a guidance document for the definition of water types to be used as descriptors on the accreditation schedules of organisations who undertake water testing and/or sampling activities. Since its original publication in June 2014, there has been a significant growth in the number of testing organisations that undertake testing of healthcare-related waters which do not fit readily into existing categories, leading to inconsistency in presentation of such waters on schedules. The purpose of this document remains to standardise accreditation schedules to prevent inadvertently conferring pecuniary advantage to an organisation with a specific or unusual water type, by classifying water types into broad categories. It is not intended as a prescriptive document and does not set out to introduce additional requirements to ISO/IEC 17025 but to provide clarification and guidance on the current requirements within the international standard.

Water types have been classified into the following broad categories;

- **Ground water**
- **Surface water**
- **Drinking water**
- **Land leachate**
- **Prepared leachate**
- **Untreated sewage**
- **Treated sewage**
- **Trade effluent**
- **Saline water**
- **Process water**
- **Recreational water**
- **Healthcare water**

.....with details, definitions and examples for each type in the section below.

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## Ground Water

*Basic Definition:* Water that does not run off, and is not taken up by plants, but soaks down beneath the ground surface into soil pore spaces and ultimately into the fractures of rock formations (called an aquifer when it can yield a usable quantity of water). The term is not applied to water that is percolating or held in the top layers of the soil, but to that below the water table and is generally restricted to water that has been drawn up from aquifers.

*Notes/Exceptions:* Many drinking water companies use ground water as a source because it is generally quite clean as a consequence of its very slow transition into the aquifers, which can be a good mechanism for filtering out contamination.

Examples:

- **Well water**
- **Borehole water**
- **Spring water**

## Surface Water

*Basic Definition:* Water which is open to the atmosphere and subject to surface runoff. Water that runs across the top of soil or bedrock without infiltrating through either material. Generally, it is accepted to be water collected on the surface of the earth for example in rivers, streams, lakes, reservoirs or wetlands.

Whilst it would naturally include seas and oceans too, these are dealt with later in this document (saline water). This category also does not include waters used for recreational purposes (e.g. lakes) which are covered under the recreational water category of this document.

*Note/Exceptions:* If both surface and ground waters are validated as the source of drinking water the term raw waters may be used on accreditation schedules.

Examples:

- **River water**
- **Lake / open reservoir water (non-bathing)**

## Drinking Water

*Basic Definition:* Water of sufficiently high quality (wholesome) that it can be consumed or used without risk of immediate or long-term harm. Water that is free from disease-producing organisms, poisonous substances, chemical, biological, and radioactive contaminants which would make it unfit for human consumption.

*Notes/Exceptions:* Statutory Private and Public waters and operational samples both fall within this category. The relevant regulations will be referred to in the 'Standard specifications/Equipment/Techniques used' column of the Accreditation Schedule for example DWTS or The Natural Mineral Water, Spring Water and Bottled Drinking Water Regulations.

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Examples:

- **Regulatory tap water**
- **Bottled water**
- **Tanker / bowser water**
- **Treated surface or ground waters**

## Land Leachate

*Basic Definition:* Water draining from landfill sites or which has percolated through contaminated land.

*Notes/Exceptions:* These types can often be extremely contaminated, coloured and malodourous and are often some of the most challenging water matrices to analyse due to the complexity of their composition. Usually contain both dissolved and suspended material.

Examples:

~ Borehole Samples from;

- **Landfill leachate**
- **Contaminated land**

~ Runoff Samples from;

- **Landfill leachate**
- **Contaminated land**

## Prepared Leachate

*Basic Definition:* Leachate that has been prepared by the laboratory (by agitating or percolating a known mass of sample with a known volume of water) which must be tested in order to ascertain whether the original sample can be accepted for landfill or is appropriate for use in construction projects.

*Notes/Exceptions:* There are a number of documented procedures (e.g. BS EN 12457) and the data is generally used for waste acceptance criteria (WAC) or to demonstrate suitability for use of a material in construction projects.

Examples:

- **Prepared leachate for WAC tests**
- **Prepared leachate for testing in support of Construction Products Regulations (CPR)**

## Untreated Sewage

*Basic Definition:* Liquid waste from domestic or industrial establishments that is carried away in sewers or drains for dumping or for treatment to convert it into a form that is not toxic.

The terminology is related to that used in the MCERTS (waters) performance standard and (where applicable) the relevant regulations will be referred to in the 'Standard specifications/ Equipment/Techniques used' column of the Accreditation Schedule for example MCERTS waters performance standard.

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*Notes/Exceptions:* It is worth considering that crude sewage from a large industrial area will differ in composition quite significantly from sewage produced by a small rural area.

Examples:

- **Crude sewage**

## Treated Sewage

*Basic Definition:* Liquid sewage that has been remediated prior to discharge, using any of a large number of processes (aeration, reed beds) to reduce its environmental impact and generally in order to meet consented discharge levels.

The terminology is related to that used in the MCERTS (waters) performance standard and (where applicable) the relevant regulations will be referred to in the 'Standard specifications/ Equipment/Techniques used' column of the Accreditation Schedule for example MCERTs waters performance standard.

*Notes/Exceptions:* It is worth considering that a treated sewage from a large industrial area will differ in composition quite significantly from treated sewage produced by a small rural area.

Examples:

- **Partially treated sewage (e.g. primary sedimentation effluent)**
- **Treated sewage effluent**

## Trade Effluent

*Basic Definition:* Liquids discharged to the wastewater system from industrial processes and ultimately to either controlled waters or to sewer. Premises producing trade effluent vary in size from small laundrettes to large chemical manufacturing facilities.

It is very unlikely that trade effluents from different sources will have the same composition (e.g. metal finishing works, abattoir, print works) and it is necessary for the accredited laboratory to demonstrate that it has considered the source and composition of the samples that it is testing and can demonstrate competence for such analysis.

The terminology is related to that used in the MCERTS (waters) performance standard and (where applicable) the relevant regulations will be referred to in the 'Standard specifications/ Equipment/Techniques used' column of the Accreditation Schedule for example MCERTs waters performance standard.

*Notes/Exceptions:* In the case of trade effluents to controlled waters, a permit will generally be in place from the Environment Agency which specifies the levels of contamination permissible within the discharge. For the purposes of trade effluents discharged to sewer, this is generally so that utility companies are able to establish the levels of contamination and devise a pricing strategy which allows them to deal with the effluent in a cost-effective manner.

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Examples:

~ Water used in,

- **Production facilities**
- **Washing facilities**
- **Cooling facilities**

## Saline Water

*Basic Definition:* Water that contains a significant concentration of dissolved salts.

This category does not include waters used for recreational purposes (i.e. bathing beach waters) which are covered under the recreational water category later in this document.

*Notes/Exceptions:* An accredited laboratory should be able to demonstrate that they are aware of and competent in analysing the relevant types of saline waters being submitted by customers (NB: sea water  $\approx 30,000\text{mg/l}$  salinity, estuarine/tidal/brackish water  $\approx 15,000\text{mg/l}$  salinity, formation water  $\leq 400,000\text{mg/l}$  salinity).

Examples:

- **Sea water**
- **Estuarine / tidal / brackish water**
- **Formation water**

## Process Water

*Basic Definition:* Water that serves in any level of an industrial/manufacturing process, with the difference from trade effluents being that they are not discharged to a wastewater system.

*Notes/Exceptions:* Process waters can come from a number of different sources but are used during industrial / manufacturing processes (e.g. cutting fluid, cooling waters, make-up water, ultra-pure water (non-healthcare) and so on). The scope of this water type category is broad, and the expectation is that an accredited laboratory will further define the process water types covered by a test method and be able to demonstrate fitness for purpose for all. An awareness of any specific technical requirements in relation to a process water is required, along with demonstrable analytical competence. A basic description of process water type may be added to schedules at the Assessment Manager's discretion. Acceptance of a request to analyse a customer process should prompt an evaluation of the appropriateness of current validation and the potential need to apply for an extension to scope.

Examples:

- **Cutting fluid**
- **Cooling waters**
- **Make-up water**
- **Ultra-pure water – non-healthcare (e.g. for semiconductor industry)**
- **Tap water (not drinking)**
- **'Grey water'**

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## Recreational Water

*Basic Definition:* Water used for recreational purposes (i.e. for enjoyment, amusement, or pleasure) and can be split into two discrete sectors – Man made or Natural.

The relevant regulations will be referred to in the 'Standard specifications / Equipment / Techniques used' column of the Accreditation Schedule for example bathing water directive etc.

*Notes/Exceptions:* It would be expected that an accredited laboratory will be able to demonstrate that they are aware of and competent in analysing the relevant types of recreational waters being submitted by customers in order to demonstrate fitness for purpose.

Examples:

Recreational waters: **Man made**

- **Spa (including hot tub / Jacuzzi / plunge pool etc.)**
- **Swimming pool waters (outdoor and indoor)**
- **Fountains**

Recreational waters: **Natural**

- **Saline (including bathing water beaches and salt water swimming pools)**
- **Fresh waters**
- **Bathing waters (lakes)**
- **Springs**

## Healthcare Water

*Basic Definition:* Water that serves in any level of the provision of healthcare where particular requirements beyond the basic need for wholesomeness are necessary. This will include water supplies to augmented care settings where water quality must be of a higher microbiological standard than that provided by the supplier as well as waters used for therapeutic purposes whether directly or indirectly (i.e. hydrotherapy, or for the purpose of sanitisation of medical equipment). This does not include water for injection requirements for which are specified in relevant pharmacopeia publications.

The relevant codes of practice will be referred to in the 'Standard specifications / Equipment / Techniques used' column of the Accreditation Schedule for example HTM 01-06.

*Notes/Exceptions:* Healthcare waters can be diverse in source and it is important that laboratories have awareness of the relevant codes of practice that underpin the quality specifications for the waters it receives. A laboratory therefore needs full knowledge of the water type being received particularly where these are being submitted by an intermediary. It would be expected that an accredited laboratory will be able to demonstrate that they are aware of and competent in analysing the relevant types of healthcare waters being submitted by customers in order to demonstrate fitness for purpose.

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Examples:

- **Hydrotherapy pools**
- **Augmented care units / settings outlets**
- **Automated endoscope reprocessor / endoscope washer-disinfector rinses**
- **RO / purified water supplies for AERs**
- **Dialysis waters / ultra-pure waters**
- **Dental irrigation waters**
- **Cardiothoracic surgery heater-cooler unit waters**

Accredited organisations will be expected to have sufficient validation data to demonstrate the capability of the method for the matrices detailed on their schedule of accreditation. Prior to the testing or sampling, and during contract review, the accredited organisation should establish that their methods/validation data match those for the specified matrix to be tested and are suitable for their customers' specific requirements.

The above guidance on water types is also applicable to organisations that hold flexible scope accreditation (LAB 39 - *UKAS Guidance on the Implementation and Management of Flexible Scopes of Accreditation within Laboratories*).

**Note:** GEN 4 UKAS Policy and General Guidance on the Implementation and Management of Flexible Scopes of Accreditation within Conformity Assessment Bodies is in draft at the time of issue of this Bulletin and will replace LAB 39 in due course.

The water matrices definitions have been prepared by UKAS in collaboration with The Drinking Water Inspectorate of England and Wales (DWI), the Drinking Water Quality Regulator for Scotland (DWQR), the Drinking Water Inspectorate for Northern Ireland, the Environment Agency and the Standard Committee of Analysts microbiology working group 2.