European Environment Agency
European Topic Centre on Inland,
Coastal and Marine Waters

Guidelines for assessment under the Bathing Water Directive

Prepared by:
ETC/ICM (Lidija Globevnik, Luka Snoj, Gašper Šubelj), October 2020

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1. Introduction

The aim of this document is to introduce the national reporter into the EEA bathing water quality assessment procedure according to the Directive 2006/7/EC (BWD) and wider principles applied by the EEA in the reporting process. The present document is part of the data call for the bathing season 2019. and provides information on the updated multi-layered assessment procedure applied.

Namely, three following statuses described further in detail in Chapter 3, are defined for each bathing water):

1. **monitoring calendar status** – describes implementation of monitoring calendar in the current season (i.e. last reporting season), as set out in Annex IV of BWD;
2. **management status** – describes management in the last assessment period, whether the bathing water was continuously monitored or not;
3. **bathing water quality status** – describes microbiological quality of water as defined in BWD Annexes I and II, as soon as enough samples are available (defined in BWD Art. 4.3).

This document describes the assessment procedure used by the EEA and is available at the Reportnet CDR Help, section for BWD. A separate document on how to structure and report the BWD data is also available at the CDR Help.

2. Selection of samples for assessment dataset

Bathing water quality status and the auxiliary statuses of "monitoring calendar" and "management" are based on the selection of samples taken in the last assessment period, which means the last four bathing seasons[1]. Sets of bathing water data used to carry out bathing water quality assessments shall always comprise at least 16 samples (BWD Article 4.3)[2].

With these prerequisites, the assessment dataset is composed for each bathing water before the annual assessment. The assessment dataset is a reference set of samples used for assigning the three statuses described further in the document.

Selection of samples to be included in the assessment dataset follows the procedure:

1. **Select the year of the first season in the last assessment period (LAP)**
   Sites with monitoring gaps can have LAP longer than four consecutive calendar years, but not more than five.
2. **Select all samples since the first season of the last assessment period**
   All samples reported to the EEA are initially selected.
3. **Disregard manually excluded samples**
   All samples reported to the EEA that had been exceptionally flagged as not valid through correspondence with national reporters are kept in the database for archiving purposes but not used in any subsequent assessment dataset.
4. **Disregard samples taken before quality changes**
   All samples taken before changes that have occurred and that are likely to affect the classification of the bathing water (BWD Article 4.4.b) are disregarded.
5. **Disregard short–term pollution (STP) samples**
   Samples taken during STP events may be disregarded and replaced by an additional sample taken seven days after the STP end. An approach to STP sample processing is described separately in section 2.2.
6. **Disregard multiple pre–season samples**
   If there is more than one sample taken shortly before the start of a bathing season, only the most recent one will be used for assessment dataset. The rest will be disregarded.
7. **Disregard post–season samples**
   Except for one pre–season sample per season, all samples need to be taken within the declared season Otherwise they will be disregarded.

[1] Also subject to BWD Article 4.2 (»A Member State may decide to carry out bathing water quality assessments on the basis of the set of bathing water quality data compiled in relation to the preceding three bathing seasons only.«) and BWD Article 4.4 (»A bathing water quality assessment may be carried out on the basis of a set of bathing water quality data relating to fewer than four bathing seasons if the bathing water is newly identified; or any changes have occurred that are likely to affect the classification of the bathing water.«).

[2] 12 samples in the special circumstances (BWD Annex IV.2): a bathing water with the bathing season not exceeding eight weeks, or situated in a region subject to special geographical constraints.

2.1. Assessment dataset of grouped bathing waters

Under the defined conditions (BWD Article 4.5), bathing waters can be grouped. For the assessment, this specifically means using a sample from any bathing water in the group for the assessment dataset of all other bathing waters in the same group.

Assigning group samples to all the other bathing waters in a group takes place before defining the assessment dataset described in section above.

2.2. Selection of short–term pollution samples

Regarding sampling, a short–term pollution (STP) event requires three types of samples:

- **short–term pollution sample** – a polluted sample with higher-than-usual values of either bacteria concentration; its date of sampling is also a declaration of an STP start; this type of sample may be disregarded (but must be reported);
- **short–term pollution end confirmation sample** – a sample with decreased bacteria concentration compared to an STP sample, used to declare an STP end; this type of sample is never to be a part of assessment dataset (but should be reported); and
- **short–term pollution replacement sample** – a sample required to replace a disregarded STP sample, taken seven days after an STP end; this type of sample is used in the assessment dataset if conditions for replacing the STP sample are met; otherwise, it is not part of the assessment dataset.

When composing the assessment dataset for each bathing water, samples related to a short–term pollution event are to be processed as follows:

1. **Disregard STP–end confirmation samples;** this includes one sample reported on the last day of an STP, if there are more samples reported within the STP; if there are more samples reported on the last day, the last sample in the original delivery is disregarded as the STP–end confirmation sample[3];
2. **Create a list of all STPs in the last assessment period;**
3. **Create list of STP samples**; this includes all samples within an STP that are not STP-end confirmation samples; sometimes, more than one such sample is reported within the STP event;
4. **Define whether replacement sample per STP event is available;** any sample reported within seven days after an STP end is treated as replacement sample[4]; if there are more sample reported within seven days, the first (sorted by date and by rows in the original delivery) is used;
5. **Count and rank samples within STP:**
    a. rank only samples that have a replacement sample;
    b. count samples for assessment in the last assessment period, by bathing water;
    c. count STP samples by bathing water, in the last assessment period;

[3] A flag sampleStatus=confirmationSample is introduced in the revised reporting 787, which will facilitate defining the correct confirmation sample.
[4] A flag sampleStatus=replacementSample is introduced in the revised reporting 787, which will facilitate defining the correct replacement sample.

d. count maximum reported STP samples by BW in any season of the last assessment period;

6. **Flag STP samples to be disregarded:**
    a. where count of STP samples with replacement in any season is *not more than one*, disregard all;
    b. where count of STP samples with replacement in any season is *more than one*, disregard a maximum of 15 % of all samples in the last assessment period; the older STP samples are disregarded until 15 % is reached.

3. Definition of statuses

3.1. Monitoring calendar status

The monitoring calendar status describes implementation of the monitoring calendar in the current season, as defined in BWD Annex IV.

Monitoring calendar status
0 – Not implemented
1 – Implemented

Monitoring provisions and exceptions are defined in BWD Article 3, monitored parameters are listed in Annex I (column A), and monitoring frequency is specified in Annex IV. The monitoring calendar requirements as set out in Annex IV are summarised as follows:

- one sample (pre-season sample) is to be taken shortly before the start of each bathing season;
- no fewer than four samples are to be taken and analysed in the most recent season; and
- an interval between sampling dates never exceeds one month.

The EEA does not collect information on monitoring calendar (to be established before the start of each bathing season, according to BWD Article 3.4), neither does it check compliance of the reported monitoring data against the monitoring calendar. For this reason, the three requirements listed above are checked for each bathing water through the standard procedure:

1. **Existence of a pre–season sample;** any sample taken before the start of the bathing season, without applying day limit before the start, satisfies the requirement; however, the number of days between the pre–season sample and the next sample in the dataset is subject to an interval requirement described in point (3);
2. **Minimum number of samples per season;** a minimum of four samples should be reported per season, including a pre–season sample; if a season is shorter than eight weeks or a bathing water is subject to special geographical constraints, a minimum of three samples should be reported;
3. **Maximum interval between sampling dates;** a maximum of one month plus four days (BWD Article 3.4) interval should be separating any two consecutive samples;

All three requirements above need to be met in order for a bathing site to be assigned the ’1-Implemented’ Status.

3.2. Management status

The management status describes management in the last assessment period – specifically, whether the bathing water was continuously monitored or not.

Management status
1 – Continuously monitored
2 – Newly identified
3 – Quality changes
4 – Monitoring gap

A bathing water should be continuously monitored as part of management measures (described under BWD Article 2.7). If monitored in any of the past four calendar years, the status "**1 – Continuously monitored**" is assigned to it. Since the status aims to describe management and circumstances of a bathing water on longer term, the number of samples taken in each year is not taken into account for this status. This means that reporting less than required number of samples per season still qualifies such bathing water for the status "1 – Continuously monitored".

If a bathing water was newly identified in any of the years in the last assessment period (BWD Article 4.4.a), it is assigned status "**2 – Newly identified**". Such status is assigned until the complete four-year dataset is available, i.e. for three years after the first reporting. The status is independent of the number of samples reported after a bathing water was identified and monitoring has started, which means that it can be assessed for water quality under independent conditions described in section 3.3.

If a bathing water was subject to changes described in BWD Article 4.4.b within the last assessment period, it is assigned status "**3 – Quality changes**". Such status is assigned until the complete four-year dataset of samples taken after changes took effect is available, i.e. for three years after the first reporting.

If a bathing water has not been monitored for at least one season in the last assessment period, it is assigned status "**4 – Monitoring gap**". It can be assigned water quality status in parallel if enough samples as defined in BWD Article 4.3) are available in the period before and after the monitoring gap No quality classification is made if no samples are reported for the most recent season.

3.3. Water quality status

Water quality status is the main focus of the EEA bathing water assessment. It assesses the microbiological quality of a bathing water.

Water quality status
0 – Not classified
1 – Excellent
2 – Good
3 – Sufficient
4 – Poor

Water quality assessment is performed independently of the first two statuses. The condition (under BWD Article 4.3) is that enough samples need to be available in the last assessment period, with no gap in the most recent year as no extrapolations of the older monitoring results can be made.

3.3.1. Minimum number of samples to execute assessment

If a four-season dataset is available and all seasons are longer than eight weeks, no less than 16 samples are required; if seasons are not longer than eight weeks, the minimum number of samples to execute assessment is 12. Any season in the last assessment period that is not longer than eight weeks should have at least three samples, which means that the minimum number of samples per bathing waters with varying season lengths should be between 12 and 16.

If a bathing water is subject to special geographical constraints, or has a bathing season not exceeding 8 weeks, the minimum number of samples needed to execute an assessment is 12. In an unlikely case of changing the reporting of the special geographical constraints or that of the lengths of the bathing season within the last assessment period, the report of the most recent year is used for definition.

If a bathing water with a season not longer than eight weeks has been newly identified or undergone quality changes, the minimum number of samples to execute assessment is eight (BWD Article 4.4).

3.3.2. Status determination – calculation of percentiles

In accordance with the requirements set out in Annex I and Annex II of BWD, the status calculation is done based on percentile evaluation. Standards are separate for inland waters and for coastal and transitional waters.

Based upon percentile evaluation of the log10 normal probability density function of microbiological data acquired from the particular bathing water, the percentile value is derived as follows:

- Take the log10 value of all bacterial enumerations in the data sequence to be evaluated. (If a zero value is obtained, take the log10 value of the minimum detection limit of the analytical method used instead.)

- Calculate the arithmetic mean of the log10 values (μ).
- Calculate the standard deviation of the log10 values (σ).

The upper 90-percentile point of the data probability density function is derived from the following equation:

upper 90-percentile = antilog (μ + 1,282 σ)

The upper 95-percentile point of the data probability density function is derived from the following equation:

upper 95-percentile = antilog (μ + 1,65 σ)

Table 1: Classification standards for inland waters

Parameter name	Excellent	Good	Sufficient	Poor
Intestinal enterococci (IE) (cfu/100ml)	200 (95-percentile evaluation)	400 (95-percentile evaluation)	330 (90-percentile evaluation)	The set of bathing water quality data for the last assessment period shows percentile values for microbiological enumerations that are worse than the 'sufficient' values.
Escherichia coli (EC) (cfu/100ml)	500 (95-percentile evaluation)	1000 (95-percentile evaluation)	900 (90-percentile evaluation)	

Table 2: Classification standards for coastal and transitional waters

Parameter name	Excellent	Good	Sufficient	Poor
Intestinal enterococci (IE) (cfu/100ml)	100 (95-percentile evaluation)	200 (95-percentile evaluation)	185 (90-percentile evaluation)	The set of bathing water quality data for the last assessment period shows percentile values for microbiological enumerations that are worse than the 'sufficient' values.
Escherichia coli (EC) (cfu/100ml)	250 (95-percentile evaluation)	500 (95-percentile evaluation)	500 (90-percentile evaluation)	

Table 3: Status definition of bathing waters considering all combinations of achieved IE and EC statuses

Parameter status (2006/7/EC)	IE: Excellent	IE: Good	IE: Sufficient	IE: Poor
EC: Excellent	Excellent	Good	Sufficient	Poor
EC: Good	Good	Good	Sufficient	Poor
EC: Sufficient	Sufficient	Sufficient	Sufficient	Poor
EC: Poor	Poor	Poor	Poor	Poor