



Guidelines on assessment under the New Bathing Water Directive and transition period

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Prepared by / compiled by: ETC/W
Organisation: IWRS

EEA Project manager: Peter Kristensen

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1. Introduction

The aim of this document is to describe the methodology for assessment of bathing water quality according to the assessment rules of the Directive 2006/7/EC and during the transition period. The methodology described is the basis for assessment procedures for the 2010 season.

2. Assessment under Directive 2006/7/EC

The parameters to be taken into account for assessment according to the assessment rules of the Directive 2006/7/EC are intestinal enterococci (ConcIE) and *Escherichia coli* (ConcEC).

When a set of samples of intestinal enterococci and *Escherichia coli* for a bathing water for three or four consecutive years is available, the assessment is done according to assessment rules of the Directive 2006/7/EC.

To do assessment under the Directive 2006/7/EC, eight to 16 samples are needed. For bathing season shorter than eight weeks, three samples per season are needed. For bathing season longer than eight weeks, four samples per season are needed. Therefore, samples for four seasons are needed for the assessment under the Directive 2006/7/EC (Article 4, Paragraph 3, Annex IV). Nevertheless, only three bathing seasons can be used for the assessment under the Directive 2006/7/EC under special circumstances (Article 4, Paragraph 4).

Article 4 of the Directive 2006/7/EC defines the conditions under which the assessment is to be made. In principle three or four years are possible if the conditions set by the Directive are met.

Member State can report samples of *Escherichia coli* and intestinal enterococci for the previous seasons (*Monitoring results of bathing waters* table) and be assessed under the Directive 2006/7/EC.

2.1. Percentage evaluation

Status calculation is done based on percentile evaluation. Standards are separate for inland waters and for coastal and transitional waters.

Percentile evaluation of the \log_{10} normal probability density function of microbiological data acquired from the particular bathing water, the percentile value is derived as follows:

- Take the \log_{10} value of all bacterial enumerations in the data sequence to be evaluated. (If a zero value is obtained, take the \log_{10} value of the minimum detection limit of the analytical method used instead.)
- Calculate the arithmetic mean of the \log_{10} values (μ).
- Calculate the standard deviation of the \log_{10} values (σ).

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

$$\text{upper 90-percentile} = \text{antilog} (\mu + 1,282 \sigma).$$

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

$$\text{upper 95-percentile} = \text{antilog} (\mu + 1,65 \sigma).$$

Table 1: Classification standards for inland waters under Directive 2006/7/EC

| Parameter | Excellent | Good | Sufficient | Poor |
|-------------------------------------|-----------------------------------|------------------------------------|-----------------------------------|---|
| Intestinal enterococci (cfu/100ml) | 200 (95-percentile evaluation) | 400 (95-percentile evaluation) | 330 (90-percentile evaluation) | In the set of bathing water quality data for the last assessment period, the percentile values for microbiological enumerations are worse than the 'sufficient' values. |
| <i>Escherichia coli</i> (cfu/100ml) | 500 (95-percentile evaluation) | 1000 (95-percentile evaluation) | 900 (90-percentile evaluation) | |

Table 2: Classification standards for coastal and transitional waters under Directive 2006/7/EC

| Parameter | Excellent | Good | Sufficient | Poor |
|-------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|---|
| Intestinal enterococci (cfu/100ml) | 100 (95-percentile evaluation) | 200 (95-percentile evaluation) | 185 (90-percentile evaluation) | In the set of bathing water quality data for the last assessment period, the percentile values for microbiological enumerations are worse than the 'sufficient' values. |
| <i>Escherichia coli</i> (cfu/100ml) | 250 (95-percentile evaluation) | 500 (95-percentile evaluation) | 500 (90-percentile evaluation) | |

2.2. Sampling frequency

According to Annex IV of the Directive 2006/7/EC, no fewer than four (or three) samples are to be taken and analysed per bathing season including a sample to be taken shortly before the start of each bathing season. In addition, sampling dates are to be distributed throughout the bathing season, with the interval between sampling dates never exceeding one month.

For the 2009 season, the frequency criteria were less strict as stated in the Directive. The first sample could be taken 10 days after the start of the 2009 bathing season in spite of the fact that it is defined by the Directive 2006/7/EC to be taken shortly before the start of the bathing season. The interval between two samples during the 2009 bathing season should not be larger than 41 days. The interval is longer than 31 days as defined in the Directive 2006/7/EC, since we are approaching the year 2012 only when the assessment rules will be in full compliance with the rules of this Directive. There should be at least 16 or at least 12 samples (bathing season not exceeding eight weeks) for four years, except for new bathing waters (at least eight samples).

Samples that were taken during short term pollution and abnormal situations were excluded from the assessment. The replaced samples after the short term pollution and abnormal situations have not been checked.

In the assessment of the 2010 season, the highest number of days between two sampling days should be 32. If "before the season" sample is taken not earlier than 10 days before the start of the season the difference between this sample and the second sample should not exceed 42 days. In the case when the first sample is only taken shortly after the start of the season (not later than five days after the start of the season), the highest number of days between the start of the season and the second sample should not be larger than 32 days. Otherwise, the frequency criteria are not met and bathing water is classified as insufficiently sampled. There should be at least 16 or at least 12 samples (bathing season not exceeding eight weeks) for four years.

Several day samples will not be averaged, but they will be included into assessment individually.

Samples taken during short term pollution and abnormal situations will not be taken into account if replaced samples are reported. In such a case the replaced samples is included into the assessment.

2.3. Assessment with BW groups

Only when BW profiles are established assessment with BW groups is possible. If Member States already grouped their bathing waters, they have to inform the European Commission if BW profiles have been already established. The deadline for establishment of BW profiles is 24.3.2011.

By the Directive 2006/7/EC, bathing waters can be grouped if they have similar physical, hydrological and geographical characteristics and same risk of pollution and bathers exposure to health damage. For that purpose BW profiles should be established.

When a bathing water is a member of a group and not monitored, it can get the quality classification from a representative bathing water. In the assessment, the samples obtained during the season from any of bathing waters in the group will be treated as one set of samples for the group. The classification is done on the basis of this sample set. Each bathing water in a group gets this classification. The statistics and visualisation in WISE (map and data viewer) is done with all bathing waters in the group.

2.4. Status definition and categories

The bathing waters are classified in the following categories:

- 0 – status can not be computed;
- 1 – excellent quality for both parameters;
- 2 – good quality if both parameters are good or only one is good and the second is excellent;
- 3 – sufficient quality if both parameters are sufficient or only one parameter is sufficient and the second is good or excellent;
- 4 – poor quality if both parameters are poor or only one parameter is poor;
- 5 – insufficiently sampled;
- 6 – new (not yet classification possible);
- 7 – changes (not yet classification possible after changes);
- 11 – temporarily closed or closed throughout the season.

For the 2009 season, Malta and Luxembourg were the first two countries to be fully assessed under the Directive 2006/7/EC. The status of a bathing water presented average of two classes (if one parameter is excellent and the second is sufficient, the status is good) since we are in the transition period.

In the 2010 season assessment, the status of a bathing water will be presented by the worst status of both parameter statuses as shown in Table 3.

Table 3: Status of bathing waters under Directive 2006/7/EC

| Parameter | Parameter status | | | | | | |
|---------------|-------------------|--------------|--------------------|--------------|--------------|--------------------|--------------|
| IE | excellent | excellent | excellent | excellent | good | good | good |
| EC | excellent | good | sufficient | poor | good | sufficient | poor |
| status | excellent quality | good quality | sufficient quality | poor quality | good quality | sufficient quality | poor quality |

| Parameter | Parameter status | | |
|---------------|--------------------|--------------|--------------|
| IE | sufficient | sufficient | poor |
| EC | sufficient | poor | poor |
| status | sufficient quality | poor quality | poor quality |

| Parameter | Parameter status | | | | | |
|---------------|------------------|--------------------|--------------|--------------------|--------------|--------------|
| IE | good | sufficient | poor | sufficient | poor | poor |
| EC | excellent | excellent | excellent | good | good | sufficient |
| status | good quality | sufficient quality | poor quality | sufficient quality | poor quality | poor quality |

IE - Intestinal enterococci, EC - *Escherichia coli*

Not sampled bathing waters are those where bathing is possible, but not sampled. This may be a case when bathing water belongs to a group or it may also be the case, that sampling is not performed due to a lack of management.

New bathing water is a bathing water with necessary data set not compiled yet (when classification of bathing waters according to the Directive 2006/7/EC has already started). The following criteria have to be satisfied: bathing water is new (“BWType” is “2”) and there are less than eight samples. New bathing water is assessed (classified into quality class) if there are at least eight samples.

A bathing water gets category “changes” if necessary data set is not available yet since the occurrence of changes. The following criteria have to be satisfied: (1) bathing season is longer than eight weeks and attribute “Changes” is “Y”, *Seasonal information on bathing waters* table, (2) there are less than eight samples and attribute “Changes” is “Y”, *Seasonal information on bathing waters* table.

Temporarily closed bathing waters are classified as closed if a bathing water is closed for at least 14 days per season or exceeded the short term pollution in case of microbiological contamination (approximately three days).

Bathing waters that are reported as closed will be further analysed according to reasons for closing. If a bathing water is closed due to bad quality, it needs to be sampled (monitored) and samples reported. If a bathing water is closed due to other reasons (e.g. renovation, not accessible due to construction activities nearby and can not be sampled), the monitoring is not needed.

2.5. Algorithm for assessment of bathing water quality

Note:

BW – bathing water

BS – bathing season

PC – percentile

IE – intestinal enterococci

EC – *Escherichia coli*

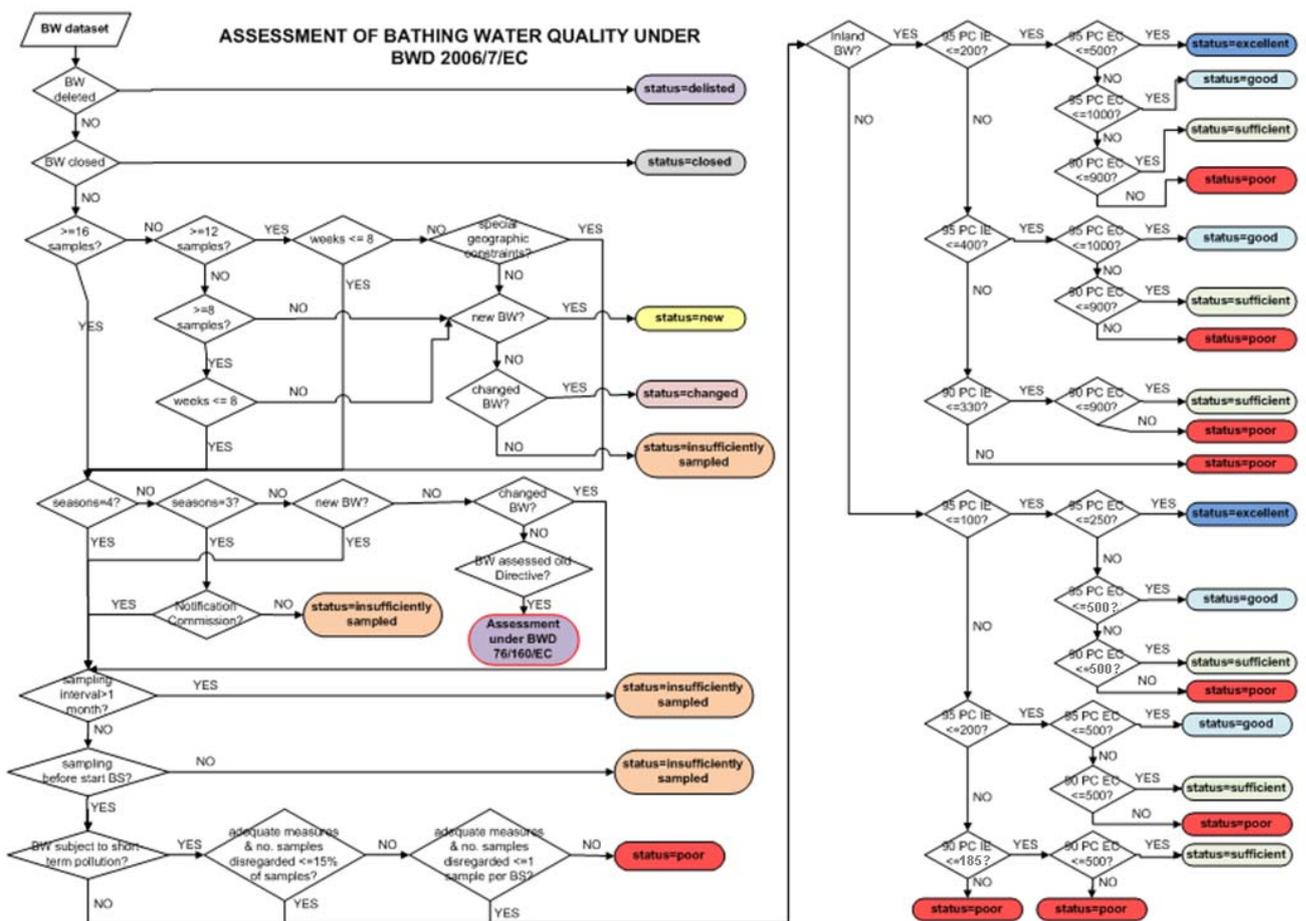


Figure 1: Algorithm for assessment of bathing water quality under Directive 2006/7/EC

3. Transition period: Reporting under Directive 2006/7/EC, assessment according to limit values of Directive 76/160/EEC

The parameters to be taken into account for assessment are Intestinal enterococci (ConcIE) and *Escherichia coli* (ConcEC).

3.1. Parameter conversion and percentage evaluation

Before the necessary data set for assessment of bathing water quality under the Directive 2006/7/EC is compiled (data for three or four consecutive years) the rules for transition period assessment is done. This means that the classification of bathing waters is defined on the basis of concentrations of intestinal enterococci and *Escherichia coli* that are reported under the Directive 2006/7/EC. The limit values for the classification are taken from the Directive 76/160/EEC. For the conversion of reported parameters under the Directive 2006/7/EC, Article 13.3 of the Directive 2006/7/EC foresees that the parameter *Escherichia coli*, reported under the Directive 2006/7/EC, is assumed to be equivalent to the parameter faecal coliforms of the Directive 76/160/EEC. The parameter intestinal enterococci reported under the Directive 2006/7/EC is assumed to be equivalent to the parameter faecal streptococci.

Table 4: Parameter conversion for assessment of bathing water quality during the transition period and corresponding classification standards under Directive 76/160/EEC

| Directive 2006/7/EC | Directive 76/160/EEC | | | |
|---|-------------------------------|--------------|------------------|----------------------------|
| Parameter | Corresponding parameter | Guide values | Mandatory values | Minimum sampling frequency |
| 1. Intestinal enterococci (cfu/100 ml) | 3. Faecal streptococci/100 ml | 100 | -* | (2) |
| 2. <i>Escherichia coli</i> (cfu/100 ml) | 2. Faecal coliforms/100 ml | 100 | 2000 | Fortnightly (1) |

*Parameter faecal streptococci (equal to intestinal enterococci) has no mandatory value according to the Directive 76/160/EEC.

Table 5: Classification standards for faecal coliforms and faecal streptococci under Directive 76/160/EEC

| Parameter | Mandatory values | Guide values |
|-------------------------------------|--------------------------|-------------------------|
| 2 - Faecal coliforms (cfu/100ml) | 2000 (95% of samples) | 100 (80% of samples) |
| 3 - Faecal streptococci (cfu/100ml) | /* | 100 (90% of samples) |

*Directive 76/160/EEC does not set limit mandatory value, therefore all bathing waters get »compliant with mandatory values« automatically.

3.2. Sampling frequency

According to Annex IV of the Directive 2006/7/EC, no fewer than four (or three) samples are to be taken and analysed per bathing season including a sample to be taken shortly before the start of each bathing season. In addition, sampling dates are to be distributed throughout the bathing season, with the interval between sampling dates never exceeding one month.

For the 2009 season, the frequency criteria were less strict as stated in the Directive. The interval between two samples during the 2009 bathing season should not be larger than 41 days. The interval is longer than 31 days as defined in the Directive 2006/7/EC, since we are approaching the year 2012 only when the assessment rules will be in full compliance with the rules of this Directive. The first sample that should be taken shortly before the start of the bathing season could be taken even 10 days after the start of the 2009 bathing season.

The frequency criteria were stricter compared to the criteria for the 2008 season when only criterion “season duration in days/number of samples per bathing water ≤ 31 ” was applied (at least one sample per month, distribution of samples was not considered).

Samples that were taken during short term pollution and abnormal situations were excluded from the assessment. The replaced samples after the short term pollution and abnormal situations have not been checked.

In the assessment of the 2010 season, the highest number of days between two sampling days should be 32. If “before the season” sample is taken not earlier than 10 days before the start of the season the difference between this sample and the second sample should not exceed 42 days. In the case when the first sample is only taken shortly after the start of the season (not later than five days after the start of the season), the highest number of days between the start of the season and the second sample should not be larger than 32 days. Otherwise, the frequency criteria are not met and bathing water is classified as insufficiently sampled.

Several day samples will not be averaged, but they will be included into assessment individually.

Samples taken during short term pollution and abnormal situations will not be taken into account if replaced samples are reported. In such a case the replaced samples is included into the assessment.

3.3. Status definition and categories

The bathing waters are classified in the following categories:

0 – status can not be computed (no data available) (NS);

5 – insufficiently sampled (NF);

8 – compliant with the mandatory value of the Directive 76/160/EEC for *Escherichia coli* and the more stringent guide values for the *Escherichia coli* and intestinal enterococci (class CG);

9 – compliant with the mandatory value of the Directive 76/160/EEC for *Escherichia coli* and not compliant with the guide values of the Directive 76/160/EEC for *Escherichia coli* or intestinal enterococci (CI);

10 – not compliant with the mandatory value of the Directive 76/160/EEC for *Escherichia coli* (NC);

11 – banned or closed (temporarily or throughout the season) (B).

The bathing water is CG and CI, respectively, if the following rules are applied:

- rule no.1: bathing water is CG if EC is CG and IE is CG;
- rule no.2: bathing water is CI if EC is CG and IE is not CG;
- rule no.3: bathing water is CI if EC is CI and IE is CG;

- rule no.4: bathing water is CI if EC is CI and IE is not CG.

The mandatory value for parameter *Escherichia coli* (EC) has to be considered in the class CG because for the guide value for EC there is the 80 % of samples rule and for the mandatory value there is the 95 % of samples rule which is in this respect stricter. This means that a bathing water can fail because of one single high value above the mandatory value, although it complies with the rules for the guide values depending on the number of samples.

Not sampled bathing waters are those where bathing is possible, but not sampled (a lack of management...).

Temporarily closed bathing waters are classified as closed if a bathing water is closed for at least 14 days per season or exceeded the short term pollution in case of microbiological contamination (approximately three days).

Bathing waters that are reported as closed will be further analysed according to reasons for closing. If a bathing water is closed due to bad quality, it needs to be sampled (monitored) and samples reported. If a bathing water is closed due to other reasons (e.g. renovation, not accessible due to construction activities nearby and can not be sampled), the monitoring is not needed.

3.4. Algorithm for assessment of bathing water quality

After parameter conversion the assessment is done according to the assessment rules of the Directive 76/160/EEC (see Section 4.4), except for the frequency criteria.

4. Transition period: Reporting under Directive 76/160/EEC, assessment according to rules of Directive 76/160/EEC

The parameters to be taken into account for assessment according to the assessment rules of the Directive 76/160/EEC are microbiological (1 Total coliforms, 2 Faecal coliforms) and physico-chemical (8 Mineral oils, 9 Surface-active substances reacting with methylene blue, 10 Phenols (phenol indices)).

4.1. Percentage evaluation

Status calculation is done based on percentage evaluation. There are two standards that bathing waters can comply with: mandatory standards and guideline standards.

To comply with mandatory standards, bathing waters must not exceed values of 10,000 total coliforms per 100ml and 2000 faecal coliforms per 100ml in 95 % of samples.

To comply with the guideline standards, bathing waters must not exceed values of 500 total coliforms per 100ml and 100 faecal coliforms per 100ml in 80 % of water quality samples, and 100 faecal streptococci per 100ml in 90 % of samples taken.

A rule “ParnoDi <= ParnoDg” is applied for total coliforms and faecal coliforms with both mandatory and guide values.

Table 6: Mandatory and guide values for parameters reported under Directive 76/160/EEC

| Parameter | Mandatory values | Guide values |
|-------------------------------|------------------|------------------|
| 1 - Total coliforms | 10000 | 500 |
| 2 - Faecal coliforms | 2000 | 100 |
| 3 - Faecal streptococci | - | 100 |
| 8 - Mineral oils | - | 0.3 |
| 9 - Surface-active substances | - | +/- 0.3 |
| 10 - Phenols | +/- 0.005 | +/- 0.005 |

Table 7: Mandatory standards for parameters reported under Directive 76/160/EEC

| Parameter | Mandatory values |
|---|-------------------------------|
| 1 - Total coliforms (cfu/100ml) | 10000 (95% of samples) |
| 2 - Faecal coliforms (cfu/100ml) | 2000 (95% of samples) |
| 8 - Mineral oils (mg/l) | - (95% of samples) |
| 9 - Surface-active substances reacting with methylene blue (mg/l) | - (95% of samples) |
| 10 - Phenols (mg/l) | +/- 0.005 (95% of samples) |

Table 8: Guideline standards for parameters reported under Directive 76/160/EEC

| Parameter | Guide values |
|---|------------------------------------|
| 1 - Total coliforms (cfu/100ml) | 500 (80% of samples) |
| 2 - Faecal coliforms (cfu/100ml) | 100 (80% of samples) |
| 8 - Mineral oils (mg/l) | - or 0.3 (90% of samples) |
| 9 - Surface-active substances reacting with methylene blue (mg/l) | - or +/- 0.3 (90% of samples) |
| 10 - Phenols (mg/l) | - or +/- 0.005 (90% of samples) |

In case of visual inspection or smell inspection for mineral oils, surface-active substances and phenols, the mandatory value is defined (descriptive), while guide value is not defined.

4.2. Sampling frequency

Sampling gets underway two weeks before the bathing season. After that, samples are taken every two weeks. If the water quality gets a good rating for two years in a row (at least “CI” for two previous years), samples are collected less frequently – once a month during the bathing season.

| |
|---|
| Sampling frequency = season duration in days/ number of samples per bathing water |
|---|

Sampling frequency must be at least 15.5 days or 31.5 days (reduced frequency). If not, status of bathing water is insufficiently sampled (NF).

In addition, bathing water is insufficiently sampled (NF), if one of two microbiological parameters, total coliforms and faecal coliforms is missing.

4.3. Status categories

The bathing waters are classified in the following categories:

- 0 – status can not be computed (no data available) (NS);
- 1 – compliant with imperative (mandatory) and guide values of the Directive for the 5 parameters (CG);
- 2 – banned or closed (temporarily or throughout the season) (B);
- 3 – insufficiently sampled (NF);
- 4 – not compliant with imperative (mandatory) values of the Directive for the 5 parameters (NC);
- 5 – compliant with imperative (mandatory) values (not guide values) of the Directive for the 5 parameters (CI);
- 6 – not sampled (NS).

Not sampled bathing waters are those where bathing is possible, but not sampled (a lack of management...).

Banned or temporarily closed bathing water are categories used for the Directive 76/160/EEC reporting. They have the same meaning (*Outline questionnaire for reporting on Directive 76/160/EEC*). Bathing waters that are closed throughout the season are categorised as banned (special attribute in the *General data table*). They are not classified into quality class and they are treated as banned (or closed).

4.4. Algorithm for assessment of bathing water quality

Note:

BW – bathing water

parnodi – number of results exceeding the mandatory values

parnob – number of analyses for this parameter

parnodg – number of results exceeding the guide values

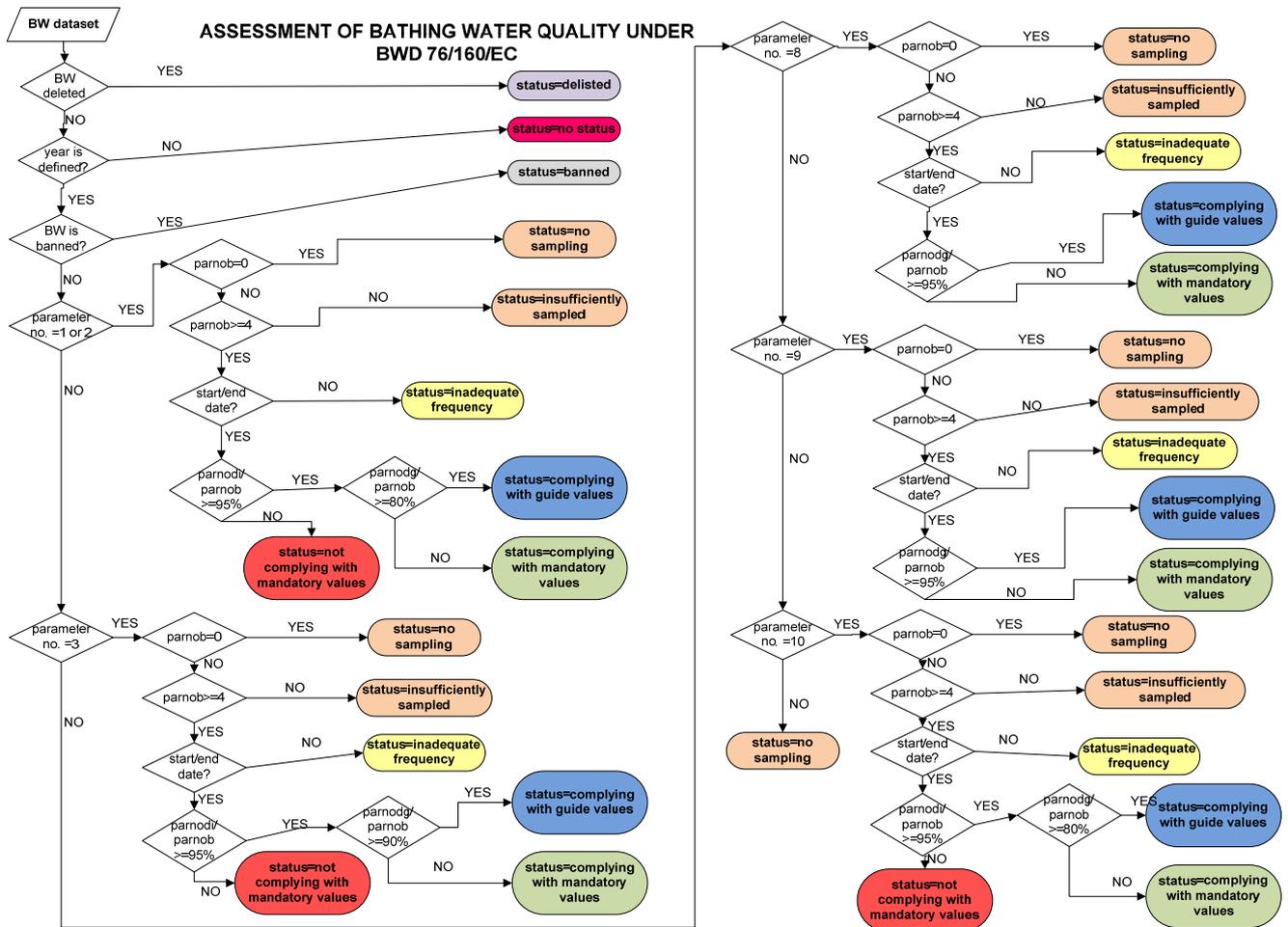


Figure 2: Algorithm for assessment of bathing water quality under Directive 76/160/EEC

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