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European Topic Centre on Water

Methodology for bathing water quality transitional assessment

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Version History

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1.1	28/10/2008	Lidija Globevnik Dunja Vrenko Marko Kovačič	Pre-draft	ETC/W
1.2	22/12/2008	Lidija Globevnik	Final draft	ETC/W, EEA

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Abbreviation used

cfu – colony forming units

1 Introduction

The aim of this document is to describe the methodology for the analysis of bathing water quality according the rules of the Bathing Water Directives 76/160/EEC and 2006/7/EC and during the transition period.

The methodology described is the basis for assessment procedures of bathing water quality, that will be done in 2009 to produce EC report and individual MS national reports by EEA as part of a compliance checking.

2 Data reporting overview

Since 1976 the Council Directive 76/160/EEC on Bathing Water Quality (the "old" bathing water Directive) sets binding standards for bathing waters throughout the European Union. Member States have to report monitoring data collected during the bathing season for the parameters described in the Annex of the Directive to the Commission annualy. The EC analyses the reported data and publishes the results in an annual report.

Assessment of bathing water quality according Directive 76/160/EEC is based on:
- sampling of 19 parameters, of which five are taken into account for quality assessment,
- for each parameter, two standards against which bathing waters are evaluated: mandatory values and guide values,
- an assessment period of one year,
- number of samples exceeding the standards,
- bi-monthly sampling frequency (monthly if bathing waters complied for two consecutive years).

The rules for compliance assessment of bathing waters according Directive 76/160/EEC have been translated into an algorithm for assessment of bathing waters (see section 2.2.3). This algorithm has been built into the BWATER software, that can be used as an assessment tool for bathing waters, next to an entry and export tool for reporting of data.

The new Bathing Water Directive 2006/7/EC of 15 February 2006 updates the provisions of Directive 76/160/EEC. Compared to the old bathing water Directive, the new bathing water Directive 2006/7/EC implies following changes:
- only two microbiological parameters are monitored: Intestinal enterococci (cfu/100 ml) and Escherichia coli (cfu/100 ml),
- new standards for assessment of bathing waters: excellent, good, sufficient and poor and different standards for inland water and coastal and transitional water,
- assessment period of four years (as a rule, but can be less),
- assessment based on calculation of percentile values,
- monthly sampling frequency.

The assessment rules for bathing water quality according Directive 2006/7/EC are defined in the current document. They will be the basis of the assessment tool to be developed by EEA for the next reporting period (bathing season 2008).

For compliance analysis according the new Directive two "assessment paths" need to be foreseen:
1. for bathing waters with a sufficient data set (see further): assessment according the new Directive assessment rules, based on an assessment period of four years (or less; see further),
2. for bathing waters for which a sufficient data set for assessment according the new Directive assessment rules has not yet been collected: assessment according the rules defined for the so-called "transition period" (see further).

Data for parameters defined in Directive 76/160/EEC have been reported by 26 Member States. Not all Member States reported data for all 19 parameters. As seen on Figure 1 most Member States reported data for Phenols (PHE), Faecal coliforms (FC), Surface-active substances reacting with methylene blue (SA), Total coliforms (TC), Mineral oils (MO) and Faecal streptococci (FS) while they are required for bathing water quality assessment.
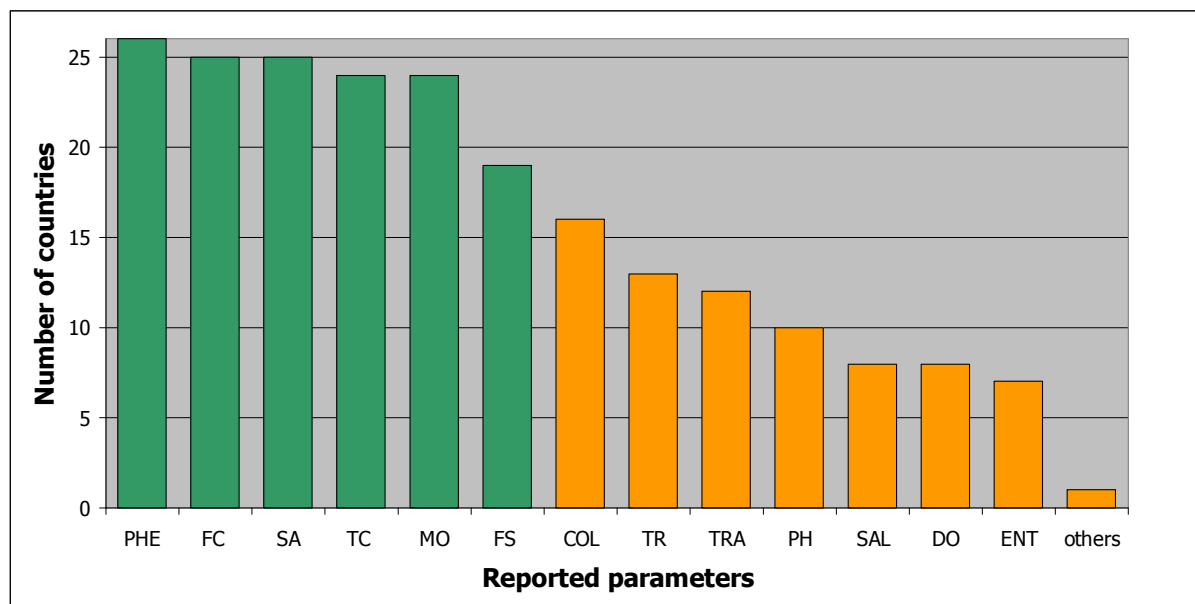
Figure 1: Statistics of reported parameters by number of Member States

Table 1: Parameter codes under Directive 76/160/EEC and their descriptions

parameter code	description
1 (TC)	Total coliforms/100 ml
2 (FC)	Faecal coliforms/100 ml
3 (FS)	Faecal streptococci/100 ml
4 (SAL)	Salmonella/litre
5 (ENT)	Enteroviruses PFU/10 litres
6 (PH)	pH
7 (COL)	Colour
8 (MO)	Mineral oils mg/litre
9 (SA)	Surface-active substances reacting with methylene blue mg/l
10 (PHE)	Phenols mg/l (phenol indices) $C6\ H5\ OH$
11 (TR)	Transparency
12 (DO)	Dissolved oxygen % saturation $O2$
13 (TR)	Tarry residues and floating materials
14 (AM)	Ammonia mg/litre NH4
15 (N)	Nitrogen Kjeldahl mg/litre N
16 (PS)	Pesticides mg/litre (parathion, HCH, dieldrin)
17 (HM)	Heavy metals such as:
18 (CY)	Cyanides mg/litre Cn
19 (NP)	Nitrates mg/litre NO3 and phosphates PO 4

In Figure 2 the time schedule for reporting and assessment under both bathing water directives. First obligatory reporting of bathing water quality under Directive 2006/7/EC for countries is bathing water season 2012. Reporting under Directive 76/160/EEC must be supported until the end of 2014. From bathing season 2015 at the latest Member States have to start classification of bathing waters according to the requirements of the Directive 2006/7/EC.
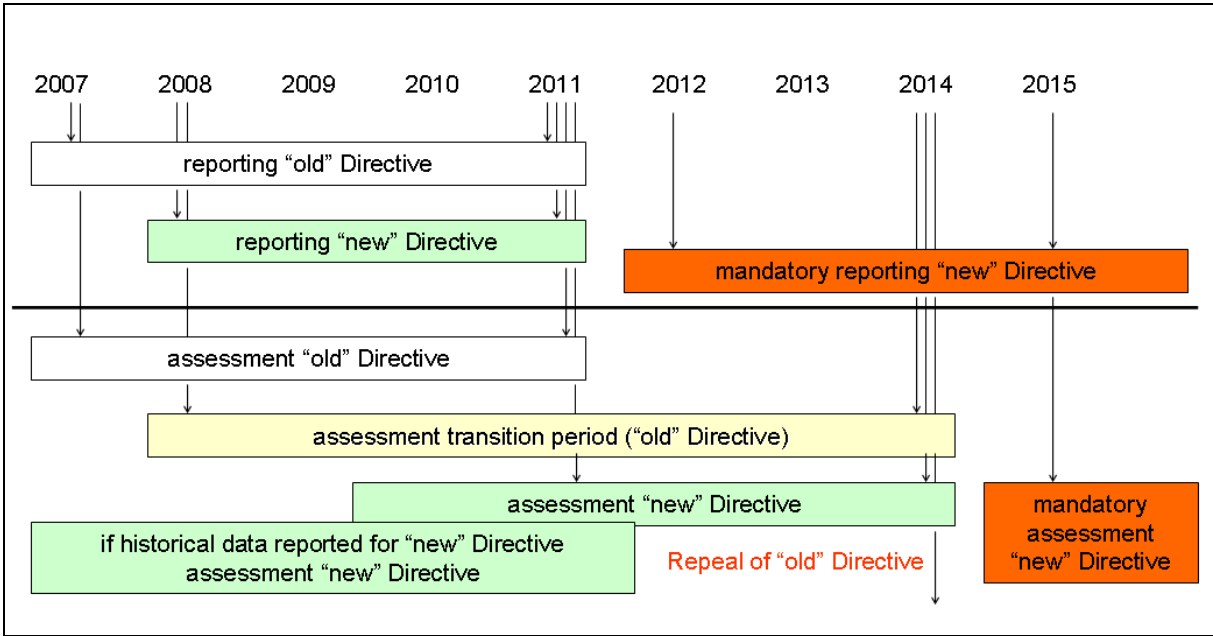

Figure 2: Reporting and assessment obligations for Member States

3 Bathing water analysis

3.1 Bathing water quality under Directive 76/160/EEC

The rules for compliance assessment of bathing waters according Directive 76/160/EEC are defined in detail in chapter 4 where the algorithm for assessment of bathing waters is described. This algorithm has been built into the BWATER software that can be used as an assessment tool for bathing waters, next to an entry and export tool for reporting of data. On EEA ReportNet a pre-defined reporting sheets are available created based on Data dictionary for Directive 76/160/EEC (http://dd.eionet.europa.eu/dataset.jsp?mode=view&ds_id=2679).

3.2 Bathing water quality under Directive 2006/7/EC

Under Directive 2006/7/EC bathing water quality assessment is carried out on the basis of the set of bathing water quality data compiled in relation to that bathing season and the three preceding bathing seasons (Article 4.2(c)). The frequency of sampling is set out in Annex IV of the Directive. Including a sample to be taken shortly before the start of the bathing season, the minimum number of samples taken per bathing season is four. However, three samples can be sufficient (see chapter 3.3.2.6).

The rules for compliance assessment of bathing waters according Directive 2006/7/EC are defined in detail in chapter 4 where the algorithm for assessment of bathing waters is described. On ReportNet a pre-defined reporting sheets are available created based on Data dictionary for Directive 2006/7/EC (http://rod.eionet.europa.eu/obligations/531)

3.3   Bathing water quality during transition period

3.3.1   What is transition period?

The "transition period" for bathing water assessment is the period when the necessary data set for assessment of bathing water quality under Directive 2006/7/EC has not yet been compiled.

For the assessment of bathing waters under Directive 2006/7/EC a sufficient data set for assessment must be compiled. This means:
- 16 samples (or 12 or 8 – explanation in chapter 3.3.2.6)
- samples collected during four seasons (or less – explanation in chapter 3.3.2.6)

During the transition period, samples of Intestinal enterococci and Escherichia coli are reported but assessment is done according the assessment rules of Directive 76/7/EEC, as described in Article 13.3 of the Directive 2006/7/EC "*When monitoring of bathing waters has started under this Directive, annual reporting to the Commission shall continue to take place pursuant to Directive 76/160/EEC until a first assessment can be made under this Directive. During that period, parameter 1 of the Annex to Directive 76/160/EEC shall not be taken into account in the annual report, and parameters 2 and 3 shall be assumed to be equivalent to parameters 2 and 1 of column A of Annex I to this Directive*".

First obligatory report of bathing water quality under new Directive 2006/7/EC for countries is bathing water season 2012. On figure is illustrated the transition period for a case where country starts reporting under Directive 2006/7/EC in bathing season 2012. The first assessment under Directive 2006/7/EC can be made in 2015. The first three years of reporting on Directive 2006/7/EC, the parameters IE and EC, after conversion (see chapter 3.3.2), are assessed according the rules of Directive 76/160/EEC, as described in Article 13.3. This period is called the "transition period".
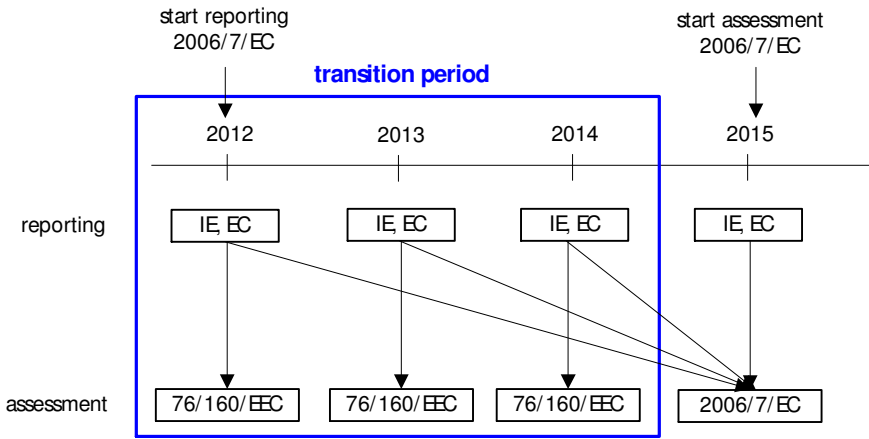

Figure 3: Scheme of reporting and assessment during "transition period"

3.3.2   *Building up data sets for bathing water quality assessment*

Assessment during the transition period is based on a set of bathing water quality data compiled in relation to one bathing season.

3.3.2.1   Conversion of reported data

During the transition period, data are reported according the requirements of Directive 2006/7/EC, but assessed according the requirements of Directive 76/160/EC.

The assessment under Directive 76/160/EC is based on the analysis of pass/fail data for five parameters: total coliforms, faecal coliforms, mineral oils, surface-active substances and phenols. For Directive 2006/7/EC, however, monitoring values in cfu/100 ml are reported, and this for two other parameters: Instestinal enterococci and Escherichia coli. This means that two factors need to be converted:
1. parameters
2. type of value.

3.3.2.2   Parameter conversion

For the conversion of reported parameters under Directive 2006/7/EC, Article 13.3 of the Directive 2006/7/EC foresees that parameter Escherichia coli, reported under Directive 2006/7/EC, is assumed to be equivalent to parameter Faecal coliforms of Directive 76/160/EEC. Parameter Intestinal enterococci reported under Directive 2006/7/EC is assumed to be equivalent to the parameter Faecal streptococci. This means that parameters Intestinal enterococci and Escherichia coli will be evaluated according the guide and mandatory standards defined in the Annex to Directive 76/160/EEC for parameters Faecal streptococci and Faecal coliforms respectively (see table 1).

Table 1: 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. Escherichia coli (cfu/100 ml)	2. Faecal coliforms/100 ml	100	2000	Fortnightly (1)

Note:
As can be seen in Table 1 there is no mandatory standard for parameter 3 Faecal streptococci under Directive 76/160/EEC. This means that only the parameter Faecal coliforms is taken into account for the evaluation of compliance of bathing water with mandatory values. Evaluation of compliance with guide standards is based on both parameters.
(1) When a sampling taken in previous years produced results which are appreciably better than those in Directive 76/160/EC Annex and when no new factor likely to lower the quality of the water has appeared, the competent authorities may reduce the sampling the sampling frequency by factor of 2.
(2) Concentration to be checked by the competent authorities when an inspection in the bathing area shows that the substance may be present or that the quality of the water has deteriorated.

3.3.2.3 Value conversion

The data reported for the parameters Intestinal enterococci and Escherichia coli needs to be converted so that it can be assessed under the rules of Directive 76/160/EEC. Instead of comparing the percentiles of the reported values, the old BWD checks the percentage of samples that are exceeding the guide/mandatory standards. According Article 5.1 of Directive 76/160/EEC bathing water is conform to the relevant parameters if samples show that it conforms to the parametric values in the case of:

- 95% of the samples corresponding to those specified in column I of the annex;
- 90% of the samples in all other cases, with the exception of the Total coliforms and Faecal coliforms parameters where the percentage may be 80%.

As set out in the Commission Decision 95/337/EEC, Member States are reporting, for each parameter, "number of results exceeding the mandatory values" and "number of results exceeding the guide values".

In order to convert data reported for the new BWD (using the reporting sheets defined for Directive 2006/7/EC) to the data needed for assessment under the old BWD, following attributes need to be calculated based on the reported values:

- number of samples taken for Escherichia coli (=Faecal coliforms) and Intestinal enterococci (=Faecal streptococci)
- number of samples exceeding the mandatory standard for Faecal coliforms (> 2000 cfu / 100 ml)
- number of samples exceeding the guide standard for Faecal coliforms and Faecal streptococci (> 100 cfu / 100 ml)

After converting the reported data for Directive 2006/7/EC to the parameters and values assessed under Directive 76/160/EEC, the bathing waters can be assessed under Directive 76/160/EC.

3.3.2.4   Reporting data for previous bathing seasons

The assessment under Directive 2006/7/EC is possible when the appropriate number of samples is available (at least 16 samples but can be fewer). This means that data must be reported under Directive 2006/7/EC approximately for 4 bathing seasons. In order to do the assessment under Directive 2006/7/EC all data from previous years should be re-calculated and sampling values of reported parameters should be reported by countries.

To omit that kind of reporting data in »transition« period all assessment will be made under Directive 76/160/EEC.

3.3.2.5   Sampling frequency

The frequency of sampling is set out in Annex IV of the Directive. Including a sample to be taken shortly before the start of the bathing season, the minimum number of samples taken per bathing season is four.
However, three samples are sufficient when:
- the bathing season is no longer than 8 weeks, or
- the region is subject to special geographic conditions.

Sampling dates must be distributed throughout the season, with the interval between sampling dates never exceeding one month.

In the event of short-term pollution, one additional sample is to be taken to confirm that the incident has ended. This sample is not to be part of the set of bathing water quality data. If necessary to replace a disregarded sample, an additional sample is to be taken seven days after the end of the short-term pollution. This will be reported and treated as a "normal" sample.

According to Article 3.4 a monitoring calendar for each bathing season has to be established before the start of each bathing season and for the first time before the start of the third full bathing season after the entry into force of the Directive. Monitoring has to take place no later than four days after the date specified in the monitoring calendar. This monitoring calendar can be suspended during abnormal situations (article 3.7). It has to be resumed as soon as possible after the end of the abnormal situation. New samples have to be taken as soon as possible after the end of the abnormal situation to replace samples that are missing due to the abnormal situation. These samples will be reported and treated as a "normal" sample.

Member States have to report any suspension of the monitoring calendar to the Commission, giving the reasons for the suspension (Article 3.8).

The reporting frequency can be derived from the reporting start and end date of the bathing season and the sampling dates of the reported samples.

3.3.2.6 Number of samples

Assessment of bathing water quality must be based on at least 16 samples for the assessment period, but the number can be fewer (Article 4.3):

- It can be minimum 12 samples in case of the special circumstances referred to in Annex IV, par 2, being:
    - when the bathing season is not exceeding eight weeks; or
    - when the bathing water is situated in a region subject to special geographical constraints.
- It can be minimum eight samples if the bathing season is not exceeding eight weeks.
-

4 Assessment according assessment rules

4.1 Assessment according assessment rules of Directive 76/160/EEC

4.1.1 Status calculation

For reporting countries report the following ASCII files:

- File on geographical locations (file containing geo-reference information)
- General data file (file containing general information for each bathing water)
- Parameter data file (file containing parameter information for each bathing water)
- ***Raw value file (file containing raw bathing water quality results by parameter)***

Under directive 76/160/EEC must be reported the following parameters (minimum set):

- *Total coliforms*
- *Faecal coliforms*
- *Mineral oils*
- *Surface-active substances*
- *Phenols*

Last assessment period means only the last bathing season.

Sets of bathing water data used to carry out bathing water quality assessment shall always comprise at least ***four samples (at least one sample per month- 4 weeks).*** 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, samples are collected less frequently – once a month during the bathing season.

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

Percentage evaluation

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.

Parameter name	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

Status codes

Status codes:
0 – Program can not compute the status
1 – complying with imperative (mandatory) and guide values
2 – banned
3 – inadequate frequency
4 – non complying
5 – complying with imperative (mandatory) values (not guide values)
6 – no sampling

4.1.2   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

ASSESSMENT OF BATHING WATER QUALITY UNDER BWD 76/160/EC

BW dataset

BW deleted — YES → status=delisted

NO

year is defined? — NO → status=no status

YES

BW is banned? — YES → status=banned

NO

parameter no. =1 or 2 — YES →

parnob=0 — YES → status=no sampling

NO

parnob>=4 — NO → status=insufficiently sampled

YES

start/end date? — NO → status=inadequate frequency

YES

parnodi/parnob >=95% — YES → parnodg/parnob >=80% — YES → status=complying with guide values

NO → status=not complying with mandatory values

NO → status=complying with mandatory values

NO

parameter no. =3 — YES →

parnob=0 — YES → status=no sampling

NO

parnob>=4 — NO → status=insufficiently sampled

YES

start/end date? — NO → status=inadequate frequency

YES

parnodi/parnob >=95% — YES → parnodg/parnob >=90% — YES → status=complying with guide values

NO → status=not complying with mandatory values

NO → status=complying with mandatory values

NO

parameter no. =8 — YES →

parnob=0 — YES → status=no sampling

NO

parnob>=4 — NO → status=insufficiently sampled

YES

start/end date? — NO → status=inadequate frequency

YES

parnodg/parnob >=95% — YES → status=complying with guide values

NO → status=complying with mandatory values

NO

parameter no. =9 — YES →

parnob=0 — YES → status=no sampling

NO

parnob>=4 — NO → status=insufficiently sampled

YES

start/end date? — NO → status=inadequate frequency

YES

parnodg/parnob >=95% — YES → status=complying with guide values

NO → status=complying with mandatory values

NO

parameter no. =10 — YES →

parnob=0 — YES → status=no sampling

NO

parnob>=4 — NO → status=insufficiently sampled

YES

start/end date? — NO → status=inadequate frequency

YES

parnodi/parnob >=95% — YES → parnodg/parnob >=80% — YES → status=complying with guide values

NO → status=not complying with mandatory values

NO → status=complying with mandatory values

NO → status=no sampling

4.1.3 Implementation of algorithm in BWATER assessment tool

Variables definition:

Nbs = Number of sample for current parameter
Jourzone = Difference between StartDate & EndDate in days
MinNbs = 1: One analysis has been done before the start of season
        = 0: Exception or JourZone > 360
OkFreq = Adequate frequency (19 character, one per parameter)
Freq = Frequency of sampling
Pguid = Maximum percentage for guide values
ImpValue = At least one parameter has an imperative value (True or False)
ShoudTaken = Number of parameters that should have been taken.

Status code:

0 : Program can not compute the status (For configuration reason)
1 : Complying with imperative & guide values
2 : Banned
3 : Inadequate frequency
4 : Non complying
5 : Complying with imperative values (not guide values)
6 : No sampling

Algorithm:

if CurrentYear is not defined in execution parameters --> **Status = 0**
if using RecordedStatus and Database!Status Not Null --> **Status = Database!Status (Status or StatusPxx)**
if Banned --> **Status = 2**
if max(PanoB)=0 --> **Status = 6**
if a date is missing (Start or end) --> **Status = 3**

Okfreq = "OOOOOOOOOOOOOOOOOOO"
Do for each selected parameters
        if parameter must be sampled (Freq. Def. in directive) or option AllFreq -->
                if Frequency ≠ Y and option Frequency is ticked off --> **OkFreq(Parameter) = "N"**
                if Nbs < 2 --> **OkFreq(Parameter) = "N"**
                Freq = JourZone / (Nbs - MinNbs)
                If Freq > 15.5 days -->
                        If No reduction frequency --> **OkFreq(Parameter) = "N"**
                        Do for each preceding years -->
                                If No conform (using fixed parameters option) --> **OkFreq(Parameter) = "N"**
                        End Do
                Endif
        Endif
End Do
If Insufficient frequency for at least one parameters ("N" ∃ in OkFreq) and SeasonYear > 1995 -->
        ShouldTaken = Int_Sup((Jourzone/15.5)+1)
        If the beach is conform for preceding year --> ShouldTaken = Int_Sup((Jourzone/30.5)+1)
Endif

lImp = "OOOOOOOOOOOOOOOOOOO"
Do for each selected parameters
        If the parameter has an imperative limit -->
                sNbs = Number of sample for current parameter
                If inadequate frequency and Seasonyear < 1996 --> sNbs = 0
                If inadequate frequency and Seasonyear > 1995 --> sNbs = Shoudtaken
                if sNbs>0 --> If (ParNoDi / sNbs) > 0.05 or ParNoDi Missing --> **lImp(Parameter) = "N"**
        Endif
End Do

lGuide = "OOOOOOOOOOOOOOOOOOO"

Do for each selected parameters

        Pguid = 0.10; If Parameters are CT or CF --> PGuid = 0.20

        If the parameter has an guide limit or hasn't an imperative limit -->

                If (ParNoDg / Nbs) > PGuid or ParNoDi Missing --> **lGuide(Parameter) = "N"**

        Endif

End Do

ImpValue=True if at least on of the selected parameter has an imperative limit

If at least one imperative value is non conform ("N" ∃ in lImp) --> **Status = 4**

If Insufficient frequency for at least one parameters ("N" ∃ in OkFreq) --> **Status = 3**

If at least one guide value is non conform ("N" ∃ in lGuide) -->

        If **ImpValue -> Status = 5** Else **Status = 4**

Endif

Status = 1

4.1.4 *Status definition*

Status of bathing water for year 1990 -2007:

0 – no data available

1 - compliant with the guide values of the Directive **(CG)**

2 - prohibited throughout the entire bathing season **(B)**

3 - insufficiently sampled **(NF)**

4 - not compliant with the mandatory values of the Directive **(NC)**

5 - compliant with the mandatory values of the Directive **(CI)**

6 - not sampled **(NS)**

Par. No. (76/160/EEC)	MV (76/160/EEC)	GV (76/160/EEC)
1	+	+
2	+	+
3	+	+
8	+	+
9	+	+
10	+	+

→ status = BW compliant with the guide values of the 76/160/EEC **(CG)**

Par. No. (76/160/EEC)	MV (76/160/EEC)	GV (76/160/EEC)
1	+	-
2	+	+ or -
3	+	+ or -
8	+	+ or -
9	+	+ or -
10	+	+ or -

→ status = BW compliant with the mandatory values of the 76/160/EEC **(CI)**

Par. No. (76/160/EEC)	MV (76/160/EEC)	GV (76/160/EEC)
1	-	-
2	+ or -	-
3	+ or -	-
8	+ or -	-
9	+ or -	-
10	+ or -	-

→ status = BW not compliant with the mandatory values of the 76/160/EEC **(NC)**

Par. No. (76/160/EEC)	MV (76/160/EEC)	GV (76/160/EEC)
1	-	-
2	-	-
3	-	-
8	-	-
9	-	-
10	-	-

→ status = BW prohibited throughout the entire bathing season **(B)**

number of samples < 4 → status = insufficiently sampled **(NF)**
number of samples = 0 → status = not sampled **(NS)**

4.2 Assessment according assessment rules of Directive 2006/7/EC

4.2.1 *Status calculation*

For reporting countries report the following files:
- Identified bathing water table (file containing bathing waters that are identified for the coming bathing season)
- Bathing water table (file containing necessary information)
- Bathing season table
- *Sample table*

Under directive 2006/7/EC must be reported the following parameters:
- *Intestinal enterococci*
- *Escerichia coli*

Last assessment period means the last four bathing seasons (included last bathing water season).

Sets of bathing water data used to carry out bathing water quality assessment shall always comprise at least **16 samples** or, in special circumstances **12 samples** or **8 samples** if the bathing season is not exceeding 8 weeks (Article 4).

Status calculation is done based on percentile evaluation. Standards are separate for inland waters and for coastal and transitional waters. The standards for excellent and good quality are based on a 95-percentile evaluation; the standards for sufficient quality are based on a 90-percentile evaluation.

Percentile evaluation

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 ( ).
- Calculate the standard deviation of the $\log_{10}$ values ( ).

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

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

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

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

Classification standards for inland waters

Parameter name	EXCELLENT	GOOD	SUFFICIENT	POOR
Intestinal entero-cocci (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, the percentile values for microbiological enumerations are worse than the 'sufficient' values.
Escerichia coli (cfu/100ml)	500 (95-percentile evaluation)	1000 (95-percentile evaluation)	900 (90-percentile evaluation)	

Classification standards for coastal and transitional waters

Parameter name	EXCELLENT	GOOD	SUFFICIENT	POOR
Intestinal entero-cocci (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, the percentile values for microbiological enumerations are worse than the 'sufficient' values.
Escerichia coli (cfu/100ml)	250 (95-percentile evaluation)	500 (95-percentile evaluation)	500 (90-percentile evaluation)	

Status codes

Status codes:
0 – Program can not compute the status
1 – excellent quality
2 – good quality
3 – sufficient quality
4 – poor quality
5 – closed throughout the season
6 – insufficiently sampled
7 – not sampled

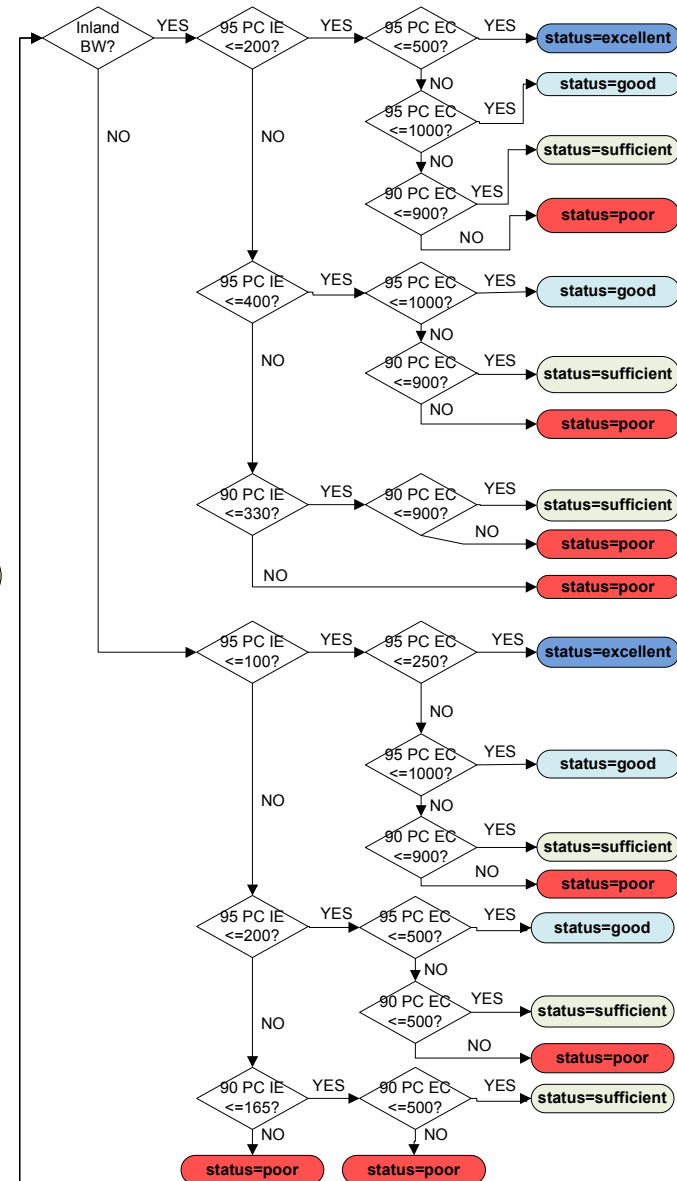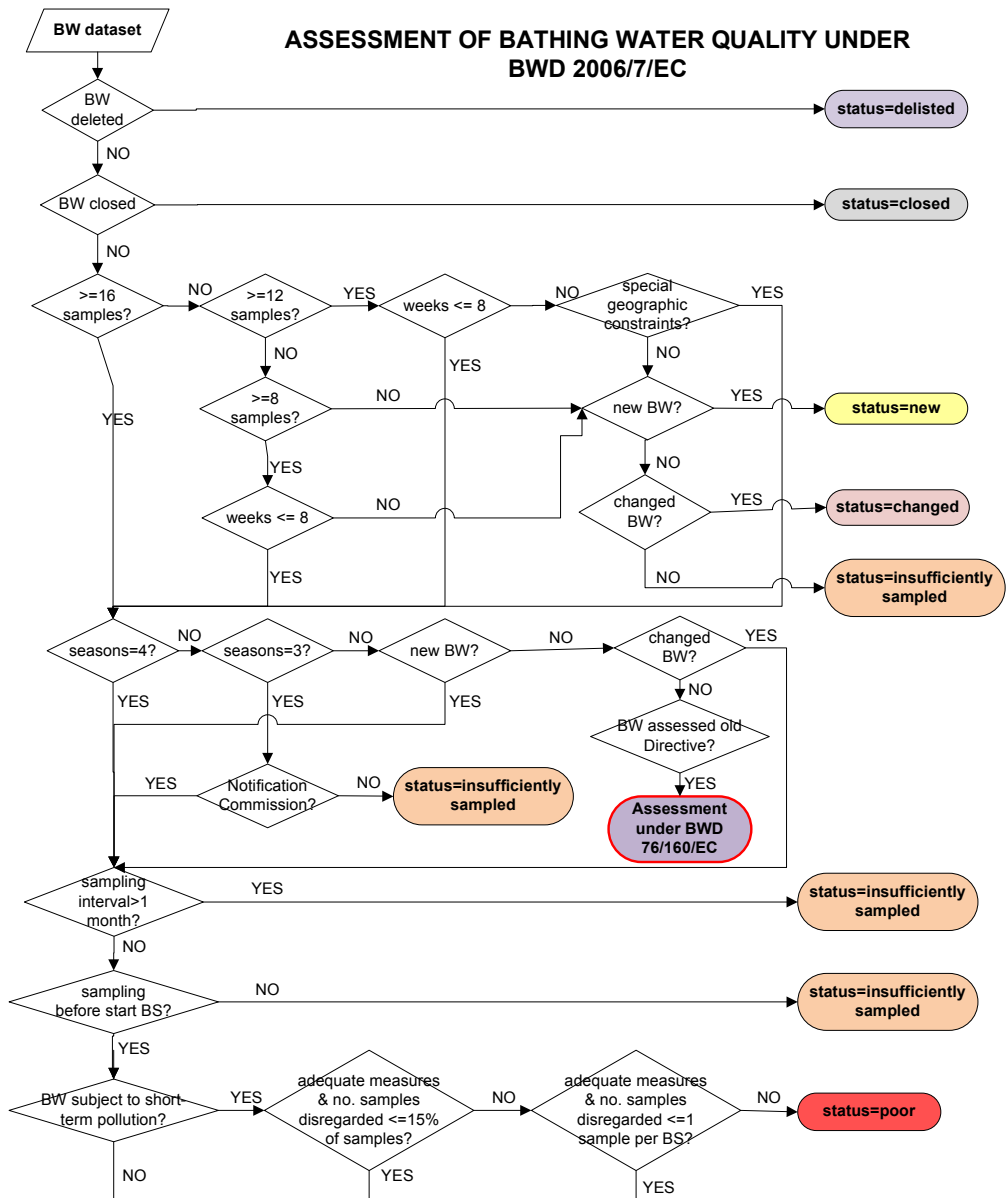### 4.2.2 Algorithm for assessment of bathing water quality

Note:
BW – bathing water
BS – bathing season
PC – percentile
IE – Intestinal enterococci
EC – Escerichia coli

ASSESSMENT OF BATHING WATER QUALITY UNDER BWD 2006/7/EC

4.2.3 Status definition

Status of bathing water for year 2008- ...:

0 – no data available
1 – excellent quality
2 – good quality
3 – sufficient quality
4 – poor quality
5 – closed throughout the season
6 – insufficiently sampled
7 – not sampled

Par. No. (2006/7/EC)	parameter status						
IE	excellent	excellent	excellent	excellent	good	good	good
EC	excellent	good	sufficient	poor	good	sufficient	poor
status	excellent quality	good quality	good quality	sufficient quality	good quality	sufficient quality	sufficient quality

Par. No. (2006/7/EC)	parameter status		
IE	sufficient	sufficient	poor
EC	sufficient	poor	poor
status	sufficient quality	poor quality	closed throughout the season

Par. No. (2006/7/EC)	parameter status					
IE	good	sufficient	poor	sufficient	poor	poor
EC	excellent	excellent	excellent	good	good	sufficient
status	good quality	good quality	sufficient quality	sufficient quality	sufficient quality	poor quality

number of samples < 16 → status = insufficiently sampled
number of samples = 0 → status = not sampled

4.3 Assessment during transition period

4.3.1 Status calculation

After parameters and values have been converted, bathing water quality is assessed using the algorithm developed for Directive 76/160/EC (chapters 4.1.2 and 4.1.4). However only para-meters 2 Faecal coliforms and 3 Faecal streptococci are taken into account.

Status codes

Status codes:
0 – Program can not compute the status
1 – excellent quality
2 – good quality
3 – sufficient quality
4 – poor quality
5 – insufficiently sampled

6 – new
7 – changes
8 – compliant with guide values
9 – compliant with imperative (mandatory) values
10 – not compliant with imperative (mandatory) values

4.3.2 Algorithm for assessment of bathing water quality

After parameter conversion (see chapter 3.3.2.1.1) the assessment is done after Directive 76/160/EEC (see chapters 4.1.2 and 4.1.4).

4.3.3 Status definition

Status of bathing water for year 2008 - ...:
0 – no data available
1 – excellent quality
2 – good quality
3 – sufficient quality
4 – poor quality
5 – insufficiently sampled
6 – new
7 – changes
8 – compliant with guide values
9 – compliant with imperative (mandatory) values
10 – not compliant with imperative (mandatory) values

Par. No. (76/160/EEC)	MV (76/160/EEC)	GV (76/160/EEC)
2	+	+
3	+	+

→ status = BW compliant with the guide values of the 76/160/EEC (**8**)

Par. No. (76/160/EEC)	MV (76/160/EEC)	GV (76/160/EEC)
2	+	-
3	+	+ or -

→ status = BW compliant with the mandatory values of the 76/160/EEC (**9**)

Par. No. (76/160/EEC)	MV (76/160/EEC)	GV (76/160/EEC)
2	-	-
3	+ or -	-

→ status = BW not compliant with the mandatory values of the 76/160/EEC (**10**)

Par. No. (76/160/EEC)	MV (76/160/EEC)	GV (76/160/EEC)
2	-	-
3	-	-

→ status = BW prohibited throughout the entire bathing season (**4**)

number of samples < 4 → status = insufficiently sampled (**5**)
number of samples = 0 → status = changes (**7**)

5 Reporting sheets

5.1 Reporting sheets under Directive 76/160/EEC

Member States have to deliver four files in digital format:
- <u>File on geographic locations</u>: file containing geographic information for each bathing water.
- <u>General data file</u>: file containing information on the bathing season for each bathing water.
- <u>Parameter data file</u>: file containing bathing water quality data per parameter for each bathing water.
- <u>Supplementary file</u>: file containing summary information on analytical methods used and a short description of improvement schemes for bathing waters not complying.

Detailed information on the reporting sheets developed for Directive 76/160/EEC reporting is presented in Data dictionary.
The files have to be delivered as xml, xls or txt files through the ReportNet.

5.2 Reporting sheets under Directive 2006/7/EC

Member States have to deliver five data tables in digital format:
- <u>Table 1: Inventory of identified bathing waters</u>: file contains identification of bathing waters for the coming bathing season and attributes to be reported before the start of the bathing season.
- <u>Table 2: Seasonal information on bathing waters</u>: file contains information on the bathing season of each bathing water necessary for assessment of the bathing water quality.
- <u>Table 3: Abnormal situations</u>: file contains an event or combination of events impacting on bathing water quality at the location concerned and not expected to occur on average more than once every four years.
- <u>Table 4: Short term pollution</u>: file contains one or more events of short term pollution that occur during the bathing season.
- <u>Table 5: Monitoring results of bathing waters</u>: file contains results of the monitoring for each bathing water and in combination with other data tables, it holds all the information necessary to assess the quality of the bathing water for the reported bathing season.

Detailed information on the reporting sheets developed for Directive 2006/7/EC reporting is presented in Data dictionary.

The files have to be delivered as xml, xls or txt files through the ReportNet.

6 Database structure

Bathing water database structure is defined to include a combination of data reported under Directive 76/160/EEC and 2006/7/EC.

Bathing water database at IWRS consists of four main tables: bwd_measurement, bwd_parameter, bwd_stations, bwd_status. Table bwd_measurement includes four attributes with parameter measurements. Table bwd_parameter includes 11 attributes with parameter names and their guide and mandatory values under Directive. In table bwd_parameter are added mandatory and guide values for two new parameters reported under Directive 2006/7/EC. Table bwd_stations includes 10 attributes with bathing water location description, 18 attributes with water quality data for years 1990 – 2007 and additionally added remarks from ETCW. Table bwd_status includes 3 attributes with date when the sampling was done and calculated bathing water quality status.
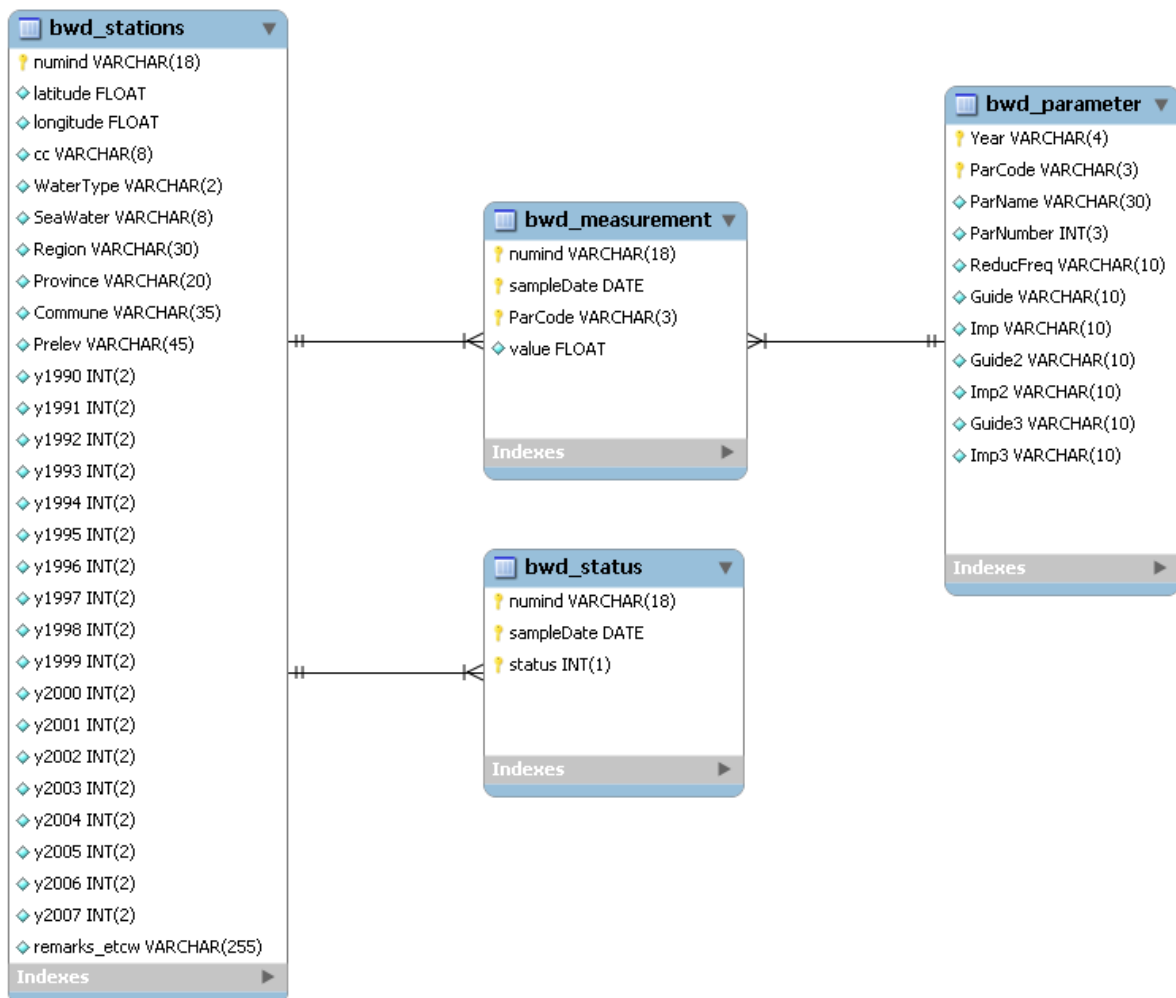

Figure 3: Bathing water database structure

7 Conclusion

Bathing water status will be presented in transition period (current bathing season forward) according to Directive 76/160/EEC. Member States are encouraged to start reporting under Directive 2006/7/EC as soon as possible to make the transition period shorter. All reporting sheets are available on ReportNet. The reporting by Member States under both Directives is done through the ReportNet. Bathing water quality status will be calculated after receiving the data by described methodologies in this document.