EUROPEAN-SCALE SURVEY ON THE LIMIT OF QUANTIFICATION PRACTICES FOR PRIORITY SUBSTANCES OF THE WATER FRAMEWORK DIRECTIVE

Results of an informal European survey

Ghestem J-P., Yari A.

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Context

This work was executed in the framework of AQUAREF 2015 program and is part of theme A2a "European-scale survey concerning the limit of quantification practices for the substances used for the determination of chemical status"

Authors :

Jean-Philippe Ghestem
BRGM
jp.ghestem@brgm.fr

Anice Yari
BRGM
a.yari@brgm.fr

Reviewed by :

Marie Pierre STRUB
INERIS
marie-pierre.strub@ineris.fr

Christine FERAY
AQUAREF
Christine.feray@ineris.fr

Contact

Onema : I Barthe Franquin, DCIE, isabelle.barthe-franquin@onema.fr

BRGM : JP Ghestem, jp.ghestem@brgm.fr

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1. CONTEXT

The Water Framework Directive defines the chemical status of surface water from monitoring programs concentrations on a list of substances called "priority substances". These concentrations are compared with environmental quality standards (EQS).

Directive 2009/90/EC sets quality assurance and quality control requirements for methods of analysis used within the framework of the monitoring programs and for laboratories that contribute to these programs. In particular, requirements are set for the limit of quantification (LOQ) of the methods. These LOQ shall be less than 30% of the EQS.

For some priority substances, the EQS are so low that LOQ of methods cannot fulfill these requirements. In this case, Directive 2009/90/EC allows the use of best available techniques not entailing excessive costs. In France many questions arise about the level of requirements to be targeted in such cases.

AQUAREF is the French National Reference Laboratory for the monitoring of aquatic environments. It provides support to public authorities for the implementation of the WFD especially on thematic related to quality of data (analysis and sampling methods).

To try to answer some of the questions related to LOQ level, AQUAREF proposed to French public authorities in 2015 to conduct a survey at European level. This survey aims to better know the practices of the other member states. In the future it may help to harmonize practices on this important parameter of the monitoring and assessment of the status of water bodies.

The authors gratefully acknowledge member states who have contributed to this survey: Austria, Belgium, Bulgaria, France, Netherlands, Poland and United Kingdom.

2. SURVEY

2.1 DIFFUSION

The survey was prepared by AQUAREF and sent to the European WFD informal group by French Environmental Ministry (Olivier GRAS) on the 15th September 2015. This informal group includes representative of Denmark, United Kingdom, Austria, Bulgaria, France, Poland, Latvia, Estonia, Belgium, Netherlands, Ireland, Lithuania, Portugal, Sweden and Germany.

2.2 CONTENT

A first set of questions was sent to member states in order to know whether they were ready to participate in a survey concerning their practices regarding the limits of quantification (LOQ) for several substances. If a member state agreed, it was invited to fill in a document with the different values of LOQ.

The questions sent to member states are listed below:

1. Do you agree to contribute to this survey?

2. If so can you tell us the name of the person (and e-mail address) with who we can directly exchange?

3. Have you specified, in your national monitoring regulations or guidance maximum LOQ values for each substance or do you only refer (in a general way) to Directive 2009/90/EC, so called "QAQC" directive ?
    i. Regulation or guides with maximum LQ for each substance (yes/no)
    ii. General reference to QAQC Directive (yes/no)

4. If you mention or impose LOQ in national regulation or guidance can you give these values in the attached file?

5. Can you specify in the attached file the last LOQ values practiced by your laboratories on these priority substances?

6. Do you agree for disseminating this information back to all the participants in this survey? Anonymously or not?

7. Do you have any comments or suggestions?

As mentioned in the survey, member states were asked to separate (if necessary) the LOQ given in their national regulations and the LOQ provided by the most recent monitoring programs (member states could indicate the monitoring year). The answering document was originally designed in order to accept only one LOQ for the regulation or guidance and one LOQ for the monitoring data. Afterwards, given the multiple answers, it was decided to admit two values for each category of LOQ: one minimum value and one maximum value. Also, a distinction was made between the LOQ values practiced for inland waters (IW) and other surface waters (OSW, *e.g.* marine waters).

The survey was sent with an excel file to be filled with member state LOQ.

2.3 SUBSTANCES

The survey is limited to the priority substances of initial Directive 2008/105/EC.

3. DATA

3.1 NUMBER OF DATA

Data were obtained for 7 countries: Austria, Belgium, Bulgaria, France, Netherlands, Poland and United Kingdom.

- For inland waters (IW), 4 member states provided LOQ information for both regulation/guidance and monitoring values. 2 member states provided data only for regulation/guidance values and 1 member state provided data only for monitoring values.

- For other surface waters (OSW), only 2 countries gave values for both regulation/guidance and monitoring. 3 countries answered for regulation/guidance values and two countries gave no data at all.

3.2 PRESENTATION OF DATA

A list of 64 priority substances was submitted to member states, which were asked to give LOQ values for a maximum of substances. In order to have a graphical representation that would be clear enough and would not request too many graphs, it was decided to sort the substances in 7 different groups:

- Organochlorine pesticides
- PBDE
- PAHs
- Metals
- Volatile and halogenated hydrocarbons compounds
- Other pesticides
- Other substances

For each substance a theoretical "target LOQ" was defined according to requirement of Directive 2009/90/CE, as 30% of EQS (annual average).
The classification and the corresponding target LOQ are presented in the Table 1. When dealing with a group of substances (*e.g.* cyclodiene pesticides or hexachlorocyclohexanes) for which only a global EQS (and therefore a global target LOQ) is defined, the individual target LOQs were defined by the global target LOQ divided by the number of substances in the group.

Group	Substances	Target LOQ (µg/l)
Organochlorine pesticides	Aldrin	0.00075
	Dieldrin	0.00075
	Endrin	0.00075
	Isodrin	0.00075
	Cyclodiene pesticides	0.003
	DDD 44’	0.0025
	DDE 44’	0.0025
	DDT 24’	0.0025
	DDT Total	0.0075
	DDT 44’	0.003
	Endosulfan	0.0015
	Alpha Endosulfan	0.00075
	Beta Endosulfan	0.00075
	Hexachlorobenzene	0.003
	Hexachlorocyclohexane	0.006
	Alpha Hexachlorocyclohexane	0.0015
	Beta Hexachlorocyclohexane	0.0015
	Delta Hexachlorocyclohexane	0.0015
	Gamma Hexachlorocyclohexane	0.0015
PBDE	BDE	0.00015
	BDE100	0.000025
	BDE153	0.000025
	BDE154	0.000025
	BDE28	0.000025
	BDE47	0.000025
	BDE99	0.000025
PAHs	Anthracene	0.03
	Benzo(a)pyrene	0.015
	Fluoranthene	0.03
	Naphtalene	0.72
	Benzo(b)fluoranthene	0.0045
	Benzo(k)fluoranthene	0.0045
	Benzo(b) + Benzo(k)fluoranthene	0.009
	Benzo(g,h,i)perylene	0.0003
	Indeno(123-cd)pyrene	0.0003
	Benzo(g,h,i)perylene + Indeno(123-cd)pyrene	0.0006
Metals	Cadmium	0.024
	Mercury	0.015
	Lead	2.16
	Nickel	6
	Tributyltin	0.00006

Table 1 (a) : Substances of the survey and target LOQ

Group	Substances	Target LOQ (µg/l)
VOC and HVOC	Benzene	3
	Chloroform	0.75
	1,2-Dichloroethane	3
	Dichloromethane	6
	Hexachlorobutadiene	0.03
	Pentachlorobenzene	0.0021
	Tetrachlorethene	3
	Carbon Tetrachloride	3.6
	Trichlorobenzenes	0.12
	Trichloroethylene	3
Other pesticides	Alachlor	0.09
	Atrazine	0.18
	Chlorfenvinphos	0.03
	Chlorpyriphos-ethyl	0.009
	Diuron	0.06
	Isoproturon	0.09
	Simazine	0.3
	Trifluralin	0.009
Other substances	4-tert-octylphenol	0.03
	C10-C13-Chloroalcanes	0.12
	Di(2-ethylhexyl)phtalate	0.39
	Nonylphenol	0.09
	Pentachlorophenol	0.12

Table 1 (b) : Substances of the survey and target LOQ

Results are presented with the following classification:

- Inland Surface Water (ISW) : Regulatory and monitoring
- Other surface water (OSW) : Regulatory and monitoring

For each category, a table (cf annex) gives all the data as they have been received from member states. From these tables, graphs are plotted in paragraphs 3.3 to 3.6 with normalised LOQ values (division of LOQ by "Target LOQ"). This normalisation was performed in order to get clearer figures which could easily be compared between substances. In order to mitigate the differences between the normalised LOQ values and thus have a clearer representation of the results, graphs are plotted using a logarithmic scale for normalised LOQ values.

In their responses some member states gave more than one value for a substance. In this case, results in the table are given as an interval [minimum value; maximum value]. The intervals are identified in each table with yellow-coloured cells. In the graph, when a member state provided an interval instead of a single value, only the minimum value of the interval is plotted.

Following the different answers provided by the member states, it was decided to report anonymously the results of the survey.

3.3 DATA FOR INLAND WATERS – REGULATION/GUIDANCE

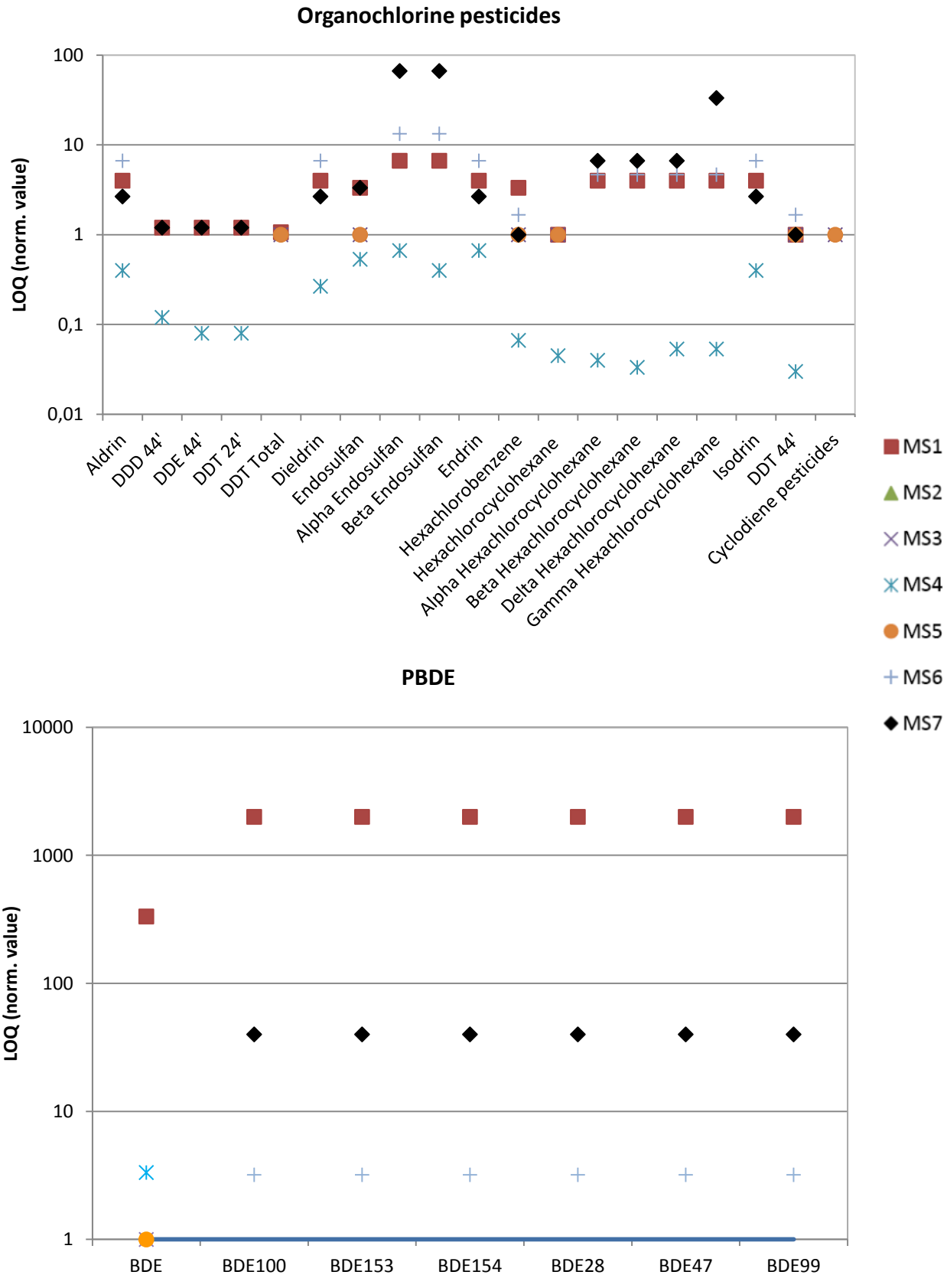

Figure 1 (a) - LOQ regulation values (normalized values) for inland surface waters

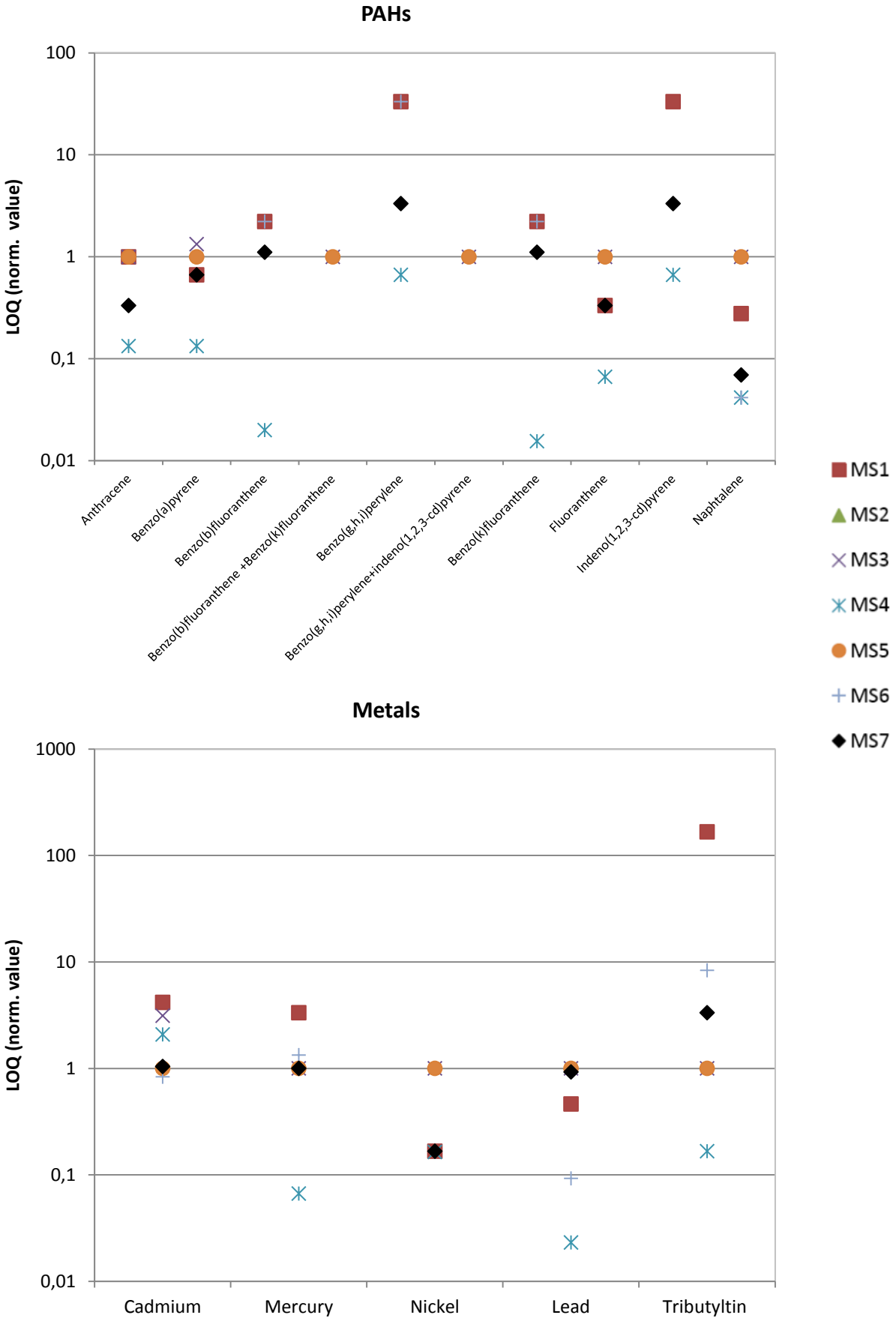

Figure 1 (b) - LOQ regulation values (normalized values) for inland surface waters

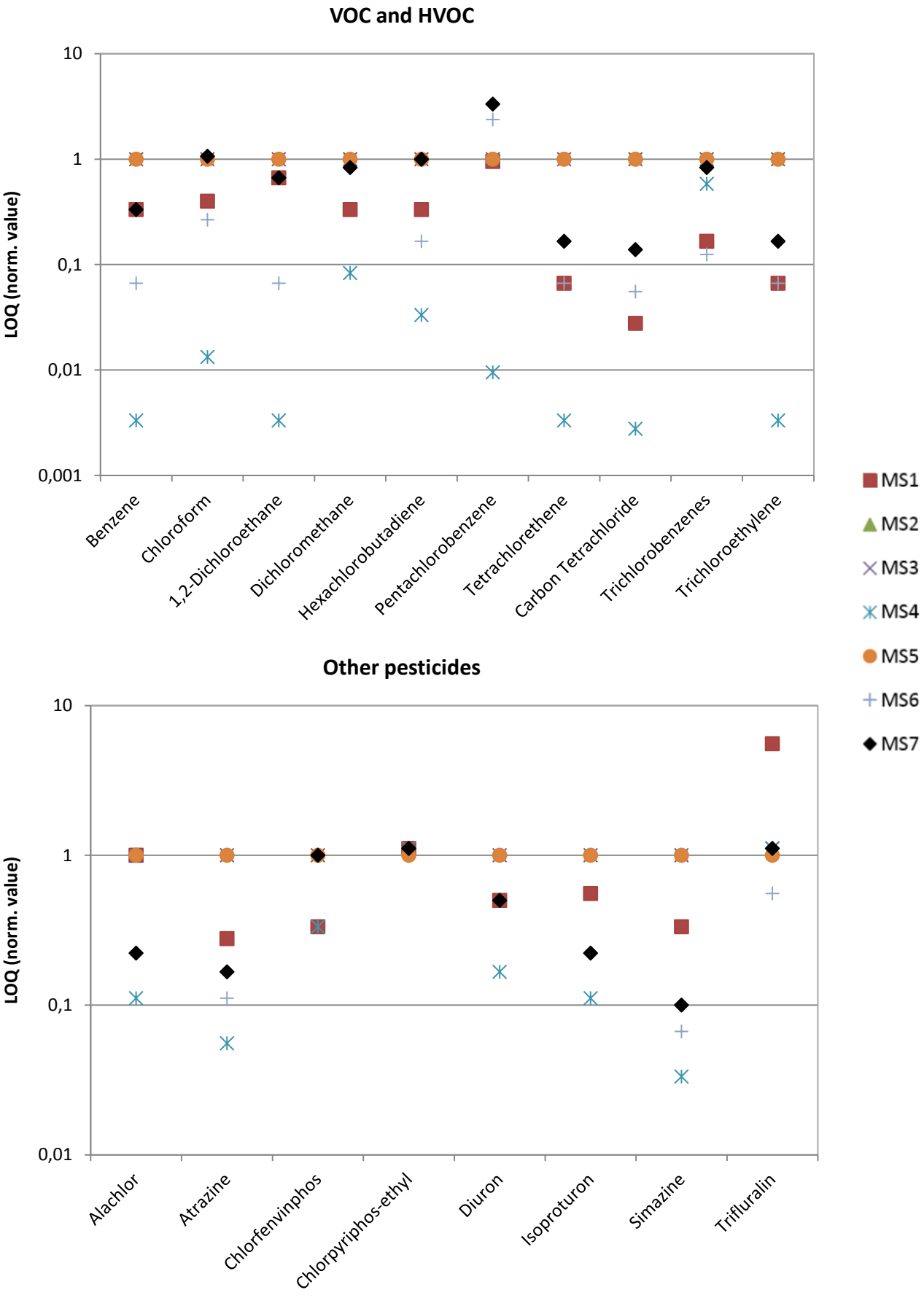

Figure 1 (c) - LOQ regulation values (normalized values) for inland surface waters

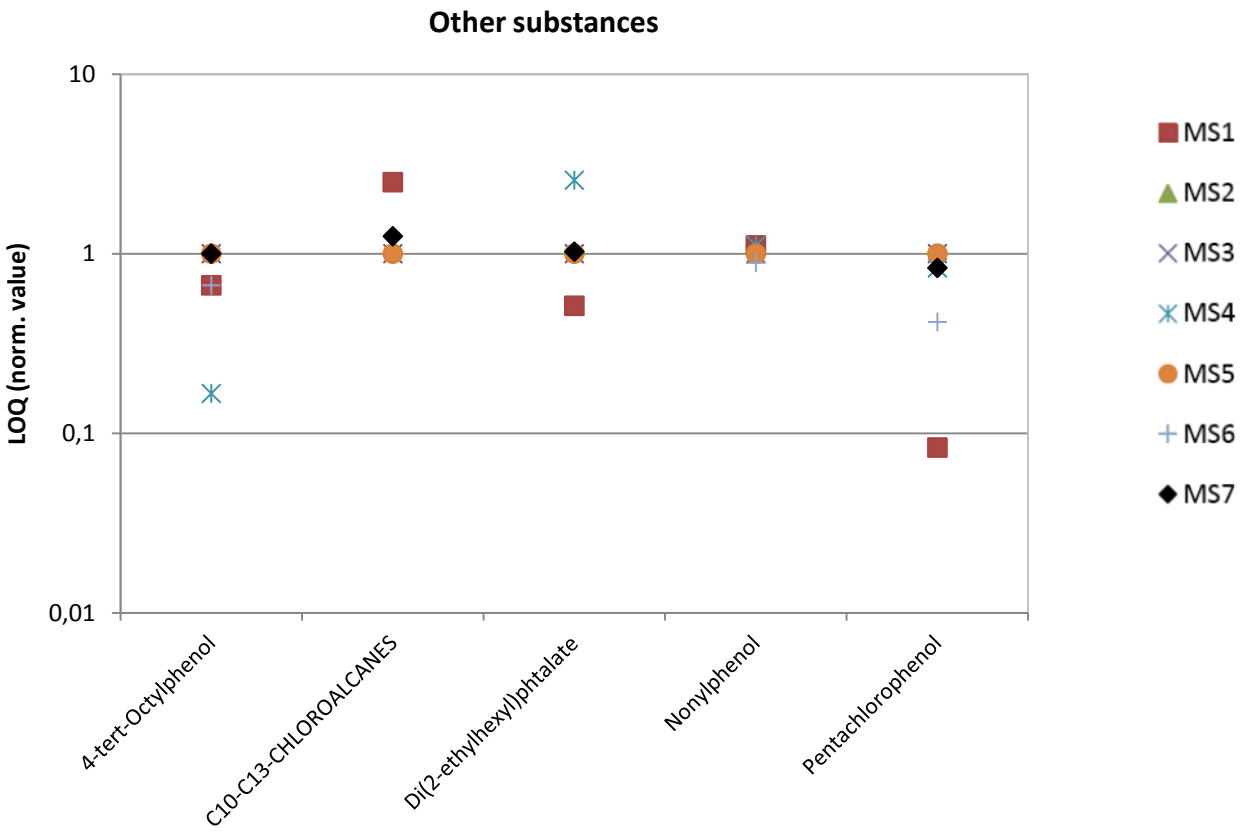

Figure 1 (d) - LOQ regulation values (normalized values) for inland surface waters

3.4 DATA FOR OTHER SURFACE WATERS – REGULATION / GUIDANCE

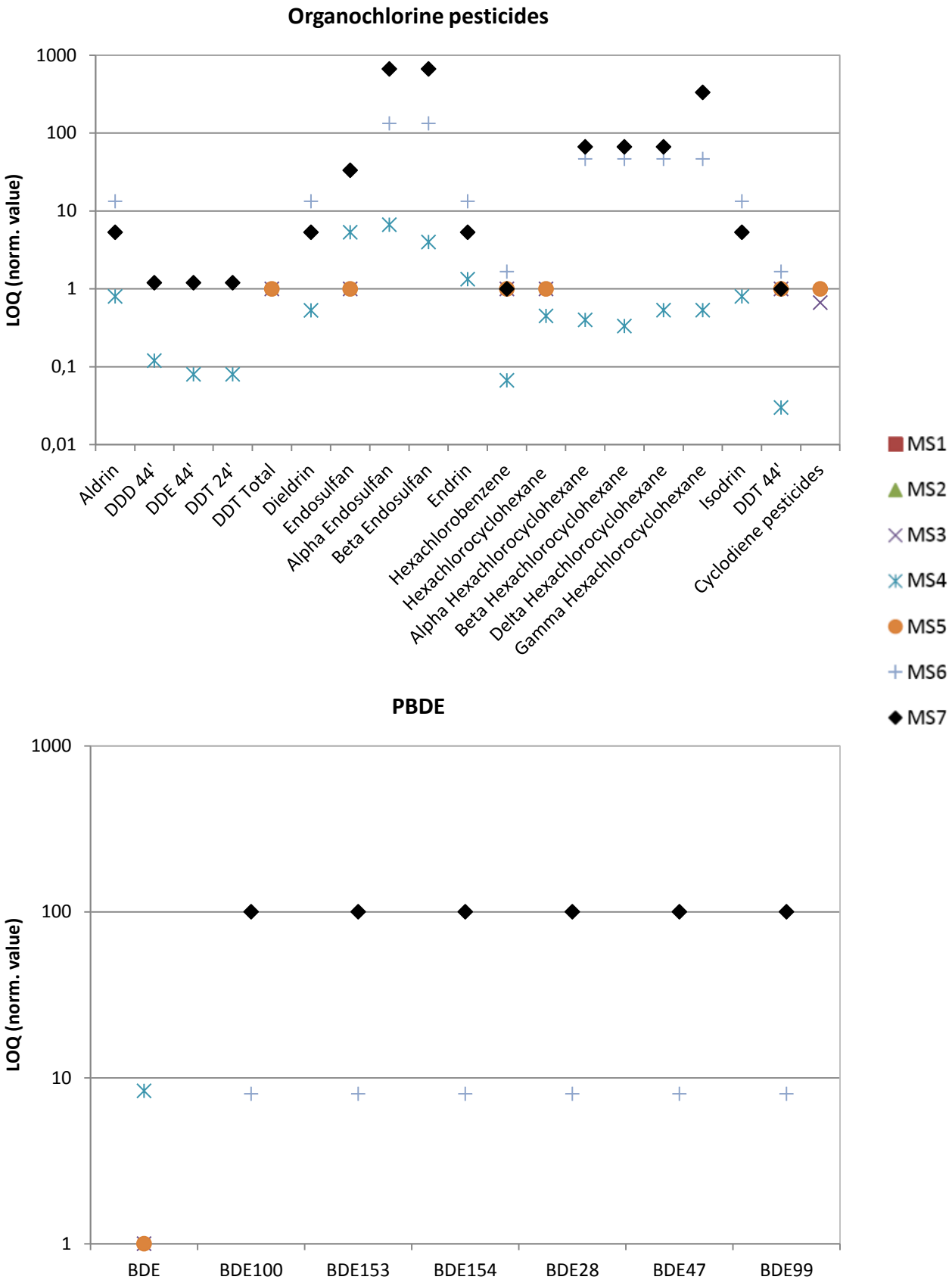

Figure 2 (a) - LOQ regulation values (normalized values) for other surface waters

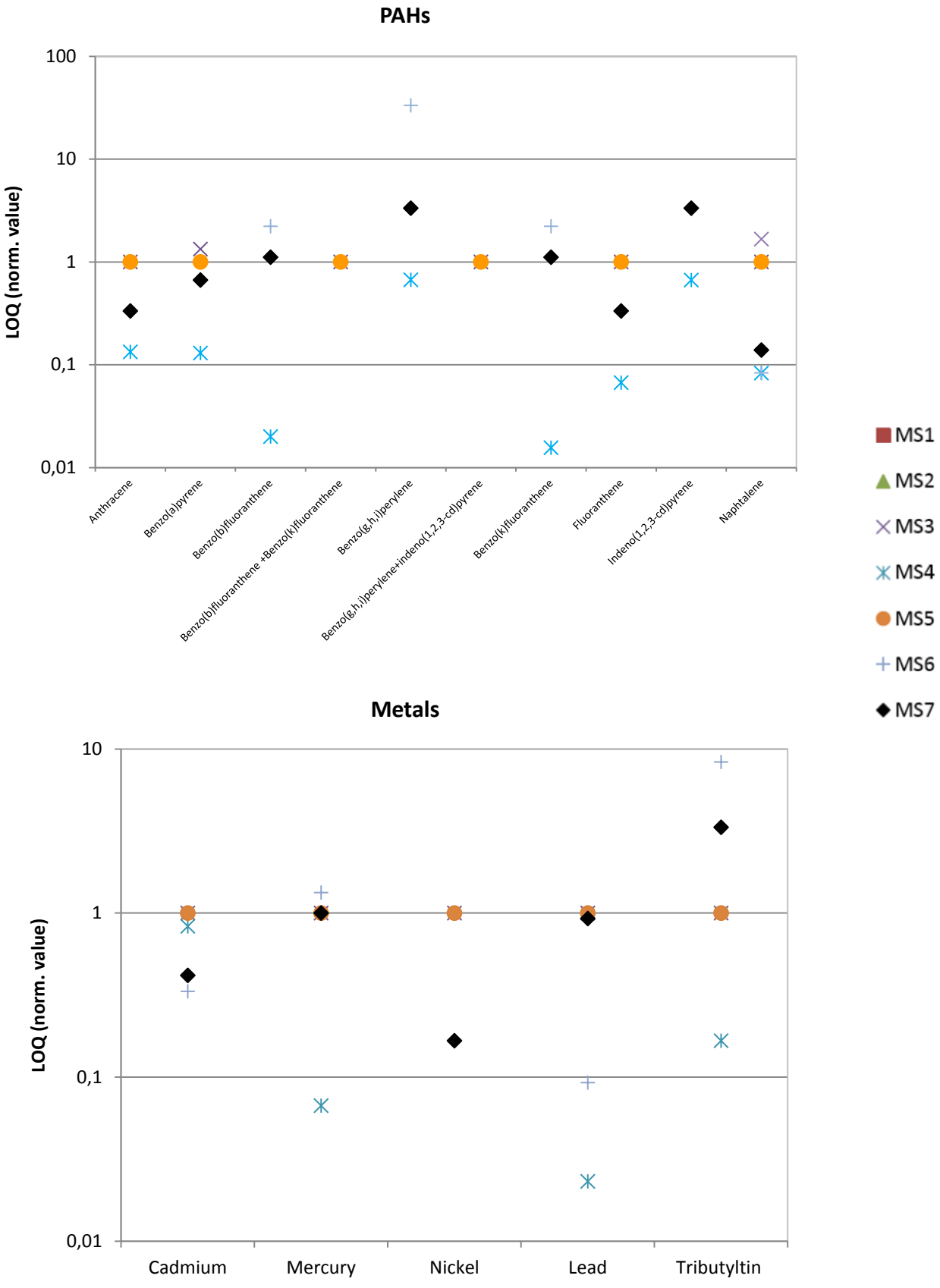

Figure 2 (b) - LOQ regulation values (normalized values) for other surface waters

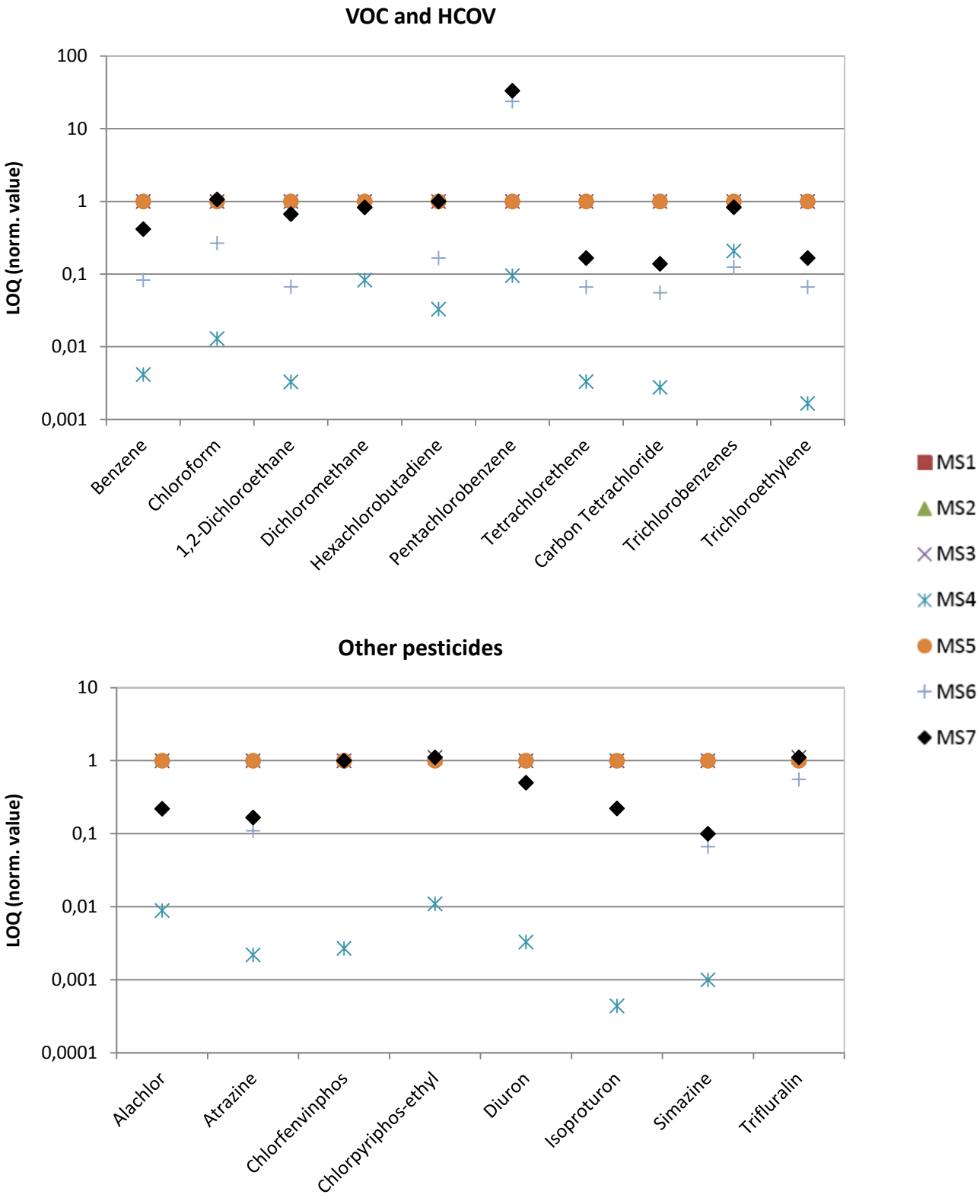

Figure 2 (c) - LOQ regulation values (normalized values) for other surface waters

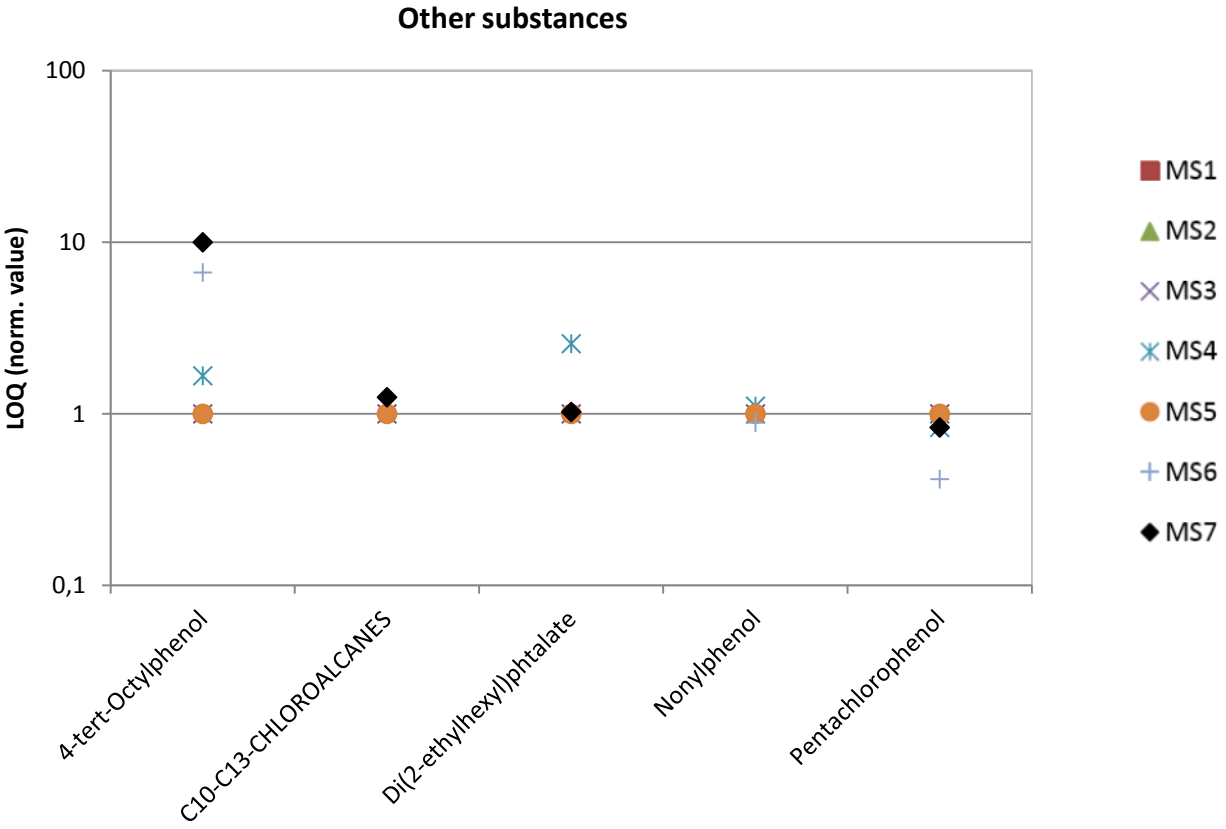

Figure 2 (d) - LOQ regulation values (normalized values) for other surface waters

3.5 DATA FOR INLAND WATERS – MONITORING

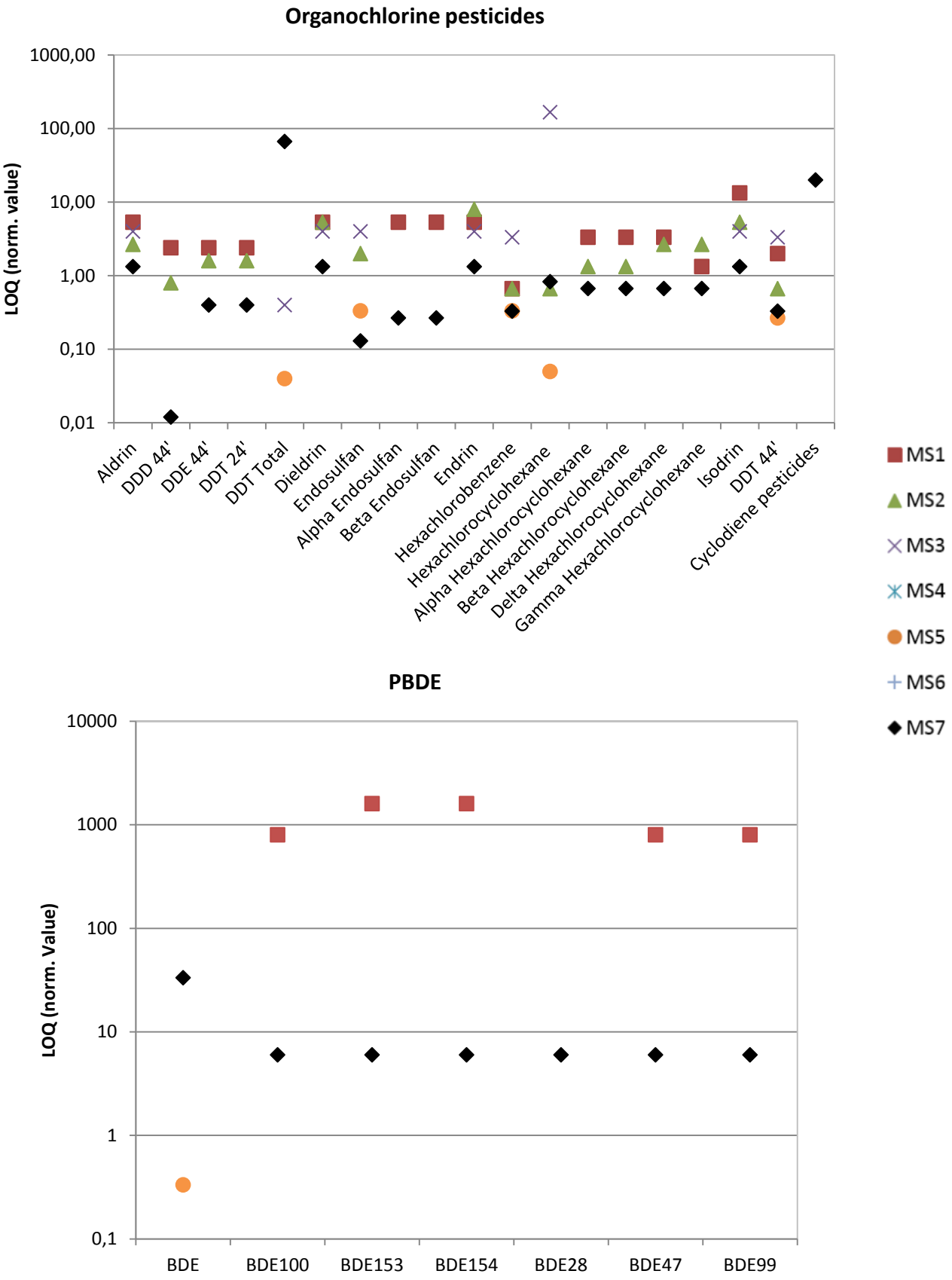

Figure 3 (a) - LOQ monitoring values (normalized values) for inland surface waters

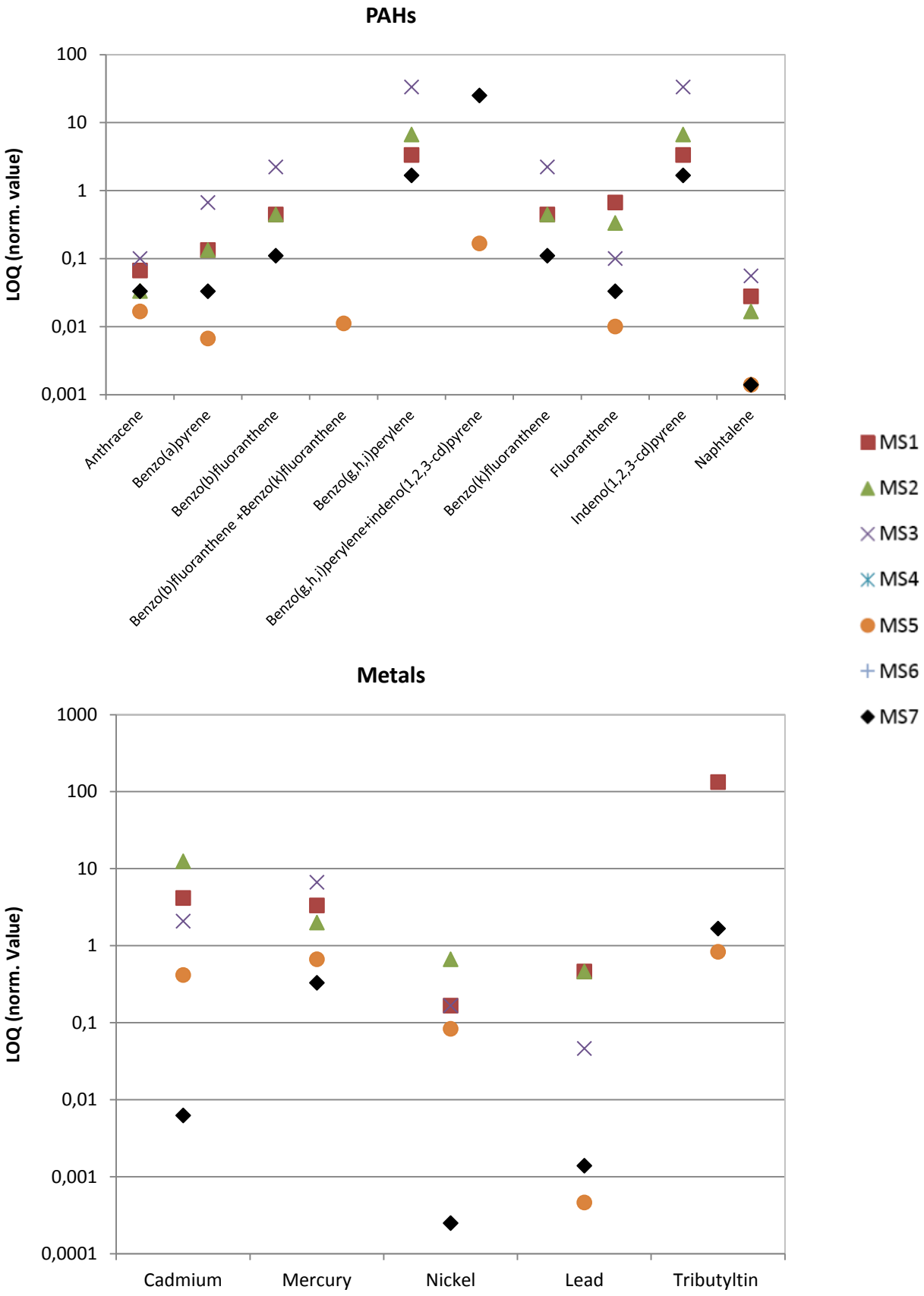

Figure 3(b) - LOQ monitoring values (normalized values) for inland surface waters

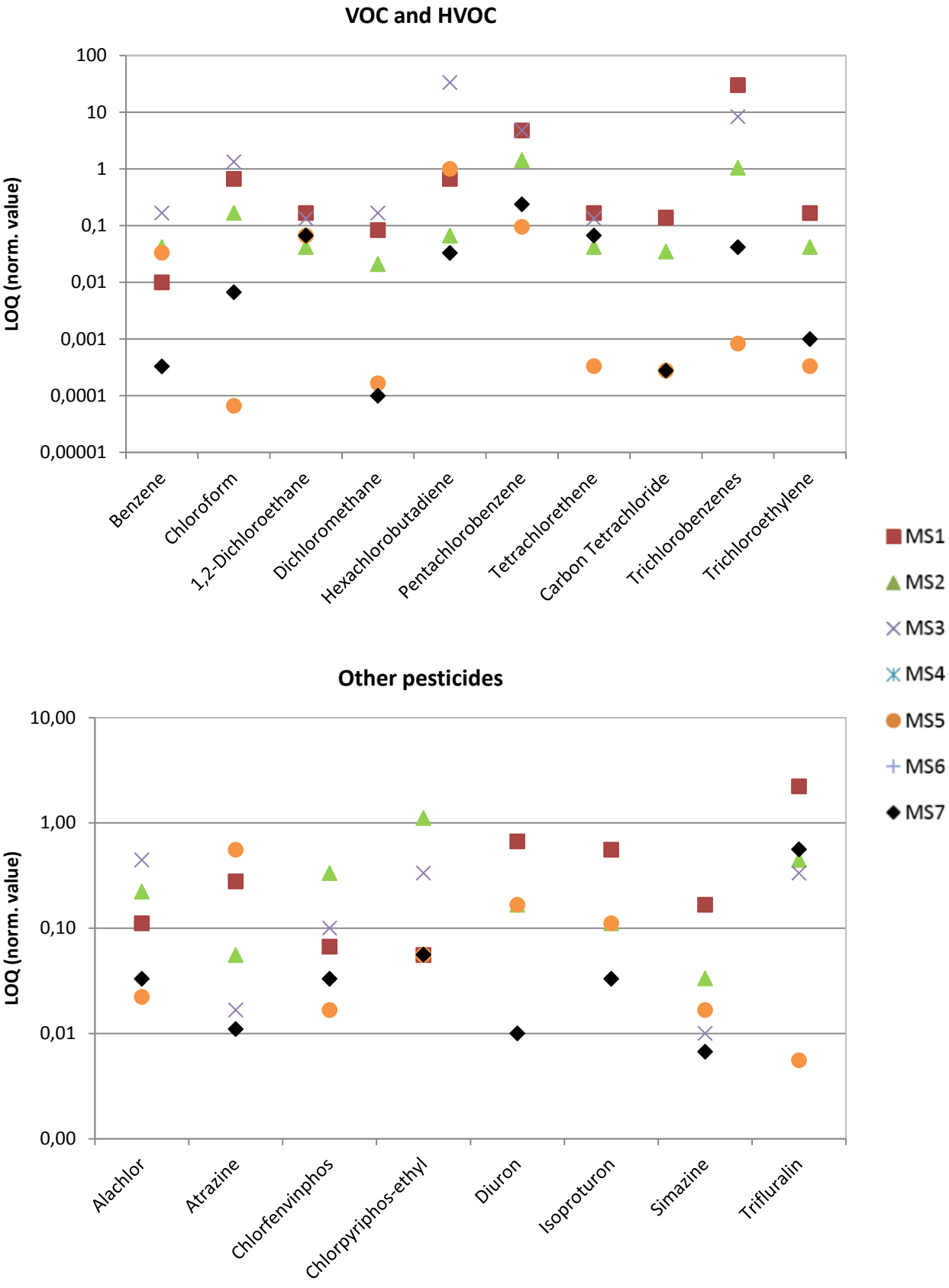

Figure 3(c) - LOQ monitoring values (normalized values) for inland surface waters

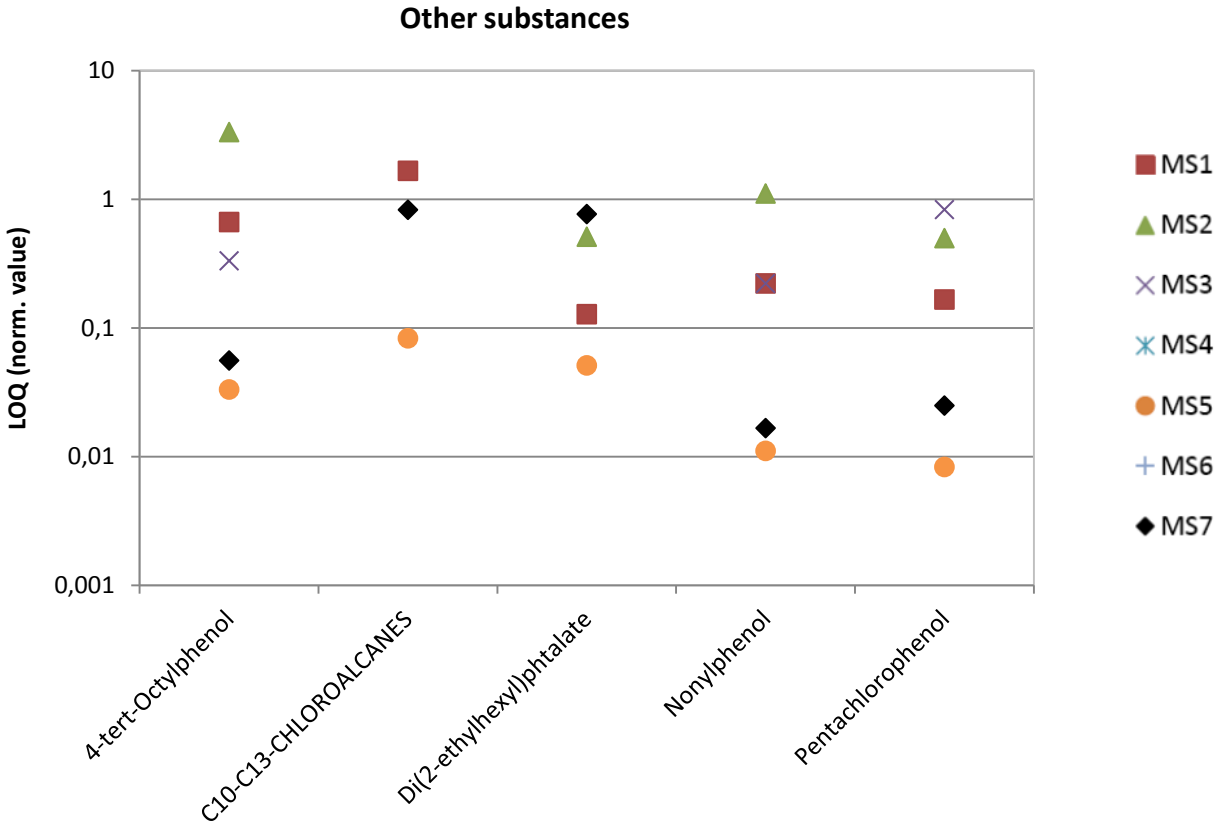

Figure 3(d) - LOQ monitoring values (normalized values) for inland surface waters

3.6 DATA FOR OTHER SURFACE WATER – MONITORING

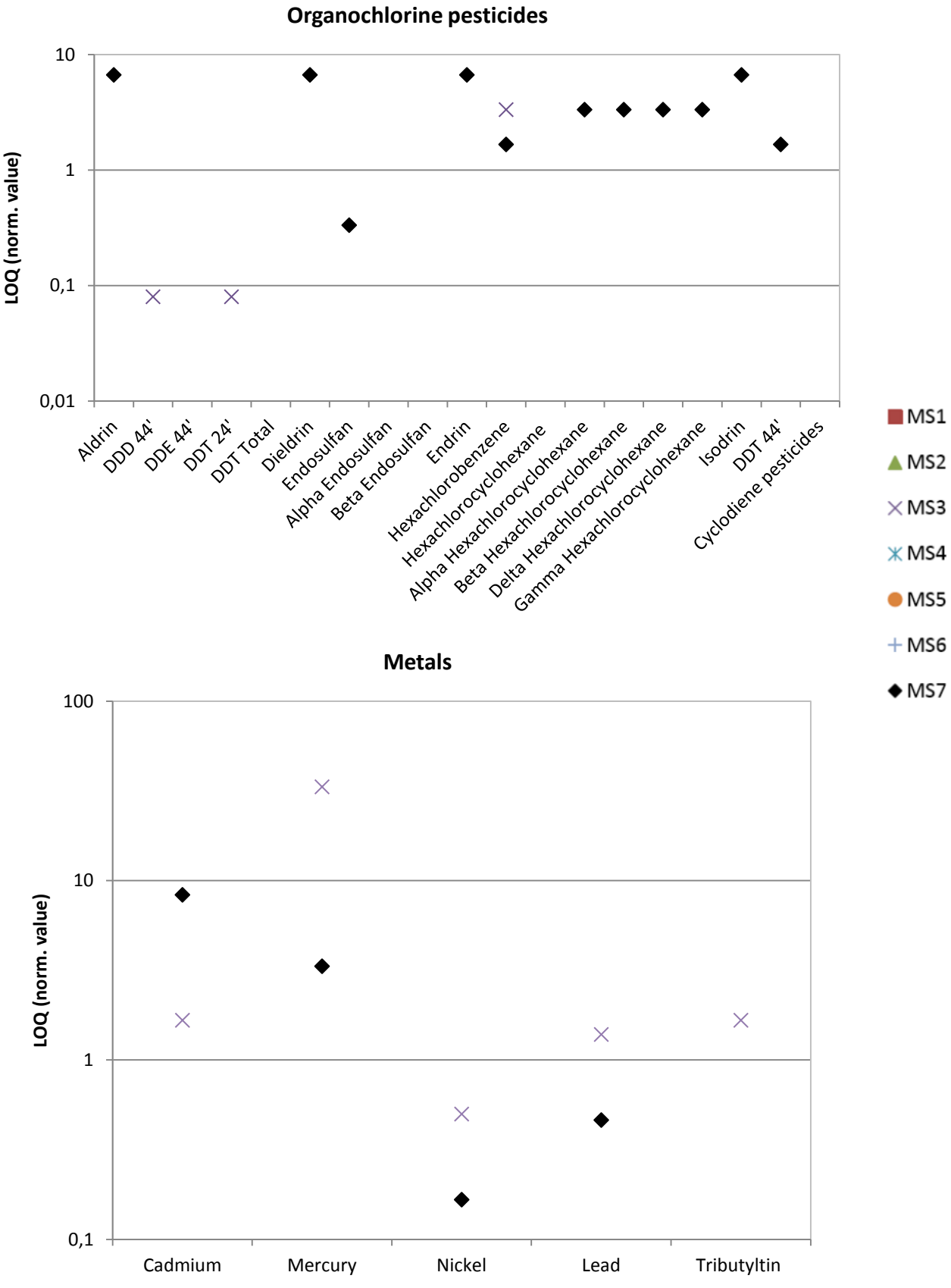

Figure 4 (a) - LOQ monitoring values (normalized values) for other surface waters

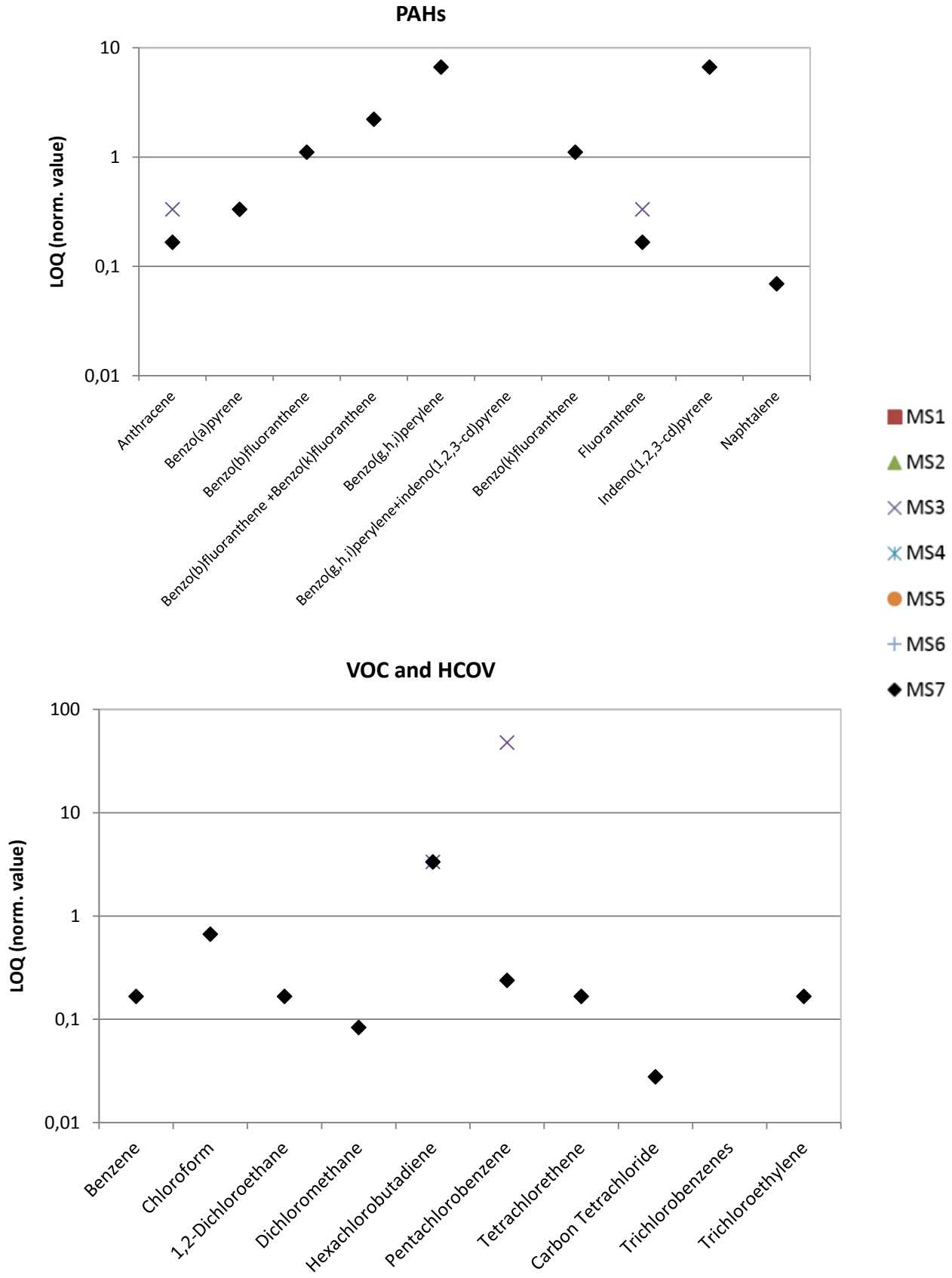

Figure 4(b) - LOQ monitoring values (normalized values) for other surface waters

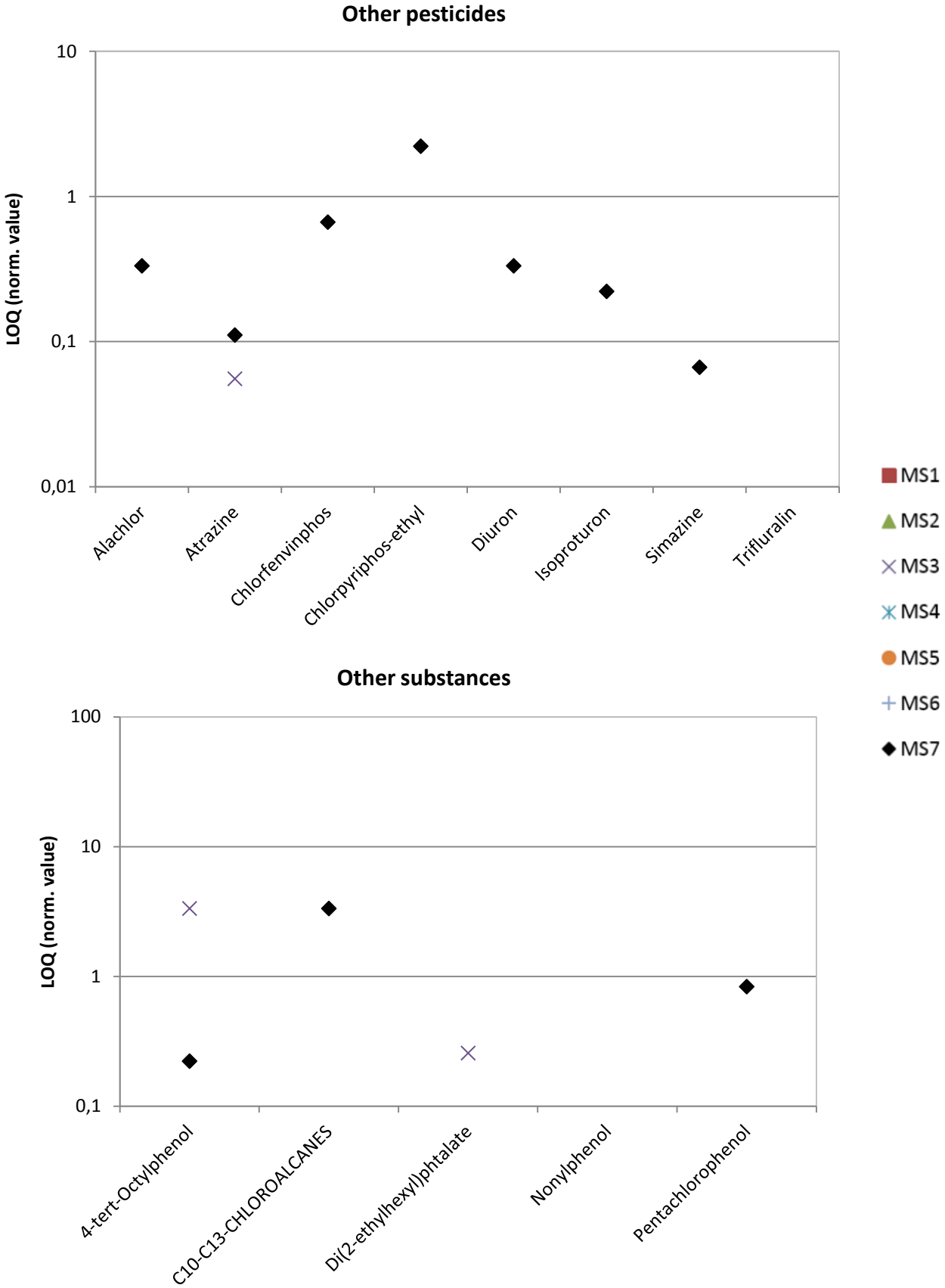

Figure 4(c) - LOQ monitoring values (normalized values) for other surface waters

4. RESULTS

This section presents the data received from Member States (see § 3) in a more integrated and interpreted form.

In view of low number of available results for some compounds, the interpretations have to be taken with caution. It is important to focus only on major trends. Some results presented in the following tables have little meaning by themselves but they help to enlighten some conclusions with quantitative information. For example, the ratio between LOQ_{min} and LOQ_{max} of all member states data by substance has little interest in itself but it illustrates quantitatively significant differences that can exist between member states on levels of performance defined in regulatory document or observed in monitoring conditions.

In this section, all results are expressed as normalized LOQ (LOQ_n), *i.e.* the LOQ divided by the target LOQ estimated with QAQC Directive criterion.

4.1 RESULTS BY MEMBER STATE

The criterion of QAQC directive is LOQ=30% EQS. In order to take into account the approximation LOQ=EQS/3, a value of 1.2 instead of 1 is considered as a threshold value for LOQ_n. If LOQ_n is above 1.2, QAQC criterion is considered as not met. Table 2 presents by member state the proportion of LOQ for inland water that is fitting the QAQC criteria (LOQ from national regulation or guidance). It presents also, min, max and median LOQ_n.

	MS1	MS2	MS3	MS4	MS5	MS6	MS7
Number of substances	61	0	41	53	41	50	57
Min LOQ_n	0,03		1	0,003	1	0,04	0,07
Max LOQ_n	2000		3	3	1	33	67
Median LOQ_n	1,2		1,0	0,1	1,0	1,1	1,1
LOQ_n >1,2 (not compliant with QAQC)	28		2	3	0	24	22
LOQ_n <=1,2 (compliant with QAQC)	33		39	50	41	26	35

Table 2 : data treatment by member state (ISW and regulation data)

Only one member state (MS5) has not adapted LOQ compared to target LOQ, that is to say that all LOQ are based on the QAQC criterion (LOQ=30%EQS).

MS3 has only adapted LOQ for two substances: benzo(a)pyrene and cadmium. Target LOQ are thus integrated in MS3's regulation with only minor modification. MS4 has also LOQ compliant with QAQC criteria but LOQ are adapted mostly far below target LOQ (10 times below as a median value, and up to 360 times below the theoretical LOQ)

MS1, MS6 and MS7 have approximately the same repartition of LOQ_n with around half of substances with LOQ that met QAQC criterion and LOQ adapted above target LOQ for the other half of substances (up to 2000 times above the target LOQ).

It is important to mention that for this survey the exploitation is done by individual substance and not by parameter of the directive 2008/105/CE. The results could be slightly different by parameter but the conclusion would be roughly the same (e.g.: if cyclodiene pesticides would have been considered independently).

Table 3 shows the same results for monitoring data. It shows that the LOQ of monitoring are generally slightly below the LOQ listed in the regulation. For MS1, MS2, MS3 and MS7, between 50 and 75 % of LOQ are compliant with QAQC directive. Only for MS5, all LOQ are compliant with QAQC.

	MS1	MS2	MS3	MS4	MS5	MS6	MS7
Number of substance	55	49	38	0	40	0	64
Min LOQn	0,01	0,02	0,01		7E-05		0,0001
Max LOQn	1600	12,5	167		1		67
Median LOQ n	0.7	0,7	0,8		0,04		0,3
LOQst >1,2 (not compliant with QAQC)	27	17	18		0		17
LOQst <=1,2 (compliant with QAQC)	28	32	20		40		47

Table 3 : data treatment by member state (ISW and monitoring data)

The same results are presented in Table 4 and Table 5 for marine waters (OSW). The available data are less numerous than for inland surface waters, especially for monitoring data. Two Member States have mainly adopted the theoretical QAQC LOQ (MS3 and MS5) without or with very little adaptation. MS6 and MS7 adapted the LOQ for about half of the substances. MS4 adapted the LOQ mainly below the target LOQ of the directive and made some little adjustments above this value.

Regarding monitoring data for saline waters, only two sets of data were received. In these data sets, the LOQ are compliant with directive for about half of the substances.

	MS1	MS2	MS3	MS4	MS5	MS6	MS7
Number of substance	0	0	41	51	41	50	57
Min LOQ_n			0,7	0,0004	1	0,06	0,1
Max LOQ_n			1,3	8,3	1	133	667
Median LOQ n			1	0,095	1	1,2	1,1
LOQ_n >1,2 (not compliant with QAQC)			1	7	0	25	23
LOQ_n<=1,2 (compliant with QAQC)			40	44	41	25	34

Table 4 : data treatment by member state (OSW and regulation data)

	MS1	MS2	MS3	MS4	MS5	MS6	MS7
Number of substance	0	0	15	0	0	0	43
Min LOQn			0,06				0,03
Max LOQn			48				8,3
Median LOQn			1,4				0,7
LOQn >1,2 (not compliant with QAQC)			8				18
LOQn <=1,2 (compliant with QAQC)			7				25

Table 5 : data treatment by member state (OSW and monitoring data)

Looking at the overall results, no Member State provided data totally compliant with the QAQC. MS 5 is the closest Member State to a strict compliance with the QAQC. MS3 and MS4 also demonstrate good compliance but only for regulation data (MS3 is far less compliant for monitoring data and MS4 provided no data).
MS7 is the only Member State which gave an answer for all four categories of data. The data provided show an intermediate compliance with QAQC : for each category, about 60% of provided data is compliant with QAQC, except for inland waters monitoring data, where the proportion of compliant data is up to 73%.

4.2 RESULTS BY SUBSTANCE

In this part the results are presented by substances including substances for which the differences between member states LOQ are most important and substances that on average do not meet the QAQC criterion and for which the LOQ has been adapted at a high level above the target LOQ.

4.2.1 INLAND SURFACE WATER

Table 6 shows, for each substance, the value of LOQ max / LOQ min (calculated from the data provided by all member states) for data from the regulation of inland surface water (only the ratios greater than 100 are mentioned). It highlights the substances for which member states have defined very different

LOQ for ISW regulation. For one substance the ratio can be as high as 1000 (for TBT, the minimum LOQ is 0.00001 µg/l (MS4) and it is 0.01 µg/l at maximum (MS1)).

Substance	LOQ max/LOQ min	Number of data
Tributyltin	1000	6
BDE154	625	3
BDE100	625	3
BDE28	625	3
BDE47	625	3
BDE153	625	3
BDE99	625	3
Gamma Hexachlorocyclohexane	625	4
Carbon Tetrachloride	360	6
Pentachlorobenzene	350	6
BDE	333	4
1,2-Dichloroethane	300	6
Benzene	300	6
Tetrachlorethene	300	6
Trichloroethylene	300	6
Beta Hexachlorocyclohexane	200	4
Beta Endosulfan	167	4
Alpha Hexachlorocyclohexane	167	4
Benzo(k)fluoranthene	143	4
Delta Hexachlorocyclohexane	125	4
Benzo(b)fluoranthene	111	4
Alpha Endosulfan	100	4

Table 6 : List of substances for which LOQ max/LOQ min >100 and number of data considered (ISW regulation)

Only for PBDEs, no Member State has defined LOQ compatible with QAQC criterion. In the new EQS directive (2013/39/UE), these substances are to be monitored mainly in biota.

Table 7 presents the substances for which only one Member State has defined in its regulation for ISW a LOQ compliant with QAQC Directive.

Substance	Number of data
Gamma Hexachlorocyclohexane	4
Beta Hexachlorocyclohexane	4
Beta Endosulfan	4
Alpha Hexachlorocyclohexane	4
Delta Hexachlorocyclohexane	4
Alpha Endosulfan	4
Benzo(g,h,i)perylene	4
Indeno(1,2,3-cd)pyrene	3
Dieldrin	4
Aldrin	4
Isodrin	4
Endrin	4

Table 7 : Substances for which only one LOQ is compliant with QAQC directive and number of data considered (ISW regulation)

Table 8 presents the substances for which Member State have adapted LOQ (ISW) at high level compared to QAQC criterion. The "mean standardized LOQ" is defined as the mean of LOQ values provided by all member states.

Substance	Mean LOQ st	Number of data
BDE154	681	3
BDE100	681	3
BDE28	681	3
BDE47	681	3
BDE153	681	3
BDE99	681	3
Tributyltin	30	6
Alpha Endosulfan	22	4
Beta Endosulfan	22	4
Benzo(g,h,i)perylene	18	4
Indeno(1,2,3-cd)pyrene	12	3
Gamma Hexachlorocyclohexane	11	4
Delta Hexachlorocyclohexane	4	4
Alpha Hexachlorocyclohexane	4	4
Beta Hexachlorocyclohexane	4	4
Endrin	4	4
Aldrin	3	4
Isodrin	3	4
Dieldrin	3	4

Table 8 : Substances for which LOQ have been defined at a high level by member state compared to QAQC criterion (mean LOQ are presented and number of data) - ISW regulation

On the other hand, Tables 9 and 10 give a list of substances for which Member States have defined low LOQ compared to the QAQC Directive criterion (for IW only, Table 13 for regulation data and Table 14 for monitoring data). However, it should be noted that regulation data are not extremely low compared to these criterion: indeed, the lowest mean LOQ is only about 40% of the targeted LOQ. Values are much lower for monitoring data since 10 substances have LOQ less than 10% of the targeted LOQ.

Tables 9 and 10 give, for each category of data, the 20 substances for which the mean LOQ are the lowest. Despite the great differences in the orders of magnitude, it can be observed that the two lists have 16 substances in common (including 3 PAHs, 5 HVOCs and 5 "Other Pesticides").

Substance	Mean LOQ n	Number of data
Carbon Tetrachloride	0,37	6
Tetrachlorethene	0,38	6
Trichloroethylene	0,38	6
Naphtalene	0,41	6
Simazine	0,42	6
Atrazine	0,44	6
Nickel	0,44	6
Benzene	0,46	6
Fluoranthene	0,51	6
Isoproturon	0,52	6
1,2-Dichloroethane	0,57	6
Lead	0,58	6
Hexachlorobutadiene	0,59	6
Diuron	0,62	6
Trichlorobenzenes	0,62	6
Chloroform	0,62	6
Alachlor	0,67	5
Dichloromethane	0,68	6
Anthracene	0,69	5
Pentachlorophenol	0,69	6

Table 9 : Substances for which LOQ have been defined at a low level by member state compared to QAQC criterion (mean LOQ are presented and number of data) – ISW regulation

Substance	Mean LOQ n	Number of data
Benzo(b)fluoranthene +Benzo(k)fluoranthene	0,01	1
Naphtalene	0,02	5
Carbon Tetrachloride	0,04	4
Simazine	0,05	5
Anthracene	0,05	5
Benzene	0,05	5
Trichloroethylene	0,05	4
Dichloromethane	0,05	5
Tetrachlorethene	0,08	5
1,2-Dichloroethane	0,10	5
Chlorfenvinphos	0,11	5
Alachlor	0,17	5
Atrazine	0,18	5
Benzo(a)pyrene	0,19	5
Lead	0,19	5
Isoproturon	0,20	4
Nickel	0,22	5
Fluoranthene	0,23	5
Diuron	0,25	4
Pentachlorophenol	0,31	5

Table 10 : Substances for which LOQ have been defined at a low level by member state compared to QAQC criterion (mean LOQ are presented and number of data) - ISW monitoring

The substances in Table 11 are substances for which the dispersions of LOQ of Member States monitoring programs are the highest (above 100). These substances and dispersions are very different from those from the same table for regulatory data (Table 6). This is mostly due to the fact that some laboratories offer much lower LOQ than certain regulatory LOQ which are sometimes based on LOQ issued from QAQC Directive criterion; given that analytical performance of laboratories are sometimes much better.

Substance	LOQ Max/LOQ min	Number of data
Chloroform	20000	5
Trichlorobenzenes	10000	4
Hexachlorocyclohexane	3333	4
Nickel	2667	5
Cadmium	2000	5
Hexachlorobutadiene	1818	5
DDT Total	1667	3
Dichloromethane	1667	5
Hexachlorobutadiene	1010	5
Lead	1000	5
Benzene	505	5
Tetrachlorethene	500	5
Trichloroethylene	500	4
Carbon Tetrachloride	500	4
Trifluralin	400	5
BDE153	267	2
BDE154	267	2
DDD 44'	200	3
Tributyltin	160	3
Benzo(g,h,i)perylene+indeno(1,2,3-cd)pyrene	150	2
BDE100	133	2
BDE47	133	2
BDE99	133	2
4-tert-Octylphenol	100	5
Nonylphenol	100	5
Pentachlorophenol	100	5
Benzo(a)pyrene	100	5
BDE	100	2

Table 11 : Ratio between LOQ max and LOQ min and number of data considered (ISW member state monitoring data).

For substances of Table 12, no LOQ from ISW monitoring reaches the target of the QAQC Directive. The minimum value of the LOQ indicates the distance from the target value. Apart for PBDEs, there is at least one Member State that has monitored these substances with a LOQ close to the QAQC LOQ (LOQ_n <2) and in all cases, less than the EQS. We exclude from this interpretation the value of 20 from cyclodiene pesticides, isolated value that seems to be an outlier regarding the values given on individual substances (aldrin, endrin, dieldrin and isodrin).

Substance	Min LOQn	Number of data
Cyclodiene pesticides	20	1
BDE153	6	2
BDE154	6	2
BDE100	6	2
BDE47	6	2
BDE99	6	2
BDE28	6	1
Benzo(g,h,i)perylene	1,7	4
Indeno(1,2,3-cd)pyrene	1,7	4
Isodrin	1,3	4
Endrin	1,3	4
Aldrin	1,3	4
Dieldrin	1,3	4

Table 12 : Substances with min LOQ_n >1.2 and number of data considered (ISW monitoring)

4.2.2 OTHER SURFACE WATER

Table 13 shows the same data as in paragraph 4.2.1 but for OSW. Note that TBT, which had the highest dispersion for ISW does not appear in the table below (only because a high LOQ defined by one Member State for ISW is absent for OSW). PBDEs are only mentioned by one Member State for OSW with LOQn of 8. In general, the differences between LOQ are identical between ISW and OSW except for isoproturon and simazine. For both substances the very high ratio between LOQ max and LOQ min is related to a very low LOQ indicated by one Member State for both substances (respectively 0.00004 and 0.0003 µg/l) for OSW while these LOQ were 0.01 µg/l for ISW for that Member state.

Substance	LOQ max/LOQ min	Number of data
Isoproturon	2273	5
Simazine	1000	5
Gamma Hexachlorocyclohexane	625	3
Trichloroethylene	600	5
Atrazine	455	5
Chlorfenvinphos	370	5
Carbon Tetrachloride	360	5
Pentachlorobenzene	350	5
1,2-Dichloroethane	303	5
Diuron	303	5
Tetrachlorethene	300	5
Benzene	240	5
Beta Hexachlorocyclohexane	200	3
Beta Endosulfan	167	3
Alpha Hexachlorocyclohexane	167	3
Benzo(k)fluoranthene	142	3
Delta Hexachlorocyclohexane	125	3
Alachlor	112	4
Benzo(b)fluoranthene	111	3
Chlorpyriphos-ethyl	101	5
Alpha Endosulfan	100	3

Table 13 : List of substances for which LOQ max/LOQ min >100 and number of data considered (OSW regulation)

For substances in Table 14, a LOQ compliant with QAQC Directive is defined by none of the Member States. Table 15 shows the substances for which a single member state has planned LOQ compliant with QAQC Directive.

Substance	LOQ min	Number of data
BDE100	8	2
BDE153	8	2
BDE154	8	2
BDE28	8	2
BDE47	8	2
BDE99	8	2
Alpha Endosulfan	6,7	3
Beta Endosulfan	4	3
Endrin	1,3	3

Table 14 : Substances with min LOQ >1.2 and number of data considered (OSW regulation)

Substance	Number of data
Aldrin	3
Isodrin	3
Benzo(g,h,i)perylene	3
Indeno(1,2,3-cd)pyrene	2
Gamma Hexachlorocyclohexane	3
Delta Hexachlorocyclohexane	3
Dieldrin	3
Alpha Hexachlorocyclohexane	3
Beta Hexachlorocyclohexane	3

Table 15 : Substances for which only one LOQ is compliant with QAQC directive and number of data considered (OSW regulation)

Table 16 presents the substances for which the LOQ are adapted at a high level compared to QAQC target LOQ. Naturally, substances for which the EQS are much lower in the OSW vs. ISW appear more clearly in this table compared to table 8 (endosulfan, hexachlorocyclohexanes, pentachlorobenzene, ...).

Substance	Mean LOQst	Number of data
Alpha Endosulfan	269	3
Beta Endosulfan	268	3
Gamma Hexachlorocyclohexane	127	3
BDE100	54	2
BDE153	54	2
BDE154	54	2
BDE28	54	2
BDE47	54	2
BDE99	54	2
Delta Hexachlorocyclohexane	38	3
Alpha Hexachlorocyclohexane	38	3
Beta Hexachlorocyclohexane	38	3
Benzo(g,h,i)perylene	12	3
Pentachlorobenzene	12	5
Endosulfan	10	4
Endrin	7	3
Aldrin	6	3
Isodrin	6	3
Dieldrin	6	3
4-tert-Octylphenol	4	5

Table 16 : Substances for which LOQ have been defined at a high level by member state compared to QAQC criterion (mean LOQ are presented and number of data) – OSW regulation

Given the small number of data (only two Member States provided data), results for monitoring data are not presented for OSW.

The previous results, associated with Figures 1 to 4, enable a distinction between two particular sets of substances:

- On the one hand, substances for which all provided data or at least a large majority of all provided data (inland or saline waters ; regulation or monitoring values) comply with QAQC or are very close to compliance: all substances from the "Other Pesticides" group (except Trifluralin) and the "VOC and HVOC" group (except for Pentachlorobenzene and monitoring data for inland waters),

- On the other hand, substances for which most of data do not comply with QAQC : all substances from the "PBDE" group, all cyclodiene pesticides, all hexachlorocyclohexanes and tributyltin.

5. CONCLUSION

The data in this report have been obtained from a survey in which seven Member States agreed to participate. It concerns the practices in terms of limit of quantification for the analysis of WFD priority substances.

The survey made a distinction between the LOQ defined by Member States in their regulations or national guides and the LOQ observed in the monitoring programs.

In a general observation, data show various practices between Member States on the application of QAQC Directive:

- strict compliance with QAQC criteria in regulation,
- adaptation of LOQ towards LOQ higher than QAQC criteria (up to 2000 times) for about 25 to 50% of substances following member states.
- adaptation significantly below the LOQ of the Directive (360 times) and well below the LOQ defined by most member states.

For fifteen substances, LOQ variations between Member States are above a factor 100 (up to 1000). For ISW, only for PBDEs has no Member state defined LOQ compatible with QAQC. For ten substances, only one Member state has defined a LOQ compliant with QAQC directive.
In the ISW monitoring programs, dispersions of LOQ between Member states are also quite high. They range up to a factor of 20000 and around 20 substances show differences higher than 100 (between LOQ min and LOQ max).
For all substances (except PBDEs), there is at least one Member state for which the LOQ for monitoring are below the EQS (for 5 substances LOQ is between 30% of the EQS and EQS).
Monitoring data are on average slightly lower than LQ defined in regulation.
The number of data received for OSW is low compared to the data for ISW especially for monitoring data.
The very large differences that sometimes exist between Member States LOQ (in regulation or in monitoring) have not been investigated in the present survey.

They might be explained by differences in the analytical methods (for example participation of highly specialized laboratories) but it could also be due to differences in the estimation of the limit of quantification methodologies. For some data (especially for marine water), very low LOQ could also be the consequence of the use of alternative tools (passive sampling for example). Additional investigation should be done if a clearer view of the most probable hypothesis is needed.

ANNEX
COMPILATION OF ALL RECEIVED DATA

Substance	Target LOQ (µg/l)	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
4-tert-Octylphenol	0.03	0.02	-	0.03	0.005	0.03	0.02	0.03
Alachlor	0.09	0.09	-	0.09	0.01	0.09	-	0.02
Aldrin	0.00075	0.003	-	-	0.0003	-	0.005	0.002
Anthracene	0.03	0.03	-	0.03	0.004	0.03	-	0.01
Atrazine	0.18	0.05	-	0.18	0.01	0.18	0.02	0.03
BDE	0.00015	0.05	-	0.00015	0.0005	0.00015	-	-
BDE100	0.000025	0.05	-	-	-	-	0.00008	0.001
BDE153	0.000025	0.05	-	-	-	-	0.00008	0.001
BDE154	0.000025	0.05-0.1	-	-	-	-	0.00008	0.001
BDE28	0.000025	0.05	-	-	-	-	0.00008	0.001
BDE47	0.000025	0.05	-	-	-	-	0.00008	0.001
BDE99	0.000025	0.05	-	-	-	-	0.00008	0.001
Benzene	3	1	-	3	0.01	3	0.2	1
Benzo(a)pyrene	0.015	0.01	-	0.02	0.002	0.015	0.01	0.01
Benzo(b)fluoranthene	0.0045	0.01	-	-	0.00009	-	0.01	0.005
Benzo(b)fluoranthene + Benzo(k)fluoranthene	0.009	-	-	0.009	-	0.009	-	-
Benzo(g,h,i)perylene	0.0003	0.01	-	-	0.0002		0.01	0.001
Benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	0.0006	-	-	0.0006	-	0.0006	-	-
Benzo(k)fluoranthene	0.0045	0.01	-	-	0.00007	-	0.01	0.005
C10-C13-Chloroalcanes	0.12	0.3	-	0.12	-	0.12	-	0.15
Cadmium	0.024	0.1	-	0.075	0.05	0.024	0.02	0.025

Table 17(a)- Data for Inland surface waters (ISW) and regulation LOQ values (MS = Member state)

Substance	Target LOQ (µg/l)	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
Chlorfenvinphos	0.03	0.01	-	0.03	0.01	0.03	0.03	0.03
Chloroform	0.75	0.3	-	0.75	0.01	0.75	0.2	0.8
Chlorpyriphos-ethyl	0.009	0.01	-	0.01	0.01	0.009	0.01	0.01
DDD 44'	0.0025	0.003	-	-	0.0003	-	-	0.003
DDE 44'	0.0025	0.003	-	-	0.0002	-	-	0.003
DDT 24'	0.0025	0.003	-	-	0.0002	-	-	0.003
DDT Total	0.0075	0.008	-	0.0075	-	0.0075	-	-
Di(2-ethylhexyl)phtalate	0.39	0.2	-	0.39	1	0.39	0.4	0.4
1,2-Dichloroethane	3	2	-	3	0.01	3	0.2	2
Dichloromethane	6	2	-	6	0.5	6	5	5
Dieldrin	0.00075	0.003	-	-	0.0002	-	0.005	0.002
Diuron	0.06	0.03	-	0.06	0.01	0.06	0.03	0.03
Endosulfan	0.0015	0.005	-	0.0015	0.0008	0.0015	-	0.005
Alpha Endosulfan alpha	0.00075	0.005	-	-	0.0005	-	0.01	0.05
Beta Endosulfan	0.00075	0.005	-	-	0.0003	-	0.01	0.05
Endrin	0.00075	0.003	-	-	0.0005	-	0.005	0.002
Fluoranthene	0.03	0.01	-	0.03	0.002	0.03	0.01	0.01
Hexachlorobenzene	0.003	0.01	-	0.003	0.0002	0.003	0.005	0.003
Hexachlorobutadiene	0.03	0.01	-	0.03	0.001	0.03	0.005	0.03
Hexachlorocyclohexane	0.006	0.006	-	0.006	0.00027	0.006	-	-
Alpha Hexachlorocyclohexane	0.0015	0.006	-	-	0.00006	-	0.007	0.01
BetaHexachlorocyclohexane	0.0015	0.006	-	-	0.00005	-	0.007	0.01
Delta Hexachlorocyclohexane	0.0015	0.006	-	-	0.00008	-	0.007	0.01
Gamma Hexachlorocyclohexane	0.0015	0.006	-	-	0.00008	-	0.007	0.05

Table 17 (b)- Data for Inland surface waters (ISW) and regulation LOQ values (MS = Member state)

Substance	Target LOQ (µg/l)	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
Indeno(1,2,3-cd)pyrene	0.0003	0.01	-	-	0.0002	-	-	0.001
Isodrin	0.00075	0.003	-	-	0.0003	-	0.005	0.002
Isoproturon	0.09	0.05	-	0.09	0.01	0.09	0.02	0.02
Mercury	0.015	0.05	-	0.015	0.001	0.015	0.02	0.015
Naphtalene	0.72	0.2	-	0.72	0.03	0.72	0.03	0.05
Nickel	6	1	-	6	0.983	6	1	1
Nonylphenol	0.09	0.1	-	0.09	0.1	0.09	0.08	-
DDT 44’	0.003	0.003	-	0.003	0.00009	0.003	0.005	0.003
Pentachlorobenzene	0.0021	0.002	-	0.0021	0.00002	0.0021	0.005	0.007
Pentachlorophenol	0.12	0.01	-	0.12	0.1	0.12	0.05	0.1
Cyclodiene pesticides	0.003	-	-	0.003	-	0.003	-	-
Lead	2.16	1	-	2.16	0.05	2.16	0.2	2
Simazine	0.3	0.1	-	0.3	0.01	0.3	0.02	0.03
Tetrachlorethene	3	0.2	-	3	0.01	3	0.2	0.5
Carbon Tetrachloride	3.6	0.1	-	3.6	0.01	3.6	0.2	0.5
Tributyltin	0.00006	0.01	-	0.00006	0.00001	0.00006	0.0005	0.0002
Trichlorobenzenes	0.12	0.02	-	0.12	0.07	0.12	0.015	0.1
Trichloroethylene	3	0.2	-	3	0.01	3	0.2	0.5
Trifluralin	0.009	0.05	-	0.01	0.01	0.009	0.005	0.01

Table 17(c)- Data for Inland surface waters (ISW) and regulation LOQ values (MS = Member state)

Substance	Target LOQ (µg/l)	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
4-tert-Octylphenol	0.003	-	-	0.003	0.005	0.003	0.02	0.03
Alachlor	0.09	-	-	0.09	0.0008	0.09	-	0.02
Aldrin	0.000375	-	-	-	0.0003	-	0.005	0.002
Anthracene	0.03	-	-	0.03	0.004	0.03	-	0.01
Atrazine	0.18	-	-	0.18	0.0004	0.18	0.02	0.03
BDE	0.00006	-	-	0.00006	0.0005	0.00006	-	-
BDE100	0.00001	-	-	-	-	-	0.00008	0.001
BDE153	0.00001	-	-	-	-	-	0.00008	0.001
BDE154	0.00001	-	-	-	-	-	0.00008	0.001
BDE28	0.00001	-	-	-	-	-	0.00008	0.001
BDE47	0.00001	-	-	-	-	-	0.00008	0.001
BDE99	0.00001	-	-	-	-	-	0.00008	0.001
Benzene	2.4	-	-	2.4	0.01	2.4	0.2	1
Benzo(a)pyrene	0.015	-	-	0.02	0.002	0.015	0.01	0.01
Benzo(b)fluoranthene	0.0045	-	-	-	0.00009	-	0.01	0.005
Benzo(b)fluoranthene + Benzo(k)fluoranthene	0.009	-	-	0.009	-	0.009	-	-
Benzo(g,h,i)perylene	0.0003	-	-	-	0.0002	-	0.01	0.001
Benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	0.0006	-	-	0.0006	-	0.0006	-	-
Benzo(k)fluoranthene	0.0045	-	-		0.00007		0.01	0.005
C10-C13- Chloroalcanes	0.12	-	-	0.12		0.12		0.15
Cadmium	0.06	-	-	0.06	0.05	0.06	0.02	0.025

Table 18(a)- Data for other surface waters (OSW) and regulation LOQ values (MS = Member state)

Substance	Target LOQ (µg/l)	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
Chlorfenvinphos	0.03	-	-	0.03	0.00008	0.03	0.03	0.03
Chloroform	0.75	-	-	0.75	0.01	0.75	0.2	0.8
Chlorpyriphos-ethyl	0.009	-	-	0.01	0.0001	0.009	0.01	0.01
DDD 44'	0.0025	-	-	-	0.0003	-	-	0.003
DDE 44'	0.0025	-	-	-	0.0002	-	-	0.003
DDT 24'	0.0025	-	-	-	0.0002	-	-	0.003
DDT Total	0.0075	-	-	0.0075	-	0.0075	-	-
Di(2-ethylhexyl)phtalate	0.39	-	-	0.39	1	0.39	0.4	0.4
1,2-Dichloroethane	3	-	-	3	0.01	3	0.2	2
Dichloromethane	6	-	-	6	0.5	6	5	5
Dieldrin	0.000375	-	-	-	0.0002	-	0.005	0.002
Diuron	0.06	-	-	0.06	0.0002	0.06	0.03	0.03
Endosulfan	0.00015	-	-	0.00015	0.0008	0.00015	-	0.005
Alpha Endosulfan	0.000075	-	-	-	0.0005	-	0.01	0.05
Beta Endosulfan	0.000075	-	-	-	0.0003	-	0.01	0.05
Endrin	0.000375	-	-	-	0.0005	-	0.005	0.002
Fluoranthene	0.03	-	-	0.03	0.002	0.03	0.01	0.01
Hexachlorobenzene	0.003	-	-	0.003	0.0002	0.003	0.005	0.003
Hexachlorobutadiene	0.03	-	-	0.03	0.001	0.03	0.005	0.03
Hexachlorocyclohexane	0.0006	-	-	0.0006	0.00027	0.0006	-	-
Alpha Hexachlorocyclohexane	0.00015	-	-	-	0.00006	-	0.007	0.01
Beta Hexachlorocyclohexane	0.00015	-	-	-	0.00005	-	0.007	0.01
Delta Hexachlorocyclohexane	0.00015	-	-	-	0.00008	-	0.007	0.01

Table 18(b)- Data for other surface waters (OSW) and regulation LOQ values (MS = Member state)

Substance	Target LOQ (µg/l)	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
Gamma Hexachlorocyclohexane	0.00015	-	-	-	0.00008	-	0.007	0.05
Indeno(1,2,3-cd)pyrene	0.0003	-	-	-	0.0002	-	-	0.001
Isodrin	0.000375	-	-	-	0.0003	-	0.005	0.002
Isoproturon	0.09	-	-	0.09	0.00004	0.09	0.02	0.02
Mercury	0.015	-	-	0.015	0.001	0.015	0.02	0.015
Naphtalene	0.36	-	-	0.36-0.6	0.03	0.36	0.03	0.05
Nickel	6	-	-	6	0	6	1	1
Nonylphenol	0.09	-	-	0.09	0.1	0.09	0.08	
DDT 44'	0.003	-	-	0.003	0.00009	0.003	0.005	0.003
Pentachlorobenzene	0.00021	-	-	0.00021	0.00002	0.00021	0.005	0.007
Pentachlorophenol	0.12	-	-	0.12	0.1	0.12	0.05	0.1
Cyclodiene pesticides	0.0015	-	-	0.001	-	0.0015	-	-
Lead	2.16	-	-	2.16	0.05	2.16	0.2	2
Simazine	0.3	-	-	0.3	0.0003	0.3	0.02	0.03
Tetrachlorethene	3	-	-	3	0.01	3	0.2	0.5
Carbon Tetrachloride	3.6	-	-	3.6	0.01	3.6	0.2	0.5
Tributyltin	0.00006	-	-	0.00006	0.00001	0.00006	0.0005	0.0002
Trichlorobenzenes	0.12	-	-	0.12	0.025	0.12	0.015	0.1
Trichloroethylene	3	-	-	3	0.005	3	0.2	0.5
Trifluralin	0.009	-	-	0.01	-	0.009	0.005	0.01

Table 18(c)- Data for other surface waters (OSW) and regulation LOQ values (MS = Member state)

Substance	Target LOQ	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
4-tert-Octylphenol	0.03	0.02	0.1	0.01	-	0.001-0.03	-	0.005-0.1
Alachlor	0.09	0.01-0.05	0.02	0.04	-	0.002-0.09	-	0.003-0.05
Aldrin	0.00075	0.004	0.002	0.003	-	-	-	0.001-0.025
Anthracene	0.03	0.002	0.001	0.003	-	0.0005-0.03	-	0.001-0.1
Atrazine	0.18	0.05	0.01	0.003-0.01	-	0.1	-	0.003-0.1
BDE	0.00015	-	-	-	-	0.00005-0.00015	-	0.005-0.04
BDE100	0.000025	0.02	-	-	-	-	-	0.00015-0.1
BDE153	0.000025	0.04	-	-	-	-	-	0.00015-0.1
BDE154	0.000025	0.04	-	-	-	-	-	0.00015-0.1
BDE28	0.000025	-	-	-	-	-	-	0.00015-0.1
BDE47	0.000025	0.02	-	-	-	-	-	0.00015-1.25
BDE99	0.000025	0.02	-	-	-	-	-	0.00015-0.075
Benzene	3	0.03-5	0.126	0.5	-	0.1-3	-	0.001-0.5
Benzo(a)pyrene	0.015	0.002	0.002	0.01	-	0.0001-0.005	-	0.0005-0.06
Benzo(b)fluoranthene	0.0045	0.002	0.002	0.01	-	-	-	0.0005-0.03
Benzo(b)fluoranthene + Benzo(k)fluoranthene	0.009	-	-	-	-	0.0001-0.005	-	0.0006-0.05
Benzo(g,h,i)perylene	0.0003	0.001	0.002	0.01	-	-	-	0.0005-0.05
Benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	0.0006	-	-	-	-	0.0001-0.001	-	0.015
Benzo(k)fluoranthene	0.0045	0.002	0.002	0.01	-	-	-	0.0005-0.015

Table 19(a)- Data for inland surface waters (ISW) and monitoring LOQ values (MS = Member state)

Substance	Target LOQ	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
C10-C13- Chloroalcanes	0.12	0.2	-	-	-	0.01-0.15	-	0.1-0.5
Cadmium	0.024	0.1	0.3	0.1-0.05	-	0.01-0.02	-	0.00015-1
Chlorfenvinphos	0.03	0.002	0.01	0.003	-	0.0005-0.05	-	0.001-0.1
Chloroform	0.75	0.5	0.126	1	-	0.00005-0.75	-	0.005-0.5
Chlorpyriphos-ethyl	0.009	0.0005	0.01	0.003	-	0.0005-0.015	-	0.0005-0.16
DDD 44'	0.0025	0.006	0.002	-	-	-	-	0.00006-0.032
DDE 44'	0.0025	0.006	0.004	-	-	-	-	0.001-0.1
DDT 24'	0.0025	0.006	0.004	-	-	-	-	0.001-0.5
DDT Total	0.0075	-	-	0.003	-	0.0003-0.012	-	0.5
Di(2-ethylhexyl)phtalate	0.39	0.05	0.2	-	-	0.02-0.61	-	0.3-4
1,2-Dichloroethane	3	0.5	0.126	10-0.4	-	0.2-3	-	0.2-0.5
Dichloromethane	6	0.5	0.126	1-5	-	0.001-10	-	0.0006-5
Dieldrin	0.00075	0.004	0.004	0.003	-	-	-	0.001-0.4
Diuron	0.06	0.04	0.01	-	-	0.01-0.2	-	0.0006-0.1
Endosulfan	0.0015	-	0.003	0.006	-	0.0005-0.003	-	0.0002-0.1
Alpha Endosulfan	0.00075	0.004	-	-	-	-	-	0.0002-0.08
Beta Endosulfan	0.00075	0.004	-	-	-	-	-	0.0002-0.05
Endrin	0.00075	0.004	0.006	0.003	-	-	-	0.001-0.05
Fluoranthene	0.03	0.02	0.01	0.003-0.01	-	0.0003-0.04	-	0.001-0.5
Hexachlorobenzene	0.003	0.002	0.002	0.01	-	0.001-0.005	-	0.001-0.1
Hexachlorobutadiene	0.03	0.02	0.002	1-5	-	0.03	-	0.001-0.5

Table 19 (b)- Data for inland surface waters (ISW) and monitoring LOQ values (MS = Member state)

Substance	Target LOQ	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
Hexachlorocyclohexane	0.006	-	0.004	1	-	0.0003-0.01	-	0.005-0.075
Alpha Hexachlorocyclohexane	0.0015	0.005	0.002	-	-	-	-	0.001-0.1
Beta Hexachlorocyclohexane	0.0015	0.005	0.002	-	-	-	-	0.001-0.1
Delta Hexachlorocyclohexane	0.0015	0.005	0.004	-	-	-	-	0.001-0.39
Gamma Hexachlorocyclohexane	0.0015	0.002	0.004	-	-	-	-	0.001-0.5
Indeno(1,2,3-cd)pyrene	0.0003	0.001	0.002	0.01	-	-	-	0.0005-1
Isodrin	0.00075	0.01	0.004	0.003	-	-	-	0.001-0.5
Isoproturon	0.09	0.05	0.01	-	-	0.01-0.4	-	0.003-5
Mercury	0.015	0.05	0.03	0.1	-	0.01-0.02	-	0.005-0.5
Naphtalene	0.72	0.02	0.012	0.04	-	0.001-1	-	0.001-0.05
Nickel	6	1	4	1	-	0.5-6	-	0.0015-10
Nonylphenol	0.09	0.02	0.1	0.02	-	0.001-0.1	-	0.0015-0.015
DDT 44’	0.003	0.006	0.002	0.01	-	0.0008-0.005	-	0.001-0.1
Pentachlorobenzene	0.0021	0.01	0.003	0.01	-	0.0002-0.003	-	0.0005-0.1
Pentachlorophenol	0.12	0.02	0.06	0.1	-	0.001-0.2	-	0.003-0.3
Cyclodiene pesticides	0.003	-	-	-	-	-	-	0.06
Lead	2.16	1	1	0.1	-	0.001-3	-	0.003-2
Simazine	0.3	0.05	0.01	0.003	-	0.005-0.5	-	0.002-0.1
Tetrachlorethene	3	0.5	0.126	0.4-1	-	0.001-3	-	0.2-0.5
Carbon Tetrachloride	3.6	0.5	0.126	-	-	0.001-3.6	-	0.001-0.5
Tributyltin	0.00006	0.008	-	-	-	0.00005-0.0001	-	0.0001-0.005
Trichlorobenzenes	0.12	-	0.126	1	-	0.0001-0.12	-	0.005-1
Trichloroethylene	3	0.5	0.126	-	-	0.001-3	-	0.003-0.5
Trifluralin	0.009	0.02	0.004	0.003	-	0.00005-0.012	-	0.005-0.1

Table 19 (c)- Data for inland surface waters (ISW) and monitoring LOQ values (MS = Member state)

Substance	Target LOQ (µg/l)	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
4-tert-Octylphenol	0.003	-	-	0.01	-	-	-	0.02
Alachlor	0.09	-	-	-	-	-	-	0.01
Aldrin	0.000375	-	-	-	-	-	-	0.005
Anthracene	0.03	-	-	0.01	-	-	-	0.005
Atrazine	0.18	-	-	0.01	-	-	-	0.02
BDE	0.00006	-	-	-	-	-	-	-
BDE100	0.00001	-	-	-	-	-	-	-
BDE153	0.00001	-	-	-	-	-	-	-
BDE154	0.00001	-	-	-	-	-	-	-
BDE28	0.00001	-	-	-	-	-	-	-
BDE47	0.00001	-	-	-	-	-	-	-
BDE99	0.00001	-	-	-	-	-	-	-
Benzene	2.4	-	-	-	-	-	-	0.5
Benzo(a)pyrene	0.015	-	-	-	-	-	-	0.005
Benzo(b)fluoranthene	0.0045	-	-	-	-	-	-	0.005
Benzo(b)fluoranthene + Benzo(k)fluoranthene	0.009	-	-	-	-	-	-	0.02
Benzo(g,h,i)perylene	0.0003	-	-	-	-	-	-	0.002
Benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	0.0006	-	-	-	-	-	-	-
Benzo(k)fluoranthene	0.0045	-	-	-	-	-	-	0.005
C10-C13- Chloroalcanes	0.12	-	-	-	-	-	-	0.4
Cadmium	0.06	-	-	0.3-0.1	-	-	-	0.2

Table 20(a)- Data for other surface waters (OSW) and monitoring LOQ values (MS = Member state)

Substance	Target LOQ (µg/l)	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
Chlorfenvinphos	0.03	-	-	-	-	-	-	0.02
Chloroform	0.75	-	-	-	-	-	-	0.5
Chlorpyriphos-ethyl	0.009	-	-	-	-	-	-	0.02
DDD 44'	0.0025	-	-	0.0002	-	-	-	-
DDE 44'	0.0025	-	-	-	-	-	-	-
DDT 24'	0.0025	-	-	0.0002	-	-	-	-
DDT Total	0.0075	-	-	-	-	-	-	-
Di(2-ethylhexyl)phtalate	0.39	-	-	0.1	-	-	-	-
1,2-Dichloroethane	3	-	-	-	-	-	-	0.5
Dichloromethane	6	-	-	-	-	-	-	0.5
Dieldrin	0.000375	-	-	-	-	-	-	0.005
Diuron	0.06	-	-	-	-	-	-	0.02
Endosulfan	0.00015	-	-	-	-	-	-	0.0005
Alpha Endosulfan	0.000075	-	-	-	-	-	-	-
Beta Endosulfan	0.000075	-	-	-	-	-	-	-
Endrin	0.000375	-	-	-	-	-	-	0.005
Fluoranthene	0.03	-	-	0.01	-	-	-	0.005
Hexachlorobenzene	0.003	-	-	0.01	-	-	-	0.005
Hexachlorobutadiene	0.03	-	-	0.1	-	-	-	0.1
Hexachlorocyclohexane	0.0006	-	-	-	-	-	-	-
Alpha Hexachlorocyclohexane	0.00015	-	-	-	-	-	-	0.005
Beta Hexachlorocyclohexane	0.00015	-	-	-	-	-	-	0.005
Delta Hexachlorocyclohexane	0.00015	-	-	-	-	-	-	0.005

Table 20 (b)- Data for other surface waters (OSW) and monitoring LOQ values (MS = Member state)

Substance	Target LOQ (µg/l)	MS 1	MS 2	MS 3	MS 4	MS 5	MS 6	MS 7
Gamma Hexachlorocyclohexane	0.00015	-	-	-	-	-	-	0.005
Indeno(1,2,3-cd)pyrene	0.0003	-	-	-	-	-	-	0.002
Isodrin	0.000375	-	-	-	-	-	-	0.005
Isoproturon	0.09	-	-	-	-	-	-	0.02
Mercury	0.015	-	-	0.5	-	-	-	0.05
Naphtalene	0.36	-	-	-	-	-	-	0.05
Nickel	6	-	-	3	-	-	-	1
Nonylphenol	0.09	-	-	-	-	-	-	-
DDT 44’	0.003	-	-	-	-	-	-	0.005
Pentachlorobenzene	0.00021	-	-	0.01	-	-	-	0.0005
Pentachlorophenol	0.12	-	-	-	-	-	-	0.1
Cyclodiene pesticides	0.0015	-	-	-	-	-	-	-
Lead	2.16	-	-	3	-	-	-	1
Simazine	0.3	-	-	-	-	-	-	0.02
Tetrachlorethene	3	-	-	-	-	-	-	0.5
Carbon Tetrachloride	3.6	-	-	-	-	-	-	0.1
Tributyltin	0.00006	-	-	0.0001	-	-	-	-
Trichlorobenzenes	0.12	-	-	-	-	-	-	-
Trichloroethylene	3	-	-	-	-	-	-	0.5
Trifluralin	0.009	-	-	-	-	-	-	-

Table 20 (c)- Data for other surface waters (OSW) and monitoring LOQ values (MS = Member state)