

## **HELCOM RECOMMENDATION 10/3**

(Supersedes the present HELCOM Recommendation 8/1)

Adopted 14 February 1989 having regard to Article 13,  
Paragraph b) of the Helsinki Convention

### **MONITORING OF RADIOACTIVE SUBSTANCES**

#### **THE COMMISSION,**

**RECALLING** Paragraph 1 of Article 6 of the Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1974 (Helsinki Convention), in which the Contracting Parties undertake to take all appropriate measures to control and minimize land-based pollution of the marine environment of the Baltic Sea Area, and Paragraph 2 of Article 6, in which the Contracting Parties undertake to take all appropriate measures to control and strictly limit pollution by noxious substances and materials in accordance with Annex II of the Convention,

**RECALLING ALSO** Paragraph 3 of Article 16 of the Helsinki Convention, in which the Contracting Parties undertake directly, or when appropriate, through competent regional or other international organizations and other basis of the information and data acquired pursuant to Paragraphs 1 and 2 of Article 16, to cooperate in developing intercomparable observation methods, in performing baseline studies and in establishing complementary or joint programmes for monitoring,

**NOTING** the concern for the effects of radioactive substances on the environment, due to accidental or other releases,

**NOTING FURTHER** the decision by the Commission that the monitoring of radioactive substances be started in 1985 as a continuation of the previous work coordinated by IAEA,

**DESIRING** to protect the Baltic Sea against harmful effects to be possibly caused by radioactive substances,

**BEING MINDFUL** of the need of reliable data on the radionuclides in the different compartments of the environment,

**RECOMMENDS** to the Governments of the Contracting Parties to the Helsinki Convention that:

- a) each Baltic Sea State should have environmental stations on the sea or on the coast, and the Commission will be informed about the positions of the stations;
- b) the list contained in the Attachment to this Recommendation should be used as the basis for the environmental monitoring programme in all Baltic Sea States, bearing in mind that the list consists of minimum requirements, and that the voluntary measurements are also highly recommended as essential complementary information;

- c) guidelines for the monitoring programme prepared by experts and adopted by the Commission (Attachment to this Recommendation) should be followed as detailed as possible including the guidelines for reporting of data;
- d) the release data should be reported to the Commission according to the guidelines,

**RECOMMENDS ALSO** that the Baltic Sea States would report their data to the Commission once every year by 1 June.

**ATTACHMENT  
to HELCOM Recommendation 10/3**

**GUIDELINES FOR MONITORING OF RADIOACTIVE SUBSTANCES**

**1. Environmental monitoring**

- 1.1 with reference to sub-paragraph a) routine stations
- 1.2 with reference to sub-paragraph a) maps
- 1.3 with reference to sub-paragraph b) radionuclides to be monitored
- 1.4 with reference to sub-paragraph c) forms to be used for reporting environmental data

**2. Release data**

- 2.1 with reference to sub-paragraph d) release data to be reported
- 2.2 with reference to sub-paragraph d) form to be used for reporting release data

1. Environmental monitoring
- 1.1 Routine station network for regular monitoring programme is recommended as indicated in the following list and the maps.

Additional stations are recommended to be sampled and data to be reported accordingly.

A. WATER SAMPLES

\*) st. = station(s) - location indicated in the maps attached (1.2))

1. Belt Sea and Baltic Proper

DK= 4 st. \*)  
FI= 3 st.  
DD= 10 to 20 st. (1 coastal st.)  
DE= 5 to 20 st.  
PL= 6 st. 3 (open sea st.) + 3 (coastal st.)  
SU= 5 st.

The regions covered are:

Denmark = Belt Sea  
Finland = North, Central, South  
German Democratic Republic = Central, South-west  
Federal Republic of Germany = South-west  
Poland = South  
Union of Soviet Socialist Republics = East

2. Great Belt and Sound

DK = 9 st.  
DE = 2 st.

3. Kattegat and Skagerrak

DK = 5 st. (occasionally)  
DE = about 8 st.  
SE = 1 st.

4. Gulf of Finland

FI = 3 st. (1 open sea, 2 coastal st.)  
DD = 2 st.  
SU = 6 st.

5. Gulf of Bothnia

FI = 3 st. (2 open sea, 1 coastal st.)  
SE = 1 st. (open/coastal)

B. SEDIMENT SAMPLES / SINKING MATTER

1. Baltic Proper

FI = 2 st.  
DD = 3 st. (coastal st.)  
PL = 6 st. (3 open sea, 3 coastal st.)  
SE = 1 open (1 coastal st.)  
SU = 2 st. (open sea)

2. Belt Sea and Kattegat

DK = 3 st.  
DE = 5 st. (maximum)  
SE = 2 coastal st.

3. Gulf of Finland

FI = 2 open sea st., 2 coastal st. (sinking matter)  
SU = 2 open sea st.

4. Gulf of Bothnia

FI = 2 open sea st., 1 coastal st. (sinking matter)  
SE = 1 coastal st.

C. FISH SAMPLES

( \*\*) [ ] = information uncertain)

1. Baltic Proper

DD = commercial catches (1 open, 1 coastal)  
DE = commercial catches (open sea areas) \*\*)  
PL = commercial catches (Gulf of Gdansk, open sea areas)  
SE = 3 st. (1 open sea st., 2 coastal st.)  
SU = 3 st. (coastal)

2. Belt Sea and Kattegat

DK = commercial catches  
SE = 1 st. (open)

3. Gulf of Finland

FI = 2 st.  
SU = 3 st. (coastal)

4. Gulf of Bothnia

FI = 3 st.  
SE = 2 st. (coastal)



D. AQUATIC PLANTS (coastal stations)

1. Baltic Proper  
DD = 2 st.  
SE = 1 st. (open/coastal)  
SU = 4 st.
2. Belt Sea and Kattegat  
DK = about 6 st.  
SE = 3 st.
3. Gulf of Gdansk  
PL = 3 st.
4. Gulf of Finland  
FI = 1 st.  
SU = 3 st.
5. Gulf of Bothnia  
FI = 1 st.  
SE = 1 st.

E. BENTHIC ANIMALS

1. Baltic Proper  
DD = 4 st.  
PL = 2 st.  
SE = 1 st.
2. Belt Sea and Kattegat  
DK = 2 st.  
SE = 3 st.
3. Gulf of Finland  
FI = 1 st.
4. Gulf of Bothnia  
FI = 1 st.  
SE = 1 st.

1.2 Maps indicating location of the sampling areas:

- Map 1. The sampling stations of Finland, German Democratic Republic, Sweden and USSR for sea water and the sites of the nuclear power stations.
- Map 2. The sampling stations of Denmark, Federal Republic of Germany and Poland for sea water.
- Map 3. The sampling stations for sediment/sinking matter.
- Map 4. The sampling stations for aquatic plants and benthic animals.
- Map 5. The sampling areas for fish.

Abbreviations used for the names of the Contracting Parties:

DK = Denmark  
FI = Finland  
DD = German Democratic Republic  
DE = Federal Republic of Germany  
PL = Polish People's Republic  
SE = Sweden  
SU = Union of Soviet Socialist Republics



Maps 1. - 5.

1.3 Radionuclides to be monitored

	<b>Sample</b>	<b>Obligatory</b>	<b>Voluntary</b>	<b>Desirable remarks</b>
A.	Water (results in Bq m <sup>-3</sup> )	Radiocesium *) Sr-90 *)	H-3; Tc-99 Pu-239,240; Am-241; γ -emitters	salinity, temperature, sample depth, total depth
B.	Sediment (results in Bq kg <sup>-1</sup> dry wt. and Bq m <sup>-2</sup> )	γ -emitters ***)	Sr-90; Pu-239,240; Am-241; natural radionuclides (e.g. Po-210)	type of sediment (mud, sand etc.), grain size distribution, water content, carbon content, oxic / anoxic, density, mass depth (kg m <sup>-2</sup> ), sample treatment and storage, sedimentation rate
C.	Fish (result in Bq kg <sup>-1</sup> wet wt.)	γ -emitters ***)	Sr-90; natural radionuclides (e.g. Po-210)	species, total fish or organ (fraction), size, age, sex
D.	Aquatic plants (results in Bq kg <sup>-1</sup> dry wt.)	γ -emitters ***)	Sr-90; Tc-99; Pu-239,240; Am-241; natural radionuclides	species
E.	Benthic animals (results in Bq kg <sup>-1</sup> dry wt.)	γ -emitters ***)	Sr-90; Tc-99; natural radionuclides (e.g. Po-210); Pu-239,240; Am-241	species, fraction
F.	Sinking matter (results in Bq kg <sup>-1</sup> dry wt.)	cf. sediment	cf. sediment	dry weight (%), ignition loss (%)

\*) Cs-137 and Cs-134, if possible

- \*\* ) regularly, on a carefully selected number of samples
- \*\*\* ) K-40, Cs-137 and other  $\gamma$ -emitters identified in the  $\gamma$ -spectrum

#### 1.4 Forms to be used for reporting environmental data (4)

- for sea water
- for bottom sediment
- for biota
- for sinking matter

HELCOM/MORS REPORTING FORMAT  
FOR SEA WATER

1. Form identifier code |   W   |
2. Country |    |
3. Laboratory |    |
4. Sequence number |    |
5. Sampling date |    |
6. Sampling station |    |
- Lat. |    |
- Lon. |    |
7. Total depth (m) |    |
8. Sample depth (m) |    |
9. Water salinity (‰) |    |
10. Water temperature (°C) |    |
11. Filtrated/not filtrated sample |    |



HELCOM/MORS REPORTING FORMAT  
FOR BOTTOM SEDIMENT

- |     |                                |   |
|-----|--------------------------------|---|
| 1.  | Form identifier code           | S |
| 2.  | Country                        |   |
| 3.  | Laboratory                     |   |
| 4.  | Sequence number                |   |
| 5.  | Sampling date                  |   |
| 6.  | Sampling station               |   |
|     | Lat.                           |   |
|     | Lon.                           |   |
| 7.  | Sampling device/method         |   |
| 8.  | Total depth (m)                |   |
| 9.  | Core slice depth from surface  |   |
|     | upper (cm)                     |   |
|     | lower (cm)                     |   |
| 10. | Sampled area (m <sup>2</sup> ) |   |
| 11. | Type of sediment               |   |
| 12. | Oxic/anoxic                    |   |
| 13. | Dry weight (%)                 |   |
| 14. | Ignition loss (%)              |   |





HELCOM/MORS REPORTING FORMAT  
FOR BIOTA

1. Form identifier code | B |
2. Country | | |
3. Laboratory | | | | |
4. Sequence number | | | | |
5. Sampling date | | | | | | |
6. Sampling area/station | | | | | | |  
    Lat. | | | | | | |  
    Lon. | | | | | | |
7. Sample depth (m) | | | |
8. Species code (Rubin) | | | | | | | | |
9. Tissue code | | |
10. Number of specimen in the sample | | | |
11. Average size of specimen  
    Length (cm) | | | |  
    Weight (g) | | | | |
12. Dry weight (%) | | |
13. Ignition loss (%) | | |



HELCOM/MORS REPORTING FORMAT  
FOR SINKING MATTER

1. Form identifier code | M |
2. Country | | |
3. Laboratory | | | | |
4. Sequence number | | | | | |
5. Sampling period  
    from | | | | | | |  
    to | | | | | | |
6. Sampling station | | | | | | |  
    Lat. | | | | | | |  
    Lon. | | | | | | |
7. Sampling device/method | | |
8. Total depth (m) | | | |
9. Sample depth (m) | | | |
10. Dry weight (%) | | |
13. Ignition loss (%) | | |



Guidelines for filling the HELCOM/MORS  
Reporting formats

The forms for sea water, bottom sediment, biota and sinking matter should be filled in according to the following description.

Item	Code Description
Form identifier code	W = sea water S = bottom sediment B = biota M = sinking matter
Country	Denmark = 26 Federal Republic of Germany = 06 Finland = 34 German Democratic Republic = 96 Polish Peoples Republic = 67 Sweden = 77 Union of Soviet Socialist Republics = 90
Laboratory	Insert a four-letter mnemonic code for your laboratory: RISO Risø National Laboratory (DK) DHIG Deutsches Hydrographisches Institut (DE) STUK Finnish Centre for Radiation and Nuclear Safety (FI) SAAS Staatliches Amt für Atomsicherheit und Strahlenschutz (DD) CLOR Central Laboratory for Radiological Protection (PL) NCRS National Swedish Environmental Protection Board, Coastal Research Laboratory (SE)
Sequence number	Insert the number of your W, S, B and M format being filled <u>1818101011</u> for the first form in 1988 (the two first digits are for the year).
Sampling date	Indicate the year (last two digits only), month and date of the sampling, e.g. <u>181811121311</u>
Sampling station	Insert first the code of the sampling station (without spaces), e.g. <u>1B1Y1115</u>     or  <u>1L1O1V12</u>     or  <u>1T1E111L1111</u>
	and then the coordinates as follows: 60° 15, 5' = <u>161011151510</u>

Note that decimal fractions of minutes are recorded and not seconds. N (north) and E (east) are not needed in the Baltic Sea.

Total depth and  
sample depth (m)  
(W7-8, S8, B8, M8-9)

Insert the depth in metres, e.g.

0.1 m = 1010101

1.20 m = 1010111

240 m = 1214101

Water salinity (‰)  
(W9)

6.85 ‰ = 101618151

Water temperature (°C)  
(W10)

5.1 °C = 1015111

Filtrated/not filtrated  
sample  
(W11)

Insert F if filtrated or N if not filtrated

Sampling device/method  
(S7, M7)

Make a list of the methods used in your laboratory and insert your own numeric code into the form according to the list. Keep up a corresponding catalog on the descriptions of methods - Example: 10111 Sediment sampling with the Niemistö corer used by STUK since 1977. Reference: Niemistö, L., A gravity corer for studies of soft sediments. Merentutkimuslait. Julk./Havsforskningsinst. Skr. 238, 33-38, Helsinki, 1974. 10121 Sediment sampling with box corer used by STUK... The HELCOM data bank should have an up-to-date catalog on all the methods used in your laboratory.

Core slice depth  
from surface  
(S9)

Insert the upper and lower limit of the slice depth in centimetres, e.g.

0-2 cm = upper 10101

lower 10121

2-4 cm = upper 10121

lower 10141

Sampled area (m<sup>2</sup>)  
(S10)

Indicate, which area of bottom surface the sample represents, e. g. 5 subsamples with the Niemistö corer (Ø5 cm) = 5 x 19.6 cm<sup>2</sup> = 98.2 cm<sup>2</sup> = 101011101 m<sup>2</sup>

Type of sediment  
(S11)

Main codes:

0 = gravel

1 = sand

2 = fine sand

3 = silt

4 = clay

5 = mud ("gyttja")

The numbers 0-5 have the same meaning both as first and second digit, but the first is always the dominating component in the sample, e.g.

1310 = silt and gravel,

1314 = silt and clay.

Pure gravel = 1010

pure sand = 1111

pure f. sand = 1212

pure silt = 1313

pure clay = 1414

pure mud = 1515

Additional codes:

6 = glacial clay characteristic for the Baltic Sea.

Number 7 as second digit means "soft". e.g.

1417 = soft clay

Number 8 as second digit means "sulphidic", e.g.

1418 = sulphidic clay

Number 9 as second digit means, that the sample consist ferromanganese concretions.

Mass depth (kg m<sup>-2</sup>)  
(S11)

Deleted during editorial work after STC 15.

Oxic/anoxic  
(S12)

Insert O if the surface layer of the sediment is oxic  
or A if anoxic.

Dry weight (%)  
(S13, B12, M10)

Dry weight in percents from fresh weight

Ignition loss (%)  
(S14, B13, M11)

Ignition loss in percents from dry weight

Species code (Rubin)  
(B8)

The RUBIN 8-letter codes are strongly preferred. Codes for some common species are as follows:

FUCU VES = Fucus vesiculosus

CLAD GLO = Cladophora glomerate

MACO BAL = Macoma baltica

MYTI EDU = Mytilus edulis

SADU ENT = Saduria entomon (syn. Mesidotea e.)

CLUP HAR = Clupea harengus

GADU MOR = Gadus morhua

Tissue code  
(B9)

Insert a code for the tissue or fraction analysed  
as follows:

FISH AND MAMMALS

- 01 fish as whole
- 02 as whole, without entrails
- 03 as whole, without head and entrails
- 04 flesh with bones
- 05 flesh without bones (fillets)
- 06 head
- 07 fins
- 08 skin/epidermis
- 09 scales
- 10 bones
- 11 gills
- 12 entrails
- 13 stomach
- 14 intestine
- 15 stomach + intestine
- 16 heart
- 17 blood
- 18 liver
- 19 kidney
- 20 ovary
- 21 testes

INVERTEBRATES

- 41 whole animals
- 42 shells
- 43 soft parts

PLANTS

- 51 whole haptophytic plants
- 52 loose - lying plants
- 53 growing tips
- 54 upper parts of plants
- 55 lower parts of plants

Radionuclide

First the symbol of element and then the mass number (without spaces), e.g.

| K40 |

| SR90 |

| CS137 |

| AG110M |

| PU239240 |

| CM243244 |

Anal. method

Insert your own code for analyse method, cf. sampling device/method





Value + exp. term

Insert the result in exponential form, first the mantissa and then the signed exponential term as follows:

$$\begin{aligned} 22\,000 &= \underline{2.2} \times 10^{+4} \\ 1.54 &= \underline{1.54} \times 10^{+0} \\ 0.003 &= \underline{3} \times 10^{-3} \\ 0.076 &= \underline{7.6} \times 10^{-2} \end{aligned}$$

(The results of sediment analyses are recommended to give both in  $\text{Bq kg}^{-1}$  dry wt. and in  $\text{Bq m}^{-2}$ )

Error

Insert the analytical error in percents (1 sigma).

Basis  
(B)

Insert a one-letter code for the basis on which the value is being reported, as follows:

W = wet weight (fresh weight)

D = dry weight

A = ash weight (not recommended)

2. Release data

2.1 Release data to be reported:

- 1) Discharges into the aquatic environment from the nuclear power plants  
- on obligatory basis
- 2) Discharges into air from the nuclear power plants and other releases, if significant  
- on voluntary basis
- 3) Only nuclides with a longer half-life than one week should be reported
- 4) Other necessary monitoring is encouraged to be carried out e.g. related to airborne pollution, river discharges etc.

## 2.2 Form to be used in reporting release data

REPORTING FORMAT

Radioactive Discharges to the Baltic Sea from Land Based Sources

1. **FACILITY**

1.1 NAME \_\_\_\_\_  
\_\_\_\_\_

1.2 COUNTRY \_\_\_\_\_

1.3 TYPE OF FACILITY (e.g. reactor, fuel cycle operations, laboratory, mine etc.)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

1.4 LOCATION - REGION \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

1.5 YEAR OPERATION COMMENCED \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. **RIVER** (in case of inland based sources) \_\_\_\_\_  
\_\_\_\_\_

2.1 NEAREST RIVER OR ROUTE FOR EFFLUENT TO REACH BALTIC SEA \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2.2 AVERAGE ANNUAL RIVER FLOW ( $m^3s^{-1}$ ) \_\_\_\_\_  
\_\_\_\_\_

MINIMUM \_\_\_\_\_  
\_\_\_\_\_

MAXIMUM \_\_\_\_\_  
\_\_\_\_\_

3.

**RADIOACTIVE DISCHARGE**

3.1 TOTAL ANNUAL DISCHARGE OF RADIONUCLIDES IN LIQUID EFFLUENTS FROM SITE (half-life longer than one week):

		<u>YEAR</u>	
Nuclide	Bq	Nuclide	Bq
	_____		_____
		_____	_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____

3.2 AIRBORNE DISCHARGES FROM SITE (on voluntary basis):

Nuclide	Bq	Nuclide	Bq
	_____		_____
		_____	_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____

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3.3 ESTIMATE OF FRACTION OF ABOVE MENTIONED RADIONUCLIDES REACHING THE BALTIC SEA

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4. **ADDITIONAL INFORMATION**

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