

Chapter 3.

Summary of the Results of the Monitoring of Water and Bottom Sediments (Fiscal Year 1998)

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1. Purpose of the survey

The purpose of this survey is to observe annually the pollution in the environment by chemical substances (especially Class 1 Specified Chemical Substances) which have been confirmed to persist in water and bottom sediments from results of environmental surveys etc., by way of grasping the long term environmental persistence of these substances, by using gas chromatography/ mass spectrometer (GC/MS) which has a characteristic of being able to analyze many different kinds of chemical substances simultaneously with high sensitivity.

2. Outline of the survey

(1) Surveyed substances

A total of 20 substances as shown in Table 3-1 and 3-2.

(2) Surveyed areas

A total of 18 areas (8 rivers, 7 seas, 3 lakes and marshes) as shown in Figure 3-1.

(3) Sampling method

In principle, one sample each of water and bottom sediments is collected in each surveyed area. For quality control sake, the sample homogenized uniformly prior to the analysis is divided into 2 parts, analytical samples A and B.

When the difference between two analytical values of A and B exceeds the allowable limits, the analysis shall be repeated. A reagent control shall be included in samples for the analysis.

(4) Analytical method

Prior to the analysis a test is to be conducted to confirm that the expected performance can be achieved with the GC/MS equipment, using the standard solution containing the surveyed substances. GC/MS equipment is also checked with DFTPP (Decafluorotriphenylphosphine) in accordance with the standard operating procedure.

The calibration curve for analysis shall be prepared using over the 5 point range. The relative response factor is obtained from the ratio of the equipment responses between analyte and internal standard or surrogate compound. The daily variation of the relative response factor shall not exceed $\pm 20\%$, and the drift shall be within $\pm 15\%$. Unknown

sample for round robin test shall be analyzed to check the precision and accuracy.

3. Survey Results

The survey results up to fiscal year 1998 have been indicated in Table 3-1.

In water, a total of 5 substances out of 20 substances, namely o-dichlorobenzene, m-dichlorobenzene, p-dichlorobenzene, BHT and tributyl phosphate were detected. All 20 substances were detected in bottom sediments.

The results of each surveyed area in the fiscal year 1998 survey are as follows. In water, none of the substances subject to the survey were detected in the 6 areas of Lake Jusan, the river in Kofu City, Lake, Kobe Port, offshore of Himeji (Harimanada), offshore of Mizushima and the mouth of Shimanto River. In the other 12 areas, only 1 to 3 substances were detected, so the detected situation has been low in general.

The detected situation in bottom sediments was generally higher compared to water, and in 14 areas excluding the river in Kofu City (no substance), offshore of Himeji (Harimanada) (4 substances), offshore of Mizushima (4 substances) and Gotanda Bridge of Gotanda River (2 substance), 5 to 20 substances were detected in each area. And at the mouth of Yamato River all of the 20 substances were detected. The area where more than 11 substances (more than half of the substances subject to the survey) were detected, except the mouth of Yamato River, were Kobe Port (15 substances), Osaka Port (14 substances), Dokai Bay (13 substances), Lake Suwa (13 substances) and the mouth of Sumida River (13 substances). The areas where the highest detected value for each surveyed substance was recorded were the mouth of Yamato River (9 substances), Dokai Bay (5 substances), Osaka Port (3 substances), the mouth of Sumida River (2 substances) and the mouth of Ishikari River (1 substance). This indicates that the pollution level is high in inner bays with closed nature.

Table 3-1 Summary of the Results of Monitoring of Water

Chemical substances	Water (μ g/L)																									
	'98		'97		'96		'95		'94		'93		'92		'91		'90		'89		'88		'87		'86	
	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.
HCB*	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	1	0.0005	1	0.0033	1	0.0054	0	—
Dieldrin*	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	1	0.011	0	—	0	—	0	—
p, p'-DDE	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	1	0.0007	0	—
p, p'-DDD	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—
p, p'-DDT*	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—
trans-Chlordane*	0	—	0	—	0	—	0	—	0	—	1	0.0004	0	—	0	—	0	—	0	—	0	—	1	0.0016	0	—
cis-Chlordane*	0	—	0	—	0	—	0	—	0	—	1	0.0003	0	—	0	—	0	—	0	—	0	—	1	0.0009	1	0.01
trans-Nonachlor*	0	—	0	—	0	—	0	—	0	—	1	0.0002	0	—	0	—	0	—	1	0.005	0	—	1	0.0008	0	—
cis-Nonachlor*	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	1	0.004	0	—	0	—	0	—
Oxychlordane*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	—	0	—
α -HCH	0	—	0	—	0	—	0	—	0	—	1	0.0053	0	—	0	—	0	—	0	—	1	0.0019	1	0.0018	0	—
β -HCH	0	—	0	—	0	—	0	—	0	—	0	—	1	0.009	1	0.026	2	0.012	2	0.010	3	0.045	1	0.010	0	—
o-Dichlorobenzene	2	0.013	6	0.034	7	0.085	5	0.029	3	0.21	5	0.087	7	0.29	4	0.034	5	0.045	6	0.16	3	0.23	3	0.41	3	0.62
m-Dichlorobenzene	2	0.013	3	0.049	7	0.046	4	0.012	2	0.018	3	0.028	5	0.025	3	0.012	4	0.022	3	0.019	4	0.028	1	0.036	1	0.06
p-Dichlorobenzene	11	0.094	12	0.242	12	0.1752	8	0.44	9	0.28	13	1.0	13	0.42	12	0.18	8	1.2	6	2.5	8	1.8	8	0.51	5	0.46
BHT	4	0.092	3	0.073	3	0.19	2	0.059	3	0.030	4	0.15	3	0.42	2	0.043	1	0.0046	2	0.061	3	0.052	—	—	0	—
o-Terphenyl	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	1	0.0011	0	—	1	0.0008	1	0.007	0	—
m-Terphenyl	0	—	0	—	0	—	0	—	1	0.0074	1	0.0017	1	0.0028	0	—	1	0.005	0	—	0	—	1	0.0004	1	0.01
p-Terphenyl	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—
Tributyl phosphate	2	0.23	3	0.152	1	0.0625	4	0.072	4	0.45	—	—	4	0.033	3	0.22	3	0.13	2	0.18	5	0.56	—	—	—	—
Benzo [a] pyrene	0	—	0	—	0	—	0	—	0	—	1	0.017	0	—	0	—	—	—	—	—	—	—	—	—	—	—
Total samples	18		18		18		18		17		19		18	(Note)	18	(Note)	18	(Note)	17	(Note)	22		20		18	

(Note) As for fiscal year 1989, the total samples are 16, 16 and 15 for p-dichlorobenzene, BHT and tributyl phosphate, respectively.

As for fiscal year 1990, the total samples are 16 and 17 for cis-nonachlor and tributyl phosphate, respectively.

As for fiscal year 1991 and 1992, the total samples are 17 for tributyl phosphate in each year.

*denotes Class 1 Specified Chemical Substances.

Table 3-2 Summary of the Results of Monitoring of Bottom Sediments

Chemical substances	Bottom sediments (ng/g·dry)																									
	'98		'97		'96		'95		'93		'94		'92		'91		'90		'89		'88		'87		'86	
	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.
HCB*	3	7.8	3	7.5	4	6.9	7	10	12	2	10	12	10	12	8	14	3	11	5	9.2	5	6.0	7	16	0	—
Dieldrin*	3	1.1	3	3.3	1	1.62	3	9.2	4	3	1	4.9	4	3.4	2	2.2	0	—	1	1.9	1	0.56	2	3.4	0	—
p, p'-DDE	13	41	12	8.3	14	34	8	28	14	52	12	29	11	60	12	74	8	51	10	37	11	12	8	13	0	—
p, p'-DDD	7	5.5	5	5.9	7	7.5	8	18	10	7.0	10	13	9	12	8	18	7	34	4	40	6	30	4	4.6	0	—
p, p'-DDT*	3	5.7	1	7.57	3	5.0	2	5.8	10	7.8	6	20	7	10	5	13	5	15	3	11	2	1.4	5	12	0	—
trans-Chlordane*	10	5.4	9	6.5	10	3.87	5	3.9	9	11	6	7.9	10	14	9	16	8	21	5	17	8	6.3	9	35	0	—
cis-Chlordane*	6	5.2	6	5.93	9	5	4	4.5	8	12	7	7.5	9	13	8	15	6	20	6	20	7	12	8	34	1	0.01
trans-Nonachlor*	7	4.4	8	6.12	6	3.28	4	4.1	8	8.9	5	6.7	8	12	7	14	5	12	4	13	7	5.5	9	30	0	—
cis-Nonachlor*	4	2	4	2.37	4	3	5	5.3	7	3.7	4	2.5	6	4.6	5	4.4	2	6.3	4	4.9	3	2.0	5	3.8	0	—
Oxychlordane*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0	—	0	—
α-HCH	1	0.38	1	0.42	2	5.0	2	1.7	3	2	3	2.0	2	0.72	1	2.0	1	2.5	0	—	1	0.21	1	0.04	0	—
β-HCH	1	2.1	3	3.14	5	8.43	3	3.4	4	2.3	2	16	1	0.90	2	4.4	4	7.3	2	15	2	16	2	0.16	0	—
o-Dichlorobenzene	14	45	14	42	15	39	13	60	17	81	15	46	14	48	14	56	7	46	12	20	10	13	9	57	3	0.62
m-Dichlorobenzene	9	10	11	16	13	34	9	21	15	18	10	14	12	16	9	17	4	13	4	14	3	2.3	6	7.5	1	0.06
p-Dichlorobenzene	17	73	17	99	16	209	15	120	18	150	16	75	16	130	16	150	10	73	13	88	15	32	12	55	5	0.46
BHT	11	97	9	29	11	73	13	63	15	90	11	70	13	120	9	120	9	34	5	75	6	150	—	—	0	—
o-Terphenyl	5	19	8	13	4	18	4	22	9	14	5	18	7	14	5	29	6	12	4	15	6	26	7	20	0	—
m-Terphenyl	14	180	13	130	15	110	11	140	16	120	13	140	16	200	15	160	12	110	10	100	10	53	13	190	1	0.01
p-Terphenyl	13	110	13	52	14	59	10	120	16	78	13	110	16	110	14	87	10	99	9	59	11	42	7	95	0	—
Tributyl phosphate	10	38	8	7.84	9	14.17	10	60	—	—	10	49	7	9.9	8	14	9	34	6	8.3	8	18	—	—	—	—
Benzo [a] pyrene	15	2100	15	1500	16	1400	13	1700	17	1600	15	1600	17	2200	16	1500	—	—	—	—	—	—	—	—	—	—
Total samples	18		18		18		18		19		17		18		18		18		17		22		20		18	
					(Note)		(Note)				(Note)		(Note)		(Note)		(Note)		(Note)							

(Note) As for fiscal year 1989, the total samples are 16, 16 and 15 for p-dichlorobenzene, BHT and tributyl phosphate, respectively.

As for fiscal year 1990, the total samples are 16 and 17 for cis-nonachlor and tributyl phosphate, respectively.

As for fiscal year 1991, the total samples are 17 for tributyl phosphate.

As for fiscal year 1992, the total samples are 15 for tributyl phosphate.

As for fiscal year 1993, tributyl phosphate is not surveyed in this survey, since it is subjected to environmental survey.

As for fiscal year 1994, the total samples are 16 and 15 for p, p'-DDT and BHT, respectively.

As for fiscal year 1995 and 1996, the total samples are 17 for p,p'-DDT in each year.

*denotes Class 1 Specified Chemical Substances.

Fig. 3-1 Locations for Monitoring of Water and Bottom Sediments (Fiscal Year 1998)

