

Chapter 2 Summary of the FY2003 Initial Environmental Survey

1. Purpose of the Survey

The purpose of this Initial Environmental Survey is to grasp the status of environmental persistence of those substances such as Designated Chemical Substances specified in the Chemical Substances Control Law, candidate substances for the PRTR system, unintentionally formed chemical substances and the substances required by social factors.

2. Surveyed substances, media and areas

In the FY2003 Initial Environmental Survey, the following 15 substances (groups) totaling 20 substances-media, which had been discussed and selected from among substances and media given priority at the FY2003 Expert Group on Substance Selection for the Comprehensive Survey of Chemical Substances on Environmental Safety were surveyed.

Table 2-1 Target Substances and Media for the FY2003 Initial Environmental Survey

Survey No.	Target substance	Number of surveyed areas per media			
		Surface water	Bottom sediment	Aquatic wildlife	Air
1	HCFCs (HCFC-141b, HCFC-22, HCFC-123, HCFC-142b, HCFC-225ca, HCFC-225cb, HFC-134a were analyzed)	20			
2	Linear alkylbenzene sulfonic acid and its salt (LAS, carbon number of alkyl group: 10 – 14)	9			
3	Isoprene	5			
4	Chlordecone	2			
5	Chlorpyrifos	12		7	
6	Chloropicrin	8			
7	Diethylenetriamine and an another substance (Triethylenetetramine was simultaneously analyzed)	14			
8	1,4-Dichloro-2-nitrobenzene and 3 other substances (1,3-Dichloro-4-nitrobenzene, 1-Chloro-3-nitrobenzene, 1,4-Dinitrobenzene) were simultaneously analyzed	25	24		
9	3,3'-Dichlorobenzidine	19			
10	Pyridine-triphenylborane	6			
11	2,4,6-Tri- <i>tert</i> -butylphenol	11			
12	Bromomethane	4			
13	1,2,5,6,9,10-Hexabromocyclododecane	20	20		
14	Hexabromobiphenyl	4	4		
15	Polybromodiphenyl ethers (hexa and deca bromides were analyzed)	7		3	

Surveys for surface water were conducted on 1 to 7 substances (groups) at 34 areas; for bottom sediment on 1 to 4 substances (groups) at 27 areas; for aquatic wildlife on 1 to 2 substances (groups) at 12 areas; and for air on 1 to 7 substances (groups) at 24 areas.

Surveyed areas of the FY2003 Initial Environmental Survey are shown in Figure 2-1 (surface water, bottom sediment), Figure 2-2 (aquatic wildlife) and Figure 2-3 (air).

3. Sampling and analytical method

Suggested sampling and analytical methods are shown in Appendix C and Appendix D, respectively.

4. Survey results

In the FY2003 Initial Environmental Survey, 2 substances (groups) in 6 areas (LAS: 5 areas out of 6, 3,3'-dichlorobenzidine: 1 area out of 19) for surface water, 3 substances (groups) in 3 areas (1,3-dichloro-4-nitrobenzene: 1 area out of 21, 1,2,5,6,9,10-hexabromocyclododecane: 1 area out of 21, decabromodiphenyl ethers: 2 areas out of 5) for bottom sediment, 1 substance in 1 area (chlorpyrifos: 1 area out of 9) for aquatic wildlife, and 3 substances (groups) in 21 areas (HCFCs: in all 20 surveyed areas, isoprene: in all 5 surveyed areas, bromomethane: in all 4 surveyed areas) for air were detected.

Five substances (groups) in surface water, 4 substances (groups) in bottom sediment, 2 substances (groups) in aquatic wildlife, and 5 substances (groups) in air were detected.

Detection results of the FY2003 Initial Environmental Survey are shown in Table 2-2.

5. Evaluation of the survey results

Targeting 15 substances (groups), 26 substances that can be analyzed simultaneously were investigated in the FY2003 survey, and 2 substances (LAS and 3,3'-dichlorobenzidine) out of 11 for surface water, 3 substances (1,3-dichloro-4-nitrobenzene, 1,2,5,6,9,10-hexabromocyclododecane and decabromodiphenyl ethers) out of 8 for bottom sediment, 1 substance (chlorpyrifos) out of 3 for aquatic wildlife, and 9 substances (HCFC-141b, HCFC-22, HCFC-123, HCFC-142b, HCFC-225ca, HCFC-225cb, HFC-134a, isoprene and bromomethane) out of 13 for air were detected.

Survey number	Target substance	Status of survey (✓: detected, n: not detected, --: not surveyed)			
		Surface water	Bottom sediment	Aquatic wildlife	Air
1	HCFC-141b	--	--	--	✓
	HCFC-22	--	--	--	✓
	HCFC-123	--	--	--	✓
	HCFC-142b	--	--	--	✓
	HCFC-225ca	--	--	--	✓
	HCFC-225cb	--	--	--	✓
	HFC-134a	--	--	--	✓

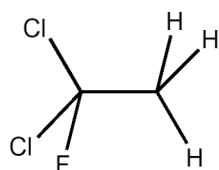
Survey number	Target substance	Status of survey (✓: detected, n: not detected, --: not surveyed)			
		Surface water	Bottom sediment	Aquatic wildlife	Air
2	LAS	✓	--	--	--
3	Isoprene	--	--	--	✓
4	Chlordecone	--	--	--	n
5	Chlorpyrifos	--	--	✓	n
6	Chloropicrin	--	--	--	n
7	Diethylenetriamine	n	--	--	--
	Triethylenetetramine	n	--	--	--
8	1,4-Dichloro-2-nitrobenzene	n	n	--	--
	1,3-Dichloro-4-nitrobenzene	n	✓	--	--
	1-Chloro-3-nitrobenzene	n	n	--	--
	1,4-Dinitrobenzene	n	n	--	--
9	3,3'-Dichlorobenzidine	✓	--	--	--
10	Pyridine-triphenylborane	n	--	--	--
11	2,4,6-Tri- <i>tert</i> -butylphenol	--	--	--	n
12	Bromomethane	--	--	--	✓
13	1,2,5,6,9,10-Hexabromocyclododecane	n	✓	--	--
14	Hexabromobiphenyl	n	n	--	--
15	Hexabromodiphenyl ethers	--	n	n	--
	Decabromodiphenyl ethers	--	✓	n	--

Evaluations of survey results for each substance (group) are described below.

[1] HCFCs (Hydrochlorofluorocarbons; surveyed media in FY2003: air)

HCFC-141b was selected as target substance for the FY2003 survey. In the actual survey, HCFC-22, HCFC-123, HCFC-142b, HCFC-225ca, HCFC-225cb and HFC-134a, which can be analyzed simultaneously, were also measured.

[1.1] HCFC-141b (1,1-Dichloro-1-fluoroethane) (CAS RN: 1717-00-6)



Chemical formula / molecular weight: C₂H₃Cl₂F / 116.95

Melting point: -103.5°C^{1), 2)}

Boiling point: 32°C^{1), 2)}

Water solubility (Sw): 2637 mg/L(25°C)¹⁾, 2632 mg/L(25°C)²⁾

Specific gravity: Unknown

n-Octanol/water partition coefficient (LogPow): 2.041¹⁾, 2.37(calculated value)²⁾, 2.3³⁾

Degradability: Unknown

Accumulativeness: Unknown

Use: Detergent, foaming agent³⁴⁾

Production / import amount: 10,000 - 100,000 t in FY2001³⁵⁾

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	5,307,693	1,855,377	0	7,163,070
FY2002	5,943,605	1,763,611	340	7,707,556

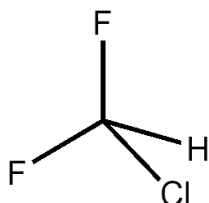
† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

A survey of HCFC-141b in air was conducted in FY2003 for the first time and, under the detection limit of 4 ng/m³, it was detected in all samples (all samples in 17 areas) with the range of 73 – 1,400 ng/m³, geometric mean of 460 ng/m³ and median value of 360 ng/m³ (geometric mean and median value of all samples. the same hereinafter). The trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past.

○ Survey Results of HCFC-141b

Survey year	Air 17 areas in total	
	Detected range (ng/m ³) (Detection frequency (areas))	Detection limit (ng/m ³)
FY2003	73 - 1,400 (17/17)	4

[1.2] HCFC-22 (Chlorodifluoromethane) (CAS RN: 75-45-6)



Chemical formula / molecular weight: CHClF₂ / 86.47

Melting point: -157.4°C¹⁾

Boiling point: -40.7°C¹⁾

Water solubility (Sw): 2770 mg/L (25°C)¹⁾

Specific gravity: 1.194 (25°C)¹⁾

n-Octanol/water partition coefficient (LogPow): 1.13 (observed value)⁴⁾, 1.07 (calculated value)⁵⁾, 1.08⁶⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: Low concentration¹⁸⁾

Use: Refrigerant³⁴⁾

Production / import amount: 39,983 t (production: 39,858 t, import: 125 t) in FY1993³⁸⁾

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	8,817,048	1,163,585	2,400	9,983,033
FY2002	8,384,717	683,596	2,400	8,441,547

† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

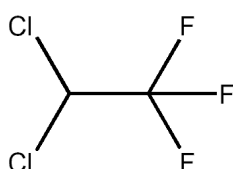
In FY2002, a survey of HCFC-22 in air was conducted in 15 areas and, under the detection limit of 6 ng/m³, it was detected in all areas with the range of 340 - 4,600 ng/m³. In the FY2003 survey under the

detection limit of 6 ng/m³ it was detected in all samples (all samples in 19 areas) with the range of 550 - 4,500 ng/m³, geometric mean of 1,400 ng/m³ and median value of 1,100 ng/m³. Concentrations of HCFC-22 in the environment were confirmed to be nearly at the same level as in the previous year.

○ Survey Results of HCFC-22

Survey year	Air 19 areas in total	
	Detected range (ng/m ³) (Detection frequency (areas))	Detection limit (ng/m ³)
FY2003	550 - 4,500 (19/19)	6
FY2002	340 - 4,600 (15/15)	6

[1.3] HCFC-123 (1,1-Dichloro-2,2,2-trifluoroethane) (CAS RN: 306-83-2)



Chemical formula / molecular weight: C₂HCl₂F₃ / 152.93

Melting point: -107°C ⁷⁾

Boiling point: 27.82°C ⁷⁾

Water solubility (Sw): 21 mg/L (25°C) ⁶⁾

Specific gravity: 1.4638 (25°C) ⁷⁾

n-Octanol/water partition coefficient (LogPow): 2.3 - 2.9 ⁸⁾

Degradability: Not easily degradable ¹⁸⁾

Accumulativeness: Low concentration ¹⁸⁾

Use: Refrigerant ³⁴⁾

Production / import amount: Unknown

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	12,125	66,610	0	78,735
FY2002	12,297	54,725	0	67,022

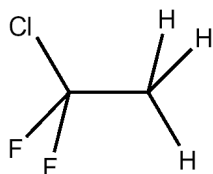
† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

A survey of HCFC-123 in air was conducted in FY2003 for the first time and, under the detection limit of 3 ng/m³, it was detected in 5 areas out of 10 with the range of 3 - 320 ng/m³. The trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past.

○ Survey Results of HCFC-123

Survey year	Air 10 areas in total	
	Detected range (ng/m ³) (Detection frequency (areas))	Detection limit (ng/m ³)
FY2003	3 - 320 (5/10)	3

[1.4] HCFC-142b (1-Chloro-1,1-difluoroethane) (CAS RN: 75-68-3)



Chemical formula / molecular weight: $C_2H_3ClF_2$ / 100.49

Melting point: $-130.8^\circ C$ ^{1),2)}

Boiling point: $-9.2^\circ C$ ¹⁾, $-9.7^\circ C$ ²⁾

Water solubility (Sw): 1400 mg/L ($25^\circ C$) ^{1),2)}

Specific gravity: 1.107 ($25^\circ C$) ¹⁾

n-Octanol/water partition coefficient (LogPow): 2.05 (calculated value) ²⁾

Degradability: Not easily degradable ¹⁸⁾

Accumulativeness: Low concentration ¹⁸⁾

Use: Foaming agent ³⁴⁾

Production / import amount: Over 10,000 t ³⁹⁾

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	827,040	1,580,697	0	2,407,737
FY2002	847,231	1,341,382	0	1,533,277

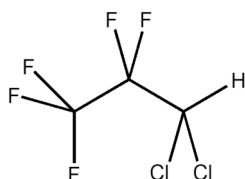
† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

A survey of HCFC-142b in air was conducted in FY2003 for the first time and, under the detection limit of 3 ng/m^3 , it was detected in all samples (all samples in 20 areas) with the range of 54 - 1,100 ng/m^3 , geometric mean of 180 ng/m^3 and median value of 120 ng/m^3 . The trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past.

○ Survey Results of HCFC-142b

Survey year	Air 20 areas in total	
	Detected range (ng/m^3) (Detection frequency (areas))	Detection limit (ng/m^3)
FY2003	54 - 1,100 (20/20)	3

[1.5] HCFC-225ca (1,1-Dichloro-2,2,3,3,3-pentafluoropropane) (CAS RN: 422-56-0)



Chemical formula / molecular weight: $C_3HCl_2F_5$ / 202.94

Melting point: $-94^\circ C$ ⁹⁾

Boiling point: $45.5^\circ C$ ⁷⁾

Water solubility (Sw): Unknown

Specific gravity: 1.54 (25°C) ⁷⁾

n-Octanol/water partition coefficient (LogPow): 3.2 ¹⁰⁾

Degradability: Unknown

Accumulativeness: Unknown

Use: Detergent ³⁴⁾

Production / import amount: Unknown

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	1,363,197	502,576	0	1,865,773
FY2002	1,150,940	413,095	220	1,564,255

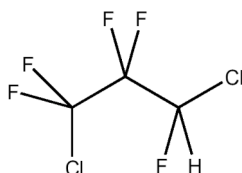
† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

A survey of HCFC-225ca in air was conducted in FY2003 for the first time and, under the detection limit of 4 ng/m³, it was detected in 15 areas out of 16 with the range of 8.5 - 4,500 ng/m³. The trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past.

○ Survey Results of HCFC-225ca

Survey year	Air 16 areas in total	
	Detected range (ng/m ³) (Detection frequency (areas))	Detection limit (ng/m ³)
FY2003	8.5 - 4,500 (15/16)	4

[1.6] HCFC-225cb (1,3-Dichloro-1,2,2,3,3-pentafluoropropane) (CAS RN: 507-55-1)



Chemical formula / molecular weight: C₃HC₂F₅ / 202.94

Melting point: -97°C ⁹⁾

Boiling point: 52°C ⁷⁾

Water solubility (Sw): Unknown

Specific gravity: 1.55 (25°C) ⁷⁾

n-Octanol/water partition coefficient (LogPow): 3.1 ¹⁾

Degradability: Unknown

Accumulativeness: Unknown

Use: Detergent ³⁴⁾

Production / import amount: Unknown

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	1,363,197	502,576	0	1,865,773
FY2002	1,150,940	413,095	220	1,564,255

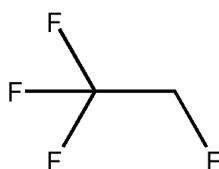
† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

A survey of HCFC-225cb in air was conducted in FY2003 for the first time and, under the detection limit of 15 ng/m³, it was detected in 13 areas out of 19 with the range of 17 - 4,400 ng/m³. The trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past.

○ Survey Results of HCFC-225cb

Survey year	Air 19 areas in total	
	Detected range (ng/m ³) (Detection frequency (areas))	Detection limit (ng/m ³)
FY2003	17 - 4,400 (13/19)	15

[1.7] HFC-134a (1,1,1,2-Tetrafluoroethane) (CAS RN: 811-97-2)



Chemical formula / molecular weight: C₂H₂F₄ / 102.03

Melting point: -101°C¹¹⁾, -103.3°C⁷⁾

Boiling point: -26.08°C⁷⁾, -26.15°C (760mmHg)¹¹⁾

Water solubility (Sw): 67 mg/L (25°C) (estimated value)¹²⁾

Specific gravity: 1.202 (25°C)¹¹⁾, 1.2072 (25°C)⁷⁾

n-Octanol/water partition coefficient (LogPow): 1.68 (estimated value)¹²⁾, 1.06⁶⁾

Degradability: Unknown

Accumulativeness: Unknown

Use: Refrigerant, foaming agent³⁴⁾

Production / import amount: 1,000 - 10,000 t in FY2001³⁵⁾

Released amount (Reported by PRTR): No report

A survey of HFC-134a in air was conducted in FY2003 for the first time and, under the detection limit of 7 ng/m³, it was detected in all samples (all samples in 20 areas) with the range of 100 - 1,800 ng/m³, geometric mean of 510 ng/m³ and median value of 420 ng/m³. The trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past.

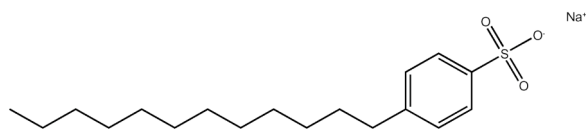
○ Survey Results of HFC-134a

Survey year	Air 20 areas in total	
	Detected range (ng/m ³) (Detection frequency (areas))	Detection limit (ng/m ³)
FY2003	100 - 1,800 (20/20)	7

[2] Linear alkylbenzene sulfonic acid and its salt (LAS; carbon number of alkyl group: 10 - 14; surveyed media in FY2003: surface water)

LAS₁₀: Sodium decylbenzene sulfonate (CAS RN: 1322-98-1; carbon number of alkyl group: 10)
 LAS₁₁: Sodium undecylbenzene sulfonate (CAS RN: 27636-75-5; carbon number of alkyl group: 11)
 LAS₁₂: Sodium dodecylbenzene sulfonate (CAS RN: 25155-30-0; carbon number of alkyl group: 12)
 LAS₁₃: Sodium tridecylbenzene sulfonate (CAS RN: 26248-24-8; carbon number of alkyl group: 13)
 LAS₁₄: Sodium tetradecylbenzene sulfonate (CAS RN: 28348-61-0; carbon number of alkyl group: 14)

(Characteristics of LAS₁₂)



Chemical formula / molecular weight: C₁₈H₂₉SO₃Na / 348.48

Melting point: >300°C⁶⁾

Boiling point: Unknown

Water solubility (S_w): 200 g/L (25°C)⁶⁾

Specific gravity: 1.0 (d₄²⁰) (60% slurry)¹⁾

n-Octanol/water partition coefficient (LogPow): 1.96 (observed value)¹³⁾

Degradability: Easily degradable¹⁸⁾

Accumulativeness: Unknown

Use: Detergent³⁹⁾, laundry detergent, dyeing assistant for the textile industry, general-use detergent, emulsifier for agrochemicals, detergent for fruits/vegetables, detergent for wool/synthetic fibers, scouring agent, pitch dispersant, detergent for metal plating, detergent for cleaning, dishwashing detergent, anti-caking agent for fertilizers⁵³⁾

Production / import amount: LAS₁₂: 64,446 t (Production 64,120 t, Import 326 t) in FY1998⁵⁴⁾

Released amount (Total of LAS₁₀ - LAS₁₄ reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	33,052,902	8,607	37,591	33,099,100
FY2002	20,160,029	5,528	35,308	20,200,865

† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

A survey of LAS in surface water was conducted in FY1977 under the detection limit of 10 µg/L and it was detected in 3 areas out of the surveyed 23 areas with the range of 280 - 2,900 µg/L. In FY2003, a survey was conducted lowering the detection limit to 0.2 µg/L and it was detected in 5 areas out of 9 with the range of 0.2 - 67 µg/L (total of LAS₁₀ - LAS₁₄). Furthermore, in the Monitoring of the Precautionary Monitoring Targets, a survey was conducted using the same analytical method and it was detected widely in 68 areas out of 76 (public water bodies).

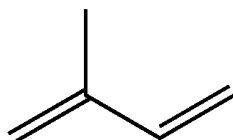
○ Survey Results of Linear alkylbenzene sulfonic acid and its salt (LAS)

Survey year	Substance	Surface water 9 areas in total	
		Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)
FY2003	Total of LAS ₁₀ - LAS ₁₄	0.2 - 67 (5/9)	0.2
	LAS ₁₀	0.32 - 28 (3/9)	0.2
	LAS ₁₁	0.32 - 17 (4/9)	0.2
	LAS ₁₂	0.2 - 16 (4/9)	0.2
	LAS ₁₃	0.25 - 6.1 (4/9)	0.2
	LAS ₁₄	ND (0/9)	0.2
FY1977	LAS	280 - 2,900 (3/23)	10

<Reference> Results of LAS (Total of LAS₁₀ - LAS₁₄) from the Monitoring of the Precautionary Monitoring Targets

Survey year	Media	Sampling area	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)
FY2000	Surface water	All	0.2 - 1,100 (68/76)	0.2
		River	0.3 - 1,100 (53/59)	0.2
		Lake	1.3 - 21 (5/6)	0.2
		Sea	0.2 - 11 (10/11)	0.2

[3] Isoprene (CAS RN: 78-79-5; surveyed media in FY2003: air)



Chemical formula / molecular weight: C₅H₈ / 68.12

Melting point: -146.7°C¹⁵⁾, -145.95°C¹⁶⁾

Boiling point: 34.067°C¹⁶⁾

Water solubility (Sw): 300 mg/L (20°C)¹⁴⁾

Specific gravity: 0.681, 0.6805¹⁶⁾

n-Octanol/water partition coefficient (LogPow): 2.30 (observed value)⁶⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: Low concentration¹⁸⁾

Use: Mainly as raw material for synthetic rubber, raw material for geraniol/linalool, etc., raw material for perfume, raw material for agrochemical intermediates such as chrysanthemic acid, raw material for isophytol⁵⁶⁾

Production / import amount: 72,069 t in FY2000, 61,240 t in FY2001, 89,250 t in FY2002⁵⁵⁾

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	1	122,138	0	122,139
FY2002	837,980	77,943	0	915,923

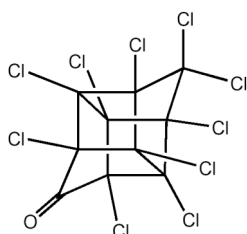
† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

A survey of isoprene in air was conducted in FY2003 for the first time and, under the detection limit of 12 ng/m³, it was detected in all samples (all samples in 5 areas) with the range of 88 - 1,300 ng/m³, geometric mean of 480 ng/m³ and median value of 380 ng/m³. The trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past.

○ Survey Results of Isoprene

Survey year	Air 5 areas in total	
	Detected range (ng/m ³) (Detection frequency (areas))	Detection limit (ng/m ³)
FY2003	88 - 1,300 (5/5)	12

[4] Chlordecone (CAS RN: 143-50-0; surveyed media in FY2003: air)



Chemical formula / molecular weight: C₁₀Cl₁₀O / 490.63

Melting point: Unknown

Boiling point: 350°C (decomposition)¹⁷⁾

Water solubility (Sw): 7.6 mg/L (24°C, observed value)¹²⁾

Specific gravity: 1.61 (25°C)⁷⁾

n-Octanol/water partition coefficient (LogPow): 3.45⁶⁾

Degradability: Not easily degradable⁹⁶⁾

Accumulativeness: High concentration⁹⁶⁾

Use: Insecticide⁶²⁾

Production / import amount: Unknown

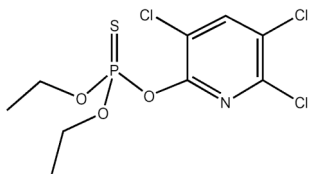
Released amount (Reported by PRTR): No report

A survey of chlordecone in air was conducted in FY2003 for the first time and, under the detection limit of 0.0005 ng/m³ (= 0.5 pg/m³), it was not detected in the surveyed 1 area. Although the trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past, it was confirmed that chlordecone was not detected in air in this survey.

○ Survey Results of Chlordecone

Survey year	Air 1 area	
	Detected range (ng/m ³) (Detection frequency (areas))	Detection limit (ng/m ³)
FY2003	ND (0/1)	0.0005

[5] Chlorpyrifos (CAS RN: 2921-88-2; surveyed media in FY2003: aquatic wildlife and air)



Chemical formula / molecular weight: C₉H₁₁Cl₃NO₃PS / 350.58

Melting point: 41- 42°C ¹⁾

Boiling point: 160°C (decomposition) ¹⁾

Water solubility (Sw): 0.4 mg/L (23°C) ¹⁾

Specific gravity: 1.398 (43.5°C) ¹⁾

n-Octanol/water partition coefficient (LogPow): 5.27 ¹⁾

Degradability: Not easily degradable ¹⁸⁾

Accumulativeness: Mediate concentration ¹⁸⁾

Use: Pesticide ³⁹⁾

Production / import amount: Hydrate 244.4 t, hydrate FD 6.0 t, emulsion 58.8 kL, granule 442.1 t in 2002 Agrochemical Year ³⁴⁾

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	105,263	0	0	105,263
FY2002	95,571	0	0	95,571

† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

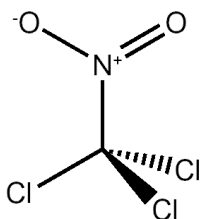
Chlorpyrifos in aquatic wildlife was surveyed in FY1988 under the detection limit of 5 ng/g-wet in 21 areas but it was not detected. In FY2003, a survey was conducted under the detection limit of 3 ng/g-wet and it was detected in 1 area out of 9 with the detected value of 10 ng/g-wet. Although it was not detected in the past survey, the trend of its persistence cannot be grasped as no survey had been conducted in the past at the area where it was detected this time.

Chlorpyrifos in air was surveyed in FY1988 under the detection limit of 10 ng/m³ in 21 areas but it was not detected. In FY2003, a survey was conducted under the detection limit of 2 ng/m³ and it was not detected in all of the surveyed 7 areas. Chlorpyrifos was not detected in air in the past surveys and it was confirmed that it was also not detectable under the detection limit in this survey. However, although its concentration was below the detection limit, there are some reports indicated the detection of chlorpyrifos (0.27 - 0.51 ng/m³).

○ Survey Results of Chlorpyrifos

Survey year	Aquatic wildlife 9 areas in total		Air 7 areas in total	
	Detected range (ng/g-wet) (Detection frequency (areas))	Detection limit (ng/g-wet)	Detected range (ng/m ³) (detection frequency (areas))	Detection limit (ng/m ³)
FY2003	10 (1/9)	3	ND (0/7)	2
FY1988	ND (0/21)	5	ND (0/21)	10

[6] Chloropicrin (CAS RN: 76-06-2; surveyed media in FY2003: air)



Chemical formula / molecular weight: CCl_3NO_2 / 164.37

Melting point: $-64^\circ C$ ¹⁾

Boiling point: $112^\circ C$ (757 mmHg) ¹⁾

Water solubility (Sw): 1621 mg/L ($25^\circ C$) ¹⁾

Specific gravity: 1.6558 ($20^\circ C$) ¹⁾

n-Octanol/water partition coefficient (LogPow): 2.09 ¹⁾

Degradability: Not easily degradable ¹⁸⁾

Accumulativeness: Low concentration ¹⁸⁾

Use: Agrochemicals (insecticide) ³⁹⁾

Production / import amount:

Production: Active ingredient 6,888.8 t, medical products 3,904.3 t (80%), 4,683.7 t (99.5%), tablets 39.0 t in 2002 Agrochemical Year

Import: 2,613.0 t (active ingredient) in 2002 Agrochemical Year ³⁴⁾

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	7,256,144	2,421	0	7,258,565
FY2002	7,320,300	3,010	0	7,323,310

† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

Chloropicrin in air was surveyed in FY1994 under the detection limit of $5,000 \text{ ng/m}^3$ and it was not detected in any of the surveyed 17 areas. In FY2003, a survey was conducted under the lowered detection limit of 220 ng/m^3 and it was not detected in any of the surveyed 8 areas. Chloropicrin was not detected in air in the past surveys and it was also confirmed that chloropicrin was not detectable under the detection limit adopted in this survey. In addition, as chloropicrin is used for agrochemicals (insecticide), the season of the survey should be considered carefully.

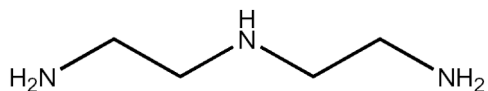
○ Survey Results of Chloropicrin

Survey year	Air 8 areas in total	
	Detected range (ng/m^3) (Detection frequency (areas))	Detection limit (ng/m^3)
FY2003	ND (0/8)	220
FY1994	ND (0/17)	5,000

[7] Diethylenetriamine and an another substance (surveyed media in FY2003: surface water)

Diethylenetriamine was selected as a target substance in the FY2003 survey and in the actual survey triethylenetetramine, which can be analyzed simultaneously, was measured.

[7.1] Diethylenetriamine (CAS RN: 111-40-0; surveyed media in FY2003: surface water)



Chemical formula / molecular weight: C₄H₁₃N₃ / 103.15

Melting point: -39°C¹⁾

Boiling point: 207°C¹⁾

Water solubility (Sw): 1000 g/L (observed value)¹²⁾

Specific gravity: 0.89586 (d₂₀²⁰)¹⁾

n-Octanol/water partition coefficient (LogPow): <-3 (observed value)¹⁸⁾, -2.13 (calculated value)¹⁹⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: Low concentration¹⁸⁾

Use: Anti-creasing agent, detergent, dye fixing agent, wet-strength agent for paper, raw material for agrochemicals, rubber chemicals⁵³⁾

Production / import amount: 7,585 t (production 6,753 t, import 832 t) in FY1998⁵⁴⁾, 7,207 t in FY2000, 7,863 t in FY2001, 8,303 t in FY2002⁵⁵⁾.

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	16,797	944	120,023	137,764
FY2002	0	928	110,004	110,932

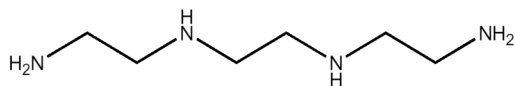
† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

A survey of diethylenetriamine in surface water was conducted in FY2003 for the first time and, under the detection limit of 2 µg/L, it was not detected in any of the surveyed 13 areas. Although the trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past, it was confirmed that diethylenetriamine was not detected in surface water under the detection limit adopted in this survey.

○ Survey Results of Diethylenetriamine

Survey year	Surface water 13 areas in total	
	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)
FY2003	ND (0/13)	2

[7.2] Triethylenetetramine (CAS RN: 112-24-3)



Chemical formula / molecular weight: C₆H₁₈N₄ / 146.21

Melting point: 12°C^{15),16)}

Boiling point: 266 - 267°C^{15),16)}

Water solubility (Sw): 4770 g/L (observed value)¹²⁾

Specific gravity: 0.9818 (d₂₀²⁰⁾¹⁾

n-Octanol/water partition coefficient (LogPow): 1.66 (calculated value)²⁰⁾, 1.4 - 1.66 (calculated value)⁶⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: Low concentration¹⁸⁾

Use: Mainly as raw material for epoxy resin hardener, and as wet-strength agent for paper⁷¹⁾

Production / import amount: 3,186 t (production 2,533 t, import 653 t) in FY1996⁷²⁾, 1,000 - 10,000 t in FY2001³⁵⁾

Released amount (Reported by PRTR): No report

A survey of triethylenetetramine in surface water was conducted in FY2003 for the first time and, under the detection limit of 8 µg/L, it was not detected in any of the surveyed 13 areas. Although the trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past, it was confirmed that triethylenetetramine was not detected in surface water under the detection limit adopted in this survey.

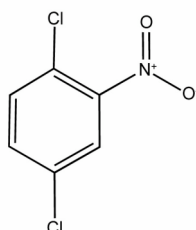
○ Survey Results of Triethylenetetramine

Survey year	Surface water 13 areas in total	
	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)
FY2003	ND (0/13)	8

[8] 1,4-Dichloro-2-nitrobenzene and 3 other substances (surveyed media in FY2003: surface water and bottom sediment)

1,4-Dichloro-2-nitrobenzene was selected as a target substance in the FY2003 survey and in the actual survey 1,3-dichloro-4-nitrobenzene, 1-chloro-3-nitrobenzene and 1,4-dinitrobenzene, which can be measured simultaneously, were analyzed.

[8.1] 1,4-Dichloro-2-nitrobenzene (CAS RN: 89-61-2)



Chemical formula / molecular weight: C₆H₃Cl₂NO₂ / 191.99

Melting point: 52.8°C ²¹⁾

Boiling point: 267°C ²¹⁾

Water solubility (Sw): 83 mg/L (20°C) ^{21),22)}

Specific gravity: 1.439 (d₄⁷⁵) ²²⁾

n-Octanol/water partition coefficient (LogPow): 2.9 (observed value) ²³⁾, 3.3 (calculated value) ²³⁾

Degradability: Not easily degradable ¹⁸⁾

Accumulativeness: Low concentration ¹⁸⁾

Use: Raw material for dye / organic pigment, raw material for ultraviolet-ray absorbent

Production / import amount: 1,266 t (production 1,139 t, import 127 t) in FY1996 ⁷²⁾

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	0	200	2	202
FY2002	0	2	0	2

† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

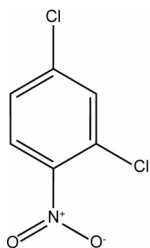
1,4-Dichloro-2-nitrobenzene in surface water was surveyed in FY1981 under the detection limit of 0.02 µg/L and it was not detected in any of the surveyed 7 areas. It was also not detected in the surveyed 9 areas in the FY1994 survey under the detection limit of 0.05 µg/L. In FY2003, a survey was conducted under the detection limit of 0.05 µg/L and it was not detected in any of the surveyed 24 areas. 1,4-Dichloro-2-nitrobenzene was not detected in surface water in the past surveys and it was also confirmed that 1,4-dichloro-2-nitrobenzene was not detected under the detection limit adopted in this survey.

1,4-Dichloro-2-nitrobenzene in bottom sediment was surveyed in FY1981 under the detection limit of 1 ng/g-dry and it was not detected in any of the surveyed 7 areas. It was also not detected in the surveyed 9 areas in the FY1994 survey under the detection limit of 12 ng/g-dry. In FY2003, a survey was conducted under the detection limit of 2.5 ng/g-dry and it was not detected in any of the surveyed 20 areas. 1,4-Dichloro-2-nitrobenzene was not detected in bottom sediment in the past surveys and it was also confirmed that 1,4-dichloro-2-nitrobenzene was not detected under the detection limit adopted in this survey.

○ Survey Results of 1,4-Dichloro-2-nitrobenzene

Survey year	Surface water 24 areas in total		Bottom sediment 20 areas in total	
	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)	Detected range (ng/g-dry) (Detection frequency (areas))	Detection limit (ng/g-dry)
FY2003	ND (0/24)	0.05	ND (0/20)	2.5
FY1994	ND (0/9)	0.05	ND (0/9)	12
FY1981	ND (0/7)	0.02	ND (0/7)	1

[8.2] 1,3-Dichloro-4-nitrobenzene (CAS RN: 611-06-3)



Chemical formula / molecular weight: C₆H₃Cl₂NO₂ / 191.99

Melting point: 30°C²³⁾

Boiling point: 258.5°C^{1),6),23),24)}

Water solubility (Sw): 188 mg/L (20°C)^{23),25)}

Specific gravity: 1.551 (d₄⁷⁸⁾¹⁵⁾

n-Octanol/water partition coefficient (LogPow): 3.09 (observed value)⁵⁾, 3.11(calculated value)⁵⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: Low concentration¹⁸⁾

Use: Mainly as raw material for medical products (antipyretics and analgesics) and other uses as raw material for herbicide, dye and pigment intermediates, and raw material for photographic chemicals⁷⁶⁾

Production / import amount: 1,678 t (production 1,316 t, import 362 t) as dichloronitrobenzene in FY1996⁷²⁾

Released amount (Reported by PRTR): No report

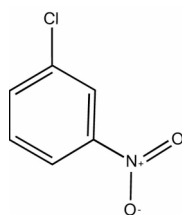
1,3-Dichloro-4-nitrobenzene in surface water was surveyed in FY1981 under the detection limit of 0.02 µg/L and it was not detected in any of the surveyed 7 areas. It was also not detected in the surveyed 9 areas in the FY1994 survey under the detection limit of 0.06 µg/L. In FY2003, a survey was conducted under the detection limit of 0.06 µg/L and it was not detected in any of the surveyed 24 areas. 1,3-Dichloro-4-nitrobenzene was not detected in surface water in the past surveys and it was also confirmed that it was not detected under the detection limit adopted in this survey.

1,3-Dichloro-4-nitrobenzene in bottom sediment was surveyed in FY1981 under the detection limit 1 ng/g-dry and it was not detected in any of the surveyed 7 areas. It was also not detected in the surveyed 9 areas in the FY1994 survey under the detection limit of 8.5 ng/g-dry. In FY2003, a survey was conducted under the detection limit of 1.9 ng/g-dry and it was detected in 1 area out of 21 with the detected value of 6.3 ng/g-dry. This area was also surveyed in FY1994 but it was not detected in this year. As 1,3-dichloro-4-nitrobenzene was not detected the past surveys and it was detected in only one area in this survey, the trend of its concentration change in the environment cannot be grasped.

○ Survey Results of 1,3-Dichloro-4-nitrobenzene

Survey year	Surface water 24 areas in total		Bottom sediment 21 areas in total	
	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)	Detected range (ng/g-dry) (Detection frequency (areas))	Detection limit (ng/g-dry)
FY2003	ND (0/24)	0.06	6.3 (1/21)	1.9
FY1994	ND (0/9)	0.06	ND (0/9)	8.5
FY1981	ND (0/7)	0.02	ND (0/7)	1

[8.3] 1-Chloro-3-nitrobenzene (CAS RN: 121-73-3)



Chemical formula / molecular weight: C₆H₄ClNO₂ / 157.55

Melting point: 46°C ¹¹⁾

Boiling point: 236°C (760 mmHg) ¹¹⁾, 117°C (12 mmHg) ¹¹⁾

Water solubility (Sw): 273 mg/L (20°C) ¹⁾

Specific gravity: 1.534 (d₄²⁰) ¹¹⁾

n-Octanol/water partition coefficient (LogPow): 2.41 ¹⁾

Degradability: Unknown

Accumulativeness: Unknown

Use: Dye intermediate ⁷⁷⁾

Production / import amount: Unknown

Released amount (Reported by PRTR): No report

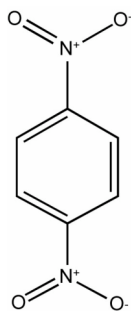
1-Chloro-3-nitrobenzene in surface water was surveyed in FY1975 under the detection limit of 0.1 µg/L and it was not detected in any of the surveyed 19 areas. It was also not detected in the surveyed 9 areas in the FY1994 survey under the detection limit of 0.05 µg/L. In FY2003, a survey was conducted under the detection limit of 0.05 µg/L and it was not detected in any of the surveyed 24 areas. 1-Chloro-3-nitrobenzene was not detected in surface water in the past surveys and it was also confirmed that it was not detected under the detection limit adopted in this survey.

1-Chloro-3-nitrobenzene in bottom sediment was surveyed in FY1994 under the detection limit of 15 ng/g-dry and it was not detected in any of the surveyed 9 areas. In FY2003, a survey was conducted under the detection limit of 3.2 ng/g-dry and it was not detected in any of the surveyed 20 areas. 1-Chloro-3-nitrobenzene was not detected in bottom sediment in the past surveys and it was also confirmed that it was not detected under the detection limit adopted in this survey.

○ Survey Results of 1-Chloro-3-nitrobenzene

Survey year	Surface water 24 areas in total		Bottom sediment 20 areas in total	
	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)	Detected range (ng/g-dry) (Detection frequency (areas))	Detection limit (ng/g-dry)
FY2003	ND (0/24)	0.05	ND (0/20)	3.2
FY1994	ND (0/9)	0.05	ND (0/9)	15
FY1975	ND (0/19)	0.1	No survey	

[8.4] 1,4-Dinitrobenzene (CAS RN: 100-25-4)



Chemical formula / molecular weight: C₆H₄N₂O₄ / 168.09

Melting point: 173-174°C ¹¹⁾

Boiling point: 299°C ⁷⁾

Water solubility (Sw): 69 mg/L (25°C) ¹⁾

Specific gravity: 1.625 (d₄¹⁸) ¹⁾

n-Octanol/water partition coefficient (LogPow): 1.46 ¹¹⁾, 1.46 - 1.49 ³⁾

Degradability: Unknown

Accumulativeness: Unknown

Use: Raw material for organic synthesis and dye (*m*-nitroaniline, *m*-phenylenediamine) ³⁴⁾

Production / import amount: Unknown

Released amount (Reported by PRTR): No report

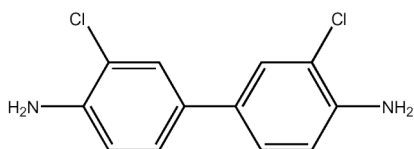
1,4-Dinitrobenzene in surface water was surveyed in FY1994 under the detection limit of 0.054 µg/L and it was not detected in any of the surveyed 9 areas. In FY2003, a survey was conducted under the detection limit of 0.054 µg/L and it was not detected in any of the surveyed 24 areas. 1,4-Dinitrobenzene was not detected in surface water in the past surveys and it was also confirmed that it was not detected under the detection limit adopted in this survey. However, although its concentration was below the detection limit, there are some reports indicated the detection of 1,4-dinitrobenzene (0.016 - 0.039 µg/L).

1,4-Dinitrobenzene in bottom sediment was surveyed in FY1994 under the detection limit of 14 ng/g-dry and it was not detected in any of the surveyed 9 areas. In FY2003, a survey was conducted under the detection limit of 3.1 ng/g-dry and it was not detected in any of the surveyed 21 areas. 1,4-Dinitrobenzene was not detected in bottom sediment in the past surveys and it was also confirmed that it was not detected under the detection limit adopted in this survey.

○ Survey Results of 1,4-Dinitrobenzene

Survey year	Surface water 24 areas in total		Bottom sediment 21 areas in total	
	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)	Detected range (ng/g-dry) (Detection frequency (areas))	Detection limit (ng/g-dry)
FY2003	ND (0/24)	0.054	ND (0/21)	3.1
FY1994	ND (0/9)	0.054	ND (0/9)	14

[9] 3,3'-Dichlorobenzidine (CAS RN: 91-94-1; surveyed media in FY2003: surface water)



Chemical formula / molecular weight: $C_{12}H_{10}Cl_2N_2$ / 253.11

Melting point: 132 - 133°C^{16),26)}

Boiling point: 402°C²³⁾

Water solubility (Sw): 3.1 mg/L²⁶⁾

Specific gravity: 0.7²³⁾

n-Octanol/water partition coefficient (LogPow): 3.51 (observed value)⁵⁾, 3.57 (calculated value)⁵⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: Low concentration¹⁸⁾

Use: Pigment intermediate⁷⁶⁾

Production / import amount: 6,504 t in FY2000, 6,975 t in FY2001, 7,605 t in FY2002⁵⁵⁾

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	0	0	0	0
FY2002	0	0	0	0

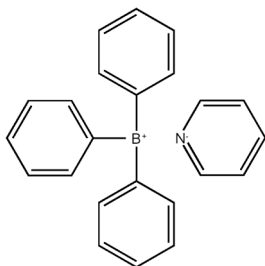
† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

3,3'-Dichlorobenzidine in surface water was surveyed in FY1979 under the detection limit of 0.01 - 7 µg/L and it was not detected in any of the surveyed 7 areas. In FY2003, a survey was conducted under the detection limit of 0.010 µg/L and it was detected in 1 area out of 19 with the detected value of 0.014 µg/L. The trend of its concentration change of 3,3'-dichlorobenzidine in the environment cannot be grasped because, although it was not detected in surface water in the past surveys, no survey was conducted in the past at the area where it was detected this time.

○ Survey Results of 3,3'-Dichlorobenzidine

Survey year	Surface water 19 areas in total	
	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)
FY2003	0.014 (1/19)	0.010
FY1979	ND (0/7)	0.01 - 7

[10] Pyridine-triphenylborane (CAS RN: 971-66-4; surveyed media in FY2003: surface water)



Chemical formula / molecular weight: C₂₃H₂₀BN / 321.22

Melting point: ¶

Boiling point: ¶

Water solubility (Sw): ¶

Specific gravity: Unknown

n-Octanol/water partition coefficient (LogPow): Unknown

Degradability: ¶

Accumulativeness: ¶

Use: ¶

Production / import amount: 113 t⁵⁵⁾ in FY2002

Released amount (Reported by PRTR): No report

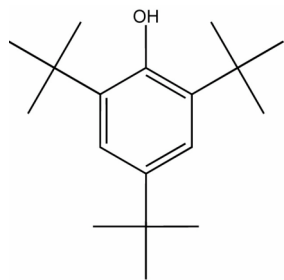
¶: This is proprietary data owned by private corporations contained in the notification dossiers of new chemical substances based on the Chemical Substances Control Law.

A survey of pyridine-triphenylborane in surface water was conducted in FY2003 for the first time and, under the detection limit of 0.12 µg/L, it was not detected in any of the surveyed 5 areas. Although the trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past, it was confirmed that pyridine-triphenylborane was not detected in surface water under the detection limit adopted in this survey.

○ Survey Results of Pyridine-triphenylborane

Survey year	Surface water 5 areas in total	
	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)
FY2003	ND (0/5)	0.12

[11] 2,4,6-Tri-*tert*-butylphenol (CAS RN: 732-26-3; surveyed media in FY2003: air)



Chemical formula / molecular weight: C₁₈H₃₀O / 262.43

Melting point: 131°C⁷⁾, 129 - 132°C²⁷⁾

Boiling point: 278°C⁷⁾, 277°C²⁷⁾

Water solubility (Sw): 35 mg/L (25°C, observed value)¹²⁾

Specific gravity: 0.864 (27°C)⁷⁾

n-Octanol/water partition coefficient (LogPow): 6.06 (observed value)¹²⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: High concentration¹⁸⁾

Use: Anti-aging agent for rubber and plastic products⁸³⁾

Production / import amount: 11,305 t as trialkylphenol in 1981⁸³⁾

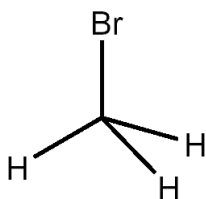
Released amount (Reported by PRTR): No report

A survey of 2,4,6-tri-*tert*-butylphenol in air was conducted in FY2003 for the first time and, under the detection limit of 0.9 ng/m³, it was not detected in any of the surveyed 9 areas. Although the trend of its concentration change in air cannot be grasped as no survey was conducted in the past, it was confirmed that 2,4,6-tri-*tert*-butylphenol was not detected in air under the detection limit adopted in this survey. Further, there was a report suggesting the detection of it (0.05 ng/m³), although its concentration was below the detection limit.

○ Survey Results of 2,4,6-Tri-*tert*-butylphenol

Survey year	Air 9 areas in total	
	Detected range (ng/m ³) (Detection frequency (areas))	Detection limit (ng/m ³)
FY2003	ND (0/9)	0.9

[12] Bromomethane (CAS RN: 74-83-9; surveyed media in FY2003: air)



Chemical formula / molecular weight: CH₃Br / 94.94

Melting point: -93.66°C¹⁾, -94°C^{6),26)}

Boiling point: 3.55°C¹⁾, 4°C^{6),26)}

Water solubility (Sw): 13.4 g/kg (25°C)¹⁾, 1.5 mL/100 mL (20°C)⁶⁾

Specific gravity: 1.73 (0°C)¹⁾, 1.730¹⁶⁾, 1.732²⁹⁾

n-Octanol/water partition coefficient (LogPow): 1.19^{1),6)}, 1.19 (observed value)⁵⁾, 1.08 (calculated value)⁵⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: Low concentration¹⁸⁾

Use: Raw material for synthesis, and others (fumigant for foodstuff / soil)³⁹⁾

Production / import amount: 1,926 t in FY2000, 837 t in FY2001, 2,804 t in FY2002⁵⁵⁾

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	3,172,498	542,393	24	3,714,915
FY2002	3,856,989	567,468	12	4,424,469

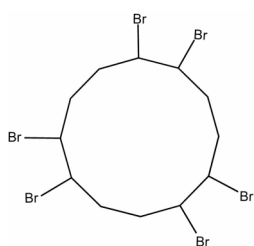
† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

In FY1980 bromomethane in air was surveyed in 8 areas under the detection limit of 64 - 430 ng/m³ and it was detected in 3 areas out of 8 with the range of 64 - 130 ng/m³. In FY1998 it was surveyed in 14 areas under the detection limit of 41 ng/m³ and it was detected in 13 areas out of 14 with the range of 49 - 340 ng/m³. In FY2003 it was surveyed under the detection limit of 27 ng/m³ and it was detected in all of the surveyed 4 areas with the range of 33 - 490 ng/m³. Comparing the results with those in the past surveys, it was confirmed that there was no significant change in the trend of concentration of bromomethane in the environment.

○ Survey Results of bromomethane

Survey year	Air 4 areas in total	
	Detected range (ng/m ³) (Detection frequency (areas))	Detection limit (ng/m ³)
FY2003	33 - 490 (4/4)	27
FY1998	49 - 340 (13/14)	41
FY1980	64 - 130 (3/8)	64 - 430

[13] 1,2,5,6,9,10-Hexabromocyclododecane (CAS RN: 3194-55-6; surveyed media in FY2003: surface water and bottom sediment)



Chemical formula / molecular weight: C₁₂H₁₈Br₆ / 641.70

Melting point: 185 - 195°C¹⁾, 173 - 177°C²⁸⁾

Boiling point: >250°C (decomposition)²⁸⁾

Water solubility (Sw): 0.0086 mg/L (25°C)¹⁾

Specific gravity: Unknown

n-Octanol/water partition coefficient (LogPow): 7.74 (calculated value)³⁰⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: High concentration¹⁸⁾

Use: Curing accelerator for flame retardants, adhesives⁸⁹⁾

Production / import amount: 976 t (production 73 t, import 903 t) in FY1998⁵⁴⁾

Released amount (Reported by PRTR): No report

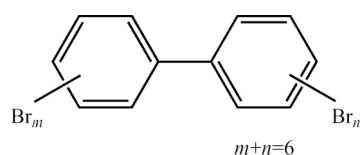
A survey of 1,2,5,6,9,10-hexabromocyclododecane in surface water was conducted in FY2003 for the first time and, under the detection limit of 0.087 µg/L, it was not detected in any of the surveyed 20 areas. Although the trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past, it was confirmed that 1,2,5,6,9,10-hexabromocyclododecane was not detected in surface water under the detection limit adopted in this survey.

A survey of 1,2,5,6,9,10-hexabromocyclododecane in bottom sediment was conducted in FY2003 for the first time and, under the detection limit of 23 ng/g-dry, it was detected in 1 area out of 15 with the range of 85 - 140 ng/g-dry. The trend of its concentration in the environment cannot be grasped as no survey was conducted in the past.

○ Survey Results of 1,2,5,6,9,10-Hexabromocyclododecane

Survey year	Surface water 20 areas in total		Bottom sediment 15 areas in total	
	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)	Detected range (ng/g-dry) (Detection frequency (areas))	Detection limit (ng/g-dry)
FY2003	ND (0/20)	0.087	85 - 140 (1/15)	23

[14] Hexabromobiphenyl (CAS RN: 36355-01-8; surveyed media in FY2003: surface water and bottom sediment)



Chemical formula / molecular weight: $C_{12}H_4Br_6$ / 627.58

Melting point: 72 - 386°C ³¹⁾

Boiling point: Unknown

Water solubility (Sw): 0.011 - 0.03 (ppm) ³¹⁾

Specific gravity: Unknown

n-Octanol/water partition coefficient (LogPow): Unknown

Degradability: Not easily degradable ⁹⁷⁾

Accumulativeness: High concentration ⁹⁷⁾

Use: Flame retardant ³¹⁾

Production / import amount: Unknown

Released amount (Reported by PRTR): No report

A survey of hexabromobiphenyl in surface water was conducted in FY1989 under the detection limit of 0.00005 µg/L (= 0.05 ng/L) and it was not detected in any of the surveyed 21 areas. In FY2003 it was surveyed under the detection limit of 0.000015 µg/L (= 0.015 ng/L) and it was not detected in any of the surveyed 4 areas. Hexabromobiphenyl was not detected in surface water in the past surveys and it was also confirmed that it was not detected in this survey.

A survey of hexabromobiphenyl in bottom sediment was conducted in FY1989 under the detection limit of 0.008 ng/g-dry(= 8 pg/g-dry)and it was not detected in any of the surveyed 21 areas. In FY2003 it was surveyed under the detection limit of 0.0087 ng/g-dry(= 8.7 pg/g-dry)and it was not detected in any of the surveyed 2 areas. Hexabromobiphenyl was not detected in bottom sediment in the past surveys and it was also confirmed that it was not detected in this survey.

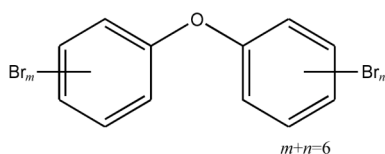
○ Survey Results of Hexabromobiphenyl

Survey year	Surface water 4 areas in total		Bottom sediment 2 areas in total	
	Detected range (µg/L) (Detection frequency (areas))	Detection limit (µg/L)	Detected range (ng/g-dry) (Detection frequency (areas))	Detection limit (ng/g-dry)
FY2003	ND (0/4)	0.000015 (= 0.015 ng/L)	ND (0/2)	0.0087 (= 8.7 pg/g-dry)
FY1989	ND (0/21)	0.00005 (= 0.05 ng/L)	ND (0/21)	0.008 (= 8 pg/g-dry)

[15] Polybromodiphenyl ethers (CAS RN: 36483-60-0; surveyed media in FY2003: bottom sediment and aquatic wildlife)

In FY2003, a survey of hexabromodiphenyl ether and decabromodiphenyl ether was conducted. In addition, a survey of octabromodiphenyl ether in surface water and aquatic wildlife is being conducted in the FY2003 Environmental Survey for Exposure Study.

[15.1] Hexabromodiphenyl ether (CAS RN: 36483-60-0)



Chemical formula / molecular weight: $C_{12}H_4Br_6O$ / 643.58

Melting point: Unknown

Boiling point: Unknown

Water solubility (Sw): Unknown

Specific gravity: Unknown

n-Octanol/water partition coefficient (LogPow): 6³¹⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: Mediate concentration¹⁸⁾

Use: Polybromodiphenyl ethers are mainly sold as penta, octa and deca bromide and used as flame retardant. Hexabromodiphenyl ether is a component contained in these commercial products.^{1),95)}

Production / import amount: Unknown

Released amount (Reported by PRTR): No report

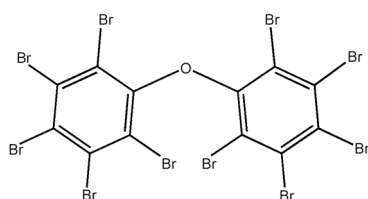
A survey of hexabromodiphenyl ether in bottom sediment was conducted in FY1987 under the detection limit of 5.1 ng/g-dry and it was detected in 2 areas out of 23 with the range of 7 - 77 ng/g-dry. In FY1988, a survey was conducted under the detection limit of 3.5 ng/g-dry and it was detected in 2 areas out of 47 with the range of 4.5 - 18 ng/g-dry. In FY2003, a survey was conducted under the detection limit of 0.5 ng/g-dry and it was not detected in any of the surveyed 3 areas. Although the trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past, it was confirmed that hexabromodiphenyl ether was not detected in bottom sediment in this survey.

A survey of hexabromodiphenyl ether in aquatic wildlife was conducted in FY1987 under the detection limit of 2 ng/g-wet and it was detected in 3 areas out of 25 with the range of 3.8 - 14 ng/g-wet. In FY1988, a survey was conducted under the detection limit of 2 ng/g-wet and it was detected in 3 areas out of 48 with the range of 2 - 6 ng/g-wet. In FY2003, a survey was conducted under the detection limit of 0.5 ng/g-wet and it was not detected in any of the surveyed 3 areas. Although the trend of its concentration change in the environment cannot be grasped as no survey was conducted in the past, it was confirmed that hexabromodiphenyl ether was not detected in aquatic wildlife in this survey.

○ Survey Results of Hexabromobiphenyl ether

Survey year	Bottom sediment 3 areas in total		Aquatic wildlife 3 areas in total	
	Detected range (ng/g-dry) (Detection frequency (areas))	Detection limit (ng/g-dry)	Detected range (ng/g-wet) (Detection frequency (areas))	Detection limit (ng/g-wet)
FY2003	ND (0/3)	0.5	ND (0/3)	0.5
FY1988	4.5 - 18 (2/47)	3.5	2 - 6 (3/48)	2
FY1987	7 - 77 (2/23)	5.1	3.8 - 14 (3/25)	2

[15.2] Decabromodiphenyl ether (CAS RN: 1163-19-5)



Chemical formula / molecular weight: C₁₂Br₁₀O / 959.2

Melting point: 295°C²⁾, 304°C¹⁵⁾, Boiling point: 425°C (decomposition)^{2), 32)}

Water solubility (Sw): 0.020 - 0.030 mg/L³³⁾, 0.025 mg/L (25°C)²⁾

Specific gravity: 3.0^{1), 32)}

n-Octanol/water partition coefficient (LogPow): 5.24¹⁾, 12.11 (calculated value)²⁾, 5.236 (calculated value)¹⁵⁾, ≥5.2 (observed value)²³⁾

Degradability: Not easily degradable¹⁸⁾

Accumulativeness: Low concentration¹⁸⁾

Use: Flame retardant (for styrenic resin: BS/ABS, polybutylene terephthalate resin, polypropylene resin)⁵⁶⁾, raw material for synthesis (flame retardant for polyethylene, ABS resin, polystyrene, polyester resin)³⁹⁾

Production / import amount: 4,320 t (production 1,022 t, import 3,298 t)³⁸⁾ in FY1993, 3,773 t in FY2000, 2,323 t in FY2001, 2,986 t in FY2002⁵⁵⁾

Released amount (Reported by PRTR, kg/year):

Year	Other than notified	To the atmosphere	To public water bodies	Total released amount
FY2001	0	2,702	879	3,581
FY2002	0	1,003	533	1,536

† Total released amount = (Other than notified) + (To the atmosphere) + (To public water bodies)

In FY1996, a survey of decabromodiphenyl ether in bottom sediment was conducted in 11 areas under the detection limit of 25 ng/g-dry and it was detected in 6 areas out of 11 with the range of 30 - 580 ng/g-dry. In FY2002, a survey was conducted in 62 areas under the detection limit of 9.7 ng/g-dry and it was detected in 34 areas out of 62 with the range of 10 - 4,400 ng/g-dry. In FY2003, a survey was conducted under the detection limit of 9.7 ng/g-dry and it was detected in 2 areas out of 5 with the range of 37 - 76 ng/g-dry. The trend of its concentration change in the environment cannot be grasped as the number of survey areas is limited.

In FY1987, a survey of decabromodiphenyl ether in aquatic wildlife was conducted in 25 areas under the detection limit of 5 ng/g-wet and it was not detected in any of the surveyed areas. In FY2003, a survey was conducted under the detection limit of 1 ng/g-wet and it was not detected in either of the surveyed 2 areas. Decabromodiphenyl ether in aquatic wildlife was not detected in the past surveys and, although the number of surveyed areas was small, it was confirmed that decabromodiphenyl ether was not detected in this survey.

Further, decabromodiphenyl ether was detected both in surface water and bottom sediment, with especially high concentration in bottom sediment, in line with its low degradable / low accumulative property. However, it has not been detected in aquatic wildlife. This suggests that the molecule of the substance is too large (C₁₂Br₁₀O) to accumulate in wildlife

○ Survey Results of Decabromodiphenyl ether

Survey year	Bottom sediment 5 areas in total		Aquatic wildlife 2 areas in total	
	Detected range (ng/g-dry) (Detection frequency (areas))	Detection limit (ng/g-dry)	Detected range (ng/g-wet) (Detection frequency (areas))	Detection limit (ng/g-wet)
FY2003	37 – 76 (2/5)	9.7	ND (0/2)	1
FY2002	10 - 4400 (34/62)	9.7	No survey	
FY1996	30 - 580 (6/11)	25	No survey	
FY1988	4 - 600 (15/43)	4	ND (0/46)	5
FY1987	10 - 1400 (6/20)	7	ND (0/25)	5
FY1977	ND (0/7)	25 - 87	No survey	

Figure 2-1 Locations of the Initial Environmental Survey for Surface Water and Bottom Sediment (FY2003)

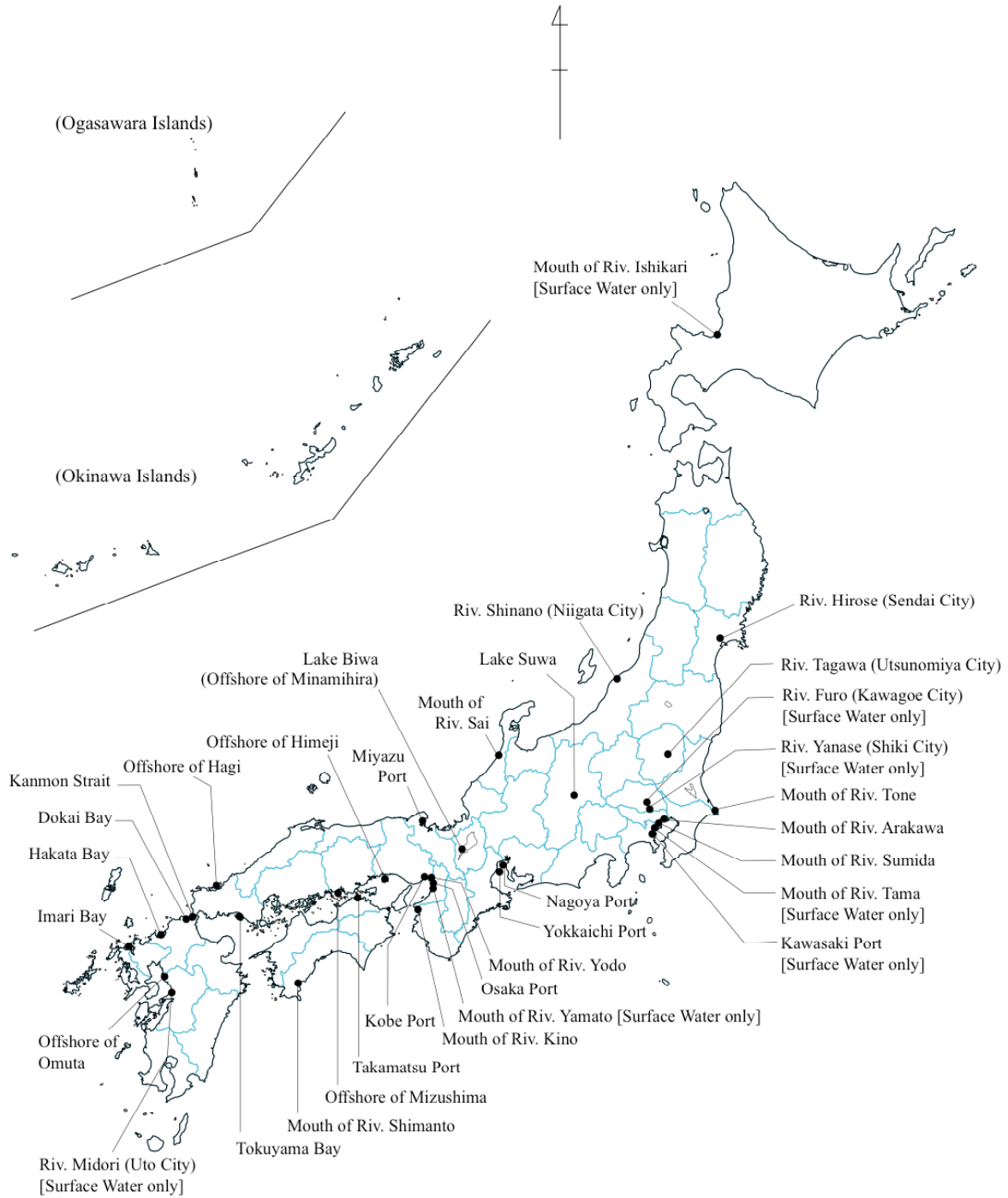


Figure 2-2 Locations of the Initial Environmental Survey for Aquatic Wildlife (FY2003)

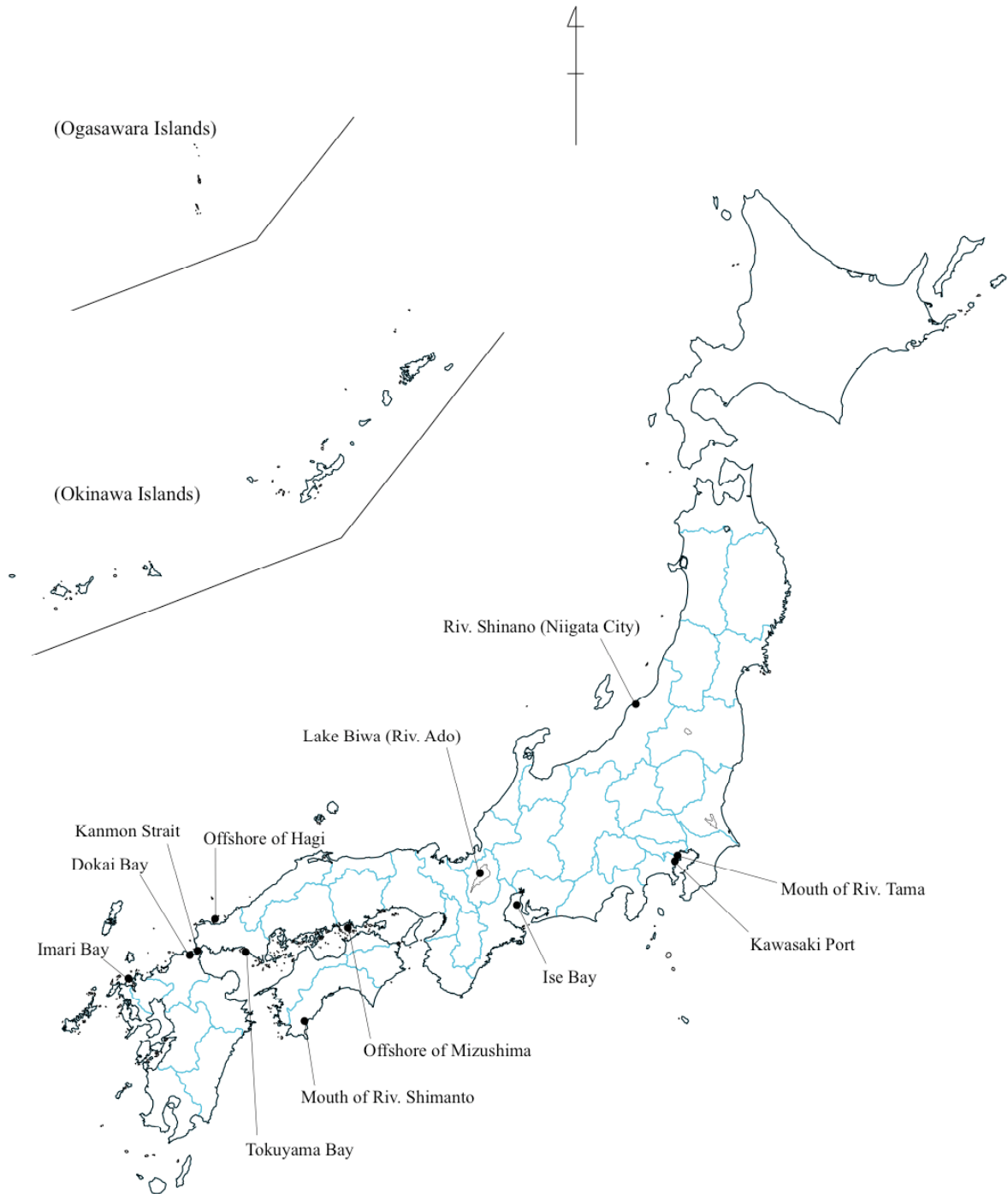


Figure 2-3 Locations of the Initial Environmental Survey for Air (FY2003)

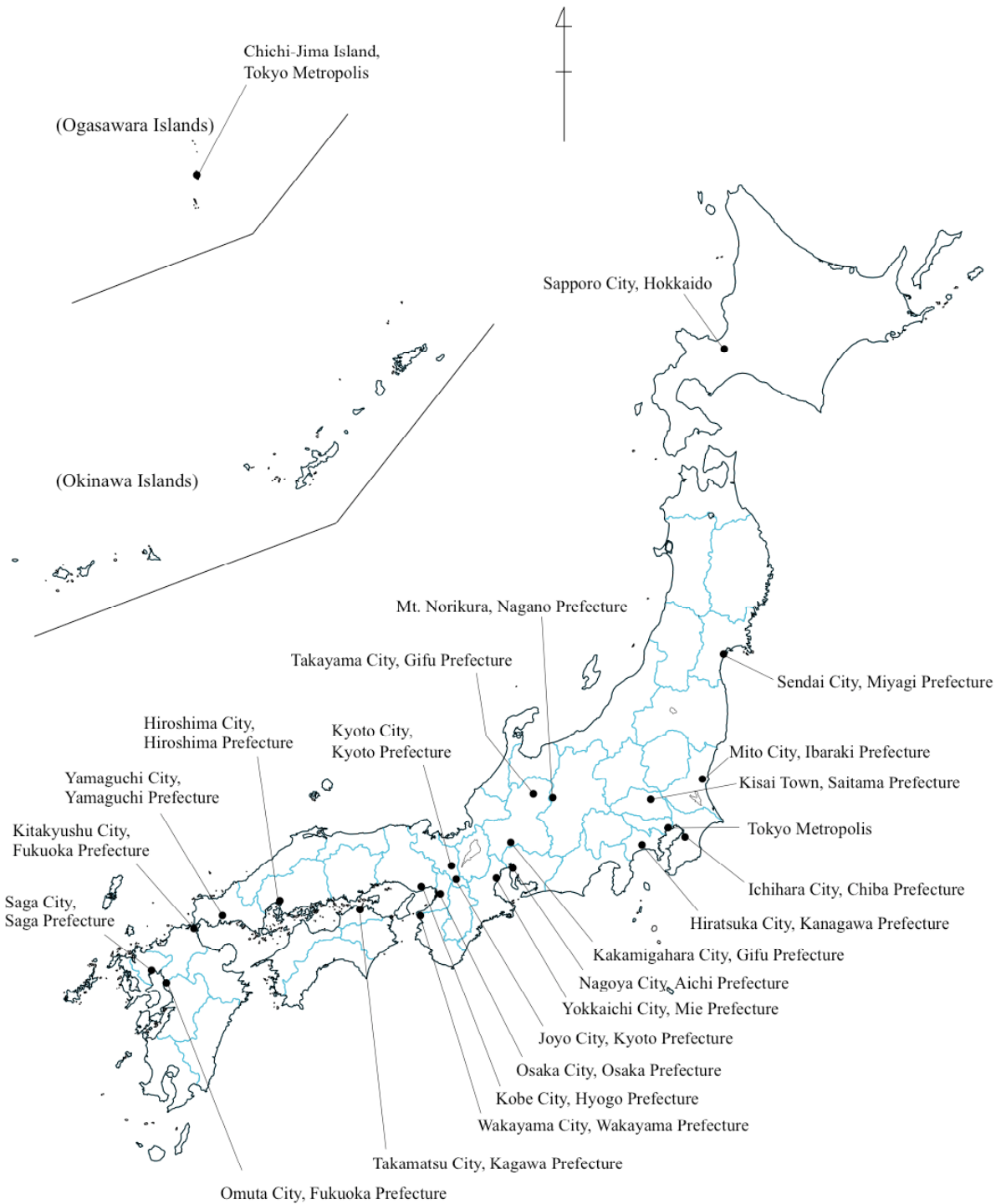


Table 2-2 Detection Results of the FY2003 Initial Environmental Survey

Survey No.	Substance	Surface water 34 areas in total		Bottom sediment 27 areas in total		Aquatic wildlife 12 areas in total		Air 24 areas in total	
		Detected range ($\mu\text{g/L}$) (frequency (area))	Detection limit ($\mu\text{g/L}$)	Detected range (ng/g-dry) (frequency (area))	Detection limit (ng/g-dry)	Detected range (ng/g-wet) (frequency (area))	Detection limit (ng/g-wet)	Detected range (ng/m ³) (frequency (area))	Detection limit (ng/m ³)
1	HCFCs								
1.1	HCFC-141b							73 - 1,400 (17/17)	4
1.2	HCFC-22							550 - 4,500 (19/19)	6
1.3	HCFC-123							3 - 320 (5/10)	3
1.4	HCFC-142b							54 - 1,100 (20/20)	3
1.5	HCFC-225ca							8.5 - 4,500 (15/16)	4
1.6	HCFC-225cb							17 - 4,400 (13/19)	15
1.7	HFC-134a							100 - 1,800 (20/20)	7
2	LAS (Total of LAS ₁₀ -LAS ₁₄)	0.2 - 67 (5/9)	0.2						
2.1	LAS ₁₀	0.32 - 28 (3/9)	0.2						
2.2	LAS ₁₁	0.32 - 17 (4/9)	0.2						
2.3	LAS ₁₂	0.2 - 16 (4/9)	0.2						
2.4	LAS ₁₃	0.25 - 6.1 (4/9)	0.2						
2.5	LAS ₁₄	--- (0/9)	0.2						
3	Isoprene							88 - 1,300 (5/5)	12

(Note 1) Hatched area denotes that the survey was conducted in other media not targeted in this survey.

(Note 2) Frequency (area) indicates: Number of detected areas / Number of surveyed areas.

(Note 3) [---] in the range column denotes that there was no detected sample.

Table 2-2 Detection Results of the FY2003 Initial Environmental Survey (continued)

Survey No.	Substance	Surface water 34 areas in total		Bottom sediment 27 areas in total		Aquatic wildlife 12 areas in total		Air 24 areas in total	
		Detected range ($\mu\text{g/L}$) (frequency (area))	Detection limit ($\mu\text{g/L}$)	Detected range (ng/g-dry) (frequency (area))	Detection limit (ng/g-dry)	Detected range (ng/g-wet) (frequency (area))	Detection limit (ng/g-wet)	Detected range (ng/m ³) (frequency (area))	Detection limit (ng/m ³)
4	Chlordecone							---	0.0005 (= 0.5 pg/m ³)
5	Chlorpyrifos					10 (1/9)	3	---	2
6	Chloropicrin							---	220
7	Diethylenetriamine and 1 other substance								
7.1	Diethylenetriamine	---	2						
7.2	Triethylenetetramine	---	8						
8	1,4-Dichloro-2-nitrobenzene and 3 other substances								
8.1	1,4-Dichloro-2-nitrobenzene	---	0.05	---	2.5				
8.2	1,3 -Dichloro-4-nitrobenzene	---	0.06	6.3 (1/21)	1.9				
8.3	1-Chloro-3-nitrobenzene	---	0.05	---	3.2				
8.4	1,4-Dinitrobenzene	---	0.054	---	3.1				
9	3,3'-Dichlorobenzidine	0.014 (1/19)	0.010						
10	Pyridine-triphenylborane	---	0.12						
11	2,4,6-Tri- <i>tert</i> -butylphenol							---	0.9
12	Bromomethane							33 - 490 (4/4)	27

(Note 1) Hatched area denotes that the survey was conducted in other media not targeted in this survey.

(Note 2) Frequency (area) indicates: Number of detected areas / Number of surveyed areas.

(Note 3) [---] in the range column denotes that there was no detected sample.

Table 2-2 Detection Results of the FY2003 Initial Environmental Survey (continued)

Survey No.	Substance	Surface water 34 areas in total		Bottom sediment 27 areas in total		Aquatic wildlife 12 areas in total		Air 24 areas in total	
		Detected range ($\mu\text{g/L}$) (frequency (area))	Detection limit ($\mu\text{g/L}$)	Detected range (ng/g-dry) (frequency (area))	Detection limit (ng/g-dry)	Detected range (ng/g-wet) (frequency (area))	Detection limit (ng/g-wet)	Detected range (ng/m ³) (frequency (area))	Detection limit (ng/m ³)
13	1,2,5,6,9,10-Hexabromocyclo-dodecane	--- (0/20)	0.087	85-140 (1/15)	23				
14	Hexabromobiphenyl	--- (0/4)	0.000015 (= 0.015 ng/L)	--- (0/2)	0.0087 (= 8.7 pg/g-dry)				
15	Polybromodiphenyl ethers								
15.1	Hexabromodiphenyl ether			--- (0/3)	0.5	--- (0/3)	0.5		
15.2	Decabromodiphenyl ether			37 - 76 (2/5)	9.7	--- (0/2)	1		

(Note 1) Hatched area denotes that the survey was conducted in other media not targeted in this survey.

(Note 2) Frequency (area) indicates: Number of detected areas / Number of surveyed areas.

(Note 3) [---] in the range column denotes that there was no detected sample.

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