

Chapter 2 Results of the Detailed Environmental Survey in FY 2010

1. Purpose of the survey

The Detailed Environmental Survey is implemented to provide as required under the Chemical Substances Control Law (Law 117, 1973), the data and details required for risk assessments et al of chemical substances prioritized for evaluations. This compiled material is intended to allow for nationwide assessments of exposure in the general environment.

2. Target chemicals

In the FY 2010 Detailed Environmental Survey, 11 chemicals (groups) that were selected and designated as target chemicals. The combinations of target chemicals and the surveyed media are given below.

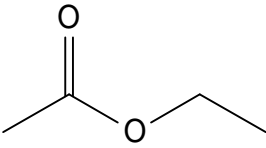
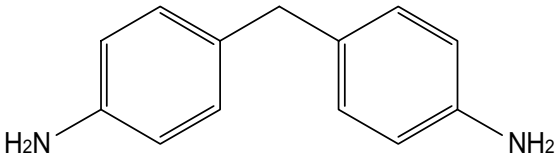
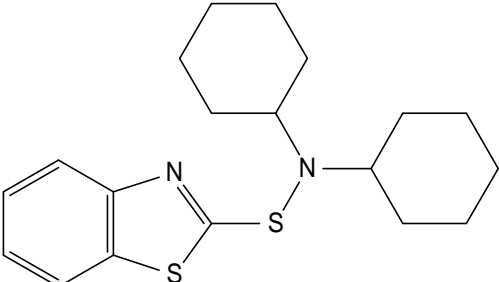
No.	Name	The Chemical Substances Control Law		The PRTR Law		Surveyed media			
				Before the revision	After the revision	Surface water	Sediment	Wildlife	Air
[1]	Ethyl acetate					○			
[2]	4,4'-Diaminodiphenylmethane	II Monitored III Monitored	Priority Assessment Chemical Substances	I 340	I 446				○
[3]	<i>N,N</i> -Dicyclohexyl-1,3-benzothiazole-2-sulphenamide	I Monitored	Monitored		I 189		○	○	
[4]	Cerium and its compounds (as Cerium)					○			
[5]	2,2',6,6'-Tetra- <i>tert</i> -butyl-4,4'-methylene-diphenol	I Monitored	Monitored			○	○	○	
[6]	4-(1,1,3,3-Tetramethylbutyl)phenol	II Monitored III Monitored		I 59	I 74		○		
[7]	Toluidines <i>o</i> -Toluidine	II Monitored III Monitored	Priority Assessment Chemical Substances	I 225	I 299	○			
	<i>p</i> -Toluidine	II Monitored III Monitored		I 226		○			
[8]	Butan-2-one oxime	II Monitored				○			
[9]	Perfluoroalkyl acid								
	Perfluorododecanoic acid	I Monitored	Monitored			○			
	Perfluorotetradecanoic acid	I Monitored	Monitored			○			
	Perfluorohexadecanoic acid	I Monitored	Monitored			○			
[10]	Methylnaphthalenes				I 438				
	1-Methylnaphthalene	III Monitored				○			
	2-Methylnaphthalene					○			
[11]	Methylenebis(4,1-cyclohexylene)diisocyanate	III Monitored		I 341	I 447				○

(Note 1) "The PRTR Law" hereafter means "Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (Law No. 86 of 1999)."

(Note 2) Pre-Revision "Areas as designated under the Chemical Substances Control Law" refer to those areas designated prior to the 20 May 2009 revision of the law (which went into effect on 1 April 2011), while "Post Revision Areas" refer to the areas defined as designated post-20 May 2009.

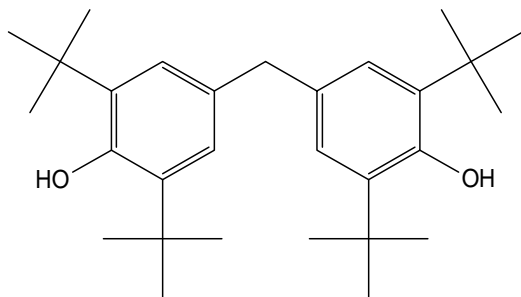
(Note 3) "Before the revision" in "The PRTR Law" means "appointments before the revision of government ordinance on November 21, 2008" and "After the revision" in "The PRTR Law" means "appointments after that revision".

Chemical and physical properties of target chemicals of the Detailed Environmental Survey are as follows.

<p>[1] Ethyl acetate</p> 	<p>Molecular formula: C₄H₈O₂ CAS: 141-78-6 ENCS: 2-726 MW: 88.11 mp: -83°C¹⁾ bp: 77°C¹⁾ sw: 1mL/100mL (25°C)¹⁾ Specific gravity: 0.902 (20/4°C)¹⁾ logPow: 0.73²⁾</p>
<p>[2] 4,4'-Diaminodiphenylmethane (synonym:4,4'-Methylenedianiline)</p> 	<p>Molecular formula: C₁₃H₁₄N₂ CAS: 101-77-9 ENCS: 4-40 MW: 198.26 mp: 91.5 ~ 92°C¹⁾ bp: 398 ~ 399°C¹⁾ sw: 1.25g/L (20°C)³⁾ Specific gravity: 1.056 (100°C)³⁾ logPow: 1.59⁴⁾</p>
<p>[3] <i>N,N</i>-Dicyclohexyl-1,3-benzothiazole-2-sulphenamide</p> 	<p>Molecular formula: C₁₉H₂₆N₂S₂ CAS: 4979-32-2 ENCS: 5-256 MW: 346.55 mp: 99°C⁵⁾ bp: >300°C⁵⁾ sw: 0.0019mg/L (25°C)⁵⁾ Specific gravity: Uncertain⁵⁾ logPow: >4.8 (25°C)⁵⁾</p>
<p>[4] Cerium and its compounds (as Cerium)</p> <p style="text-align: center; font-size: 2em; font-weight: bold;">Ce</p>	<p>Molecular formula: Not specified CAS: 7440-45-1 etc. ENCS: Not specified MW: Not specified mp: Not specified bp: Not specified sw: Not specified Specific gravity: Not specified logPow: Not specified</p>

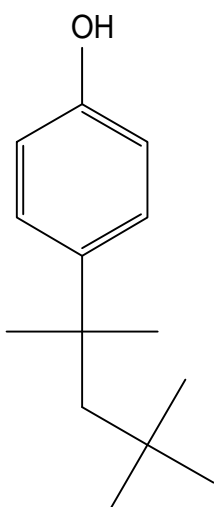
(Abbreviations) CAS: CAS registry number, ENCS: registry number in the Existing and New Chemical Substances List, MW: molecular weight, mp: melting point, bp: boiling point, SW: solubility in water, logPow: *n*-octanol-water partition coefficient, kPa: kilopascal (1 atm = 101.3kPa).

[5] 2,2',6,6'-Tetra-*tert*-butyl-4,4'-methylenediphenol



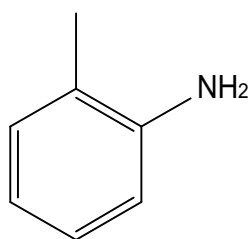
Molecular formula: C₂₉H₄₄O₂
CAS: 118-82-1
ENCS: 4-39
MW: 424.66
mp: 154°C²⁾
bp: 289°C (40mmHg)²⁾
sw: <10mg/L (20°C)⁶⁾
Specific gravity: 1g/cm³ (15°C)⁶⁾
logPow: 6.24 (20°C)⁶⁾

[6] 4-(1,1,3,3-Tetramethylbutyl)phenol



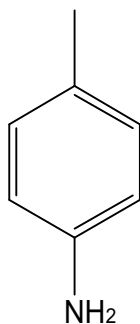
Molecular formula: C₁₄H₂₂O
CAS: 140-66-9
ENCS: 3-503
MW: 206.32
mp: 85.0°C²⁾
bp: 279°C²⁾
sw: 19mg/L (22°C)⁷⁾
Specific gravity: 950kg/m³⁷⁾
logPow: 37⁷⁾

[7] Toluidines
[7-1] *o*-Toluidine



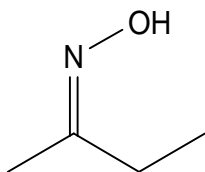
Molecular formula: C₇H₉N
CAS: 95-53-4
ENCS: 3-186
MW: 107.15
mp: -14.41°C²⁾
bp: 200.0°C²⁾
sw: 16.9g/kg (20°C)²⁾
Specific gravity: 1.008 (20/20°C)¹⁾
logPow: 1.32²⁾

[7-2] *p*-Toluidine



Molecular formula: C₇H₉N
CAS: 106-49-0
ENCS: 3-186
MW: 107.15
mp: 43.3°C²⁾
bp: 201°C²⁾
sw: 79.3g/kg (21°C)²⁾
Specific gravity: 1.046 (4/20°C)¹⁾
logPow: 1.39²⁾

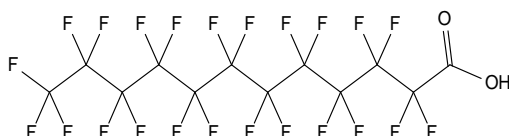
[8] Butan-2-one oxime



Molecular formula: C₄H₉NO
 CAS: 96-29-7
 ENCS: 2-546
 MW: 87.12
 mp: -29.5°C²⁾
 bp: 151.5°C²⁾
 sw: Uncertain
 Specific gravity: 0.9232g/cm³ (20°C)²⁾
 logPow: 0.63⁸⁾

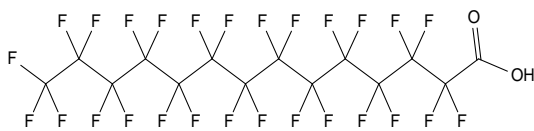
[9] Perfluoroalkyl acids

[9-1] Perfluorododecanoic acid



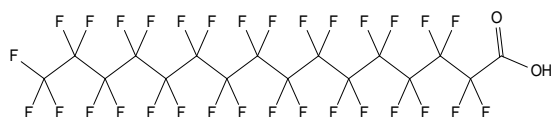
Molecular formula: C₁₂HF₂₃O₂
 CAS: 307-55-1
 ENCS: 2-2658
 MW: 614.10
 mp: Uncertain
 bp: Uncertain
 sw: Uncertain
 Specific gravity: Uncertain
 logPow: Uncertain

[9-2] Perfluorotetradecanoic acid



Molecular formula: C₁₄HF₂₇O₂
 CAS: 376-06-7
 ENCS: 2-2658
 MW: 714.11
 mp: Uncertain
 bp: Uncertain
 sw: Uncertain
 Specific gravity: Uncertain
 logPow: Uncertain

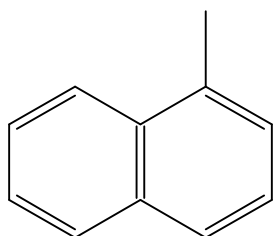
[9-3] Perfluorohexadecanoic acid



Molecular formula: C₁₆HF₃₁O₂
 CAS: 67905-19-5
 ENCS: 2-2658
 MW: 814.13
 mp: Uncertain
 bp: Uncertain
 sw: Uncertain
 Specific gravity: Uncertain
 logPow: Uncertain

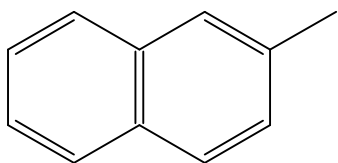
[10] Methylnaphthalenes

[10-1] 1-Methylnaphthalene



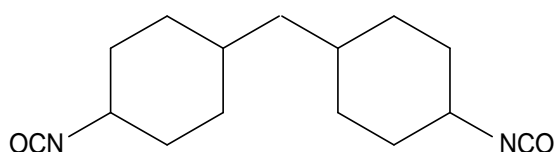
Molecular formula: C₁₁H₁₀
 CAS: 90-12-0
 ENCS: 4-80
 MW: 142.20
 mp: -30.43°C²⁾
 bp: 244.4°C²⁾
 sw: 0.0281g/kg (25°C)²⁾
 Specific gravity: 1.0202g/cm³ (20°C)²⁾
 logPow: 3.87²⁾

[10-2] 2-Methylnaphthalene



Molecular formula: C₁₁H₁₀
CAS: 91-57-6
ENCS: 4-80
MW: 142.20
mp: 34.6°C²⁾
bp: 241.1°C²⁾
sw: 0.025g/kg (25°C)²⁾
Specific gravity: 1.0058g/cm³ (20°C)²⁾
logPow: 4.00²⁾

[11] Methylenebis(4,1-cyclohexylene)diisocyanate



Molecular formula: C₁₅H₂₂N₂O₂
CAS: 5124-30-1
ENCS: 4-119
MW: 262.35
mp: 15°C⁶⁾
bp: 167 ~ 168°C (2hPa)⁶⁾
sw: Uncertain (In water, it diisocyanate hydrolyzes with a half-life of approximately 2h.⁶⁾)
Specific gravity: 1.066g/cm³¹⁾
logPow: Uncertain (In water, it diisocyanate hydrolyzes with a half-life of approximately 2h.⁶⁾)

References

- 1) O'Neil, The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals 14th Edition, Merck Co. Inc. (2006)
- 2) Haynes, CRC Handbook of Chemistry and Physics, 92nd Edition, CRC Press LLC (2011)
- 3) OECD, 4,4'-Methylenedianiline, SIDS Initial Assessment Report for 10th SIAM (2000)
- 4) Hansch et al., Exploring QSAR - Hydrophobic, Electronic and Steric Constants, American Chemical Society (1995)
- 5) OECD, N,N-Dicyclohexyl-2-benzothiazolesulfenamide, SIDS Initial Assessment Report for 18th SIAM (2004)
- 6) European Commission European Chemicals Bureau, 2,2',6,6'-tetra-tert-butyl-methylenediphenol, International Uniform Chemical Information Database (IUCLID) Dataset (2000)
- 7) OECD, Phenol, 4-(1,1,3,3-tetramethylbutyl), SIDS Initial Assessment Report for SIAM3 (1995)
- 8) Japan Chemical Industry Ecology-Toxicology & Information Center
- 9) OECD, 4,4'-Methylenedicyclohexyl diisocyanate, SIDS Initial Assessment Report for 20th SIAM (2005)

3. Surveyed site and procedure

In the Detailed Environmental Survey, the sampling and analysis of specimens was entrusted to prefectural governments and government-designated cities across Japan, and some specimens were sampled and analyzed by private analytical laboratories.

(1) Organisations responsible for sampling

Local communities	Organisations responsible for sampling	Surveyed media			
		Surface water	Sediment	Wildlife	Air
Hokkaido	Hokkaido Research Organization Environmental and Geological Research Department Institute of Environmental Sciences	○	○		○
Sapporo City	Sapporo City Institute of Public Health	○	○		○
Iwate Pref.	Research Institute for Environmental Sciences and Public Health of Iwate Prefecture	○	○	○	
Miyagi Pref.	Miyagi Prefectural Institute of Public Health and Environment	○			
Sendai City	Sendai City Institute of Public Health	○	○		
Yamagata Pref.	Yamagata Institute of Environmental Sciences	○	○		
Ibaraki Pref.	Ibaraki Kasumigaura Environmental Science Center	○			○*2
Tochigi Pref.	Tochigi Prefectural Institute of Public Health and Environmental Science	○			
Gunma Pref.	Gunma Prefectural Institute of Public Health and Environmental Sciences	○			○
Saitama Pref.	Center for Environmental Science in Saitama	○			○*2
Chiba Pref.	Chiba Prefectural Environmental Research Center	○	○		○*2
Tokyo Met.	Tokyo Metropolitan Research Institute for Environmental Protection	○	○	○	
Kanagawa Pref.	Kanagawa Environmental Research Center				○
Yokohama City	Yokohama Environmental Science Research Institute	○	○	○	
Kawasaki City	Kawasaki Municipal Research Institute for Environmental Protection	○	○	○	
Niigata Pref.	Niigata Prefectural Institute of Public Health and Environmental Sciences	○	○	○	
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science	○	○		○
Nagano Pref.	Nagano Environmental Conservation Research Institute	○	○		○
Gifu Pref.	Gifu Prefectural Research Institute for Health and Environmental Sciences				○
Shizuoka Pref.	Shizuoka Institute of Environment and Hygiene	○	○		
Aichi Pref.	Aichi Environmental Research Center	○	○		
Nagoya City	Nagoya City Environmental Science Research Institute	○	○		○
Mie Pref.	Mie Prefecture Health and Environment Research Institute	○	○		○
Kyoto Pref.	Kyoto Prefectural Institute of Public Health and Environment	○			○
Kyoto City	Kyoto Prefectural Institute of Public Health and Environment	○	○		
Osaka Pref.	Research Institute of Environment, Agriculture and Fisheries, Osaka Prefectural Government	○	○	○	○*2
Osaka City	Osaka City Institute of Public Health and Environmental Sciences	○	○		
Hyogo Pref.	Hyogo Prefectural Agricultural Administration and Environment Division, Environment Bureau	○			○
Kobe City	Environmental Conservation and Guidance Division, Environment Bureau	○	○		
Nara Pref.	Nara Prefectural Institute for Hygiene and Environment	○	○		
Wakayama Pref.	Wakayama Prefectural Research Center of Environment and Public Health	○	○		
Okayama Pref.	Okayama Prefectural Institute for Environmental Science and Public Health	○	○	○	
Yamaguchi Pref.	Yamaguchi Prefectural Public Health and Environment	○	○	○	○
Kagawa Pref.	Kagawa Prefectural Research Institute for Environmental Sciences and Public Health	○	○		○
Ehime Pref.	Ehime Prefectural Institute of Public Health and Environmental Science	○			
Fukuoka Pref.	Fukuoka Institute of Health and Environmental Science	○	○		○*2
Kitakyushu City	Kitakyushu City Institute of Environmental Sciences	○			
Fukuoka City	Fukuoka City Institute for Hygiene and the Environment	○	○		
Saga Pref.	Saga Prefectural Environmental Research Center	○	○		○
Kumamoto Pref.	Kumamoto Prefectural Institute of Public Health and Environmental Science				○*2
Oita Pref.	Oita Prefectural Environmental Preservation Division, Life and Environment Department	○		○	○

(Note 1) *1: Organisations responsible for sampling are described by their official names in FY 2010.

(Note 2) *2: Those organizations cooperated with a private analytical laboratory in sampling specimens.

(2) Surveyed sites (or areas) and target chemicals

Surveyed sites and target chemicals for surface water are shown in Table 2-1-1 and Figure 2-1-1. Surveyed sites and target chemicals for sediment are shown in Table 2-1-2 and Figure 2-1-1. Surveyed sites and target chemicals for air are shown in Table 2-1-4 and Figure 2-1-3. The breakdown is summarized as follows. Surveyed sites and target chemicals for surface water and sediment at the pesticide survey are shown in Table 2-1-3 and Figure 2-1-2.

Surveyed media	Numbers of local communities	Numbers of target chemicals	Numbers of surveyed sites	Numbers of samples at a surveyed site
Surface water	38	7	51	3
Sediment	28	3	34	3
Wildlife	9	2	11	3
Air	21	2	26	3
All media	41	11	83	

(Note 1) *1: 6 of the 21 organizations cooperated with private analytical laboratories in sampling all specimens.

Table 2-1-1 List of surveyed sites (surface water) and target chemicals in the Detailed Environmental Survey in FY 2010

Local communities	Surveyed sites	Target chemicals											
		[1]	[4]	[5]	[7-1]	[7-2]	[8]	[9-1]	[9-2]	[9-3]	[10-1]	[10-2]	
Hokkaido	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)		○		○	○	○					○	○
	Tomakomai Port	○	○						○	○	○		
Sapporo City	Nakanuma of Riv.Toyohira(Sapporo City)			○									
	Daiichishinkawa-bashi Bridge, Riv. Shin(Sapporo City)			○									
Iwate Pref.	Riv. Toyosawa(Hanamaki City)		○					○	○	○			
Miyagi Pref.	Hutatsuya-bashi Bridge, Riv. Hasama(Tome City)					○							
	Funaoka-ohashi Bridge, Riv. Shiraishi(Shibata Town)					○							
Sendai City	Hirose-ohashi Bridge, Riv. Hirose(Sendai City)	○	○	○	○		○					○	○
Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)				○	○						○	○
Ibaraki Pref.	Katta-bashi Bridge, Riv. Naka(Hitachinaka City)	○	○	○	○	○	○	○	○	○	○	○	○
	Tonekamome-ohashi Bridge, Mouth of Riv. Tone(Kamisu City)	○	○	○	○	○	○	○	○	○	○	○	○
Tochigi Pref.	Riv. Tagawa(Utsunomiya City)	○	○										
Gunma Pref.	Tako Bridge of Riv. Kabura(Takasaki City)			○	○							○	○
Saitama Pref.	Shiki-ohashi Bridge, Riv. Yanase(Shiki City)	○		○			○						
	Kachi-hashii Bridge, Riv. Ichino(Yoshimi Town)							○	○	○			
Chiba Pref.	Coast of Ichihara and Anegasaki	○		○	○	○	○					○	○
	Asai-bashi Bridge, Riv. Yourou(Ichihara City)				○			○	○	○	○	○	○
Tokyo Met.	Mouth of Riv. Arakawa(Koto Ward)	○	○		○	○		○	○	○	○	○	○
	Mouth of Riv. Sumida(Minato Ward)	○	○		○	○		○	○	○	○	○	○
Yokohama City	Kamenoko Bridge over Riv. Tsurumi(Yokohama City)	○	○	○	○	○	○	○	○	○	○	○	○
	Yokohama Port	○	○	○	○	○	○	○	○	○	○	○	○
Kawasaki City	Mouth of Riv. Tama(Kawasaki City)	○			○	○	○	○	○	○	○	○	○
	Keihin Canal, Port of Kawasaki			○	○	○	○					○	○
Niigata Pref.	Lower Riv. Shinano(Niigata City)	○			○			○	○	○	○	○	○
Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)			○	○	○	○					○	○
Nagano Pref.	Lake Suwa(center)			○	○	○	○					○	○
Shizuoka Pref.	Shimizu Port	○			○	○						○	○
	Riv. Tenryu(Iwata City)			○				○	○	○			
Aichi Pref.	Nagoya Port	○	○	○	○	○	○	○	○	○	○	○	○
Nagoya City	Minatoshinbashi Bridge, Riv. Hori (Nagoya City)							○	○	○			
Mie Pref.	Yokkaichi Port	○	○		○		○					○	○
Kyoto Pref.	Miyazu Port				○			○	○	○	○	○	○
Kyoto City	Miyamae-bashi Bridge, Miyamae Bridge, Riv. Katsura(Kyoto City)			○			○						
Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	○	○	○	○	○	○	○	○	○	○	○	○
Osaka City	Kema Bridge, Riv. Oh-kawa (Osaka City)	○	○	○	○	○		○	○	○	○	○	○
	Osaka Port				○	○		○	○	○	○	○	○
Hyogo Pref.	Offshore of Himeji							○	○	○			
Kobe City	Kobe Port(center)	○	○	○	○	○	○	○	○	○	○	○	○
Nara Pref.	Riv. Yamato(Ooji Town)			○			○						
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City)							○	○	○			
Okayama Pref.	Otoidezeki of Riv. Asahi(Okayama City)				○	○						○	○
	Offshore of Mizushima	○	○	○	○	○	○					○	○
Yamaguchi Pref.	Tokuyama Bay	○	○	○	○	○	○	○	○	○	○	○	○
	Offshore of Hagi		○		○	○						○	○
Kagawa Pref.	Takamatsu Port	○			○	○	○	○	○	○	○	○	○
Ehime Pref.	Mishima area, Riv. Iwamatsu(Uwajima City)						○						
Fukuoka Pref.	Kabura-bashi Bridge, River Raizan(Maebaru City)		○	○	○	○	○	○	○	○			
Kitakyushu City	Dokai Bay				○							○	○
Fukuoka City	Hakata Bay		○			○							
Saga Pref.	Imari Bay		○					○	○	○			
Oita Pref.	Mouth of Riv. Oita	○		○			○	○	○	○			

[1] Ethyl acetate, [4] Cerium and its compounds (as Cerium), [5] 2,2',6,6'-Tetra-tert-butyl-4,4'-methylenediphenol, [7-1] *o*-Toluidine, [7-2] *p*-Toluidine, [8] Butan-2-one oxime, [9-1] Perfluorododecanoic acid, [9-2] Perfluorotetradecanoic acid, [9-3] Perfluorohexadecanoic acid, [10-1] 1-Methylnaphthalene, [10-2] 2-Methylnaphthalene

Table 2-1-2 List of surveyed sites (sediment) and target chemicals in the Detailed Environmental Survey in FY 2010

Local communities	Surveyed sites	Target chemicals		
		[3]	[5]	[6]
Hokkaido	Tomakomai Port			○
Sapporo City	Nakanuma of Riv. Toyohira(Sapporo City)	○	○	
	Daiichishinkawa-bashi Bridge, Riv. Shin(Sapporo City)	○	○	
Iwate Pref.	Riv. Toyosawa(Hanamaki City)		○	
Sendai City	Hirose-ohashi Bridge, Riv. Hirose(Sendai City)	○		○
Yamagata Pref.	Mouth of Riv. Mogami(Sakata City)		○	
Chiba Pref.	Coast of Ichihara and Anegasaki	○	○	○
Tokyo Met.	Mouth of Riv. Arakawa(Koto Ward)	○		○
	Mouth of Riv. Sumida(Minato Ward)	○		○
Yokohama City	Kamenoko Bridge over Riv. Tsurumi(Yokohama City)	○	○	○
	Yokohama Port	○	○	○
Kawasaki City	Mouth of Riv. Tama(Kawasaki City)	○	○	○
	Keihin Canal, Port of Kawasaki	○	○	○
Niigata Pref.	Lower Riv. Shinano(Niigata City)	○	○	○
Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)	○	○	○
Nagano Pref.	Lake Suwa(center)	○	○	○
Shizuoka Pref.	Shimizu Port	○	○	○
	Riv. Tenryu(Iwata City)	○	○	○
Aichi Pref.	Nagoya Port	○	○	○
Nagoya City	Minatoshinbashi Bridge, Riv. Hori (Nagoya City)	○	○	○
Mie Pref.	Yokkaichi Port	○	○	○
Kyoto City	Miyamae-bashi Bridge, Miyamae Bridge, Riv. Katsura(Kyoto City)	○	○	○
Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	○	○	○
Osaka City	Kema Bridge, Riv. Oh-kawa (Osaka City)	○	○	○
	Osaka Port	○	○	○
Kobe City	Kobe Port(center)	○	○	○
Nara Pref.	Riv. Yamato(Ooji Town)		○	○
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City)		○	
Okayama Pref.	Offshore of Mizushima	○	○	○
Yamaguchi Pref.	Tokuyama Bay	○	○	○
Kagawa Pref.	Takamatsu Port	○	○	○
Fukuoka Pref.	Offshore of Omuta	○	○	○
Fukuoka City	Hakata Bay	○	○	○
Saga Pref.	Imari Bay	○	○	○

[3] *N,N*-Dicyclohexyl-1,3-benzothiazole-2-sulphenamide,

[5] 2,2',6,6'-Tetra-tert-butyl-4,4'-methylenediphenol, [6] 4-(1,1,3,3-Tetramethylbutyl)phenol

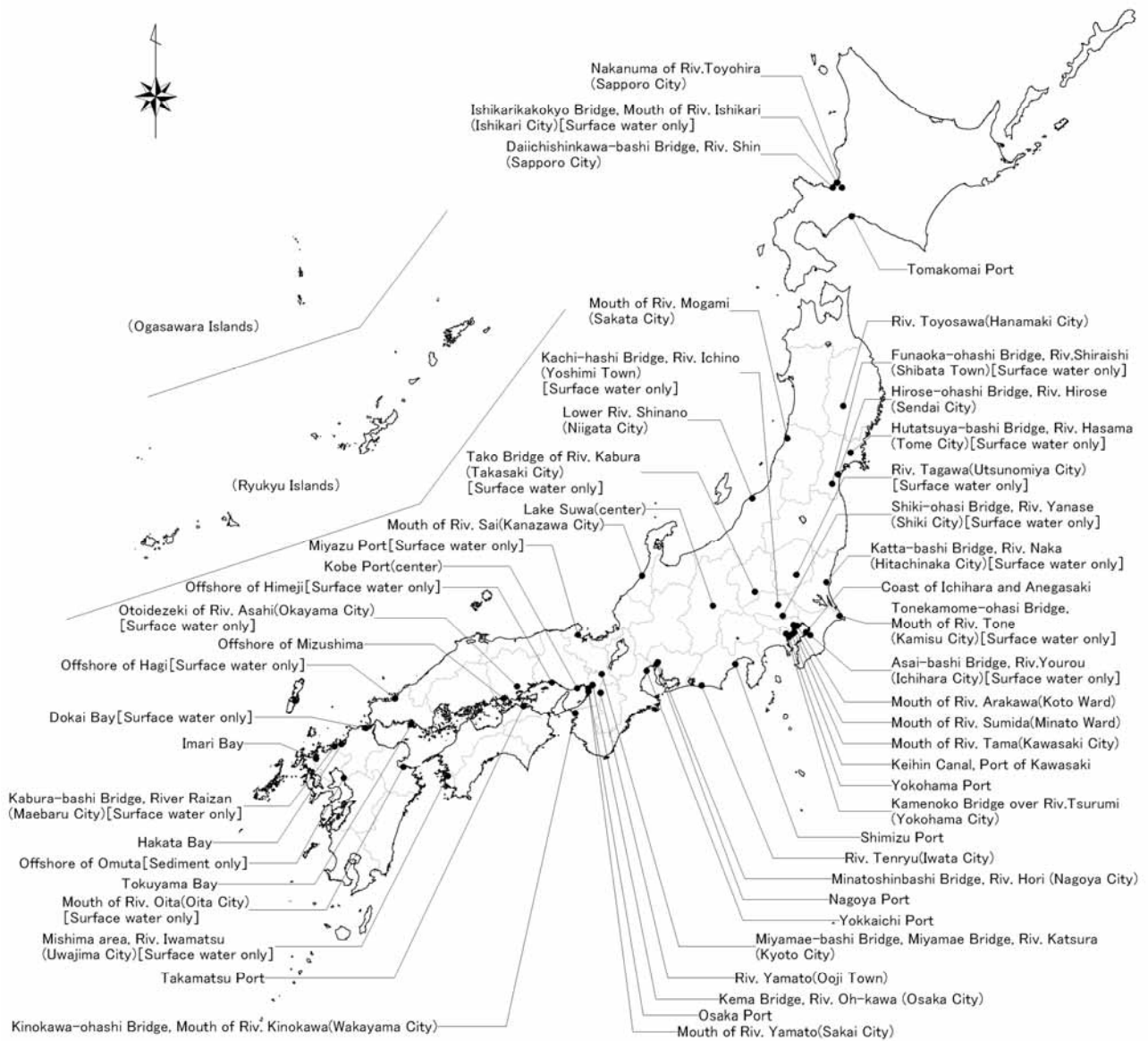


Figure 2-1-1 Surveyed sites (surface water and sediment) in the Detailed Environmental Survey in FY 2010

Table 2-1-3 List of surveyed sites (wildlife) and target chemicals in the Detailed Environmental Survey in FY 2010

Local communities	Surveyed sites	Wildlife species	Target chemicals	
			[3]	[5]
Iwate Pref.	Yamada Bay	Blue mussel	○	○
		Greenling	○	○
Tokyo Met.	Tokyo Bay	Sea bass	○	○
Yokohama City	Yokohama Port	Green mussel	○	○
Kawasaki City	Offshore of Ogishima Island, Port of Kawasaki	Sea bass	○	○
Niigata Pref.	Lower Riv. Shinano (Niigata City)	Carp	○	○
Osaka Pref.	Osaka Bay	Sea bass	○	○
Okayama Pref.	Offshore of Mizushima	Striped mullet	○	○
Yamaguchi Pref.	Tokuyama Bay	Striped mullet	○	○
	Offshore of Hagi	Sea bass	○	○
Oita Pref.	Mouth of Riv. Oita(Oita City)	Sea bass	○	○

[3] *N,N*-Dicyclohexyl-1,3-benzothiazole-2-sulphenamide, [5] 2,2',6,6'-Tetra-tert-butyl-4,4'-methylenediphenol



Figure 2-1-2 Surveyed sites (wildlife) in the Detailed Environmental Survey in FY 2010

Table 2-1-4 List of surveyed sites (air) and target chemicals in the Detailed Environmental Survey in FY 2010

Local communities	Surveyed sites	Target chemicals	
		[2]	[11]
Hokkaido	Hokkaido Institute of Environmental Sciences	○	
Sapporo City	Sapporo City Institute of Public Health(Sapporo City)		○
Ibaraki Pref.	Ibaraki Kasumigaura Environmental Science Center(Tsuchiura City)	○	○
	Kamisu Fire Station(Kamisu City)	○	○
Gunma Pref.	Maebashi City Miyagi Junior High School(Maebashi City)		○
Saitama Pref.	Center for Environmental Science in Saitama(Kazo City)	○	○
Chiba Pref.	Kashiwa-oomuro Air Quality Monitoring Station (Kashiwa City)		○
	Matsudo-gokou Air Quality Monitoring Station (Matsudo City)		○
Kanagawa Pref.	Kanagawa Environmental Research Center(Hiratsuka City)	○	○
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science(Kanazawa City)		○
Nagano Pref.	Nagano Environmental Conservation Research Institute (Nagano City)	○	
Gifu Pref.	Gifu Prefectural Research Institute for Health and Environmental Sciences(Kakamigahara City)		○
Nagoya City	Chikusa Ward Heiwa Park(Nagoya City)	○	○
Mie Pref.	Mie Prefecture Health and Environment Research Institute(Yokkaichi City)	○	○
Kyoto Pref.	Uji Prefectural Government Building(Uji City)	○	
Osaka Pref.	Research Institute of Environment, Agriculture and Fisheries, Osaka Prefectural Government(Osaka City)	○	○
Hyogo Pref.	Kawanishi City Government Building(Kawanishi City)		○
	Hyogo Prefectural Environmental Research Center (Kobe City)	○	○
Yamaguchi Pref.	Yamaguchi Prefectural Public Health and Environment(Yamaguchi City)	○	○
Kagawa Pref.	Takamatsu Joint Prefectural Government Building (Takamatsu City)	○	○
Fukuoka Pref.	Munakata Prefectural Government Building (Munakata City)	○	○
	Omuta City Government Building(Omuta City)	○	○
Saga Pref.	Saga Prefectural Environmental Research Center (Saga City)	○	
Kumamoto Pref.	Kumamoto Prefectural Institute of Public Health and Environmental Science(Udo City)	○	○
Oita Pref.	Oita Prefectural Institute of Public Health and Environment(Oita City)	○	○
	Oita Prefectural West Public Health Center(Hita City)	○	○

[2] 4,4'-Diaminodiphenylmethane, [11] Methylenebis(4,1-cyclohexylene)diisocyanate



Figure 2-1-4 Surveyed sites (air) in the Detailed Environmental Survey in FY 2010

(3) Detection limit

The detection limits of analysed values reported by the analytical laboratory are not necessarily the same because of differences in the properties of specimens and in the available measurement equipment. To enable summarisation, therefore, a unified detection limit is predetermined and the analytical values reported by the analytical laboratory are summarised by the following procedure.

Treatment of measured value as an undetected value in high-sensitivity analysis

In the case of high-sensitivity analysis, in which the detection limit of the analytical laboratory is lower than the unified detection limit, any measured value lower than the unified detection limit is treated as an undetected value in the nationwide summary (see schematic (A)).

Elimination of undetected values in low-sensitivity analysis from summary subject

When the detection limit of the analytical laboratory is higher than the unified detection limit, any target chemical not detected is eliminated from the subject of the summary (see schematic (B)).

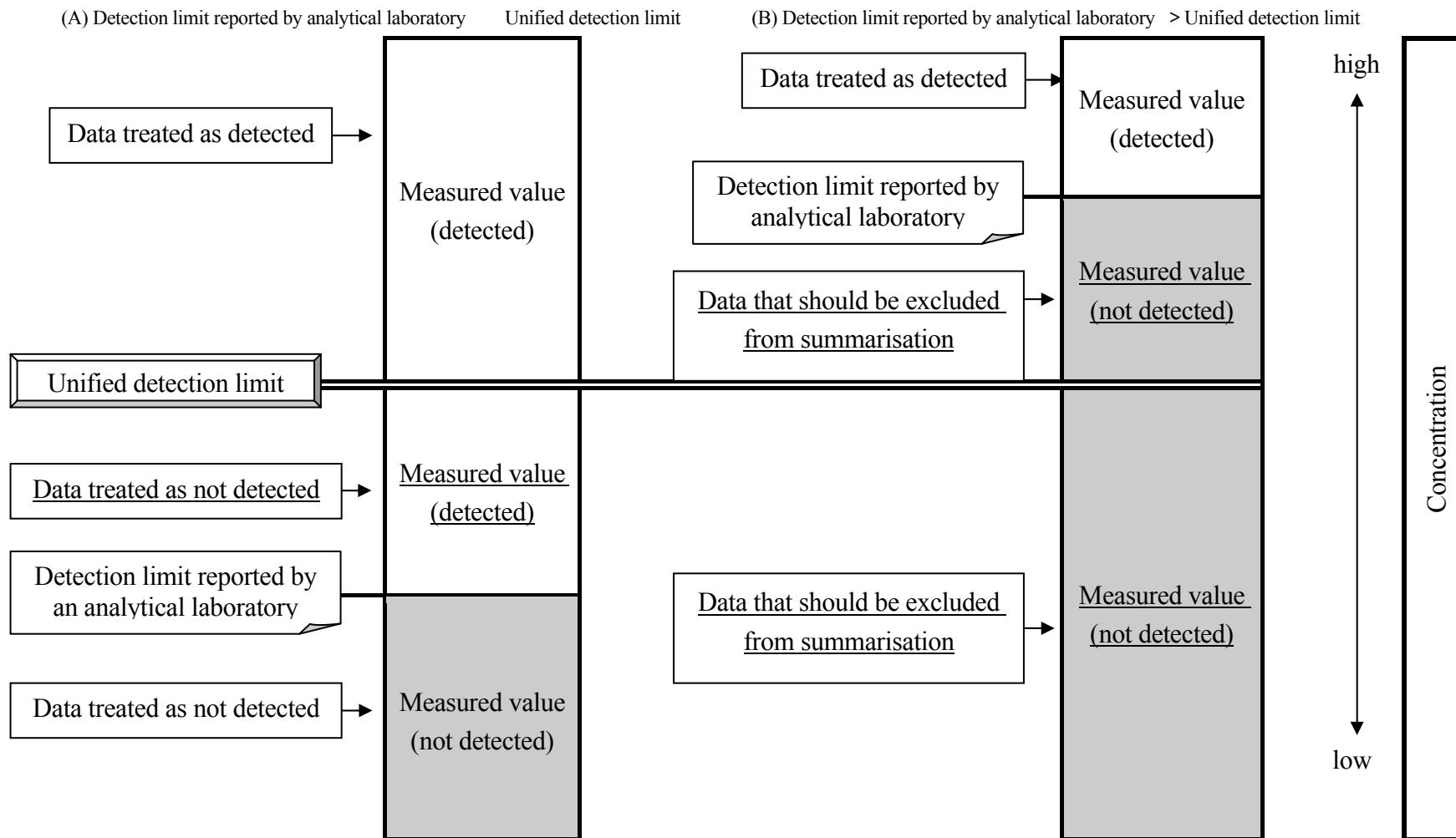
When the instrument detection limit (IDL) and the method detection limit (MDL) are given in the analytical method, which is described in reports on the investigation of the development of analytical methods for chemicals and adopted in the Detailed Environmental Survey (hereafter, the Detailed Environmental Survey Analytical Method), if the IDL measured by the analytical laboratory is lower than the given IDL, the MDL of the Detailed Environmental Survey Analytical Method is used as the detection limit by the analytical laboratory.

When IDL and MDL are not given in the Detailed Environmental Survey Analytical Method, the detection limit is predetermined by the following procedure.

When the analytical laboratory calculates the appropriate IDL and MDL following the calculation method stated in the analytical method development instruction manuals, this calculated MDL is used as the detection limit by the analytical laboratory.

When the appropriate IDL and MDL are not calculated by the analytical laboratory, one of the following procedures was employed to establish the detection limit by the analytical laboratory.

- deduction from the IDL and MDL calculated for the corresponding chemical by Detailed Environmental Survey Analytical Method or other analytical laboratories
- deduction from the lowest calibration curve concentration and the results of recovery tests
- deduction from the results of addition and collection tests, the results of operation blank tests, and the signal/noise ratio (S/N ratio) obtained from the chromatogram of environmental specimens



Schematic of procedure for data summarisation

4. Summary of survey results

The detection ranges and the detection limits are shown in Table 2-2. The survey results are summarized as follows.

In surface water, 6 out of the 7 target chemicals (groups) were detected.

- [4] Cerium and its compounds (as Cerium): 21 of the 21 valid sites
- [5] 2,2',6,6'-Tetra-tert-butyl-4,4'-methylenediphenol: 1 of the 24 valid site
- [7-1] *o*-Toluidine: 14 of the 32 valid sites
- [7-2] *p*-Toluidine: 13 of the 28 valid sites
- [8] Butan-2-one oxime: 20 of the 22 valid sites
- [9-1] Perfluorododecanoic acid: 3 of the 27 valid sites
- [10-1] 1-Methylnaphthalene: 9 of the 31 valid sites
- [10-2] 2-Methylnaphthalene: 9 of the 31 valid sites

In sediment, 1 out of the 1 target group was detected.

- [5] 2,2',6,6'-Tetra-tert-butyl-4,4'-methylenediphenol: 12 of the 30 valid sites
- [6] 4-(1,1,3,3-Tetramethylbutyl)phenol: 13 of the 29 valid sites

In wildlife (bivalves or fish), 3 out of the 3 target chemicals (groups) were detected.

- [5] 2,2',6,6'-Tetra-tert-butyl-4,4'-methylenediphenol: 3 of the 11 valid sites

In air, 2 target chemicals (groups) were not detected.

Table 2-2 Summary of the detection ranges and the detection limits in the Detailed Environmental Survey in FY 2010

No.	Target chemicals	Surface water [ng/L]		Sediment [ng/g-dry]		Wildlife [ng/g-wet]		Air [ng/m ³]	
		Detection range and frequency	Detection range and frequency	Detection range and frequency	Detection limit	Detection range and frequency	Detection limit	Detection range and frequency	Detection limit
[1]	Ethyl acetate	nd 0/23	380						
[2]	4,4'-Diaminodiphenylmethane							nd 0/19	16
[3]	<i>N,N</i> -Dicyclohexyl-1,3-benzothiazole-2-sulphenamide			nd 0/29	0.7	nd 0/11	4.4		
[4]	Cerium and its compounds (as Cerium)	4.0 ~ 1,300 21/21	1.4						
[5]	2,2',6,6'-Tetra-tert-butyl-4,4'-methylenediphenol	nd ~ 2.5 1/24	1.7	nd ~ 12 12/30	0.18	nd ~ 0.14 3/11	0.037		
[6]	4-(1,1,3,3-Tetramethylbutyl)phenol			nd ~ 86 13/29	1.9				
[7]	Toluidines								
[7-1]	<i>o</i> -Toluidine	nd ~ 8.0 14/32	1.9						
[7-2]	<i>p</i> -Toluidine	nd ~ 2.9 13/28	0.50						
[8]	Butan-2-one oxime	nd ~ 520 20/22	9.7						
[9]	Perfluoroalkyl acid								
[9-1]	Perfluorododecanoic acid	nd ~ 0.3 3/27	0.1						
[9-2]	Perfluorotetradecanoic acid	nd 0/27	0.1						
[9-3]	Perfluorohexadecanoic acid	nd 0/27	0.061						
[10]	Methylnaphthalenes								
[10-1]	1-Methylnaphthalene	nd ~ 5.0 9/31	1.8						
[10-2]	2-Methylnaphthalene	nd ~ 9.9 9/31	2.8						
[11]	Methylenebis(4,1-cyclohexylene) diisocyanate							nd 0/21	0.31

(Note 1) Detection frequency is based on the number of sites or areas, thus means (the number of detected sites/the number of surveyed sites). A site where data was not available was excluded from the number of surveyed sites. A site where the data became invalid under a unified detection limit was also excluded. 3 samples were measured for a site or area, and the detection in more than one out of samples from a site or area can be defined as one detected site or area.

(Note 2) Detection range is based on the number of samples and therefore can be shown as "nd ~ " even if a target chemical is detected in all sites (or areas).

(Note 3) □ means the medium was not surveyed.

(Note 4)* connote target substances or points selected for survey in light of documentation or submittals regarding emissions.