

Chapter 2 Results of the Detailed Environmental Survey in FY 2012

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 2011 Detailed Environmental Survey, 14 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	Before the revision	After the revision	Surface water	Sedi-ment	Wild life	Air
[1]	<i>n</i> -Butyl acrylate	III Monitored	Priority Assessment Chemical Substances		I 7	○			
[2]	Methyl acrylate	II Monitored	Priority Assessment Chemical Substances	I 6	I 8	○			
[3]	Acrylonitrile	II Monitored	Priority Assessment Chemical Substances	I 7	I 9	○			
[4]	Ethylbenzene	II Monitored	Priority Assessment Chemical Substances	I 40	I 53	○			
[5]	1,2-Epoxypropane (synonym: Propylene oxide)	II Monitored	Priority Assessment Chemical Substances	I 56	I 68	○			
[6]	Vinyl acetate	II Monitored	Priority Assessment Chemical Substances	I 102	I 134	○			
[7]	Dimethylamine	II Monitored	Priority Assessment Chemical Substances		I 218	○			○
[8]	Styrene	II Monitored	Priority Assessment Chemical Substances	I 177	I 240	○			○
[9]	4-(1,1,3,3-Tetramethylbutyl) phenol	II Monitored III Monitored		II 59	I 74	○			
[10]	Trimethylamine	II Monitored				○			○
[11]	Phenylenediamines				I 348				
	[11-1] <i>o</i> -Phenylenediamine	II Monitored III Monitored	Priority Assessment Chemical Substances	I 262		○			
	[11-2] <i>m</i> -Phenylenediamine	II Monitored III Monitored	Priority Assessment Chemical Substances	I 264		○			
	[11-3] <i>p</i> -Phenylenediamine			I 263		○			

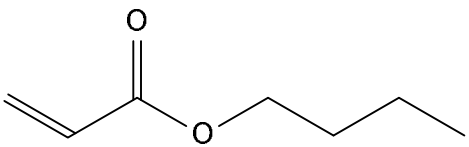
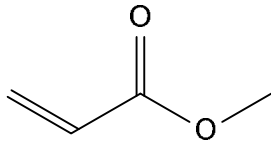
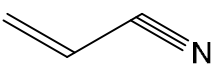
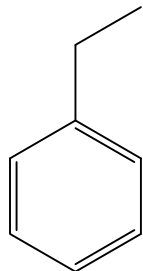
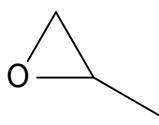
No.	Name	The Chemical Substances Control Law		The PRTR Law		Surveyed media			
		Before the revision	After the revision	Before the revision	After the revision	Surface water	Sedi-ment	Wild life	Air
[12]	Bis(2-ethylhexyl) phthalate	II Monitored	Priority Assessment Chemical Substances	I 272	I 355	○	○	○	
[13]	<i>n</i> -Butyl benzyl phthalate			I 273	I 356	○	○	○	
[14]	Methacrylic acid	II Monitored	Priority Assessment Chemical Substances	I 314	I 415	○			

(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.

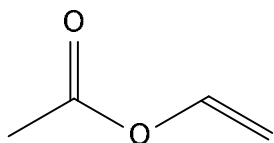
(Note 3) "Before the revision" in "The PRTR Law" means "appointments before the revision of government ordinance on November 21, 2008" and "After the revision" in "The PRTR Law" means "appointments after that revision".

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

<p>[1] <i>n</i>-Butyl acrylate</p> 	<p>Molecular formula: C₇H₁₂O₂ CAS: 141-32-2 ENCS: 2-989 MW: 128.17 mp: -64.6°C ¹⁾ bp: 145°C(760mmHg) ²⁾ sw: 0.14g/100mL(20°C) ³⁾ Specific gravity: 0.8986(20/4°C) ²⁾ logPow: 2.38 ³⁾</p>
<p>[2] Methyl acrylate</p> 	<p>Molecular formula: C₃H₃N CAS: 107-13-1 ENCS: 2-1513 MW: 53.06 mp: -83.55°C ⁴⁾ bp: 77.3°C(760mmHg)⁴⁾ sw: 79.3g/L(20°C) ⁵⁾ Specific gravity: 0.8050(20/4°C) ⁴⁾ logPow: 0.25 ⁵⁾</p>
<p>[3] Acrylonitrile</p> 	<p>Molecular formula: C₃H_{3.5}N CAS: 106-47-8 ENCS: 3-194 MW: 127.57 mp: 72.5°C ¹⁾ bp: 232°C ¹⁾ sw: 2.75g/kg(20°C) ²⁾ Specific gravity: 1.169(77/4°C) ¹⁾ logPow: 1.83 ³⁾</p>
<p>[4] Ethylbenzene</p> 	<p>Molecular formula: C₈H₁₀ CAS: 100-41-4 ENCS: 3-28, 3-60 MW: 106.17 mp: -95.01°C ⁴⁾ bp: 136.25°C ⁴⁾ sw: 0.2g/L(0°C) ⁵⁾ Specific gravity: 0.866(25/25°C) ⁶⁾ logPow: 3.15 ⁵⁾</p>
<p>[5] 1,2-Epoxypropane (synonym: Propylene oxide)</p> 	<p>Molecular formula: C₃H₆O CAS: 75-56-9 ENCS: 2-219 MW: 58.08 mp: -112.13°C ⁴⁾ bp: 34.23°C ⁴⁾ sw: 590 g/L(25°C) ⁷⁾ Specific gravity: 0.859(0/4°C) ⁴⁾ logPow: 0.03 ⁷⁾</p>

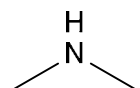
(Abbreviations) CAS: CAS registry number, ENCS: registry number in the Existing and New Chemical Substances List, MW: molecular weight, mp: melting point, bp: boiling point, SW: solubility in water, logPow: *n*-octanol-water partition coefficient, kPa: kilopascal (1 atom = 101.3kPa).

[6] Vinyl acetate



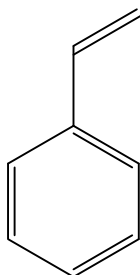
Molecular formula: C₄H₆O₂
CAS: 108-05-4
ENCS: 2-728
MW: 86.09
mp: -100 °C⁴⁾
bp: 72.7 °C⁴⁾
sw: 1g/50mL (20 °C)⁴⁾
Specific gravity: 0.932 (20/4 °C)⁴⁾
logPow: 0.73⁵⁾

[7] Dimethylamine



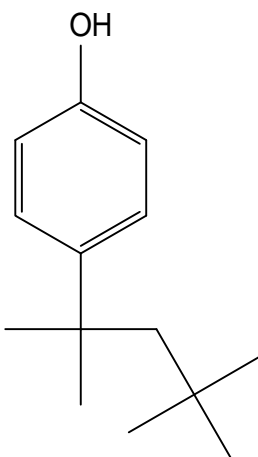
Molecular formula: C₂H₇N
CAS: 124-40-3
ENCS: 2-134
MW: 45.08
mp: -96°C²⁾
bp: 7°C²⁾
sw: 354g/mL
Specific gravity: 0.68(0/4°C)²⁾
logPow: -0.2⁸⁾

[8] Styrene



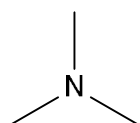
Molecular formula: C₈H₈
CAS: 100-42-5
ENCS: 3-4
MW: 104.15
mp: -30.6°C⁴⁾
bp: 145-146°C⁴⁾
sw: 0.321g/L⁵⁾
Specific gravity: 0.9059(20°C)⁴⁾
logPow: 3.05⁵⁾

[9] 4-(1,1,3,3-Tetramethylbutyl)phenol



Molecular formula: C₁₄H₂₂O
CAS: 140-66-9
ENCS: 3-503
MW: 206.32
mp: 85.8°C⁵⁾
bp: 279°C⁵⁾
sw: 5mg/L⁹⁾
Specific gravity: 950kg/m³⁴⁾
logPow: 5.28¹⁰⁾

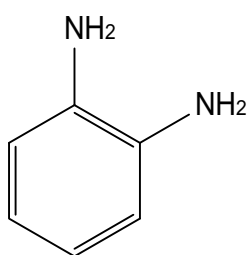
[10] Trimethylamine



Molecular formula: C₃H₉N
CAS: 75-50-3
ENCS: 2-140
MW: 59.11
mp: -117.08°C⁴⁾
bp: 2.87°C⁴⁾
sw: 890g/L¹¹⁾
Specific gravity: 0.902(25°C)⁴⁾
logPow: 0.16⁵⁾

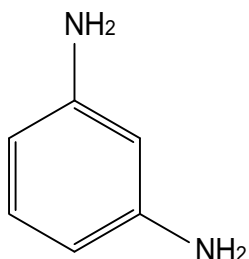
[11] Phenylenediamines

[11-1] *o*-Phenylenediamine



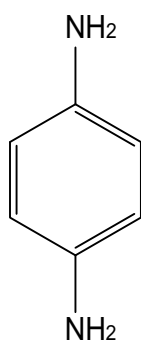
Molecular formula: C₆H₈N₂
CAS: 95-54-5
ENCS: 3-185
MW: 108.14
mp: 103-104°C ⁴⁾
bp: 256-258°C ⁴⁾
sw: 31.1g/L(20°C) ⁵⁾
Specific gravity: 1.14g/cm³(20°C) ¹²⁾
logPow: 0.15 ⁷⁾

[11-2] *m*-Phenylenediamine



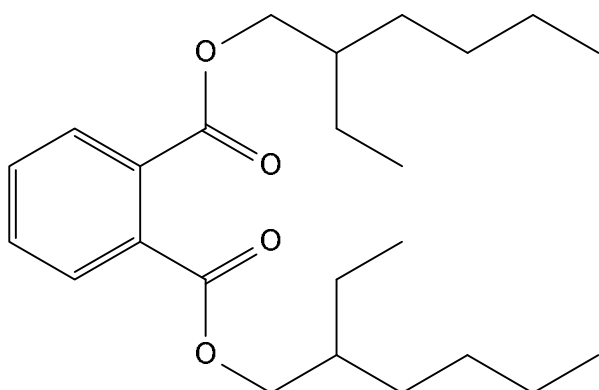
Molecular formula: C₆H₈N₂
CAS: 108-45-2
ENCS: 3-185
MW: 108.14
mp: 62-63°C ⁴⁾
bp: 284-287°C ⁴⁾
sw: 36.1g/L(20°C) ⁵⁾
Specific gravity: 1.139g/cm³(20°C) ⁴⁾
logPow: -0.33 ⁷⁾

[11-3] *p*-Phenylenediamine



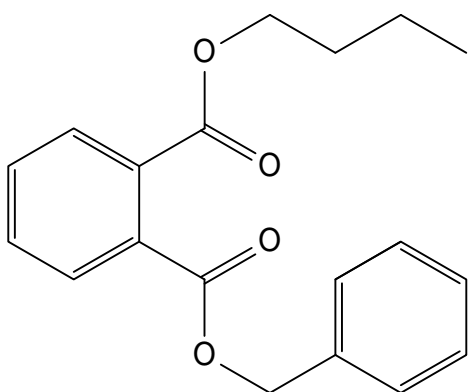
Molecular formula: C₆H₈N₂
CAS: 106-50-3
ENCS: 3-185, 5-4998
MW: 108.14
mp: 145-147°C ⁴⁾
bp: 267°C ⁴⁾
sw: 35.7g/L(24°C) ⁵⁾
Specific gravity: 1.1 ¹³⁾
logPow: -0.25 ⁷⁾

[12] Bis(2-ethylhexyl) phthalate



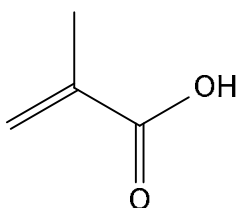
Molecular formula: C₂₄H₃₈O₄
CAS: 117-81-7
ENCS: 3-1307
MW: 390.56
mp: -47°C ⁴⁾
bp: 231°C ⁴⁾
sw: 0.00027g/L(25°C) ⁴⁾
Specific gravity: 0.986(20/20°C) ⁴⁾
logPow: 4.89 ⁷⁾

[13] *n*-Butyl benzyl phthalate



Molecular formula: $C_{19}H_{20}O_4$
CAS: 85-68-7
ENCS: 3-1312
MW: 312.36
mp: $-35^{\circ}C$ ⁷⁾
bp: $370^{\circ}C$ ⁵⁾
sw: $0.71mg/L$ ⁷⁾
Specific gravity: $1.119g/cm^3(25^{\circ}C)$ ⁵⁾
logPow: 4.77 ⁷⁾

[14] Methacrylic acid



Molecular formula: $C_4H_6O_2$
CAS: 79-41-4
ENCS: 2-1025
MW: 86.09
mp: $16^{\circ}C$ ⁴⁾
bp: $163^{\circ}C(760mmHg)$ ⁴⁾
sw: $98g/L(20^{\circ}C)$ ⁵⁾
Specific gravity: $0.902(25^{\circ}C)$ ⁴⁾
logPow: 0.93 ⁵⁾

References

- 1) Lide, D.R.(ed), CRC Handbook of Chemistry and Physics 84th Edition, CRC Press LLC (2003)
- 2) Budavari, S.,(Ed), The Merck Index Ver.12:2 (1995)
- 3) IPCS, International Chemical Safety Cards, Butyl acrylate, ICSC0400 (2003)
- 4) O'Neil, The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals 14th Edition, Merck Co. Inc. (2006)
- 5) Lide, D.R.(ed), CRC Handbook of Chemistry and Physics 88th Edition, CRC Press LLC (2007)
- 6) Sanemasa I et al; Bull Chem Soc Japan 55: 1054-1062 (1982)
- 7) PRTR releases calculation manual 4th Edition(2009)
- 8) IPCS, International Chemical Safety Cards, Dimethylamine, ICSC0260(2003)
- 9) Philip H. Howard, William M. Meylan, Handbook of Physical Properties of Organic Chemicals (1997)
- 10) OECD-SIDS(<http://www.inchem.org/documents/sids/sids/140669.pdf>)(1995)
- 11) Kirk-Othmer,Encyclopedia of Chemical Technology,5th Ed, John Wiley & Sons(2005)
- 12) International Uniform Chemical Information Database IUCLID Data Set
- 13) IPCS, International Chemical Safety Cards, p-Phenylenediamine, ICSC0805(1997)

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 analysed by private analytical laboratories.

(1) Organisations responsible for sampling

Local communities	Organisations responsible for sampling*1	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	○			
Fukushima Pref.	Fukushima Prefectural Institute of Environmental Research	○			
Ibaraki Pref.	Ibaraki Kasumigaura Environmental Science Center	○			○
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	○			○
Saitama City	Saitama City Institute of Health Science and Research	○			○
Chiba Pref.	Chiba Prefectural Environmental Research Center	○			
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	○		○	
Toyama Pref.	Toyama Prefectural Environmental Science Research Center	○	○		
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science	○	○		○
Nagano Pref.	Nagano Environmental Conservation Research Institute	○	○		○
Shizuoka Pref.	Shizuoka Institute of Environment and Hygiene	○	○		○*2
Aichi Pref.	Aichi Environmental Research Center	○	○		○
Nagoya City	Nagoya City Environmental Science Research Institute	○	○	○	○
Mie Pref.	Mie Prefecture Health and Environment Research Institute	○	○		○
Shiga Pref.	Lake Biwa Environmental 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	○	○	○	
Hiroshima Pref.	Hiroshima Prefectural Technology Research Institute Health and Environment Center	○			
Yamaguchi Pref.	Yamaguchi Prefectural Public Health and Environment	○		○	○
Tokushima Pref.	Tokushima Prefectural Public Health	○	○		○
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	○			○
Kitakyushu City	Kitakyushu City Institute of Environmental Sciences	○			○

Local communities	Organisations responsible for sampling ^{*1}	Surveyed media			
		Surface water	Sediment	Wildlife	Air
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	○			
Oita Pref.	Oita Prefectural Environmental Preservation Division, Life and Environment Department	○	○	○	○
Miyazaki Pref.	Miyazaki Prefectural Institute for Public Health and Environment	○			○
Okinawa Pref.	Okinawa Prefectural Institute of Health and Environment	○			

(Note 1) *1: Organisations responsible for sampling are described by their official names in FY 2012.

(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 wildlife are shown in Table 2-1-3 and Figure 2-1-2. 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 media	Numbers of local communities	Numbers of target chemicals	Numbers of surveyed sites	Numbers of samples at a surveyed site
Surface water	47	14	83	1
Sediment	20	2	23	3
Wildlife	11	2	13	3
Air	25*	3	30	3
All media	48	14	127	

(Note) *: 2 of the 25 organizations cooperated with a private analytical laboratory in sampling specimens.

Table 2-1-1 List of surveyed sites (surface water) and target chemicals in the Detailed Environmental Survey in FY 2012

Local communities	Surveyed sites	Target chemicals													
		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Hokkaido	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	○	○		○		○		○				○	○	
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)									○					○
Fukushima Pref.	Binda-bashi Bridge, Riv. Binda (Iwaki City)			○				○			○		○	○	
Ibaraki Pref.	Isonare-bashi Bridge, Riv. Hanazono (Kitaibaraki City)	○	○					○							
	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, Riv. Kabura (Takasaki City)			○		○							○		
Saitama Pref.	Dou-hash Bridge, Riv. Naka (Kazo City)													○	○
	Shiki-ohashi Bridge, Riv. Yanase (Shiki City)			○		○								○	○
	Kachi-hash Bridge, Riv. Ichino (Yoshimi Town)							○			○				
Saitama City	Hattyou-bashi Bridge, Riv. Shiba (Saitama City)			○		○									○
	Nakadote-hash Bridge, Riv. Kamo (Saitama City)	○	○				○			○					
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-bashi Bridge, Riv.Tsurumi (Yokohama City)	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Yokohama Port	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	Offshore of Isogo				○				○						
Kawasaki City	Mouth of Riv. Tama (Kawasaki City)			○		○				○					
	Keihin Canal, Port of Kawasaki,The Coast of Chidori Town				○										
	Keihin Canal, Port of Kawasaki,The Coast of Ougi Town							○		○	○		○	○	
Niigata Pref.	Lower Riv. Shinano (Niigata City)														
	City Road Oumigawa-bashi Bridge,Riv. Oumi (Itoigawa City)	○	○					○							
Toyama Pref.	Ishida-bashi Bridge, Riv. Kurose(Kurobe City)													○	○
	Hagiura-bashi Bridge, Mouth of Riv. Jintsu (Toyama City)				○				○						
	Jyokoji-bashi Bridge, Riv. Koyabu (Takaoka City)							○			○				
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)	○	○					○							
Nagano Pref.	Ichikawa-bashi Bridge, Riv. Chikuma (Iiyama City)							○							
	Lake Suwa (center)							○			○	○			
	Lower Manzai-ohashi Bridge, Riv. Achi (Ida City)												○	○	

Local communities	Surveyed sites	Target chemicals													
		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Shizuoka Pref.	Shimizu Port			o								o			
	Riv. Tenryu (Iwata City)					o		o			o				
Aichi Pref.	Kinuura Port	o	o	o			o								o
	Sakai-ohashi Bridge, Riv. Sakai(Obu City)														o
	Nagoya Port , West of Shiomi Wharf				o	o			o	o			o	o	
Nagoya City	Minatoshinbashi Bridge, Riv. Hori (Nagoya City)				o	o		o	o	o	o		o	o	
	Nagoya Port , South of Shiomi Wharf					o						o			
Mie Pref.	Mouth of Riv. Nagara (Kuwana City)				o				o						
	Yokkaichi Port	o	o	o	o		o		o	o			o	o	
	Toba Port				o				o						
Shiga Pref.	Lake Biwa (center, offshore of Minamihira)									o		o			o
	Lake Biwa (center, offshore of Karasaki)	o	o				o			o			o	o	
Kyoto Pref.	Miyazu Port														o
Kyoto City	Miyamae-bashi Bridge, Riv. Katsura(Kyoto City)											o			o
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Osaka City	Kema-bashi Bridge, Riv. Oh-kawa (Osaka City)														o
	Osaka Port				o				o			o			
Hyogo Pref.	Offshore of Naruohama					o						o			o
	Takasago-honkou Port	o	o	o			o								
	Offshore of Himeji				o			o	o	o	o		o	o	
Kobe City	Kobe Port(center)									o					
Nara Pref.	Riv. Yamato (Ooji Town)										o	o			o
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)			o		o		o					o	o	
Okayama Pref.	Otoidezeki of Riv. Asahi (Okayama City)					o		o			o				
	Inner part of Mizushima Port												o	o	o
	Offshore of Mizushima			o	o					o					
Hiroshima Pref.	West of Hiroshima Bay 8	o	o				o			o					
	West of Hiroshima Bay 29					o									
Yamaguchi Pref.	Tokuyama Bay	o	o		o		o		o						o
	Ube Port	o	o				o								
	Offshore of Hagi				o							o			
Tokushima Pref.	Takase-bashi Bridge, Riv. Yoshino (Ishii Town)							o			o		o	o	
Kagawa Pref.	Takamatsu Port			o							o				
Ehime Pref.	Matsumae Marine Area of Matsumae Port	o	o	o			o	o							
	Mishima area, Riv. Iwamatsu (Uwajima City)					o						o			o
Fukuoka Pref.	Kabura-bashi Bridge, Riv. Raizan (Maebaru City)				o				o	o					
	Offshore of Omuta				o				o	o					
Kitakyushu City	Dokai Bay				o				o				o	o	
Fukuoka City	Hakata Bay							o			o	o			
Saga Pref.	Imari Bay				o	o			o						
Kumamoto Pref.	Ariake Sea	o	o				o								o
	Heiseisougata-ohashi Bridge, Riv. Hamato (Udo City)	o	o				o								
Oita Pref.	Mouth of Riv. Oita (Oita City)	o	o				o								
Miyazaki Pref.	Naka-bashi Bridge, Riv. Hama (Nobeoka City)			o				o			o				
Okinawa Pref.	Naha Port	o	o		o		o		o				o	o	

[1] *n*-Butyl acrylate, [2] Methyl acrylate, [3] Acrylonitrile, [4] Ethylbenzene, [5] 1,2-Epoxypropane (synonym:Propylene oxide), [6] Vinyl acetate, [7] Dimethylamine, [8] Styrene, [9] 4-(1,1,3,3-Tetramethylbutyl)phenol, [10] Trimethylamine, [11] Phenylenediamines, [12] Bis(2-ethylhexyl) phthalate, [13] *n*-Butyl benzyl phthalate, [14] Methacrylic acid

Table 2-1-2 List of surveyed sites (sediment) and target chemicals in the Detailed Environmental Survey in FY 2012

Local communities	Surveyed sites	Target chemicals	
		[12]	[13]
Hokkaido	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City)	○	○
	Tomakomai Port	○	○
Sendai City	Hirose-ohashi Bridge, Riv. Hirose(Sendai City)	○	○
Tokyo Met.	Mouth of Riv. Arakawa(Koto Ward)	○	○
	Mouth of Riv. Sumida(Minato Ward)	○	○
Yokohama City	Yokohama Port	○	○
Kawasaki City	Mouth of Riv. Tama(Kawasaki City)	○	○
	Keihin Canal, Port of Kawasaki, The Coast of Ougi Town	○	○
Toyama Pref.	Ishida-bashi Bridge, Riv. Kurose(Kurobe City)	○	○
Ishikawa Pref.	Mouth of Riv. Sai(Kanazawa City)	○	○
Nagano Pref.	Lake Suwa(center)	○	○
Shizuoka Pref.	Riv. Tenryu(Iwata City)	○	○
Aichi Pref.	Nagoya Port , West of Shiomi Wharf	○	○
Nagoya City	Minatoshinbashi Bridge, Riv. Hori (Nagoya City)	○	○
Mie Pref.	Yokkaichi Port	○	○
Shiga Pref.	Lake Biwa(center, offshore of Karasaki)	○	○
Osaka Pref.	Mouth of Riv. Yamato(Sakai City)	○	○
Osaka City	Osaka Port	○	○
Hyogo Pref.	Offshore of Himeji	○	○
Okayama Pref.	Offshore of Mizushima	○	○
Tokushima Pref.	Takase-bashi Bridge, Riv. Yoshino (Ishii Town)	○	○
Kagawa Pref.	Takamatsu Port	○	○
Oita Pref.	Mouth of Riv. Oita(Oita City)	○	○

[12] Bis(2-ethylhexyl) phthalate, [13] *n*-Butyl benzyl phthalate



Figure 2-1-1 Surveyed sites (surface water and sediment) in the Detailed Environmental Survey in FY 2012

Table 2-1-3 List of surveyed sites (wildlife) and target chemicals in the Detailed Environmental Survey in FY 2012

Local communities	Surveyed sites	Wildlife species	Target chemicals	
			[12]	[13]
Iwate Pref.	Yamada Bay	Greenling	○	○
		Blue mussel	○	○
Tokyo Met.	Tokyo Bay	Sea bass	○	○
Kawasaki City	Offshore of Ogishima Island, Port of Kawasaki	Sea bass	○	○
Niigata Pref.	Lower Riv. Shinano(Niigata City)	Carp	○	○
Nagoya City	Nagoya Port	Striped mullet	○	○
Osaka Pref.	Osaka Bay	Sea bass	○	○
Hyogo Pref.	Offshore of Himeji	Sea bass	○	○
Okayama Pref.	Offshore of Mizushima	Striped mullet	○	○
Yamaguchi Pref.	Tokuyama Bay	Striped mullet	○	○
	Offshore of Hagi	Sea bass	○	○
Kagawa Pref.	Takamatsu Port	Striped mullet	○	○
Oita Pref.	Mouth of Riv. Oita(Oita City)	Sea bass	○	○

[12] Bis(2-ethylhexyl) phthalate, [13] *n*-Butyl benzyl phthalate

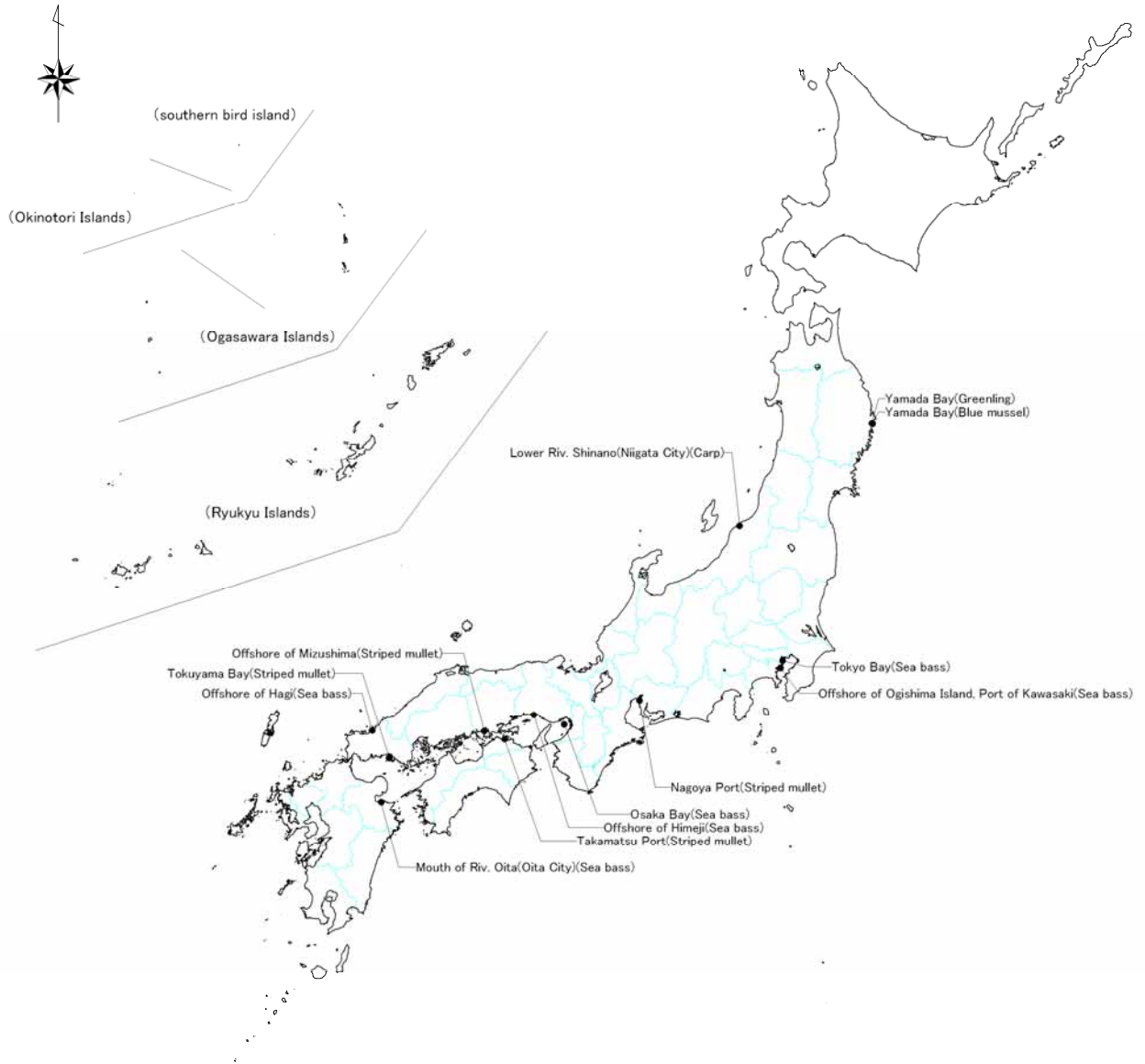


Figure 2-1-2 Surveyed sites (wildlife) in the Detailed Environmental Survey in FY 2012

Table 2-1-4 List of surveyed sites (air) and target chemicals in the Detailed Environmental Survey in FY 2012

Local communities	Surveyed sites	Target chemicals		
		[7]	[8]	[10]
Hokkaido	Hokkaido Institute of Environmental Sciences	○	○	○
Ibaraki Pref.	Mito-Ishikawa Air Quality Monitoring Station (Mito City)	○	○	○
	Kitaibaraki-Nakagou Air Quality Monitoring Station (Kitaibaraki City)		○	
Saitama Pref.	Center for Environmental Science in Saitama (Kazo City)	○		○
Saitama City	Saitama City Public Health Center (Saitama City)	○		○
Kanagawa Pref.	Kanagawa Environmental Research Center (Hiratsuka City)		○	
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science (Kanazawa City)	○	○	○
Nagana Pref.	Matsumoto-Nagisa Intersection Air Quality Monitoring Station (Matsumoto City)		○	
	Nagano Environmental Conservation Research Institute (Nagano City)		○	
Shizuoka Pref.	Kakegawa City Government Building, Daito Branch (Kakegawa City)	○		○
Aichi Pref.	Toyokawa City Government Building (Toyokawa City)		○	
Nagoya City	Chikusa Ward Heiwa Park (Nagoya City)	○	○	○
Mie Pref.	Mie Prefecture Health and Environment Research Institute (Yokkaichi City)	○	○	○
Kyoto Pref.	Kyoto Prefectural Institute of Public Health and Environment (Kyoto City)		○	
	Uji Prefectural Government Building (Uji City)	○	○	○
Kyoto City	Kyoto City Life Environmental Clean Center(Kyoto City)	○		○
Osaka Pref.	Research Institute of Environment, Agriculture and Fisheries, Osaka Prefectural Government (Osaka City)	○	○	○
Hyogo Pref.	Hyogo Prefectural Environmental Research Center (Kobe City)	○	○	○
	Takasago City Government Building (Takasago City)		○	
Wakayama Pref.	Wakayama Prefectural Research Center of Environment and Public Health (Wakayama City)	○		○
Yamaguchi Pref.	Yamaguchi Prefectural Public Health and Environment (Yamaguchi City)	○	○	○
Tokushima Pref.	Ohno Air Quality Monitoring Station (Anan City)	○		○
Kagawa Pref.	Takamatsu Joint Prefectural Government Building (Takamatsu City)	○	○	○
Ehime Pref.	Takatsu Air Quality Monitoring Station (Niihama City)		○	
Fukuoka Pref.	Munakata Prefectural Government Building (Munakata City)	○		○
	Omuta City Government Building (Omuta City)	○		○
Kitakyushu City	Kitakyushu Monitoring Station (Kitakyushu City)		○	
Saga Pref.	Saga Prefectural Environmental Research Center (Saga City)	○	○	○
Oita Pref.	Hijimachi-Takajyo Air Quality Monitoring Station (Hiji Town)		○	
Miyazaki Pref.	Miyazaki Prefectural Institute for Public Health and Environment (Miyazaki City)	○	○	○

[7] Dimethylamine, [8] Styrene, [10] Trimethylamine

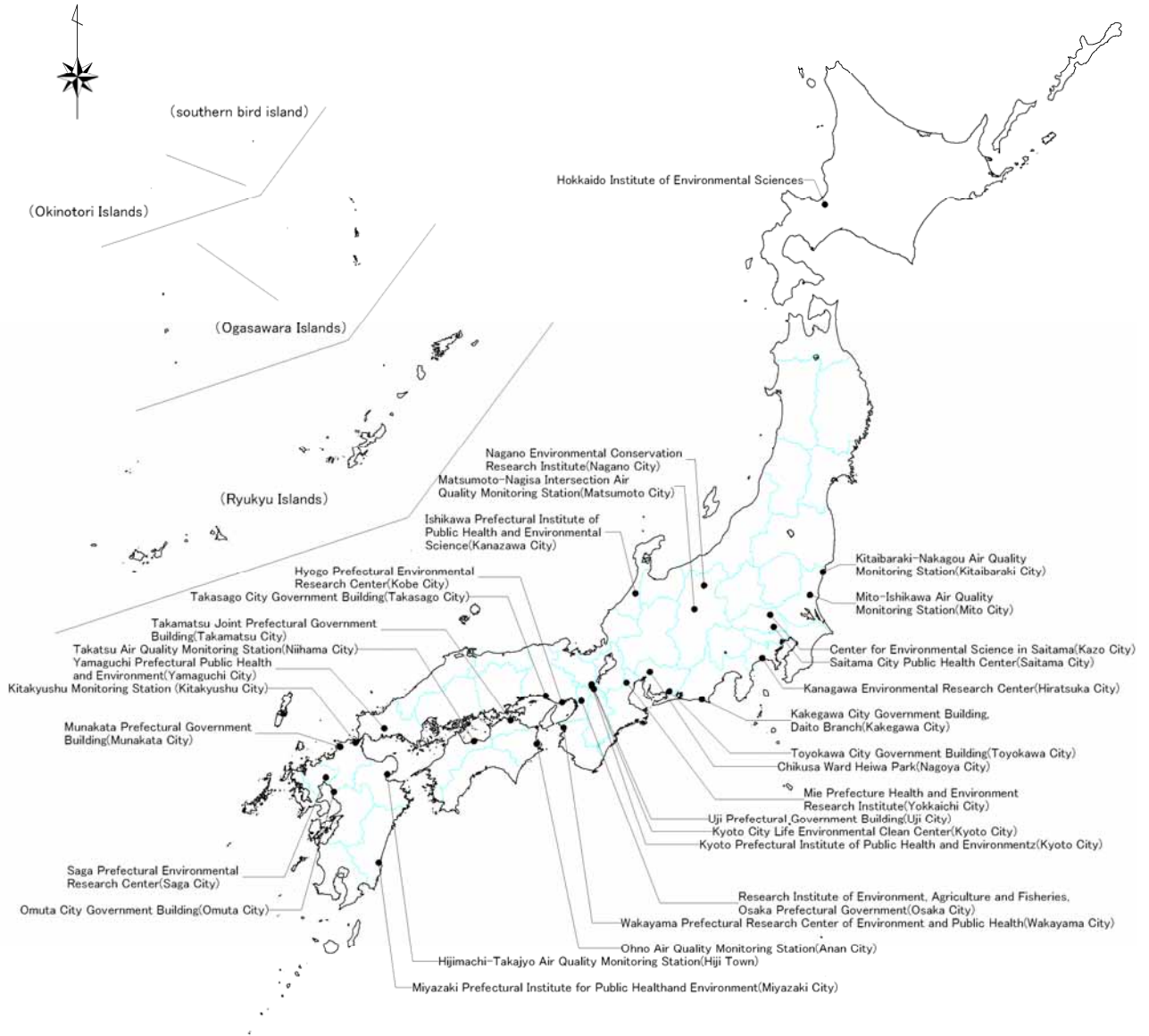


Figure 2-1-3 Surveyed sites (air) in the Detailed Environmental Survey in FY 2012

(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)).

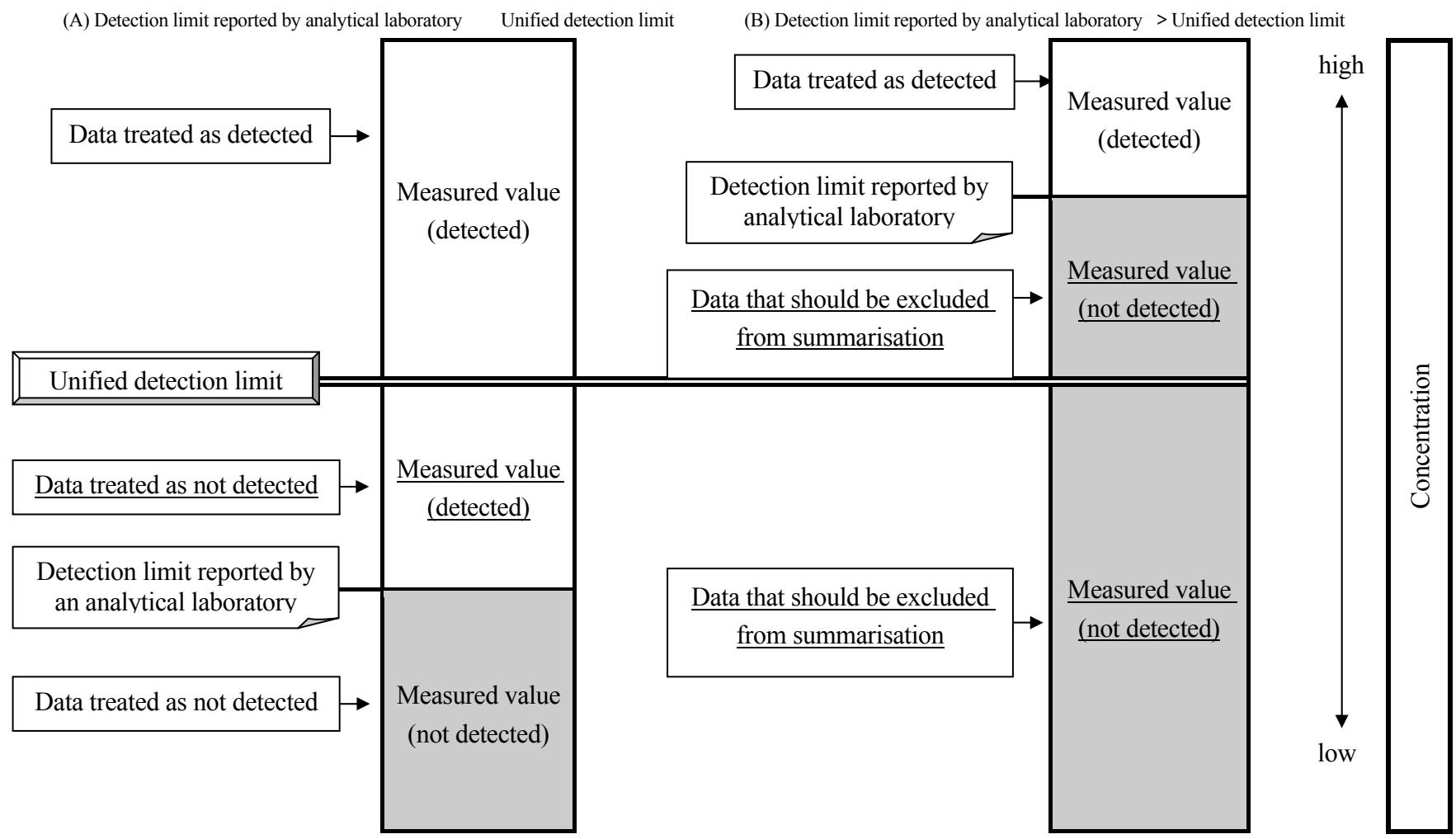
When the instrument detection limit (IDL) and the method detection limit (MDL) are given in the analytical method, which is described in reports on the investigation of the development of analytical methods for chemicals and adopted in the Detailed Environmental Survey (hereafter, the Detailed Environmental 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, 12 out of the 14 target chemicals (groups) were detected.

- [1] *n*-Butyl acrylate: 2 of the 22 valid sites
- [2] Methyl acrylate: 2 of the 22 valid site
- [3] Acrylonitrile: 8 of the 23 valid sites
- [4] Ethylbenzene: 16 of the 25 valid sites
- [5] 1,2-Epoxypropane (synonym: Propylene oxide): 5 of the 22 valid sites
- [6] Vinyl acetate: 1 of the 23 valid sites
- [7] Dimethylamine: 5 of the 23 valid sites
- [9] 4-(1,1,3,3-Tetramethylbutyl)phenol: 19 of the 24 valid sites
- [10] Trimethylamine: 6 of the 22 valid sites
- [12] Bis(2-ethylhexyl) phthalate: 13 of the 23 valid sites
- [13] *n*-Butyl benzyl phthalate: 2 of the 23 valid sites
- [14] Methacrylic acid: 7 of the 23 valid sites

In sediment, all 2 target chemicals were detected.

- [12] Bis(2-ethylhexyl) phthalate: 23 of the 23 valid sites
- [13] *n*-Butyl benzyl phthalate: 21 of the 23 valid sites

In wildlife (bivalves or fish), all 2 target chemicals were detected.

- [12] Bis(2-ethylhexyl) phthalate: 13 of the 13 valid sites
- [13] *n*-Butyl benzyl phthalate: 3 of the 13 valid sites

In air, all 3 target chemicals were detected.

- [7] Dimethylamine: 2 of the 20 valid sites
- [8] Styrene: 21 of the 21 valid sites
- [10] Trimethylamine: 6 of the 20 valid sites

Table 2-2 Summary of the detection ranges and the detection limits in the Detailed Environmental Survey in FY 2012

No.	Target chemicals	Surface water [ng/L]		Sediment [ng/g-dry]		Wildlife [ng/g-wet]		Air [ng/m ³]	
		Detection range and frequency	Detection limit	Detection range and frequency	Detection limit	Detection range and frequency	Detection limit	Detection range and frequency	Detection limit
[1]	<i>n</i> -Butyl acrylate *	nd ~ 47 2/22	9						
[2]	Methyl acrylate *	nd ~ 8,900 2/22	8						
[3]	Acrylonitrile *	nd ~ 1,900 8/23	30						
[4]	Ethylbenzene *	nd ~ 50 16/25	20						
[5]	1,2-Epoxypropane (synonym: Propylene oxide)*	nd ~ 12,000 5/22	23						
[6]	Vinyl acetate *	nd ~ 2,100 1/23	35						
[7]	Dimethylamine *	nd ~ 21,000 5/23	520					nd ~ 41 2/20	15
[8]	Styrene *	nd 0/25	40					nd ~ 4,500 21/21	11
[9]	4-(1,1,3,3-Tetramethylbutyl) phenol *	nd ~ 31 19/24	0.36						
[10]	Trimethylamine	nd ~ 17,000 6/22	370					nd ~ 16 6/20	7.0
[11]	Phenylenediamines								
[11-1]	<i>o</i> -Phenylenediamine*	nd 0/22	15						
[11-2]	<i>m</i> -Phenylenediamine*	nd 0/22	10						
[11-3]	<i>p</i> -Phenylenediamine*	nd 0/22	16						
[12]	Bis(2-ethylhexyl) phthalate*	nd ~ 1,700 13/23	90	nd ~ 15,000 23/23	3.6	1.1 ~ 130 13/13	0.93		
[13]	<i>n</i> -Butyl benzyl phthalate*	nd ~ 190 2/23	80	nd ~ 180 21/23	0.56	nd ~ 1.4 3/13	0.59		
[14]	Methacrylic acid *	nd ~ 100 7/23	28						

(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.