

## Chapter 2 Results of the Detailed Environmental Survey in FY2017

### 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 FY2017 Detailed Environmental Survey, 10 chemicals (groups) that were selected and designated as target chemicals. The combinations of target chemicals and the surveyed media are given below.

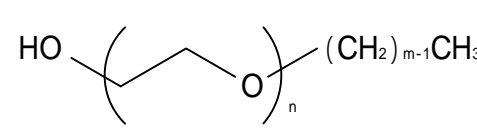
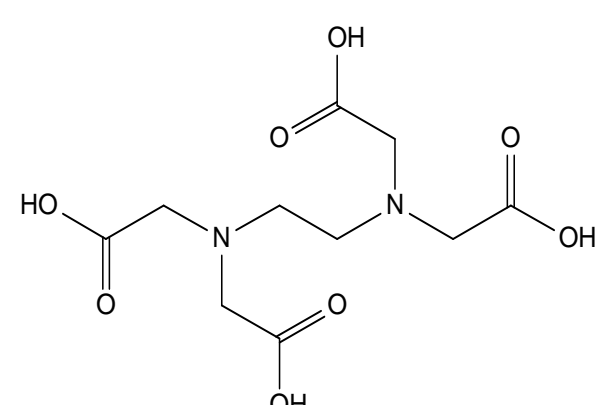
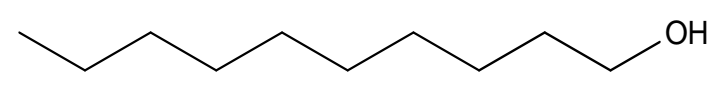
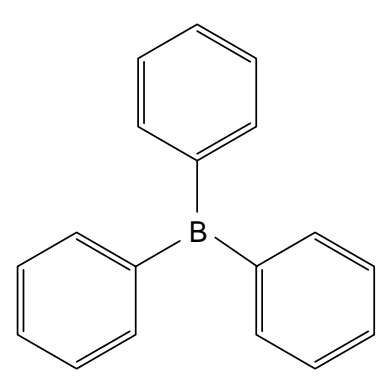
No.	Name	The Chemical Substances Control Law		The PRTR Law		Surveyed media		
		Before the revision	After the revision	Before the revision	After the revision	Surface water	Sedi-ment	Air
[1]	<i>alpha</i> -Alkyl- <i>omega</i> -hydroxypoly(oxyethylene) (The carbon number of the alkyl group: 9-15, The polymerisation degree of the oxyethylenes: 1-15) (synonym: Poly(oxyethylene)-alkylether (The carbon number of the alkyl group: 9-15, The polymerisation degree of the oxyethylenes: 1-15)))		Priority Assessment Chemical Substances	I 307	I 407	○		
[2]	Ethylenediaminetetraacetic acid	II Monitored	Priority Assessment Chemical Substances	I 47	I 60	○		
[3]	Decyl alcohol (synonym: Decanol)		Priority Assessment Chemical Substances		I 257	○	○	
[4]	Triphenylboron (III) and its compounds	II Monitored III Monitored	Priority Assessment Chemical Substances			○		
[5]	1,2,4-Trimethylbenzene	III Monitored	Priority Assessment Chemical Substances		I 296	○		
[6]	Toluidines							
	[6-1] <i>o</i> -Toluidine	II Monitored III Monitored	*	I 225	I 299			○
	[6-2] <i>m</i> -Toluidine	II Monitored III Monitored						○
	[6-3] <i>p</i> -Toluidine	II Monitored III Monitored	**	I 226				○
[7]	Naphthalene	II Monitored III Monitored	Priority Assessment Chemical Substances		I 302	○	○	
[8]	Nitilotriacetic acid (as Trisodium 2,2',2''-nitilotriacetate)	II Monitored	Priority Assessment Chemical Substances	I 233	I 310	○		
[9]	Nitrobenzene	II Monitored	Priority Assessment Chemical Substances	I 240	I 316			○
[10]	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.

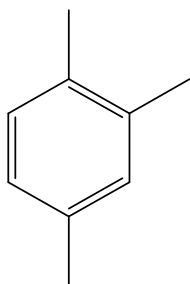
- (Note 3) “Before the revision” in “The PRTR Law” means “appointments before the revision of government ordinance on November 21, 2008” and “After the revision” in “The PRTR Law” means “appointments after that revision”.
- (Note 4) The Chemical Substances Control Law designate average molecular weight as below 1,000 (not designate polymerization degree of Oxyethylene) at Priority Assessment Chemical Substances. The alkyl chain length was designated separately C<sub>9</sub>~C<sub>11</sub> and C<sub>12</sub>~C<sub>15</sub>.
- (Note 5) The PRTR Law not designate polymerization degree of Oxyethylene at Class I. The alkyl chain length was designated C<sub>12</sub>~C<sub>15</sub>.
- (Note 6) \*: Designation of Priority Assessment Chemical Substances was rescinded on 30th March 2017.  
\*\* : Designation of Priority Assessment Chemical Substances was rescinded on 30th March 2018.

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

<p>[1] <i>alpha</i>-Alkyl-<i>omega</i>-hydroxypoly(oxyethylene) (The carbon number of the alkyl group: 9-15, The polymerisation degree of the oxyethylenes: 1-15) (synonym: Poly(oxyethylene)alkylether (The carbon number of the alkyl group: 9-15, The polymerisation degree of the oxyethylenes: 1-15)))</p> 	<p>Molecular formula: <math>C_mH_{2m+2}O(C_2H_4O)_n</math> (<math>m=9 \sim 15</math>, <math>n=1 \sim 15</math>) CAS: 68131-39-5 ENCS: 7-97 MW: Not specified mp: Not specified bp: Not specified sw: Not specified Specific gravit: Not specified logPow: Not specified</p>
<p>[2] Ethylenediaminetetraacetic acid</p> 	<p>Molecular formula: <math>C_{10}H_{16}N_2O_8</math> CAS: 60-00-4 ENCS: 2-1263 MW: 292.25 mp: <math>204 \sim 241^\circ C^{1)}</math> bp: Uncertain sw: <math>0.2g/100g(20^\circ C)^{1)}</math> Specific gravit: Uncertain logPow: Uncertain</p>
<p>[3] Decyl alcohol (synonym: Decanol)</p> 	<p>Molecular formula: <math>C_{10}H_{22}O</math> CAS: 112-30-1 ENCS: 2-217 MW: 158.28 mp: <math>6.4^\circ C^{1)}</math> bp: <math>232.9^\circ C^{1)}</math> sw: <math>0.037g/kg(25^\circ C)^{2)}</math> Specific gravit: <math>0.8297(20^\circ C/4^\circ C)^{1)}</math> logPow: <math>4.57^{3)}</math></p>
<p>[4] Triphenylboron (III) and its compounds</p> 	<p>Molecular formula: Not specified CAS: 960-71-4 ENCS: Not specified MW: Not specified mp: Not specified bp: Not specified sw: Not specified Specific gravit: Not specified logPow: Not specified</p>

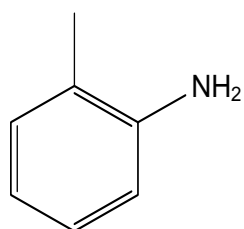
(Abbreviations) CAS CAS registry number, ENCS registry number in the Existing and New Chemical Substances List, MW molecular weight, mp melting point, bp boiling point, SW solubility in water, Specific gravities Specific gravity(no unit) or density, logPow *n*-octanol-water partition coefficient, kPa kilopascal (1 atom approximately equal to 101.3kPa).

[5] 1,2,4-Trimethylbenzene



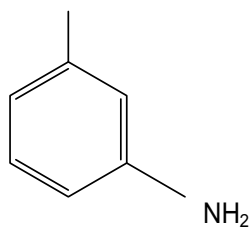
Molecular formula: C<sub>9</sub>H<sub>12</sub>  
 CAS: 95-63-6  
 ENCS: 3-7  
 MW: 120.19  
 mp: -43.78°C<sup>1)</sup>  
 bp: 169 ~ 171°C<sup>1)</sup>  
 sw: 0.057g/kg(25°C)<sup>2)</sup>  
 Specific gravit: 0.8761(20°C/4°C)<sup>1)</sup>  
 logPow: 3.63<sup>3)</sup>

[6] Toluidines  
 [6-1] *o*-Toluidine



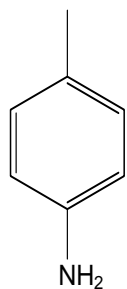
Molecular formula: C<sub>7</sub>H<sub>9</sub>N  
 CAS: 95-53-4  
 ENCS: 3-186  
 MW: 107.15  
 mp: -14.41°C<sup>2)</sup>  
 bp: 200 ~ 202°C<sup>1)</sup>  
 sw: 16.9g/kg(20°C)<sup>2)</sup>  
 Specific gravit: 1.008(20°C/20°C)<sup>1)</sup>  
 logPow: 1.40<sup>4)</sup>

[6-2] *m*-Toluidine



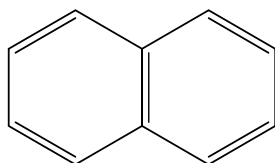
Molecular formula: C<sub>7</sub>H<sub>9</sub>N  
 CAS: 108-44-1  
 ENCS: 3-186  
 MW: 107.15  
 mp: 約-50°C<sup>1)</sup>  
 bp: 203 ~ 204°C<sup>1)</sup>  
 sw: 10g/L(25°C)<sup>4)</sup>  
 Specific gravit: 0.990(25°C/25°C)<sup>1)</sup>  
 logPow: 1.53<sup>4)</sup>

[6-3] *p*-Toluidine



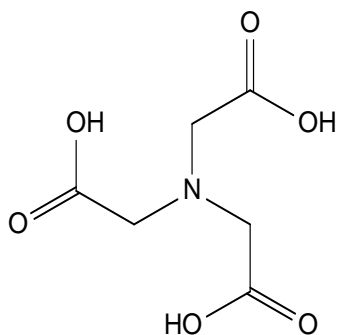
Molecular formula: C<sub>7</sub>H<sub>9</sub>N  
 CAS: 106-49-0  
 ENCS: 3-186  
 MW: 107.15  
 mp: 44 ~ 45°C<sup>1)</sup>  
 bp: 201°C<sup>2)</sup>  
 sw: 79.3g/kg(21°C)<sup>2)</sup>  
 Specific gravit: 1.046(4°C/20°C)<sup>1)</sup>  
 logPow: 1.39<sup>5)</sup>

[7] Naphthalene



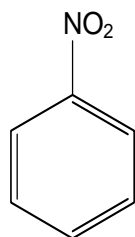
Molecular formula: C<sub>10</sub>H<sub>8</sub>  
 CAS: 91-20-3  
 ENCS: 4-311  
 MW: 128.17  
 mp: 357°C<sup>1)</sup>  
 bp: 341°C<sup>1)</sup>  
 sw: 0.0316g/kg(25°C)<sup>2)</sup>  
 Specific gravit: 1.35<sup>1)</sup>  
 logPow: 3.34<sup>3)</sup>

[8] | Nitritotriacetic acid (as Trisodium 2,2',2''-nitritotriacetate)



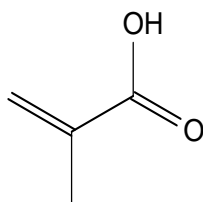
Molecular formula: C<sub>6</sub>H<sub>9</sub>NO<sub>6</sub>  
CAS: 139-13-9  
ENCS: 2-1276  
MW: 191.14  
mp: 241.5°C<sup>1)</sup>  
bp: Uncertain  
sw: 1.28g/L(22.5°C)<sup>1)</sup>  
Specific gravit: >1(20°C)<sup>6)</sup>  
logPow: Uncertain

[9] | Nitrobenzene



Molecular formula: C<sub>6</sub>H<sub>5</sub>NO<sub>2</sub>  
CAS: 98-95-3  
ENCS: 3-436  
MW: 123.11  
mp: 6°C<sup>1)</sup>  
bp: 210 ~ 211°C<sup>1)</sup>  
sw: 1.19864(25°C/4°C)<sup>1)</sup>  
Specific gravit: 2.1g/kg(25°C)<sup>2)</sup>  
logPow: 1.85<sup>3)</sup>

[10] | Methacrylic acid



Molecular formula: C<sub>4</sub>H<sub>6</sub>O<sub>2</sub>  
CAS: 79-41-4  
ENCS: 2-1025  
MW: 86.09  
mp: 14.6°C<sup>2)</sup>  
bp: 163°C<sup>1)</sup>  
sw: 98g/kg(20°C)<sup>2)</sup>  
Specific gravit: 1.0153(20°C/4°C)<sup>1)</sup>  
logPow: 0.93<sup>3)</sup>

#### References

- 1) O'Neil, M.J. (ed), The Merck Index 15th Edition (2013), CRC Press.
- 2) Rumble, J.R. (ed), CRC Handbook of Chemistry and Physics 98th Edition (2017), The Royal society of Chemistry.
- 3) Rumble, J.R. (ed), CRC Handbook of Chemistry and Physics 99th Edition (2018), The Royal society of Chemistry.
- 4) OECD, Screening Information Dataset (SIDS) for High Product in Volume Chemicals (Processed by UNEP Chemicals) (<http://www.inchem.org/pages/sids.html>)
- 5) U.S. EPA, Estimation Programs Interface (EPI) Suite v4.1 (<http://www.epa.gov/oppt/exposure/pubs/episuitd1.htm>)
- 6) U.S. National Library of Medicine, Hazardous Substances Data Bank (HSDB) (<https://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>)

### 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	Air
Hokkaido	Environmental Promotion Section, Environment Division, Department of Environment and Lifestyle, Hokkaido Prefectural Government and Hokkaido Research Organization Environmental and Geological Research Department Institute of Environmental Sciences	○	○	○
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	○	○	○
Akita Pref.	Akita Research Center for Public Health and Environment	○	○	
Yamagata Pref.	Yamagata Institute of Environmental Sciences	○	○	
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.	Environmental Improvement Division, Bureau of Environment, Tokyo Metropolitan Government and Tokyo Metropolitan Research Institute for Environmental Protection	○	○	○
Kanagawa Pref.	Kanagawa Environmental Research Center			○
Yokohama City	Yokohama Environmental Science Research Institute	○	○	○
Kawasaki City	Kawasaki Environment Research Institute	○	○	
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	○	○	
Aichi Pref.	Aichi Environmental Research Center	○	○	○
Nagoya City	Nagoya City Environmental Science Research Center	○		○
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 City Institute of Health and Environmental Sciences	○	○	○
Osaka Pref.	Environment Preservation Division, Environment Management Office, Department of Environment, Agriculture, Forestry and Fisheries, Osaka Prefectural Government and Research Institute of Environment, Agriculture and Fisheries, Osaka Prefecture	○	○	○*2
Osaka City	Osaka City Institute of Public Health and Environmental Sciences	○	○	
Hyogo Pref.	Water and Air Quality Control Division, Environmental Management Bureau, Agricultural and Environmental Affairs Department, Hyogo Prefectural Government and Hyogo Prefectural Institute of Environmental Sciences, Hyogo Environmental Advancement Association	○	○	○
Kobe City	Natural Environmental Symbiotic Division, Environmental Preservation Branch, Environment Bureau, Kobe City and Kobe Institute of Health, Welfare Bureau, Health Division, Health	○		
Nara Pref.	Nara Prefecture Landscape and Environment Center	○	○	
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 Institute of Public Health and Environment	○	○	○
Tokushima Pref.	Tokushima Prefectural Public Health, Pharmaceutical and Environmental Sciences Center			○
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 Sciences	○		○
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	○		
Oita Pref.	Environment Preservation Division, Department of Environment, Oita Prefectural Government and Oita Prefectural Institute of Health and Environment	○	○	○
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 2017.

(Note 2) \*2: That organization cooperated with a private analytical laboratory in sampling specimens

## (2) Surveyed sites and target chemicals

The numbers of target chemicals (groups) and the numbers of surveyed sites, etc. by surveyed medium in the detailed environmental survey were as shown in the following table.

The target chemicals and the national distribution map of the survey sites for each medium are shown in Table 2-1-1 and Figures 2-1-1 for surface water, Table 2-1-2 and Fig.2-1-1 for sediment, Table 2-1-3 and Fig.2-1-2 for wildlife and Table 2-1-4 and Fig.2-1-3 for the air.

In addition, about 20 sites were selected as survey sites per target chemical. To obtain data for areas to be expected to high concentrations in the general environment survey sites are selected based on information regarding releases and emissions. Among the sites considering to rank in the top of PRTR emissions, it was included the surrounding sites where samples can be taken in the survey sites.

Surveyed media	Numbers of local communities	Numbers of target chemicals	Numbers of surveyed sites	Numbers of samples at a surveyed site
Surface water	44	7	77	1
Sediment	28	2	38	3
Air	25*	3	30	3
All media	46	10	107	

(Note) \*: For 1 of the 25 organizations, it was cooperated with a private analytical laboratory in sampling specimens.

## (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 Initial Environmental Survey (hereafter, the Initial Environmental Survey Analytical Method), if the IDL measured by the analytical laboratory is lower than the given IDL, the MDL of the Initial Environmental Survey Analytical Method is used as the detection limit by the analytical laboratory.

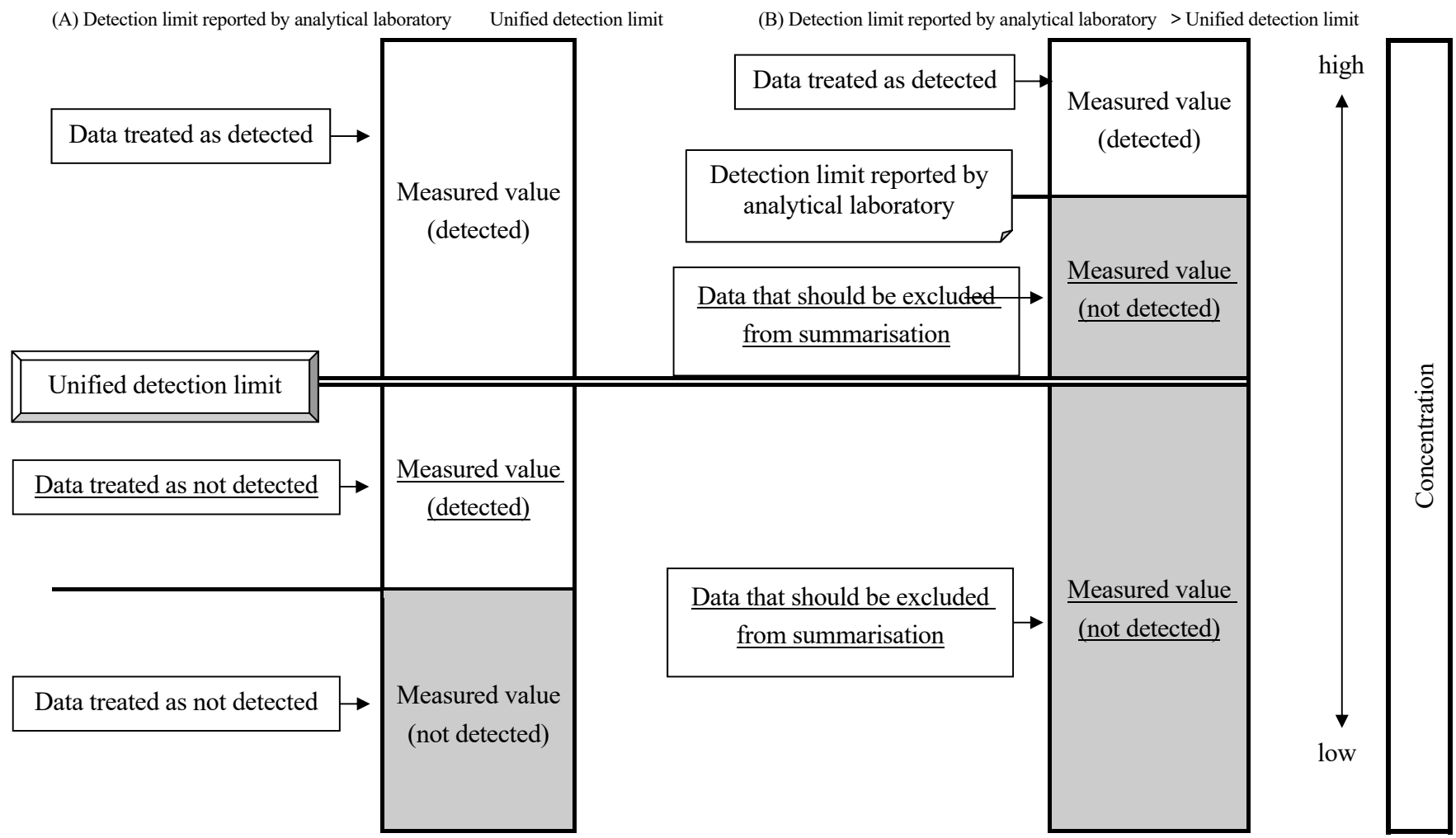
When IDL and MDL are not given in the Initial Environmental Survey Analytical Method, the detection limit is predetermined by the following procedure.

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 Initial 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

Table 2-1-1 List of surveyed sites (surface water) and target chemicals in the Detailed Environmental Survey in FY2017

Local communities	Surveyed sites	Target chemicals						
		[1]	[2]	[3]	[4]	[5]	[7]	[8]
Hokkaido	Onnenai-ohashi Bridge, Riv. Teshio (Bifuka Town)	○						
	Suzuran-ohashi Bridge, Riv. Tokachi (Obihiro City)	○				○		
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari (Ishikari City)	○	○	○			○	○
	Tomakomai Port			○	○			
	Muroran Port						○	
Iwate Pref.	Riv. Toyosawa (Hanamaki City)							○
Miyagi Pref.	Futatsuya-bashi Bridge, Riv. Hasama (Tome City)		○	○			○	
	Sakura-hodoukyou Bridge, Riv. Shiroishi (Shibata Town)		○	○			○	
Sendai City	Hirose-ohashi Bridge, Riv. Hirose (Sendai City)					○		○
Akita Pref.	Taiheikawa-hashii Bridge, Riv. Taihei (Akita City)			○				
	Akita Canal (Akita City)	○	○	○	○	○	○	○
Yamagata Pref.	Mouth of Riv. Mogami (Sakata City)		○				○	
Ibaraki Pref.	Tonekamome-ohashi Bridge, Mouth of Riv. Tone (Kamisu City)	○	○	○				○
Tochigi Pref.	Tagawa Kyubun Area Head Works (Utsunomiya City)		○	○				○
Gunma Pref.	Izumi-ohashi Bridge, Riv. Kyuhaku (Oizumi Town)					○		○
	Nakajima-bashi Bridge, Riv. Hirose (Isesaki City)			○				
Saitama Pref.	Akigaseshuzeki of Riv. Arakawa (Shiki City)		○			○	○	
	Shiki-ohashi Bridge, Riv. Yanase (Shiki City)	○	○					
	Kachi-hashii Bridge, Riv. Ichino (Yoshimi Town)	○	○					
Saitama City	Nakadote-hashii Bridge, Riv. Kamo (Saitama City)					○		○
Chiba Pref.	Asai-bashi Bridge, Riv. Yourou (Ichihara City)						○	○
	Coast of Ichihara and Anegasaki					○		
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	○		○	○	○	○	
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)	○	○		○			○
Toyama Pref.	Ishida-bashi Bridge, Riv. Kurose (Kurobe City)			○				
	Hagiura-bashi Bridge, Mouth of Riv. Jintu (Toyama City)					○	○	
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)		○	○				○
Nagano Pref.	Tategahana-bashi Bridge, Riv. Shinano (Nakano City)						○	
	Lake Suwa (center)	○						○
Shizuoka Pref.	Shimizu Port				○		○	
	Nagano-bashi Bridge, Riv. Boso (Iwata City)							○
	Riv. Tenryu (Iwata City)		○	○		○		
	Shinkawa-bashi Bridge, Riv. Ho (Hamamatsu City)	○				○		
Aichi Pref.	Nagoya Port, West of Shiomi Wharf**	○		○	○	○	○	
Nagoya City	Minatoshinbashi Bridge, Riv. Hori (Nagoya City)	○	○			○	○	○
Mie Pref.	Yokkaichi Port	○			○	○		
	Toba Port				○			
Shiga Pref.	Lake Biwa (center, offshore of Minamihira)		○	○				
	Lake Biwa (center, offshore of Karasaki)		○	○				○
Kyoto Pref.	Miyazu Port				○			
	Gokou-bashi Bridge, Riv. Kizu (Yawata City)					○		○
Kyoto City	Miyamae-bashi Bridge, Riv. Katsura (Kyoto City)	○						
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)		○	○	○	○	○	○

Local communities	Surveyed sites	Target chemicals						
		[1]	[2]	[3]	[4]	[5]	[7]	[8]
Osaka City	Kema-bashi Bridge, Riv. Oh-kawa (Osaka City)	○						○
	Osaka Port	○			○	○	○	
Hyogo Pref.	Tachino-ohashi Bridge, Riv. Maruyama (Toyo-oka City)		○					
	Offshore of Himeji				○			
	Masago-bashi Bridge, Riv. Hayashida (Tatsuno City)		○				○	
Kobe City	Kobe Port (center)	○			○			
Nara Pref.	Taisho-bashi Bridge, Riv. Yamato (Oji Town)						○	○
Wakayama Pref.	Shinzaike-bashi Bridge, Riv. Daimon (Wakayama City)					○		
	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)		○				○	○
	Wakayamashimotsu Port, Honkou Port Area			○	○			
	Yasudaizeki of Riv. Arida (Arida City)			○				
Okayama Pref.	Sasagase-bashi Bridge, Riv. Sasagase (Okayama City)		○					○
	Offshore of Mizushima	○		○	○			
Yamaguchi Pref.	Tokuyama Bay						○	
	Offshore of Hagi	○			○			
Kagawa Pref.	Takamatsu Port				○	○	○	
Ehime Pref.	Sawadu Fishing Port				○			
Fukuoka Pref.	Kabura-bashi Bridge, Riv Raizan (Itoshima City)					○		
	Offshore of Omuta					○		
Kitakyushu City	Dokai Bay				○	○	○	
Fukuoka City	Hakata Bay	○			○		○	
Saga Pref.	Imari Bay			○	○			
Kumamoto Pref.	Hiraki-bashi Bridge, Riv. Midori (Uto City)			○				
	Yatsushiro Sea the Coast of Ushibuka Port				○			
Oita Pref.	Mouth of Riv. Oita (Oita City)		○	○				○
Miyazaki Pref.	Mouth of Riv. Oyodo (Miyazaki City)			○				
	Torigakubo-bashi Bridge, Riv. Tsujinodou (Kobayashi City)	○						
Okinawa Pref.	Ryutou-bashi Bridge, Riv. Nagadou (Haeburu Town)			○				

[1] *alpha*-Alkyl-*omega*-hydroxypoly(oxyethylene) (The carbon number of the alkyl group: 9-15, The polymerisation degree of the oxyethylenes: 1-15) (synonym: Poly(oxyethylene)alkylether (The carbon number of the alkyl group: 9-15, The polymerisation degree of the oxyethylenes: 1-15))), [2] Ethylenediaminetetraacetic acid, [3] Decyl alcohol (synonym: Decanol) , [4] Triphenylboron (III) and its compounds , [5] 1,2,4-Trimethylbenzene , [7] Naphthalene, [8] Nitritotriacetic acid (as Trisodium 2,2',2''-nitritotriacetate)

(Note) \*: “Keihin Canal, Port of Kawasaki (front of Ogimachi)” of Detailed Environmental Survey and “Keihin Canal, Port of Kawasaki” of Environmental Monitoring are the same point each.

\*\* : “Nagoya Port, West of Shiomi Wharf” of Detailed Environmental Survey and “Nagoya Port” of Environmental Monitoring are the same point each.

Table 2-1-2 List of surveyed sites (sediment) and target chemicals in the Detailed Environmental Survey in FY2017

Local communities	Surveyed sites	Target chemicals	
		[3]	[7]
Hokkaido	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari (Ishikari City)	○	○
	Tomakomai Port	○	○
	Muroran Port		○
Sendai City	Hirose-ohashi Bridge, Riv. Hirose (Sendai City)		○
Akita Pref.	Taiheikawa-hashi Bridge, Riv. Taihei (Akita City)	○	
	Akita Canal (Akita City)	○	○
Yamagata Pref.	Mouth of Riv. Mogami (Sakata City)		○
Ibaraki Pref.	Tonekamome-ohashi Bridge, Mouth of Riv. Tone (Kamisu City)	○	
Chiba Pref.	Coast of Ichihara and Anegasaki		○
Tokyo Met.	Mouth of Riv. Arakawa (Koto Ward)	○	○
	Mouth of Riv. Sumida (Minato Ward)	○	○
Yokohama City	Yokohama Port		○
Kawasaki City	Keihin Canal, Port of Kawasaki, The Coast of Ougi Town*		○
Toyama Pref.	Ishida-bashi Bridge, Riv. Kurose (Kurobe City)	○	
	Hagiura-bashi Bridge, Mouth of Riv. Jintsu (Toyama City)		○
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)	○	
Shizuoka Pref.	Shimizu Port		○
	Riv. Tenryu (Iwata City)	○	
Aichi Pref.	Nagoya Port, West of Shiomi Wharf*	○	○
Shiga Pref.	Lake Biwa (center, offshore of Minamihira)	○	
	Lake Biwa (center, offshore of Karasaki)	○	
Kyoto City	Miyamae-bashi Bridge, Riv. Katsura (Kyoto City)	○	
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)	○	○
Osaka City	Osaka Port		○
Hyogo Pref.	Offshore of Himeji	○	
	Masago-bashi Bridge, Riv. Hayashida (Tatsuno City)		○
Nara Pref.	Taisho-bashi Bridge, Riv. Yamato (Oji Town)		○
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)		○
	Wakayamashimotsu Port, Honkou Port Area	○	
Okayama Pref.	Offshore of Mizushima	○	
Yamaguchi Pref.	Tokuyama Bay		○
	Offshore of Hagi	○	
Kagawa Pref.	Takamatsu Port		○
Kitakyushu City	Dokai Bay		○
Fukuoka City	Hakata Bay	○	○
Saga Pref.	Imari Bay	○	
Oita Pref.	Mouth of Riv. Oita (Oita City)	○	
Miyazaki Pref.	Mouth of Riv. Oyodo (Miyazaki City)	○	

[3] Decyl alcohol (synonym: Decanol), [7] Naphthalene

(Note) \*: “Keihin Canal, Port of Kawasaki (front of Ogimachi)” of Detailed Environmental Survey and “Keihin Canal, Port of Kawasaki” of Environmental Monitoring are the same point each.

\*\* : “Nagoya Port, West of Shiomi Wharf” of Detailed Environmental Survey and “Nagoya Port” of Environmental Monitoring are the same point each.



Figure 2-1-1 Surveyed sites (surface water and sediment) in the Detailed Environmental Survey in FY2017

Table 2-1-3 List of surveyed sites (air) and target chemicals in the Detailed Environmental Survey in FY2017

Local communities	Surveyed sites	Target chemicals		
		[6]	[9]	[10]
Hokkaido	Hokkaido Research Organization Environmental and Geological Research Department Institute of Environmental Sciences (Sapporo City)	○	○	○
Sendai City	Tsutsujigaoka Park (Sendai City)		○	
Ibaraki Pref.	Ibaraki Kasumigaura Environmental Science Center (Tsuchiura City)	○	○	○
Saitama Pref.	Center for Environmental Science in Saitama (Kazo City)		○	
Saitama City	Saitama City Public Health Center (Saitama City)		○	
Chiba Pref.	Ichihara-Iwasakinishi Air Quality Monitoring Station (Ichihara City)	○	○	○
Tokyo Met.	Tokyo Metropolitan Research Institute for Environmental Protection (Koto Ward)		○	
	Chichijima Island (Ogasawara Village)		○	
Kanagawa Pref.	Kanagawa Environmental Research Center (Hiratsuka City)	○	○	○
Yokohama City	Yokohama Environmental Science Research Institute (Yokohama City)		○	
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science (Kanazawa City)		○	
Nagano Pref.	Nagano Environmental Conservation Research Institute (Nagano City)	○		○
	Tatsuno Town Office (Tatsuno Town)	○		○
Aichi Pref.	Aichi Prefectural Anjo Norin (Agricultural and Forestry) Senior High School (Anjo City)		○	
Nagoya City	Chikusa Ward Heiwa Park (Nagoya City)	○	○	○
Mie Pref.	Mie Prefecture Health and Environment Research Institute (Yokkaichi City)	○		○
Kyoto Pref.	Kyoto Prefecture Joyo Senior High School (Joyo City)		○	○
Kyoto City	Kyoto City Institute of Health and Environmental Sciences (Kyoto City)	○		○
Osaka Pref.	Shodai Air Quality Monitoring Station (Hirakata City)	○	○	○
	Shijonawate National Air Quality Monitoring Station (Shijonawate City)		○	
	Osaka Joint Prefectural Government Building, Building 2 Annex (Osaka City)	○		○
Hyogo Pref.	Shikama Air Quality Monitoring Station (Himeji City)			○
Wakayama Pref.	Wakayama Prefectural Research Center of Environment and Public Health (Wakayama City)		○	
Yamaguchi Pref.	Yamaguchi Prefectural Institute of Public Health and Environment (Yamaguchi City)	○	○	○
Tokushima Pref.	Tokushima Prefectural Public Health, Pharmaceutical and Environmental Sciences Center (Tokushima City)	○		○
Kagawa Pref.	Kagawa Prefectural Public Swimming Pool (Takamatsu City)		○	○
Fukuoka Pref.	Fukuoka Institute of Health and Environmental Sciences (Dazaifu City)		○	
	Omuta City Government Building (Omuta City)		○	○
Saga Pref.	Saga Prefectural Environmental Research Center (Saga City)	○	○	○
Oita Pref.	Oita City Misa Elementary School (Oita City)	○		○

[6] Toluidines, [9] Nitrobenzene, [10] Methacrylic acid

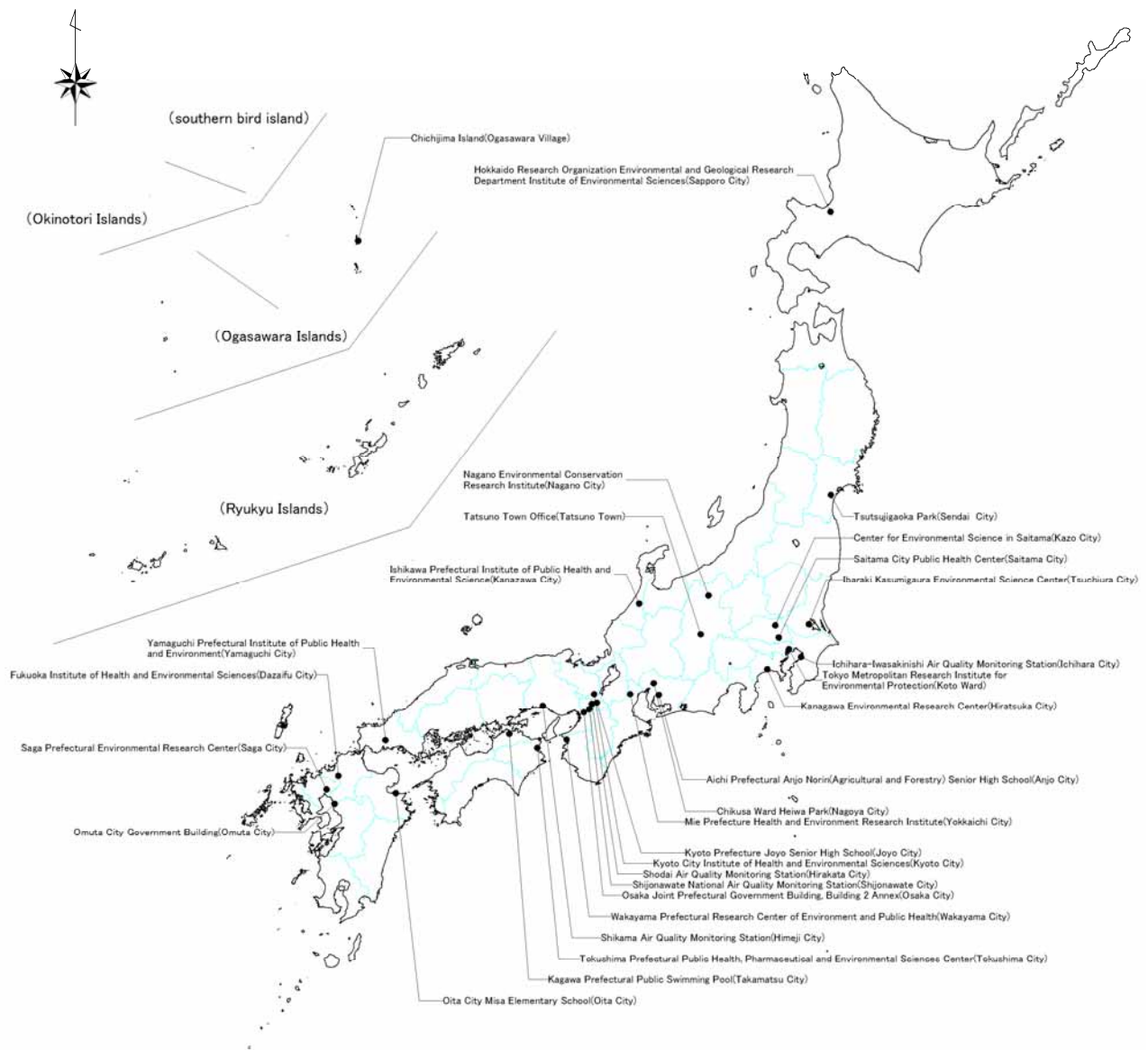


Figure 2-1-2 Surveyed sites (air) in the Detailed Environmental Survey in FY 2017

#### 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, all 7 target chemicals (groups) were detected. Target chemicals were categorized by analytical methods such as structurally similar chemicals capable of simultaneous analyses.

- [1] *alpha*-Alkyl-*omega*-hydroxypoly(oxyethylene) (The carbon number of the alkyl group: 9-15, The polymerisation degree of the oxyethylenes: 1-15) (synonym: Poly(oxyethylene)-alkylether (The carbon number of the alkyl group: 9-15, The polymerisation degree of the oxyethylenes: 1-15)))
  - [1-4] poly(oxyethylene) dodecyl ether (The polymerisation degree of the oxyethylenes: 1-15): 21 of the 25 valid sites
- [2] Ethylenediaminetetraacetic acid : All 26 valid sites
- [3] Decyl alcohol (synonym: Decanol) : 2 of the 26 valid sites
- [4] Triphenylboron (III) and its compounds : 14 of the 25 valid sites
- [5] 1,2,4-Trimethylbenzene : 1 of the 25 valid site
- [7] Naphthalene : 8 of the 26 valid sites
- [8] Nitrilotriacetic acid (as Trisodium 2,2',2''-nitrilotriacetate) : All 26 valid sites

In sediment, all 2 target chemicals (groups) were detected. Target chemicals were categorized by analytical methods such as structurally similar chemicals capable of simultaneous analyses.

- [3] Decyl alcohol (synonym: Decanol) : 17 of the 24 valid sites
- [7] Naphthalene : All 23 valid sites

In air, 2 out of the 3 target chemicals (groups) were detected. Target chemicals were categorized by analytical methods such as structurally similar chemicals capable of simultaneous analyses.

- [9] Nitrobenzene : 3 of the 22 valid sites
- [10] Methacrylic acid : 8 of the 17 valid sites



Table 1-2 Summary of the detection ranges and the detection limits in the Detailed Environmental Survey in FY 2017

No.	Target chemicals	Surface water [ng/L]		Sediment [ng/g-dry]		Air [ng/m <sup>3</sup> ]	
		Detection range and frequency	Detection limit	Detection range and frequency	Detection limit	Detection range and frequency	Detection limit
[1]	<i>alpha</i> -Alkyl- <i>omega</i> -hydroxypoly(oxyethylene) (The carbon number of the alkyl group: 9-15, The polymerisation degree of the oxyethylenes: 1-15) (synonym: Poly(oxyethylene)-alkylether (The carbon number of the alkyl group: 9-15, The polymerisation degree of the oxyethylenes: 1-15))) *						
	(Reference) [1-1] poly(oxyethylene) nonyl ether (The polymerisation degree of the oxyethylenes: 1-15)	nd~58 1/25	**23				
	(Reference) [1-2] poly(oxyethylene) decyl ether (The polymerisation degree of the oxyethylenes: 1-15)	nd~98 2/25	**23				
	(Reference) [1-3] poly(oxyethylene) undecyl ether (The polymerisation degree of the oxyethylenes: 1-15)	nd~25 1/25	**23				
	[1-4] poly(oxyethylene) dodecyl ether (The polymerisation degree of the oxyethylenes: 1-15)	nd~5,300 21/25	**14				
	(Reference) [1-5] poly(oxyethylene) tridecyl ether (The polymerisation degree of the oxyethylenes: 1-15)	nd~30 1/25	**23				
	(Reference) [1-6] poly(oxyethylene) tetradecyl ether (The polymerisation degree of the oxyethylenes: 1-15)	nd~137 3/25	**23				
	(Reference) [1-7] poly(oxyethylene) pentadecyl ether (The polymerisation degree of the oxyethylenes: 1-15)	nd 0/25	**23				
[2]	Ethylenediaminetetraacetic acid *	350~120,000 26/26	37				
[3]	Decyl alcohol (synonym: Decanol) *	nd~13 2/26	6.2	nd~520 17/24	1.1		
[4]	Triphenylboron (III) and its compounds	nd~0.37 14/25	0.023				
[5]	1,2,4-Trimethylbenzene *	nd~110 1/23	33				
[6]	Toluidines *						
	[6-1] <i>o</i> -Toluidine					nd 0/15	1.8
	[6-2] <i>m</i> -Toluidine					nd 0/15	0.91
	[6-3] <i>p</i> -Toluidine					nd 0/15	1.4
[7]	Naphthalene *	nd~9.5 8/26	0.11	0.58~2,400 23/23	0.34		
[8]	Nitrilotriacetic acid (as Trisodium 2,2',2''-nitrilotriacetate)*	50~4,500 26/26	60				
[9]	Nitrobenzene *					nd~140 3/22	5.4
[10]	Methacrylic acid *					nd~9.1 8/17	5.4

(Note 1) Detection frequency is based on the number of sites, 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. In sediment, wildlife and air, 3 samples were measured for a site, and the detection in more than one out of samples from a site can be defined as one detected site.

(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.

(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.

(Note 5) \*\* Total value of detected limit value each polymerisation degree of the oxyethylenes.

(Note 6) Reference: Estimated value based on industrial products.