

Chapter 1 Results of the Initial Environmental Survey in FY2016

1. Purpose of the survey

Initial Environmental Surveys are implemented in compliance with the Law Concerning Reporting, etc. of Releases of Specific Chemical Substances to the Environment and Promoting Improvement in Their Management (Law No. 86, 1999) (hereafter, the PRTR); these surveys provide the basic resources to properly evaluate chemical substances which may present environmental risk by compiling and tracking data notably from areas susceptible to high concentrations in their general environments, as well as for evaluating environmental and exposure risks to chemical substances that are other than as designated by law.

2. Target chemicals

In the FY2016 Initial Environmental Survey, 15 chemicals (groups) that were selected and designated as target chemicals. The combinations of target chemicals and the surveyed media are given below.

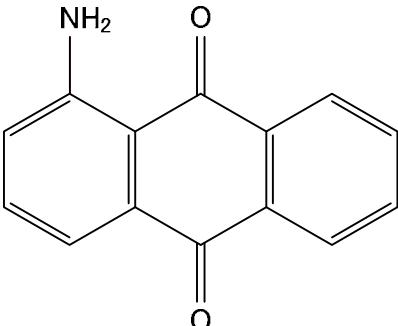
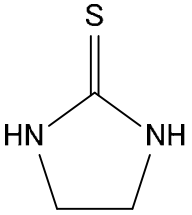
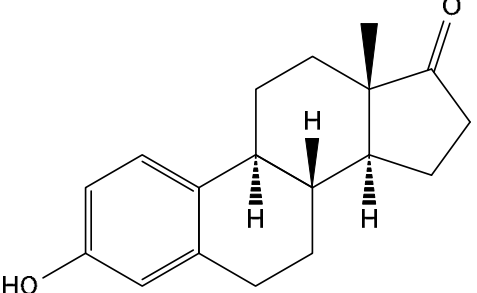
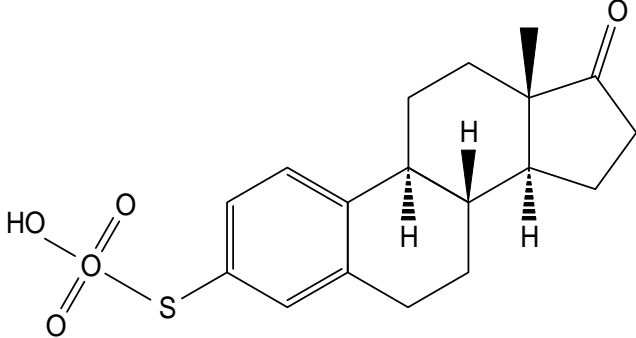
No.	Name	The Chemical Substances Control Law		The PRTR Law		Surveyed media		
		Before the revision	Before the revision	Before the revision	After the revision	Surface water	Sedi-ment	Air
[1]	1-Amino-9,10-anthraquinone	II Monitored III Monitored			I 19	○	○	
[2]	2-Imidazolidinethione (synonym: 2-Mercaptoimidazoline)	II Monitored		I 32	I 42	○		
[3]	Estrone and its metabolites							
	[3-1] 1,3,5(10)-Estratrien-3-ol-17-one (synonym: Estrone)					○		
	[3-2] Estrone-3-sulfate					○		
	[3-3] Estrone-3-glucuronide					○		
[4]	1,2-Epoxy-3-(tolylxy)propane				II 14	○		
[5]	Cyanides (contains Hydrogen cyanide)			I 108	I 144			○
[6]	[<i>o</i> -(2,6-Dichloroanilino)phenyl]acetic acid (synonym: Diclofenac)					○		
[7]	(1 <i>S</i> ,4 <i>S</i>)-4-(3,4-Dichlorophenyl)-1,2,3,4-tetrahydronaphthalen-1-amine (synonym: Sertraline)					○		
[8]	5,5-Diphenyl-2,4-Imidazolidinedione (synonym: Phenytoin)	II Monitored				○		
[9]	Diphenyldisulfane (synonym: Diphenyldisulfide)	II Monitored III Monitored				○		○
[10]	3,3'-Dimethylbenzidine (synonym: <i>o</i> -Tolidine)	II Monitored III Monitored		I 171	I 231			○
[11]	Tris(2,3-dibromopropan-1-yl) phosphate (synonym: Tris(2,3-dibromopropyl) phosphate)	III Monitored						○
[12]	<i>m</i> -Nitrotoluene				II 71	○		
[13]	<i>p</i> -Nitrophenol	II Monitored III Monitored		I 239	II 72	○		
[14]	Hexamethylenediamine	II Monitored		I 292	I 390	○		○
[15]	(3 <i>S</i> ,4 <i>R</i>)-3-[(2 <i>H</i> -1,3-Benzodioxol-5-yl)oxy)methyl]-4-(4-fluorophenyl)piperidine (synonym: Paroxetine)					○		

(Note 1) "The Chemical Substances Control Law" hereafter means "Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances (Law No. 117 of 1973)."

(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.

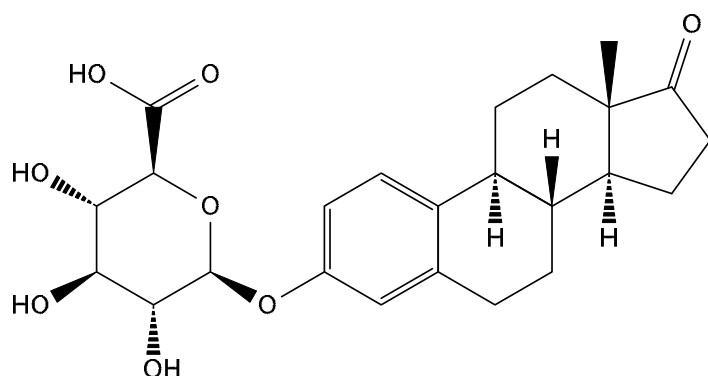
(Note 3) "Before the revision" in "The PRTR Law" means "appointments before the revision of government ordinance on November 21, 2008" and "After the revision" in "The PRTR Law" means "appointments after that revision".

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

<p>[1] 1-Amino-9,10-anthraquinone</p> 	<p>Molecular formula: C₁₄H₉NO₂ CAS: 82-45-1 ENCS: 4-706 MW: 223.23 mp: 253.5°C¹⁾ bp: Above 300°C²⁾ sw: 32mg/L (25°C)²⁾ Specific gravities: Uncertain logPow: 3.74²⁾</p>
<p>[2] 2-Imidazolidinethione (synonym: 2-Mercaptoimidazoline)</p> 	<p>Molecular formula: C₃H₆N₂S CAS: 96-45-7 ENCS: 5-423 MW: 102.16 mp: 203°C¹⁾ bp: 347.18°C³⁾ sw: 2g/100mL (30°C)⁴⁾ Specific gravities: 1.26~1.28g/cm³ (20°C)⁵⁾ logPow: -0.66³⁾</p>
<p>[3] Estrone and its metabolites</p> <p>[3-1] 1,3,5(10)-Estratrien-3-ol-17-one (synonym: Estrone)</p> 	<p>Molecular formula: C₁₈H₂₂O₂ CAS: 53-16-7 ENCS: 9-2145 MW: 270.37 mp: 260.2°C¹⁾ bp: 154°C³⁾ sw: 0.00130g/kg (25°C)¹⁾ Specific gravities: 1.236g/cm³ (25°C)¹⁾ logPow: 3.13³⁾</p>
<p>[3-2] Estrone-3-sulfate</p> 	<p>Molecular formula: C₁₈H₂₂O₅S CAS: 481-97-0 ENCS: No pertinence MW: 350.43 mp: Uncertain bp: Uncertain sw: Uncertain Specific gravities: Uncertain logPow: Uncertain</p>

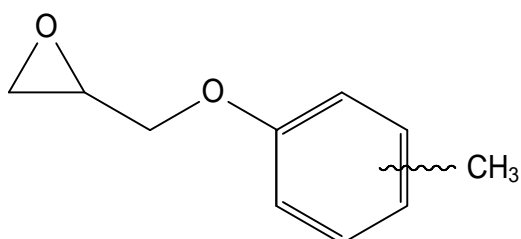
(Abbreviations) CAS CAS registry number, ENCS registry number in the Existing and New Chemical Substances List, MW molecular weight, mp melting point, bp boiling point, SW solubility in water, Specific gravities Specific gravity(no unit) or density, logPow *n*-octanol-water partition coefficient, kPa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

[3-3] Estrone-3-glucuronide



Molecular formula: $C_{24}H_{30}O_8$
 CAS: 2479-90-5
 ENCS: No pertinence
 MW: 446.49
 mp: Uncertain
 bp: Uncertain
 sw: Uncertain
 Specific gravities: Uncertain
 logPow: Uncertain

[4] 1,2-Epoxy-3-(tolylloxy)propane



Molecular formula: $C_{10}H_{12}O_2$
 CAS: 26447-14-3
 ENCS: 3-574, 3-594
 MW: 164.20
 mp: Uncertain
 bp: 170~195°C (100mbar) ⁶⁾
 sw: Uncertain
 Specific gravities: 1.14 (25°C) ⁶⁾
 logPow: Uncertain

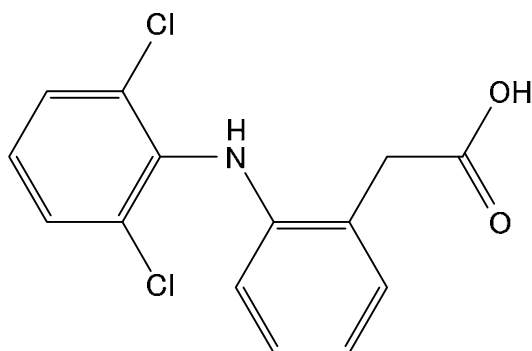
[5] Cyanides (contains Hydrogen cyanide)



Molecular formula: CHN
 CAS: 74-90-8
 ENCS: 1-138
 MW: 27.03
 mp: -13.28°C ¹⁾
 bp: 25.63°C ¹⁾
 sw: Miscible ¹⁾
 Specific gravities: 0.6876g/cm³ (20°C) ¹⁾
 logPow: -0.25 ³⁾

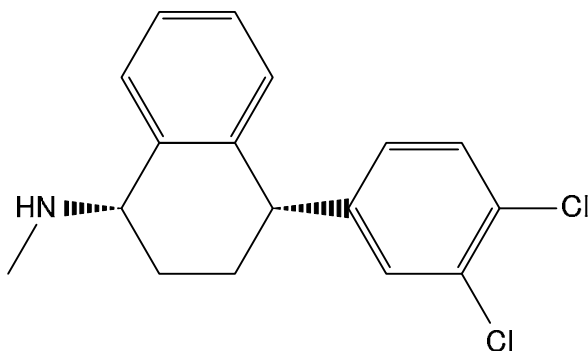
(Note) The structure, physical and chemical properties were those of hydrogen cyanide.

[6] [*o*-(2,6-Dichloroanilino)phenyl]acetic acid (synonym: Diclofenac)



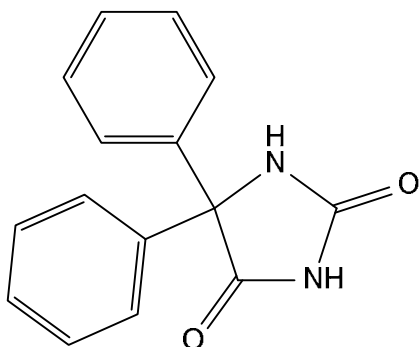
Molecular formula: $C_{14}H_{11}Cl_2NO_2$
 CAS: 15307-86-5
 ENCS: 3-3082 (as a sodium salt)
 MW: 296.15
 mp: 156~158°C ⁴⁾
 bp: Uncertain
 sw: 0.00237g/L (25°C) ³⁾
 Specific gravities: Uncertain
 logPow: 4.51 ³⁾

[7] (1*S*,4*S*)-4-(3,4-Dichlorophenyl)1,2,3,4-tetrahydronaphthalen-1-amine (synonym: Sertraline)



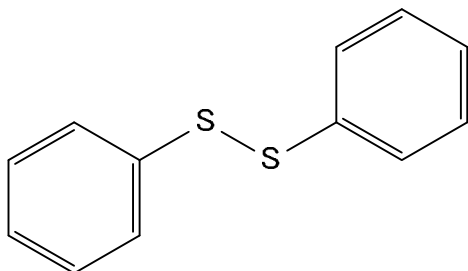
Molecular formula: C₁₇H₁₇Cl₂N
CAS: 79617-96-2
ENCS: No pertinence
MW: 306.23
mp: Uncertain
bp: Uncertain
sw: Uncertain
Specific gravities: Uncertain
logPow: Uncertain

[8] 5,5-Diphenyl-2,4-Imidazolidinedione (synonym: Phenytoin)



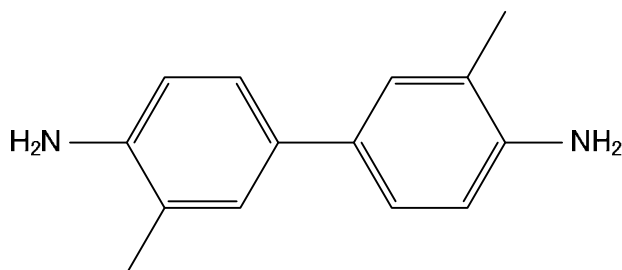
Molecular formula: C₁₅H₁₂N₂O₂
CAS: 57-41-0
ENCS: 9-621
MW: 252.27
mp: 295~298°C⁴⁾
bp: Uncertain
sw: 0.032g/L (22°C)³⁾
Specific gravities: Uncertain
logPow: 2.47³⁾

[9] Diphenyldisulfane (synonym: Diphenyldisulfide)



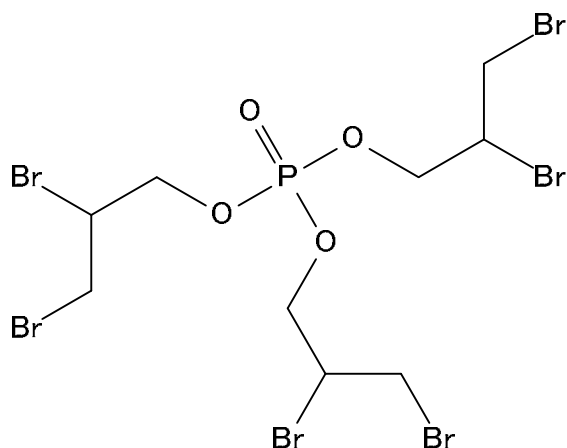
Molecular formula: C₁₂H₁₀S₂
CAS: 882-33-7
ENCS: 3-1124
MW: 218.34
mp: 60.4°C¹⁾
bp: 310°C¹⁾
sw: Insoluble¹⁾
Specific gravities: 1.353g/cm³ (20°C)¹⁾
logPow: 4.41³⁾

[10] 3,3'-Dimethylbenzidine (synonym: : *o*-Tolidine)



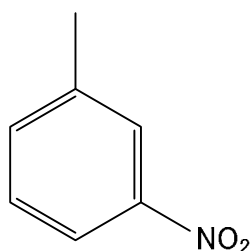
Molecular formula: C₁₄H₁₆N₂
CAS: 119-93-7
ENCS: 9-882
MW: 212.29
mp: 131°C¹⁾
bp: 339°C³⁾
sw: 1.3g/kg (25°C)¹⁾
Specific gravities: 1.234g/cm³⁶⁾
logPow: 2.34³⁾

[11] Tris(2,3-dibromopropan-1-yl) phosphate (synonym: Tris(2,3- dibromopropyl) phosphate)



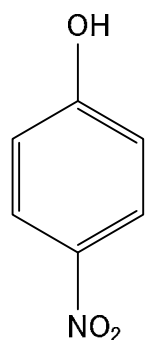
Molecular formula: $C_9H_{15}Br_6O_4P$
CAS: 126-72-7
ENCS: 2-1941, 2-1955, 2-2188
MW: 697.61
mp: $5.5^{\circ}C$ ³⁾
bp: $390^{\circ}C$ ⁷⁾
sw: $0.008g/L$ ($24^{\circ}C$)³⁾
Specific gravities: 2.27 ($25^{\circ}C$)⁶⁾
logPow: 4.29 ³⁾

[12] *m*-Nitrotoluene



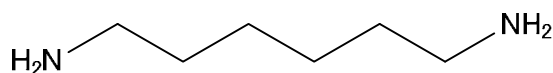
Molecular formula: $C_7H_7NO_2$
CAS: 99-08-1
ENCS: 3-437
MW: 137.14
mp: $15.9^{\circ}C$ ¹⁾
bp: $232.1^{\circ}C$ ¹⁾
sw: $0.50g/kg$ ($30^{\circ}C$)¹⁾
Specific gravities: $1.1581g/cm^3$ ($20^{\circ}C$)¹⁾
logPow: 2.40 ⁴⁾

[13] *p*-Nitrophenol



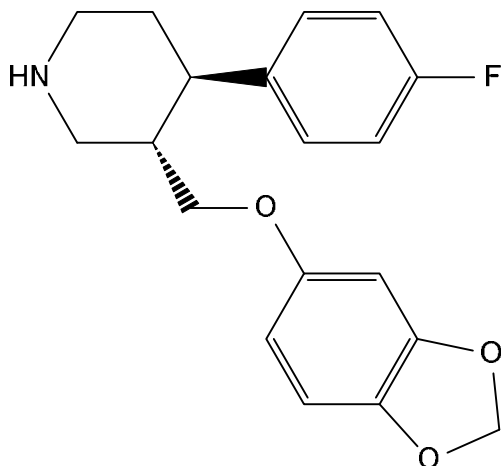
Molecular formula: $C_6H_5NO_3$
CAS: 100-02-7
ENCS: 3-777
MW: 139.11
mp: $113.8^{\circ}C$ ¹⁾
bp: $279^{\circ}C$ ³⁾
sw: $15.8g/kg$ ($20^{\circ}C$)¹⁾
Specific gravities: $1.479g/cm^3$ ($20^{\circ}C$)¹⁾
logPow: 1.91 ³⁾

[14] Hexamethylenediamine



Molecular formula: $C_6H_{16}N_2$
CAS: 124-09-4
ENCS: 2-153
MW: 116.20
mp: $38.8^{\circ}C$ ¹⁾
bp: $197^{\circ}C$ ¹⁾
sw: About $720g/kg$ ($5^{\circ}C$)¹⁾
Specific gravities: 0.854 ($25^{\circ}C$)⁴⁾
logPow: 0.02 ²⁾

[15] (3*S*,4*R*)-3-[(2*H*-1,3-Benzodioxol-5-yloxy)methyl]-4-(4-fluorophenyl)piperidine (synonym: Paroxetine)



Molecular formula: C₁₉H₂₀FNO₃
CAS: 61869-08-7
ENCS: No pertinence
MW: 329.37
mp: Uncertain
bp: Uncertain
sw: 1.131g/L (25 ° C)⁶⁾
Specific gravities: Uncertain
logPow: 1.23⁶⁾

References

- 1) Rumble, J.R. (ed), CRC Handbook of Chemistry and Physics 98th Edition (2017), The Royal society of Chemistry.
- 2) OECD, Screening Information Dataset (SIDS) for High Product in Volume Chemicals (Processed by UNEP Chemicals) (<http://www.inchem.org/pages/sids.html>)
- 3) U.S. EPA, Estimation Programs Interface (EPI) Suite v4.1 (<http://www.epa.gov/oppt/exposure/pubs/episuite.html>)
- 4) O'Neil, M.J. (ed), The Merck Index 15th Edition (2013), CRC Press.
- 5) International Programme on Chemical Safety, International Chemical Safety Cards (ICSC) (http://www.ilo.org/safework/info/publications/WCMS_113134/lang-en/index.htm)
- 6) U.S. National Library of Medicine, Hazardous Substances Data Bank (HSDB) (<https://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>)
- 7) World Health Organization, Environmental Health Criteria EHC173 (1995)

3. Surveyed site and procedure

In the Initial 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	○	○	
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	○		
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	○	○	○*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	○		
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 Institute of 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 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			○
Miyazaki Pref.	Miyazaki Prefectural Institute for Public Health and Environment	○		○

(Note 1) *1: Organisations responsible for sampling are described by their official names in FY 2016.

(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 initial 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 1-1-1 and Fig.1-1-1 for surface water, Table 1-1-2 and Fig.1-1-1 for sediment, Table 1-1-3 and Fig.1-1-2 for 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 (groups)	Numbers of surveyed sites	Numbers of samples at a surveyed site
Surface water	30	12	39	1
Sediment	14	1	15	3
Air	23*	5	27	3
All media	36	15	66	

(Note) *:For 1 of the 30 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.

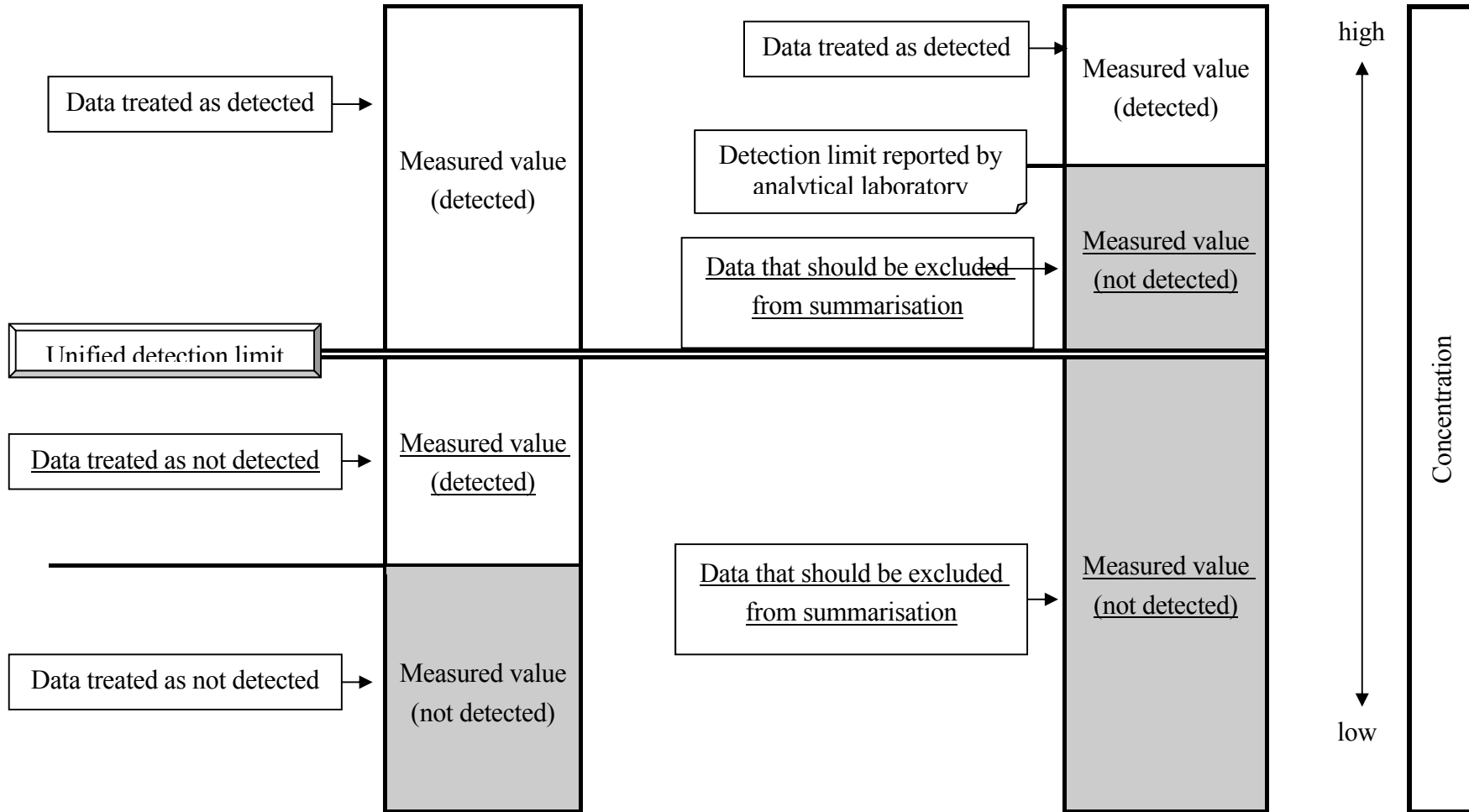
When the appropriate IDL and MDL are not calculated by the analytical laboratory, one of the following

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

(A) Detection limit reported by analytical laboratory \leq Unified detection limit

(B) Detection limit reported by analytical laboratory $>$ Unified detection limit



Schematic of procedure for data summarisation

Table 1-1-1 List of surveyed sites (surface water) and target chemicals in the Initial Environmental Survey in FY2016

Local Communities	Surveyed sites	Target chemicals											
		[1]	[2]	[3]	[4]	[6]	[7]	[8]	[9]	[12]	[13]	[14]	[15]
Hokkaido	Bifuka Bridge, Riv. Teshio (Bifuka Town)					○	○	○					○
	Suzuran-ohashi Bridge, Riv. Tokachi (Obihiro City)					○	○	○					○
	Ishikarikakokyo Bridge, Mouth of Riv. Ishikari (Ishikari City)		○			○	○	○					○
Iwate Pref.	Riv. Toyosawa (Hanamaki City)		○										
Miyagi Pref.	Futatsuya-bashi Bridge, Riv. Hasama (Tome City)										○		
	Sakura-hodoukyou Bridge, Riv. Shiroishi (Shibata Town)										○		
Akita Pref.	Akita Canal (Akita City)	○	○	○	○	○	○	○	○	○	○	○	○
Saitama Pref.	Akigaseshusui of Riv. Arakawa (Shiki City)											○	
Saitama City	Nakadote-hashii Bridge, Riv. Kamo (Saitama City)										○		
Chiba Pref.	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	○	○	○	○	○	○	○	○	○	○	○	○
Kawasaki City	Mouth of Riv. Tama (Kawasaki City)		○	○									
Niigata Pref.	Lower Riv. Shinano (Niigata City)									○			
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)								○				
Nagano Pref.	Lake Suwa (center)	○	○	○	○				○	○	○		
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 Minamihira)											○	
	Lake Biwa (center, offshore of Karasaki)											○	
Kyoto Pref.	Miyazu Port	○											
Kyoto City	Miyamae-bashi Bridge, Riv. Katsura (Kyoto City)			○				○					
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)	○	○	○	○	○	○	○	○	○	○	○	○
Osaka City	Kema-bashi Bridge, Riv. Oh-kawa (Osaka City)					○	○	○					○
	Osaka Port		○	○		○	○	○	○			○	○
Hyogo Pref.	Offshore of Himeji											○	
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)											○	
Okayama Pref.	Sasagase-bashi Bridge, Riv. Sasagase Otoidezeki of Riv. Asahi Okayama City)	○				○	○		○				○
	Offshore of Mizushima	○	○	○	○	○	○		○				○
Yamaguchi Pref.	Tokuyama Bay											○	
Kagawa Pref.	Takamatsu Port	○	○	○	○			○	○	○	○		
Fukuoka Pref.	Kabura-bashi Bridge, Riv. Raizan (Maebaru Itoshima City)				○					○			
	Offshore of Omuta	○			○					○			
Kitakyushu City	Dokai Bay								○	○			
Fukuoka City	Hakata Bay	○	○	○	○	○	○	○	○	○	○	○	○
Miyazaki Pref.	Naka Bridge, Riv. Hama (Nobeoka City)											○	

[1] 1-Amino-9,10-anthraquinone, [2] 2-Imidazolidinethione (synonym: 2-Mercaptoimidazoline), [3] Estrone and its metabolites, [4] 1,2-Epoxy-3-(tolylxy)propane, [6] [*o*-(2,6-Dichloroanilino)phenyl]acetic acid (synonym: Diclofenac), [7] (1*S*,4*S*)-4-(3,4-Dichlorophenyl)1,2,3,4-tetrahydronaphthalen-1-amine (synonym: Sertraline), [8] 5,5-Diphenyl-2,4-Imidazolidinedione (synonym: Phenytoin), [9] Diphenyldisulfane (synonym: Diphenyldisulfide), [12] *m*-Nitrotoluene, [13] *p*-Nitrophenol, [14] Hexamethylenediamine, [15] (3*S*,4*R*)-3-[(2*H*-1,3-Benzodioxol-5-ylxy)methyl]-4-(4-fluorophenyl)piperidine (synonym: Paroxetine)

Table 1-1-2 List of surveyed sites (sediment) and target chemicals in the Initial Environmental Survey in FY2016

Local communities	Surveyed sites	Target chemicals
		[1]
Iwate Pref.	Riv. Toyosawa (Hanamaki City)	○
Akita Pref.	Akita Canal (Akita 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)	○
Nagano Pref.	Lake Suwa (center)	○
Aichi Pref.	Nagoya Port, West of Shiomi Wharf*	○
Nagoya City	Minatoshinbashi Bridge, Riv. Hori (Nagoya City)	○
Mie Pref.	Yokkaichi Port	○
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)	○
Osaka City	Osaka Port	○
Okayama Pref.	Offshore of Mizushima	○
Fukuoka Pref.	Offshore of Omuta	○
Fukuoka City	Hakata Bay	○

[1] 1-Amino-9,10-anthraquinone



Figure 1-1-1 Surveyed sites (surface water and sediment) in the Initial Environmental Survey in FY 2016

Table 1-1-3 List of surveyed sites (air) and target chemicals in the Initial Environmental Survey in FY 2016

Local communities	Surveyed sites	Target chemicals				
		[5]	[9]	[10]	[11]	[14]
Hokkaido	Hokkaido Research Organization Environmental and Geological Research Department Institute of Environmental Sciences (Sapporo City)			○	○	○
Sendai City	Tsutsujigaoka Park (Sendai City)		○			
Saitama Pref.	Center for Environmental Science in Saitama (Kazo City)	○				○
Saitama City	Saitama City 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					○
Kanagawa Pref.	Kanagawa Environmental Research Center (Hiratsuka City)	○	○	○	○	○
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science (Kanazawa City)		○	○		
Nagano Pref.	Komatsu Air Quality Monitoring Station (Komatsu City)	○	○	○	○	○
Shizuoka Pref.	Mishima Roadside Air Pollution Monitoring Station (Mishima 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 City	Kyoto City Institute of Health and Environmental Sciences (Kyoto City)				○	
Osaka Pref.	Annex of 2nd Osaka common building for government offices (Osaka City)			○		
	Amanogawa-gesui-pompoujou Roadside Air Pollution Monitoring Station (Kishiwada City)					○
Wakayama Pref.	Wakayama Prefectural Research Center of Environment and Public Health (Wakayama City)		○			○
Hiroshima Pref.	Otake-Yumi Park (Otake City)	○				○
Yamaguchi Pref.	Miyanomae Children's Park Air Quality Monitoring Station (Shunan City)					○
	Yamaguchi Prefectural Institute of Public Health and Environment (Yamaguchi City)	○	○	○	○	
Kagawa Pref.	Kagawa Prefectural Public Swimming Pool (Takamatsu City)	○				
Ehime Pref.	Masaki Air Quality Monitoring Station (Masaki Town)	○				
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)		○	○		○
Miyazaki Pref.	Sin-nobeoka Miyanomae Children's Park Air Quality Monitoring Station (Nobeoka City)					○

[5] Cyanides (contains Hydrogen cyanide), [9] Diphenyldisulfane (synonym: Diphenyldisulfide), [10] 3,3'-Dimethylbenzidine (synonym: : *o*-Tolidine), [11] Tris(2,3-dibromopropan-1-yl) phosphate (synonym: Tris(2,3- dibromopropyl) phosphate), [14] Hexamethylenediamine



Figure 1-1-2 Surveyed sites (air) in the Initial Environmental Survey in FY 2015

4. Summary of survey results

The detection ranges and the detection limits are shown in Table 1-2. The survey results are summarized as follows.

In surface water, 7 out of the 12 target chemicals (groups) were detected. Target chemicals were categorized by analytical methods such as structurally similar chemicals capable of simultaneous analyses.

- [3] Estrone and its metabolites
 - [3-1] 1,3,5(10)-Estratrien-3-ol-17-one (synonym: Estrone) : 10 of the 15 valid sites
 - [3-2] Estrone-3-sulfate: 8 of the 15 valid sites
- [6] [*o*-(2,6-Dichloroanilino)phenyl]acetic acid (synonym: Diclofenac): 15 of the 16 valid sites
- [7] (1*S*,4*S*)-4-(3,4-Dichlorophenyl)1,2,3,4-tetrahydronaphthalen-1-amine (synonym: Sertraline): 7 of the 16 valid sites
- [8] 5,5-Diphenyl-2,4-Imidazolidinedione (synonym: Phenytoin): 2 of the 15 valid sites
- [13] *p*-Nitrophenol: 14 of the 15 valid sites
- [14] Hexamethylenediamine: 1 of the 16 valid sites
- [15] (3*S*,4*R*)-3-[(2*H*-1,3-Benzodioxol-5-yloxy)methyl]-4-(4-fluorophenyl)piperidine (synonym: Paroxetine): 1 of the 16 valid site

In sediment, 1 target chemical was detected.

- [1] 1-Amino-9,10-anthraquinone: 1 of the 15 valid site

In air, 2 out of the 6 target chemicals (groups) were detected.

- [5] Cyanides (contains Hydrogen cyanide): All 10 valid sites
- [14] Hexamethylenediamine: 3 of the 15 valid sites

Table 1-2 Summary of the detection ranges and the detection limits in the Initial Environmental Survey in FY 2016

No.	Target chemicals	Surface water [ng/L]		Sediment [ng/g-dry]		Air [ng/m ³]	
		Detection range and frequency	Detection limit	Detection range and frequency	Detection limit	Detection range and frequency	Detection limit
[1]	1-Amino-9,10-anthraquinone	nd 0/15	2.8	nd~7.1 1/15	0.84		
[2]	2-Imidazolidinethione (synonym: 2-Mercaptoimidazoline)	nd 0/15	18				
[3]	Estrone and its metabolites						
	[3-1] 1,3,5(10)-Estratrien-3-ol-17-one (synonym: Estrone)	nd~4.1 10/15	0.046				
	[3-2] Estrone-3-sulfate	nd~3.4 8/15	0.068				
	[3-3] Estrone-3-glucuronide	nd 0/15	0.50				
[4]	1,2-Epoxy-3-(tolylxy)propane	nd 0/15	240				
[5]	Cyanides (contains Hydrogen cyanide) *					160~740 10/10	49
[6]	[<i>o</i> -(2,6-Dichloroanilino)phenyl]acetic acid (synonym: Diclofenac)	nd~76 15/16	0.17				
[7]	(1 <i>S</i> ,4 <i>S</i>)-4-(3,4-Dichlorophenyl)1,2,3,4-tetrahydronaphthalen-1-amine (synonym: Sertraline)	nd~3.6 7/16	0.44				
[8]	5,5-Diphenyl-2,4-Imidazolidinedione (synonym: Phenytoin)	nd~28 2/15	2.1				
[9]	Diphenyldisulfane (synonym: Diphenyldisulfide)	nd 0/15	0.57			nd 0/13	1.9
[10]	3,3'-Dimethylbenzidine (synonym: <i>o</i> -Tolidine)					nd 0/8	0.076
[11]	Tris(2,3-dibromopropan-1-yl) phosphate (synonym: Tris(2,3-dibromopropyl) phosphate)					nd 0/8	0.015
[12]	<i>m</i> -Nitrotoluene	nd 0/15	3.2				
[13]	<i>p</i> -Nitrophenol	nd~240 14/15	4.6				
[14]	Hexamethylenediamine *	nd~2,700 1/16	4.3			nd~3.7 3/15	0.91
[15]	(3 <i>S</i> ,4 <i>R</i>)-3-[(2 <i>H</i> -1,3-Benzodioxol-5-yloxy)methyl]-4-(4-fluorophenyl)piperidine (synonym: Paroxetine)	nd~2.9 1/16	0.65				

(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.