

Chapter 2 Results of the Detailed Environmental Survey in FY2015

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 FY2015 Detailed Environmental Survey, 11 chemicals that were selected and designated as target chemicals. The combinations of target chemicals and the surveyed media are given below.

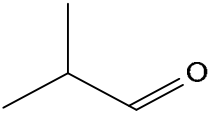
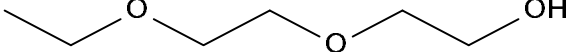
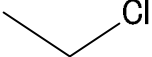
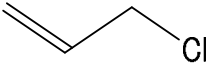
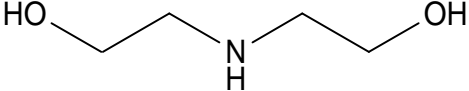
No.	Name	The Chemical Substances Control Law		The PRTR Law		Surveyed media			
		Before the revision	After the revision	Before the revision	After the revision	Surface water	Sediment	Wild life	Air
[1]	Isobutyraldehyde	II Monitored	Priority Assessment Chemical Substances		I 35				○
[2]	2-(2-Ethoxyethoxy)ethanol		Priority Assessment Chemical Substances			○			
[3]	Chloroethane	II Monitored	Priority Assessment Chemical Substances	I 74		○			
[4]	3-Chloropropene (synonym: Allyl chloride)	II Monitored	Priority Assessment Chemical Substances	I 91	I 123	○			
[5]	Diethanolamine		Priority Assessment Chemical Substances			○			
[6]	2,6-Di-tert-butyl-4-methylphenol (synonym: 2,6-Di-tert-butyl-4-cresol)	III Monitored	Priority Assessment Chemical Substances		I 207	○	○	○	
[7]	<i>N,N</i> -Dimethyldodecylamine N-oxide		Priority Assessment Chemical Substances	I 166	I 224	○	○		
[8]	1,5,5-Trimethyl-1-cyclohexen-3-one (synonym: Isophorone)		Priority Assessment Chemical Substances			○			
[9]	Hydrazine	II Monitored III Monitored	Priority Assessment Chemical Substances	I 253	I 333	○			
[10]	1-Butanol		Priority Assessment Chemical Substances			○			
[11]	Methyl ethyl ketone		Priority Assessment Chemical Substances			○			

(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.

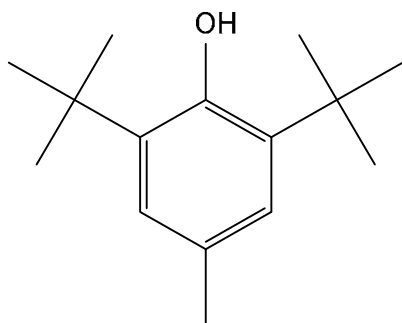
(Note 3) "Before the revision" in "The PRTR Law" means "appointments before the revision of government ordinance on November 21, 2008" and "After the revision" in "The PRTR Law" means "appointments after that revision".

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

<p>[1] Isobutyraldehyde</p> 	<p>Molecular formula: C₄H₈O CAS: 78-84-2 ENCS: 2-494 MW: 72.11 mp: -72.1°C¹⁾ bp: 64.1°C¹⁾ sw: 100g/kg (20°C)¹⁾ Specific gravit: 0.7891g/cm³ (20°C)¹⁾ logPow: 0.77²⁾</p>
<p>[2] 2-(2-Ethoxyethoxy)ethanol</p> 	<p>Molecular formula: C₆H₁₄O₃ CAS: 111-90-0 ENCS: 2-422, 7-97 MW: 134.17 mp: -54.0°C (Coagulating point)²⁾ bp: 202°C¹⁾ sw: 1,000,000mg/L (20°C)³⁾ Specific gravit: 0.9885g/cm³ (20°C)¹⁾ logPow: -0.54³⁾</p>
<p>[3] Chloroethane</p> 	<p>Molecular formula: C₂H₅Cl CAS: 75-00-3 ENCS: 2-53 MW: 64.51 mp: -138°C¹⁾ bp: 12.3°C¹⁾ sw: 6.7g/kg (25°C, Gas)¹⁾ Specific gravit: 0.9239g/cm³ (0°C)¹⁾ logPow: 1.43¹⁾</p>
<p>[4] 3-Chloropropene (synonym: Allyl chloride)</p> 	<p>Molecular formula: C₃H₅Cl CAS: 107-05-1 ENCS: 2-123 MW: 76.53 mp: -136°C¹⁾ bp: 44.8°C¹⁾ sw: 4.0g/kg (25°C)¹⁾ Specific gravit: 0.9376g/cm³ (20°C)¹⁾ logPow: 2.1²⁾</p>
<p>[5] Diethanolamine</p> 	<p>Molecular formula: C₄H₁₁NO₂ CAS: 111-42-2 ENCS: 2-302, 2-354 MW: 105.14 mp: 27.9°C¹⁾ bp: 271.2°C¹⁾ sw: 20,700g/kg (20°C)¹⁾ Specific gravit: 1.0966g/cm³ (20°C)¹⁾ logPow: -1.43⁴⁾</p>

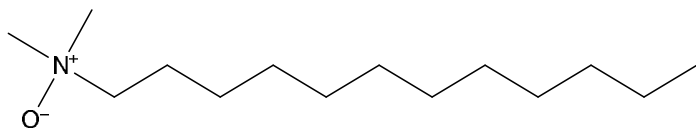
(Abbreviations) CAS CAS registry number, ENCS registry number in the Existing and New Chemical Substances List, MW molecular weight, mp melting point, bp boiling point, SW solubility in water, Specific gravities Specific gravity(no unit) or density, logPow *n*-octanol-water partition coefficient, kPa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

[6] 2,6-Di-*tert*-butyl-4-methylphenol (synonym: 2,6-Di-*tert*-butyl-4-cresol)



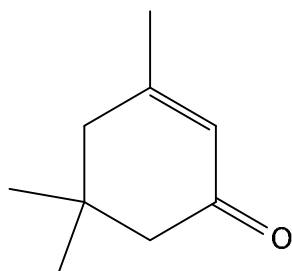
Molecular formula: C₁₅H₂₄O
CAS: 128-37-0
ENCS: 3-540, 9-1805
MW: 220.35
mp: 70.1°C¹⁾
bp: 265°C¹⁾
sw: 0.6~1.1mg/L (20~25°C)²⁾
Specific gravit: 1.03g/cm³ (20°C)²⁾
logPow: 5.1²⁾

[7] *N,N*-Dimethyldodecylamine *N*-oxide



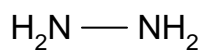
Molecular formula: C₁₄H₃₁NO
CAS: 1643-20-5
ENCS: 2-198
MW: 229.41
mp: 130.5°C¹⁾
bp: Uncertain
sw: 190,000mg/L (25°C)⁴⁾
Specific gravit: Uncertain
logPow: Uncertain

[8] 1,5,5-Trimethyl-1-cyclohexen-3-one (synonym: Isophorone)



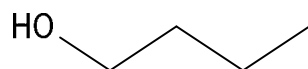
Molecular formula: C₉H₁₄O
CAS: 78-59-1
ENCS: 3-2381, 3-2389
MW: 138.21
mp: -8.1°C¹⁾
bp: 214.8°C¹⁾
sw: 16.0g/kg (20°C)¹⁾
Specific gravit: 0.9255g/cm³ (20°C)¹⁾
logPow: 1.70⁴⁾

[9] Hydrazine



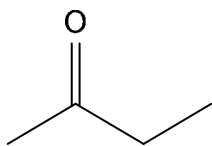
Molecular formula: H₄N₂
CAS: 302-01-2
ENCS: 1-374
MW: 32.05
mp: 1.54°C¹⁾
bp: 113.55°C¹⁾
sw: Miscible⁵⁾
Specific gravit: 1.0036g/cm³ (25°C)¹⁾
logPow: -2.1⁵⁾

[10] 1-Butanol



Molecular formula: C₄H₁₀O
CAS: 71-36-3
ENCS: 2-3049
MW: 74.12
mp: -88.60°C¹⁾
bp: 117.6°C¹⁾
sw: 79g/kg (25°C)¹⁾
Specific gravit: 0.8095g/cm³ (20°C)¹⁾
logPow: 0.84¹⁾

[11] Methyl ethyl ketone



Molecular formula: C₄H₈O
CAS: 78-93-3
ENCS: 2-542
MW: 72.11
mp: -86.67°C¹⁾
bp: 79.6°C¹⁾
sw: 344g/kg(25°C)¹⁾
Specific gravit: 0.7999g/cm³(25°C)¹⁾
logPow: 0.29¹⁾

References

- 1) Lide, D.R. (ed), CRC Handbook of Chemistry and Physics 97th Edition (2016)
- 2) OECD, Screening Information Data Sets (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) U.S. National Library of Medicine, Hazardous Substances Data Bank (HSDB) (<https://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>)
- 5) International Programme on Chemical Safety, International Chemical Safety Cards (ICSC)

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	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	○			○
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	○			○
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	○			
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 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	○	○		○
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	○		○	○
Kobe City	Kobe Institute of Health, Welfare Bureau, Health Division, Health	○			
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	○	○	○	○
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	○			
Fukuoka City	Fukuoka City Institute for Hygiene and the Environment	○	○		
Saga Pref.	Saga Prefectural Environmental Research Center		○		
Oita Pref.	Oita Prefectural Institute of Health and Environment, Life and Environment Department	○	○	○	○
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 2015.

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

(2) Surveyed sites and target chemicals

The number of target chemicals (groups) and the number 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	35	11	51	1
Sediment	23	2	26	3
Wildlife	10	1	12	3
Air	18*	1	19	3
All media	40	12	84	

(Note) *:For 1 of the 18 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)).

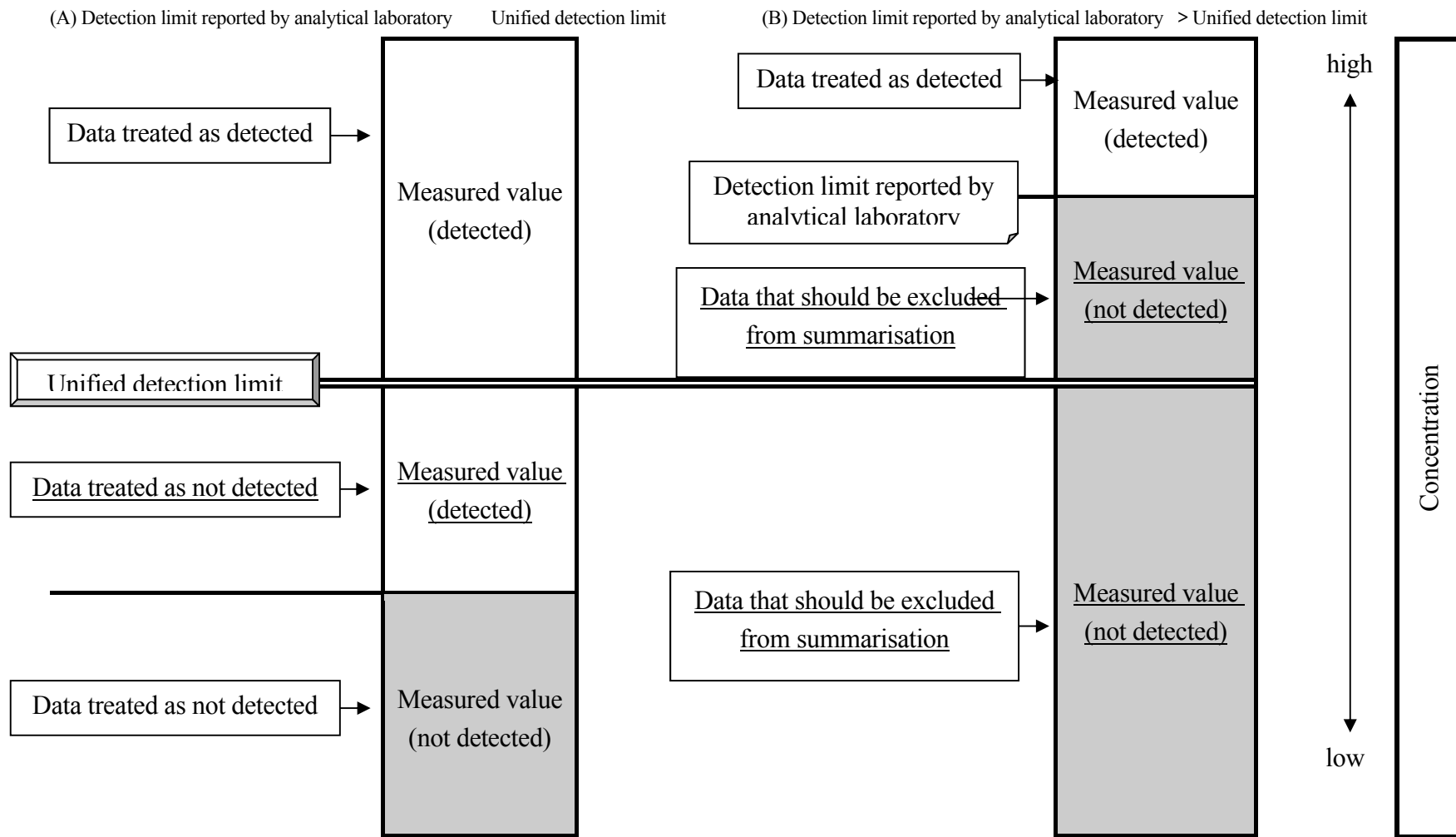
When the instrument detection limit (IDL) and the method detection limit (MDL) are given in the analytical method, which is described in reports on the investigation of the development of analytical methods for chemicals and adopted in the Initial Environmental Survey (hereafter, the Initial Environmental 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 FY2015

Local communities	Surveyed sites	Target chemicals									
		[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
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)		○					○	○		
Sendai City	Hirose-ohashi Bridge, Riv. Hirose (Sendai City)							○			
Akita Pref.	Akita Canal (Akita City)	○	○	○	○	○	○	○	○	○	○
Yamagata Pref.	Lower Riv. Murayamano (Higashine City)								○		
Ibaraki Pref.	Tonekamome-ohashi Bridge, Mouth of Riv. Tone (Kamisu City)						○				
Tochigi Pref.	Riv. Tagawa (Utsunomiya City)		○								
Gunma Pref.	Tako-bashi Bridge, Riv. Kabura (Takasaki City)			○	○	○			○		
Saitama Pref.	Akigaseshusui of Riv. Arakawa (Shiki 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	○	○	○	○	○	○	○	○	○	○
Kawasaki City	Mouth of Riv. Tama (Kawasaki City)	○	○			○				○	○
	Keihin Canal, Port of Kawasaki					○					
Niigata Pref.	Niigata Higashi Port								○		
	Lower Riv. Shinano (Niigata City)	○	○	○	○	○	○			○	○
Ishikawa Pref.	Mouth of Riv. Sai (Kanazawa City)	○				○					
Shizuoka Pref.	Shimizu Port	○	○	○	○	○	○	○	○	○	○
	kashima Bridge, Riv. Ushibuchi (Kakegawa City)						○				
Aichi Pref.	Nagoya Port , West of Shiomi Wharf*	○			○	○	○	○		○	○
Nagoya City	Nagoya Port , East of Shiomi Wharf						○				
Mie Pref.	Yokkaichi Port	○	○	○	○	○	○	○	○	○	○
Shiga Pref.	Lake Biwa (center, offshore of Minamihira)			○					○		
	Lake Biwa (center, offshore of Karasaki)			○					○		
Kyoto Pref.	Miyazu Port						○				
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)						○				
Osaka City	Kema-bashi Bridge, Riv. Oh-kawa (Osaka City)					○	○				○
	Osaka Port					○	○				○
Hyogo Pref.	Coast of Amagasaki	○	○	○	○	○		○	○	○	○
	Takasago-honko Port								○		
	Offshore of Himeji			○							
Kobe City	Kobe Port(center)			○	○						
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)			○	○	○	○			○	
	Hokkou Area of Wakayama-shimotsu Port								○		
Okayama Pref.	Offshore of Numa, Kojima Bay			○							
	Offshore of Mizushima	○	○	○	○	○	○	○	○	○	○

Local communities	Surveyed sites	Target chemicals									
		[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Yamaguchi Pref.	Tokuyama Bay	○	○	○	○	○	○	○	○	○	○
Tokushima Pref.	Tomioka Port						○				
Ehime Pref.	Offshore of Niihama Port	○	○	○	○	○		○	○	○	○
Fukuoka Pref.	Kabura-bashi Bridge, Riv. Raizan (Maebaru City)							○			
	Offshore of Omuta							○			
Fukuoka City	Hakata Bay	○	○	○	○	○	○	○	○	○	○
Oita Pref.	Mouth of Riv. Oita(Oita City)	○	○							○	○
Miyazaki Pref.	Naka Bridge, Riv. Hama (Nobeoka City)			○							

[2] 2-(2-Ethoxyethoxy)ethanol, [3] Chloroethane, [4] 3-Chloropropene (synonym: Allyl chloride), [5] Diethanolamine, [6] 2,6-Di-*tert*-butyl-4-methylphenol (synonym: 2,6-Di-*tert*-butyl-4-cresol), [7] *N,N*-Dimethyldodecylamine *N*-oxide, [8] 1,5,5-Trimethyl-1-cyclohexen-3-one (synonym: Isophorone), [9] Hydrazine, [10] 1-Butanol, [11] Methyl ethyl ketone

(Note) *: “Nagoya Port, West of Shiomi Wharf” of Initial and 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 FY2015

Local communities	Surveyed sites	Target chemicals	
		[6]	[7]
Iwate Pref.	Riv. Toyosawa (Hanamaki City)	○	○
Akita Pref.	Akita Canal (Akita 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	Mouth of Riv. Tama (Kawasaki City)	○	
	Keihin Canal, Port of Kawasaki	○	
Niigata Pref.	Lower Riv. Shinano (Niigata City)	○	○
Nagano Pref.	Lake Suwa (center)	○	○
Shizuoka Pref.	Shimizu Port	○	○
	kashima Bridge, Riv. Ushibuchi (Kakegawa City)		○
Aichi Pref.	Nagoya Port , West of Shiomi Wharf*	○	○
Mie Pref.	Yokkaichi Port	○	○
Shiga Pref.	Lake Biwa (center, offshore of Minamihira)	○	○
Kyoto Pref.	Miyazu Port	○	○
Osaka Pref.	Mouth of Riv. Yamato (Sakai City)	○	○
Osaka City	Osaka Port	○	○
Wakayama Pref.	Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City)	○	○
Okayama Pref.	Offshore of Mizushima	○	○
Yamaguchi Pref.	Tokuyama Bay	○	○
Tokushima Pref.	Tomioka Port	○	○
Fukuoka City	Hakata Bay	○	○
Saga Pref.	Imari Bay	○	○
Oita Pref.	Mouth of Riv. Oita(Oita City)	○	○

[6] 2,6-Di-*tert*-butyl-4-methylphenol (synonym: 2,6-Di-*tert*-butyl-4-cresol), [7] *N,N*-Dimethyldodecylamine *N*-oxide

(Note) *: “Nagoya Port, West of Shiomi Wharf” of Initial and 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 FY2015

Table 2-1-3 List of surveyed sites (wildlife) and target chemicals in the Detailed Environmental Survey in FY2015

Local communities	Surveyed areas	Wildlife species	Target chemical
			[6]
Iwate Pref.	Yamada Bay	Blue mussel	○
		Greenling	○
Akita Pref.	Akita Canal	Sea bass	○
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	○
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	○
Oita Pref.	Mouth of Riv. Oita(Oita City)	Sea bass	○

[6] 2,6-Di-*tert*-butyl-4-methylphenol (synonym: 2,6-Di-*tert*-butyl-4-cresol)

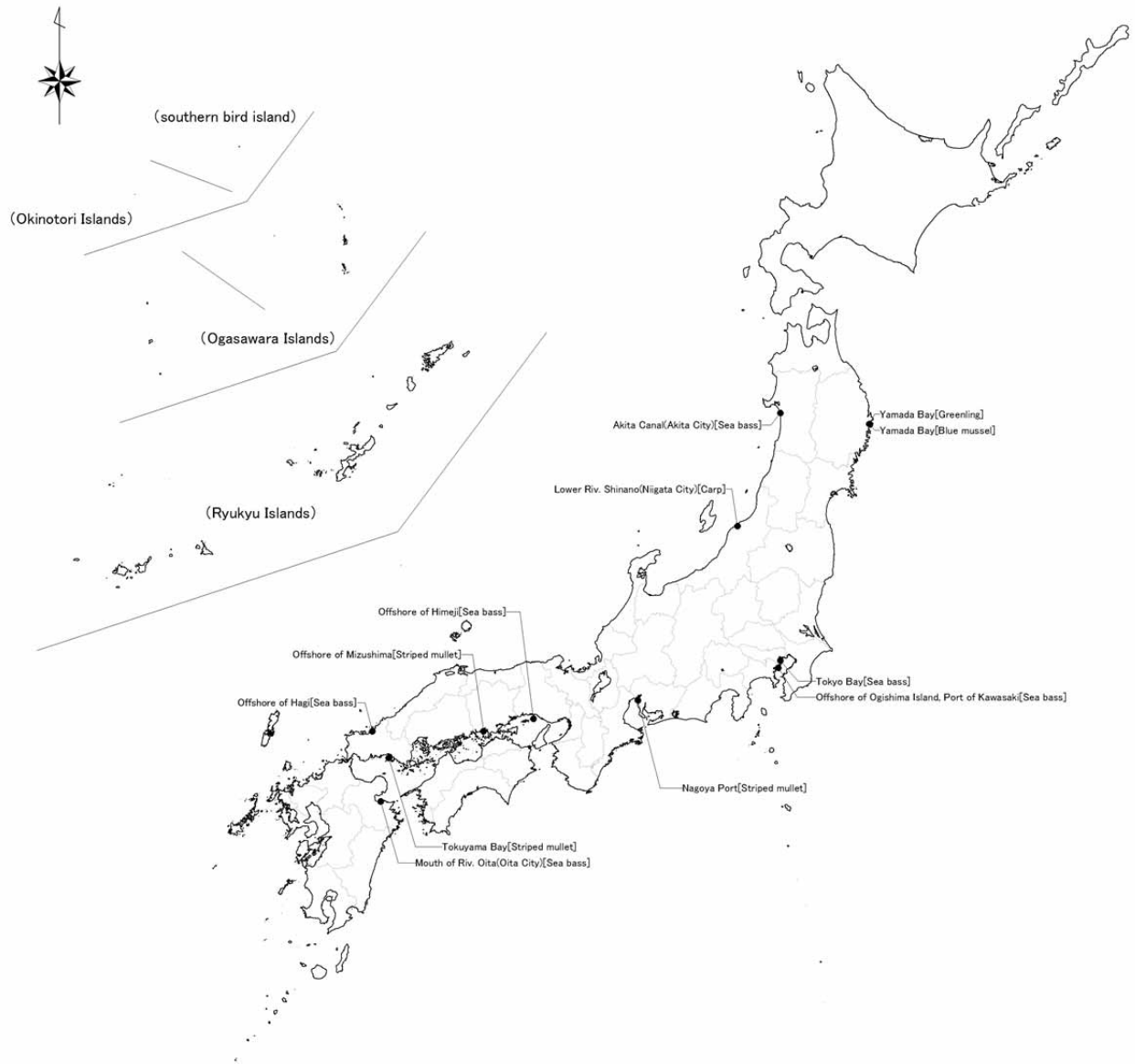


Figure 2-1-2 Surveyed sites (wildlife) in the Detailed Environmental Survey in FY2015

Table 2-1-4 List of surveyed sites (air) and target chemicals in the Detailed Environmental Survey in FY2015

Local communities	Surveyed sites	Target chemicals
		[1]
Hokkaido	Hokkaido Research Organization Environmental and Geological Research Department Institute of Environmental Sciences (Sapporo City)	○
Sapporo City	Sapporo City Institute of Public Health (Sapporo City)	○
Sendai City	Tsutsujigaoka Park (Sendai City)	○
Ibaraki Pref.	Ibaraki Kasumigaura Environmental Science Center(Tsuchiura City)	○
Chiba Pref.	Sodegaura-daijuku Air Quality Monitoring Station (Sodegaura City)	○
Kanagawa Pref.	Kanagawa Environmental Research Center (Hiratsuka City)	○
Toyama Pref.	Takaoka Fushiki Air Quality Monitoring Station (Takaoka City)	○
Ishikawa Pref.	Ishikawa Prefectural Institute of Public Health and Environmental Science (Kanazawa City)	○
Nagano Pref.	Nagano Environmental Conservation Research Institute (Nagano City)	○
Nagoya City	Chikusa Ward Heiwa Park(Nagoya City)	○
Mie Pref.	Mie Prefecture Health and Environment Research Institute (Yokkaichi City)	○
Kyoto Pref.	Uji Prefectural Government Building (Uji City)	○
Osaka Pref.	Amanogawa-gesui-pompoujou Roadside Air Pollution Monitoring Station (Kishiwada City)	○
Hyogo Pref.	Onoe Air Quality Monitoring Station (Kakogawa)	○
	Aboshi Air Quality Monitoring Station (Himeji)	○
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)	○
Kagawa Pref.	Kagawa Prefectural Public Swimming Pool (Takamatsu City)	○
Oita Pref.	Oita Municipal Misa Elementary School (Oita City)	○

[1] Isobutyraldehyde

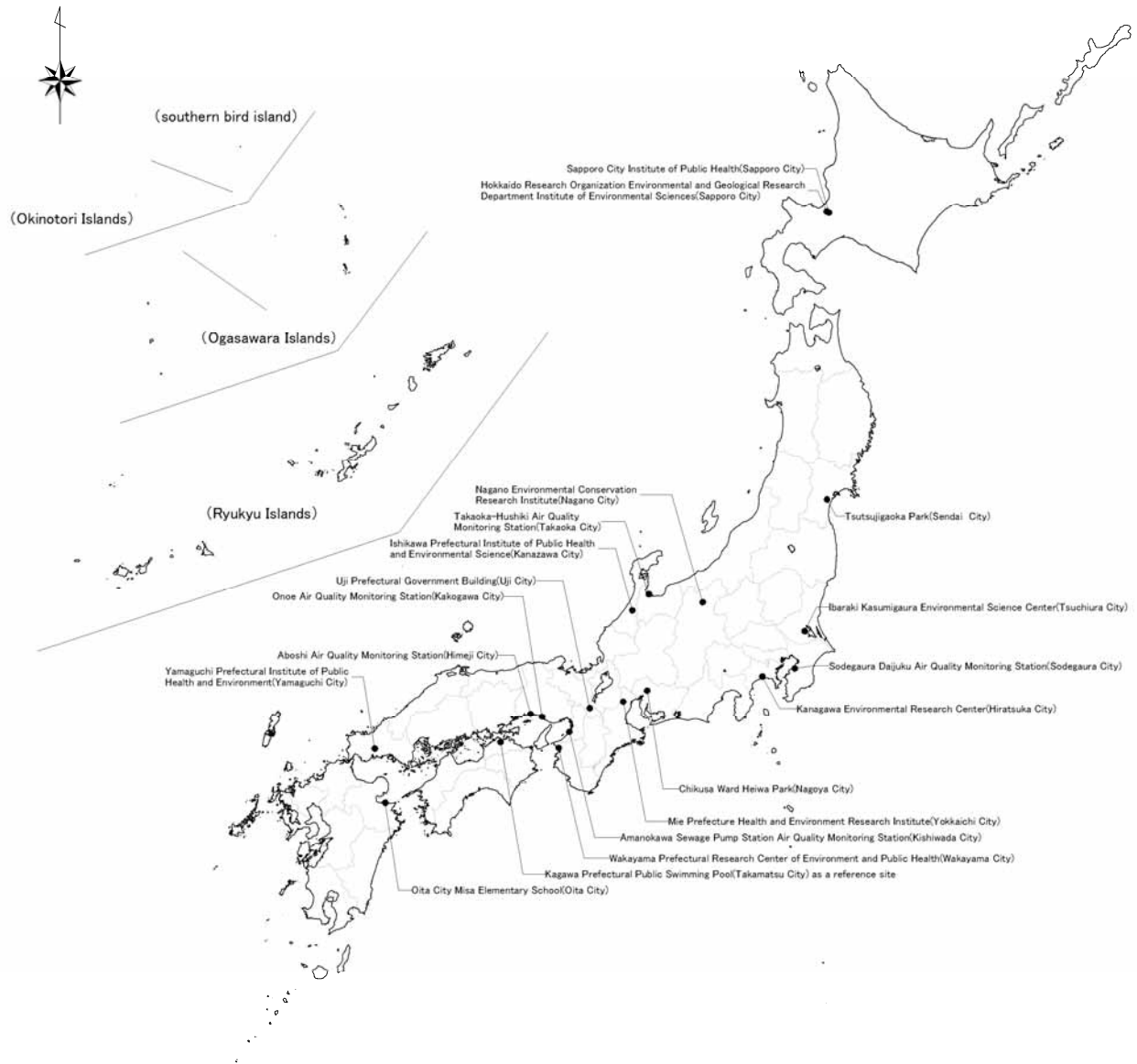


Figure 2-1-3 Surveyed sites (air) in the Detailed Environmental Survey in FY 2015

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, 8 out of the 10 target chemicals were detected.

- [2] 2-(2-Ethoxyethoxy)ethanol : 20 of the 20 valid sites
- [3] Chloroethane : 9 of the 20 valid sites
- [5] Diethanolamine : 11 of the 12 valid sites (fresh water area) and 6 of the 11 valid sites (sea water area)
- [6] 2,6-Di-*tert*-butyl-4-methylphenol (synonym: 2,6-Di-*tert*-butyl-4-cresol) : 18 of the 21 valid sites
- [7] *N,N*-Dimethyldodecylamine *N*-oxide : 20 of the 23 valid sites
- [8] 1,5,5-Trimethyl-1-cyclohexen-3-one (synonym: Isophorone) : 10 of the 21 valid sites
- [9] Hydrazine : 20 of the 21 valid sites
- [11] Methyl ethyl ketone : 20 of the 20 valid sites

In sediment, all 2 target chemicals were detected.

- [6] 2,6-Di-*tert*-butyl-4-methylphenol (synonym: 2,6-Di-*tert*-butyl-4-cresol) : 20 of the 21 valid sites
- [7] *N,N*-Dimethyldodecylamine *N*-oxide : 24 of the 24 valid sites

In wildlife (bivalves or fish), 1 target chemical was detected.

- [6] 2,6-Di-*tert*-butyl-4-methylphenol (synonym: 2,6-Di-*tert*-butyl-4-cresol) : 11 of the 12 valid sites

In air, 1 target chemical was not detected.

Table 1-2 Summary of the detection ranges and the detection limits in the Detailed Environmental Survey in FY 2015

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]	Isobutyraldehyde *							nd 0/19	2,200
[2]	2-(2-Ethoxyethoxy)ethanol	110~480 20/20	54						
[3]	Chloroethane	nd~19 9/20	1.7						
[4]	3-Chloropropene (synonym: Allyl chloride) *	nd 0/23	1.1						
[5]	Diethanolamine	Fresh water area nd~720 11/12 Sea water area nd~1,100 6/11	Fresh-water area 14 Sea-water area 220						
[6]	2,6-Di- <i>tert</i> -butyl-4-methylphenol (synonym: 2,6-Di- <i>tert</i> -butyl-4-cresol)	nd~43 18/21	6.2	nd~32 20/21	0.37	nd~120 11/12	0.29		
[7]	<i>N,N</i> -Dimethyldodecylamine <i>N</i> -oxide *	nd~25 20/23	0.5	nd~3.5 24/24	0.014				
[8]	1,5,5-Trimethyl-1-cyclohexen-3-one (synonym: Isophorone)	nd~53 10/21	7.8						
[9]	Hydrazine *	nd~14 20/21	0.41						
[10]	1-Butanol	nd 0/19	160						
[11]	Methyl ethyl ketone	50~1,300 20/20	8.1						

(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.