

Chapter 2 Results of the Detailed Environmental Survey in FY2013

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 FY2013 Detailed Environmental Survey, 7 chemicals that were selected and designated as target chemicals. The combinations of target chemicals and the surveyed media are given below.

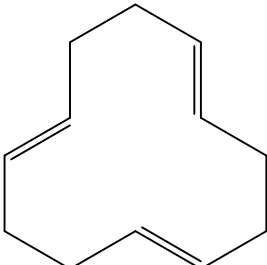
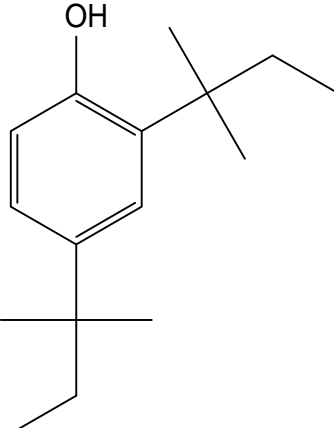
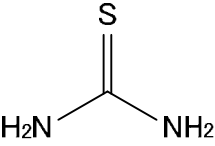
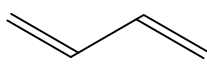
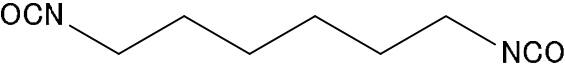
| No. | Name | The Chemical Substances Control Law | | The PRTR Law | | Surveyed media | | | |
|-----|-----------------------------------|-------------------------------------|---|---------------------|--------------------|----------------|-----------|-----------|-----|
| | | Before the revision | After the revision | Before the revision | After the revision | Surface water | Sedi-ment | Wild life | Air |
| [1] | Cyclododeca-1,5,9-triene | | Monitored | | | ○ | ○ | ○ | |
| [2] | 2,4-Di- <i>tert</i> -pentylphenol | III Monitored | Priority Assessment Chemical Substances | | | ○ | ○ | | |
| [3] | Thiourea | II Monitored III Monitored | Priority Assessment Chemical Substances | I 181 | I 245 | ○ | | | |
| [4] | 1,3-Butadiene | II Monitored | Priority Assessment Chemical Substances | I 268 | I 351 | ○ | | | |
| [5] | 1,6-Diisocyanatohexane | II Monitored | Priority Assessment Chemical Substances | I 293 | I 391 | | | | ○ |
| [6] | Methyl dodecanoate | III Monitored | Priority Assessment Chemical Substances | | | ○ | | | |
| [7] | 2-Methylpropan-2-ol | II Monitored | | | | ○ | | | |

(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.

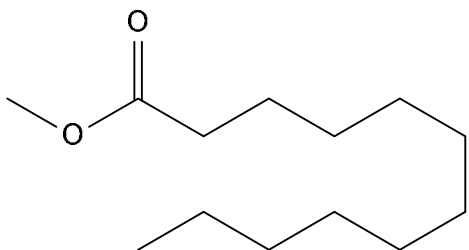
(Note 3) "Before the revision" in "The PRTR Law" means "appointments before the revision of government ordinance on November 21, 2008" and "After the revision" in "The PRTR Law" means "appointments after that revision".

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

| | |
|---|--|
| <p>[1] Cyclododeca-1,5,9-triene</p>  | <p>Molecular formula: C₁₂H₁₈ CAS: 4904-61-4 ENCS: 3-2239 MW: 162.27 mp: -17°C ¹⁾ bp: 240°C ¹⁾ sw: 0.39mg/L(25°C, estimated) ²⁾ Specific gravity: 0.84g/cm³(100°C) ¹⁾ logPow: 5.5 ²⁾</p> |
| <p>[2] 2,4-Di-<i>tert</i>-pentylphenol</p>  | <p>Molecular formula: C₁₆H₂₆O CAS: 120-95-6 ENCS: 3-521 MW: 234.38 mp: 26°C ¹⁾ bp: 169°C(22mmHg) ¹⁾ sw: Uncertain Specific gravity: 0.93 ³⁾ logPow: Uncertain</p> |
| <p>[3] Thiourea</p>  | <p>Molecular formula: CH₄N₂S CAS: 62-56-6 ENCS: 2-1733 MW: 76.12 mp: 176-178°C ⁴⁾ bp: resolution ⁵⁾ sw: 119g/L(20°C) ¹⁾ Specific gravity: 1.405 g/cm³ ⁴⁾ logPow: -1.02 ⁵⁾</p> |
| <p>[4] 1,3-Butadiene</p>  | <p>Molecular formula: C₄H₆ CAS: 106-99-0 ENCS: 2-17 MW: 54.09 mp: -108.97°C ⁴⁾ bp: -4.5°C(760mmHg) ⁴⁾ sw: 0.735g/L(25°C) ¹⁾ Specific gravity: 0.650(-6/4°C) ⁴⁾ logPow: 1.99 ¹⁾</p> |
| <p>[5] 1,6-Diisocyanatohexane</p>  | <p>Molecular formula: C₈H₁₂N₂O₂ CAS: 822-06-0 ENCS: 2-2863 MW: 168.19 mp: -67°C ⁵⁾ bp: 82-85°C(0.1mmHg) ⁵⁾ sw: 117mg/L(25°C) ⁵⁾ Specific gravity: 1.0528 g/cm³(20°C) ⁴⁾ logPow: 3.2(calculated) ⁵⁾</p> |

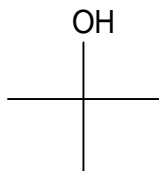
(Abbreviations) CAS: CAS registry number, ENCS: registry number in the Existing and New Chemical Substances List, MW: molecular weight, mp: melting point, bp: boiling point, SW: solubility in water, logPow: *n*-octanol-water partition coefficient, kPa: kilopascal (1 atom = 101.3kPa).

[6] Methyl dodecanoate



Molecular formula: $C_{13}H_{26}O_2$
CAS: 111-82-0
ENCS: 2-798
MW: 214.34
mp: $5.1-5.3^{\circ}C$ ¹⁾
bp: $268-270^{\circ}C$ ¹⁾
sw: $1.13mg/L(25^{\circ}C, \text{ estimated})$ ²⁾
Specific gravity: $0.8702 g/cm^3(20^{\circ}C)$ ¹⁾
logPow: $5.28(\text{estimated})$ ²⁾

[7] 2-Methylpropan-2-ol



Molecular formula: $C_4H_{10}O$
CAS: 75-65-0
ENCS: 2-3049
MW: 74.12
mp: $25.7^{\circ}C$ ⁴⁾
bp: $82.41^{\circ}C$ ⁴⁾
sw: $1,000,000mg/L$ ²⁾
Specific gravity: $0.78581(20/4^{\circ}C)$ ⁴⁾
logPow: 0.35 ¹⁾

References

- 1) Lide, D.R.(ed), CRC Handbook of Chemistry and Physics 95th Edition, CRC Press LLC (2014-2015)
- 2) Philip H. Howard, William M. Meylan, Handbook of Physical Properties of Organic Chemicals (1997)
- 3) Sigma-Aldrich MSDS
- 4) O'Neil, The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals 14th Edition, Merck Co. Inc. (2006)
- 5) PRTR releases calculation manual 4th Edition(2009)

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 | ○ | ○ | | ○ |
| Iwate Pref. | Research Institute for Environmental Sciences and Public Health of Iwate Prefecture | ○ | ○ | ○ | |
| 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 | ○ | | | |
| Fukushima Pref. | Fukushima Prefectural Environmental Center | ○ | | | |
| Ibaraki Pref. | Ibaraki Kasumigaura Environmental Science Center | ○ | ○ | | ○ |
| Tochigi Pref. | Tochigi Prefectural Institute of Public Health and Environmental Science | ○ | | | |
| Saitama Pref. | Center for Environmental Science in Saitama | ○ | | | ○ |
| Saitama City | Saitama City Institute of Health Science and Research | ○ | | | ○ |
| Chiba Pref. | Chiba Prefectural Environmental Research Center | ○ | | | |
| Tokyo Met. | Tokyo Metropolitan Research Institute for Environmental Protection | ○ | ○ | ○ | |
| Kanagawa Pref. | Kanagawa Environmental Research Center | | | | ○ |
| Yokohama City | Yokohama Environmental Science Research Institute | ○ | ○ | ○ | |
| Kawasaki City | Kawasaki 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 | ○ | ○ | | ○*2 |
| 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. | Hyogo Prefectural Agricultural Administration and Environment Division, Environment Bureau | ○ | ○ | ○ | |
| Kobe City | Health Division, Health Welfare Bureau, Kobe Institute of Health | ○ | | | |
| Nara Pref. | Nara Prefectural Scenery and Environmental 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 | ○ | | | |
| Saga Pref. | Saga Prefectural Environmental Research Center | ○ | | | ○ |

| Local communities | Organisations responsible for sampling*1 | Surveyed media | | | |
|-------------------|---|----------------|----------|----------|-----|
| | | Surface water | Sediment | Wildlife | Air |
| 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 2013.

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

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

Surveyed sites and target chemicals for surface water are shown in Table 2-1-1 and Figure 2-1-1. Surveyed sites and target chemicals for sediment are shown in Table 2-1-2 and Figure 2-1-1. Surveyed sites and target chemicals for wildlife are shown in Table 2-1-3 and Figure 2-1-2. Surveyed sites and target chemicals for Air are shown in Table 2-1-4 and Figure 2-1-3. The breakdown is summarized as follows.

To ensure more accurate data for areas susceptible to high concentrations in the general environment, Survey Points are selected and determined based on information regarding releases and emissions. New survey points utilized for the FY2013 surveys were finalized considering the emissions and releases reports submitted in accord with the PRTR, correlated with identification of geographical points with high particulate release volumes.

| Surveyed media | Numbers of local communities | Numbers of target chemicals | Numbers of surveyed sites | Numbers of samples at a surveyed site |
|----------------|------------------------------|-----------------------------|---------------------------|---------------------------------------|
| Surface water | 38 | 6 | 54 | 1 |
| Sediment | 21 | 2 | 25 | 3 |
| Wildlife | 11 | 1 | 13 | 3 |
| Air | 19 | 1 | 19 | 3 |
| All media | 42 | 7 | 89 | |

Table 2-1-1 List of surveyed sites (surface water) and target chemicals in the Detailed Environmental Survey in FY2013

| Local communities | Surveyed sites | Target chemicals | | | | | |
|-------------------|--|------------------|-----|-----|-----|-----|-----|
| | | [1] | [2] | [3] | [4] | [6] | [7] |
| Hokkaido | Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City) | ○ | | | | | ○ |
| Iwate Pref. | Riv. Toyosawa(Hanamaki City) | | ○ | | | ○ | ○ |
| Sendai City | Hirose-ohashi Bridge, Riv. Hirose (Sendai City) | ○ | ○ | | | | ○ |
| Akita Pref. | Takanosu-bashi Bridge, Riv. Yoneshiro(Kita-akita City) | | ○ | | ○ | | |
| | Akita Canal(Akita City) | | ○ | | ○ | | |
| | Takemi-bashi Bridge, Riv. Omono(Daisen City) | | ○ | | ○ | | |
| Yamagata Pref. | Mouth of Riv. Mogami (Sakata City) | ○ | ○ | | | | ○ |
| Fukushima Pref. | Minato-ohasi Bridge, Riv. Fujiwara(Iwaki City) | | | ○ | | | |
| Ibaraki Pref. | Tonekamome-ohasi Bridge, Mouth of Riv. Tone(Kamisu City) | ○ | | ○ | ○ | | |
| Tochigi Pref. | Riv. Tagawa (Utsunomiya City) | | | | ○ | | |
| Saitama Pref. | Shiki-ohasi Bridge, Riv. Yanase(Shiki City) | ○ | | | | ○ | |
| | Akigaseshusui of Riv. Arakawa(Shiki City) | | | | ○ | | |
| Saitama City | Nakadote-hashi Bridge, Riv. Kamo (Saitama City) | | ○ | | | | ○ |
| Chiba Pref. | Coast of Ichihara and Anegasaki | ○ | | | ○ | ○ | |
| | Asai-bashi Bridge, Riv. Yourou(Ichihara City) | | | ○ | ○ | | |
| Tokyo Met. | Mouth of Riv. Arakawa(Koto Ward) | ○ | ○ | ○ | ○ | ○ | ○ |
| | Mouth of Riv. Sumida(Minato Ward) | ○ | ○ | ○ | ○ | ○ | ○ |
| Yokohama City | Kamenoko-bashi Bridge, Riv. Tsurumi(Yokohama City) | ○ | ○ | ○ | ○ | ○ | ○ |
| | Yokohama Port | ○ | ○ | ○ | ○ | ○ | ○ |
| 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) | | | | | ○ | |
| | Nakagawashindo-bashi Bridge, Riv. Shibue(Myoko City) | | | ○ | | | |
| Toyama Pref. | Takata-bashi Bridge, Riv. Ida(Toyama City) | | | ○ | | | |
| Ishikawa Pref. | Mouth of Riv. Sai (Kanazawa City) | | | | | ○ | |
| Nagano Pref. | Lake Suwa (center) | | | | | ○ | |
| Shizuoka Pref. | Shimizu Port | | ○ | | | | ○ |
| 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) | | ○ | ○ | ○ | ○ | |
| 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 | | ○ | | | | ○ |
| | Offshore of Aboshi | | | ○ | | | |
| Kobe City | Kobe Port(center) | | ○ | ○ | | | |
| Nara Pref. | Riv. Yamato (Oji Town) | | | | | | ○ |
| Wakayama Pref. | Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa (Wakayama City) | ○ | ○ | | | ○ | |
| Okayama Pref. | Otoidezeki of Riv. Asahi (Okayama City) | ○ | ○ | ○ | | ○ | ○ |
| | Offshore of Mizushima | ○ | ○ | ○ | | ○ | ○ |
| Yamaguchi Pref. | Tokuyama Bay | | | ○ | ○ | | ○ |
| | Offshore of Hagi | | | ○ | ○ | | ○ |
| Tokushima Pref. | Takase-bashi Bridge, Riv. Yoshino (Ishii Town) | | | ○ | ○ | | |
| Kagawa Pref. | Takamatsu Port | | | | ○ | ○ | |
| Ehime Pref. | Mishima area, Riv. Iwamatsu (Uwajima City) | | | | | | ○ |
| Fukuoka Pref. | Kabura-bashi Bridge, Riv. Raizan (Maebaru City) | | | | ○ | | |
| | Offshore of Omuta | | | | ○ | | |
| Kitakyushu City | Dokai Bay | ○ | | | | ○ | |
| Saga Pref. | Imari Bay | ○ | ○ | ○ | | ○ | ○ |

| Local communities | Surveyed sites | Target chemicals | | | | | |
|-------------------|---|------------------|-----|-----|-----|-----|-----|
| | | [1] | [2] | [3] | [4] | [6] | [7] |
| Miyazaki Pref. | Yanase-bashi Bridge, Riv. Honjou(Miyazaki City) | | | ○ | | | |

[1] Cyclododeca-1,5,9-triene, [2] 2,4-Di-*tert*-pentylphenol, [3] Thiourea, [4] 1,3-Butadiene, [6] Methyl dodecanoate, [7] 2-Methylpropan-2-ol

Table 2-1-2 List of surveyed sites (sediment) and target chemicals in the Detailed Environmental Survey in FY2013

| Local communities | Surveyed sites | Target chemicals | |
|-------------------|---|------------------|-----|
| | | [1] | [2] |
| Hokkaido | Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City) | ○ | ○ |
| | Tomakomai Port | ○ | ○ |
| Iwate Pref. | Riv. Toyosawa(Hanamaki City) | ○ | ○ |
| Sendai City | Hirose-ohashi Bridge, Riv. Hirose(Sendai City) | ○ | ○ |
| Akita Pref. | Akita Canal(Akita City) | | ○ |
| | Takemi-bashi Bridge, Riv. Omono(Daisen City) | | ○ |
| Ibaraki Pref. | Tonekamome-ohashi Bridge, Mouth of Riv. Tone (Kamisu City) | ○ | ○ |
| Tokyo Met. | Mouth of Riv. Arakawa(Koto Ward) | ○ | ○ |
| | Mouth of Riv. Sumida(Minato Ward) | ○ | ○ |
| Yokohama City | Yokohama Port | ○ | |
| Kawasaki City | Mouth of Riv. Tama(Kawasaki City) | ○ | ○ |
| | Keihin Canal, Port of Kawasaki,The Coast of Ougi Town | ○ | ○ |
| Ishikawa Pref. | Mouth of Riv. Sai(Kanazawa City) | ○ | ○ |
| Nagano Pref. | Lake Suwa(center) | ○ | ○ |
| Shizuoka Pref. | Riv. Tenryu(Iwata City) | ○ | ○ |
| Aichi Pref. | Nagoya Port , West of Shiomi Wharf | ○ | ○ |
| Nagoya City | Minatoshinbashi Bridge, Riv. Hori (Nagoya City) | ○ | ○ |
| Mie Pref. | Yokkaichi Port | ○ | ○ |
| Shiga Pref. | Lake Biwa(center, offshore of Karasaki) | ○ | ○ |
| Osaka Pref. | Mouth of Riv. Yamato(Sakai City) | ○ | ○ |
| Osaka City | Osaka Port | ○ | ○ |
| Hyogo Pref. | Offshore of Himeji | ○ | ○ |
| Okayama Pref. | Offshore of Mizushima | ○ | ○ |
| Kagawa Pref. | Takamatsu Port | ○ | ○ |
| Oita Pref. | Mouth of Riv. Oita(Oita City) | ○ | ○ |

[1] Cyclododeca-1,5,9-triene, [2] 2,4-Di-*tert*-pentylphenol



Figure 2-1-1 Surveyed sites (surface water and sediment) in the Detailed Environmental Survey in FY2013

Table 2-1-3 List of surveyed sites (wildlife) and target chemicals in the Detailed Environmental Survey in FY2013

| Local communities | Surveyed sites | Wildlife species | Target chemical |
|-------------------|---|------------------|-----------------|
| | | | [1] |
| Iwate Pref. | Yamada Bay | Blue mussel | ○ |
| | | Greenling | ○ |
| Tokyo Met. | Tokyo Bay | Sea bass | ○ |
| Yokohama City | Yokohama Port | Blue mussel | ○ |
| Kawasaki City | Offshore of Ogishima Island, Port of Kawasaki | Sea bass | ○ |
| Niigata Pref. | Lower Riv. Shinano(Niigata City) | Carp | ○ |
| Nagoya City | Nagoya Port | Striped mullet | ○ |
| Osaka Pref. | Osaka Bay | Sea bass | ○ |
| Hyogo Pref. | Offshore of Himeji | Sea bass | ○ |
| Okayama Pref. | Offshore of Mizushima | Striped mullet | ○ |
| Yamaguchi Pref. | Tokuyama Bay | Striped mullet | ○ |
| | Offshore of Hagi | Striped mullet | ○ |
| Oita Pref. | Mouth of Riv. Oita(Oita City) | Sea bass | ○ |

[1] Cyclododeca-1,5,9-triene



Figure 2-1-2 Surveyed sites (wildlife) in the Detailed Environmental Survey in FY2013

Table 2-1-4 List of surveyed sites (air) and target chemicals in the Detailed Environmental Survey in FY2013

| Local communities | Surveyed sites | Target chemical |
|-------------------|--|-----------------|
| | | [5] |
| Hokkaido | Hokkaido Research Organization Environmental and Geological Research Department Institute of Environmental Sciences(Sapporo 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) | ○ |
| Kanagawa Pref. | Kanagawa Environmental Research Center (Hiratsuka City) | ○ |
| Ishikawa Pref. | Ishikawa Prefectural Institute of Public Health and Environmental Science (Kanazawa City) | ○ |
| Nagano Pref. | Nagano Environmental Conservation Research Institute (Nagano City) | ○ |
| Shizuoka Pref. | Kakegawa City Government Building, Daito Branch (Kakegawa City) | ○ |
| Aichi Pref. | Kotobuki Town(Kariya City) | ○ |
| Nagoya City | Chikusa Ward Heiwa Park (Nagoya City) | ○ |
| Mie Pref. | Mie Prefecture Health and Environment Research Institute (Yokkaichi City) | ○ |
| Kyoto Pref. | Kyoto Prefectural Institute of Public Health and Environment (Kyoto City) | ○ |
| Kyoto City | Kyoto City Government Building(Kyoto City) | ○ |
| Osaka Pref. | Moriguchi City Daini Air Quality Monitoring Station(Moriguchi City) | ○ |
| Yamaguchi Pref. | Miyanomae Children's Park Air Quality Monitoring Station(Syunan City) | ○ |
| | Kaho Elementary School Air Quality Monitoring Station(Hofu City) | ○ |
| Tokushima Pref. | Tokushima Prefectural Public Health, Pharmaceutical and Environmental Sciences Center (Tokushima City) | ○ |
| Kagawa Pref. | Takamatsu Joint Prefectural Government Building (Takamatsu City) | ○ |
| Saga Pref. | Saga Prefectural Environmental Research Center (Saga City) | ○ |
| Oita Pref. | Oita City Misa Elementary School(Oita City) | ○ |
| Miyazaki Pref. | Hososhima Community Center(Hyuga City) | ○ |

[5] 1,6-Diisocyanatohexane

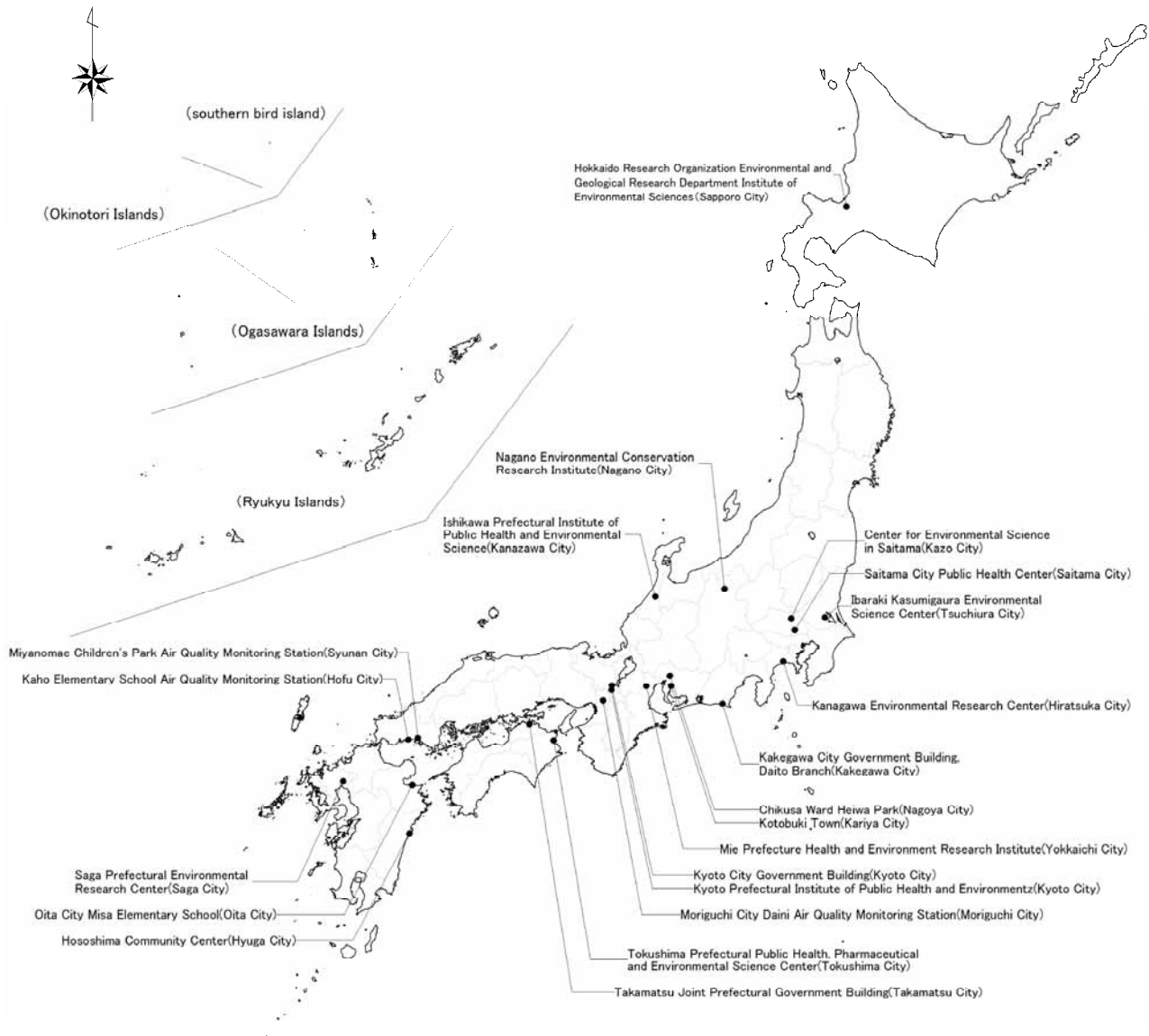


Figure 2-1-3 Surveyed sites (air) in the Detailed Environmental Survey in FY 2013

(3) Detection limit

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

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

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

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

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

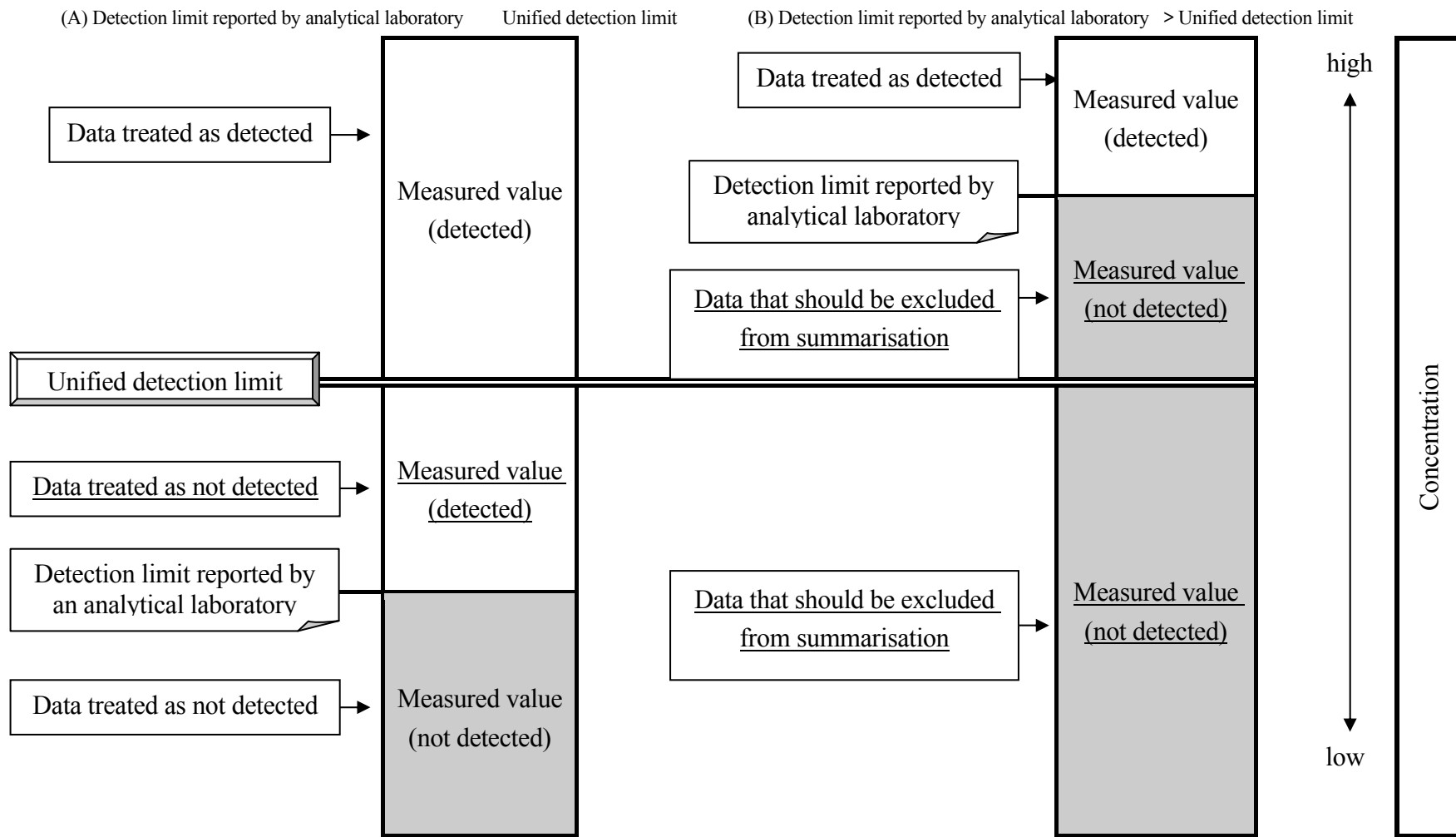
When the instrument detection limit (IDL) and the method detection limit (MDL) are given in the analytical method, which is described in reports on the investigation of the development of analytical methods for chemicals and adopted in the Detailed Environmental Survey (hereafter, the Detailed Environmental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

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

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

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

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



Schematic of procedure for data summarisation

4. Summary of survey results

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

In surface water, 3 out of the 6 target chemicals were detected.

- [3] Thiourea: 2 of the 23 valid sites
- [6] Methyl dodecanoate: 9 of the 22 valid sites
- [7] 2-Methylpropan-2-ol: 23 of the 23 valid sites

In sediment, all 2 target chemicals were detected.

- [1] Cyclododeca-1,5,9-triene: 2 of the 23 valid sites
- [2] 2,4-Di-*tert*-pentylphenol: 7 of the 24 valid sites

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

- [1] Cyclododeca-1,5,9-triene: 1 of the 13 valid sites

In air, 1 target chemical was detected.

- [5] 1,6-Diisocyanatohexane: 2 of the 21 valid sites

Table 2-2 Summary of the detection ranges and the detection limits in the Detailed Environmental Survey in FY 2013

| 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] | Cyclododeca-1,5,9-triene | nd 0/22 | 25 | nd~3.4 2/23 | 0.32 | nd~1.1 1/13 | 0.32 | | |
| [2] | 2,4-Di- <i>tert</i> -pentylphenol | nd 0/25 | 0.98 | nd~1.6 7/24 | 0.14 | | | | |
| [3] | Thiourea * | nd~310,000 2/23 | 140 | | | | | | |
| [4] | 1,3-Butadiene * | nd 0/25 | 49 | | | | | | |
| [5] | 1,6-Diisocyanatohexane * | | | | | | | nd~0.41 2/21 | 0.14 |
| [6] | Methyl dodecanoate | nd~38 9/22 | 5.2 | | | | | | |
| [7] | 2-Methylpropan-2-ol | 59~2,300 23/23 | 20 | | | | | | |

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

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

(Note 3) means the medium was not surveyed.

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