

Chapter 2 Results of the Detailed Environmental Survey in FY 2011

1. Purpose of the survey

The Detailed Environmental Survey is implemented to provide as required under the Chemical Substances Control Law (Law 117, 1973), the data and details required for risk assessments et al. of chemical substances prioritized for evaluations. This compiled material is intended to allow for nationwide assessments of exposure in the general environment.

2. Target chemicals

In the FY 2011 Detailed Environmental Survey, 4 chemicals (groups) that were selected and designated as target chemicals. The combinations of target chemicals and the surveyed media are given below.

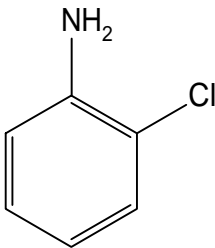
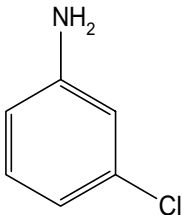
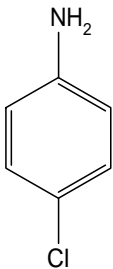
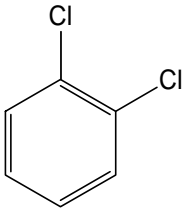
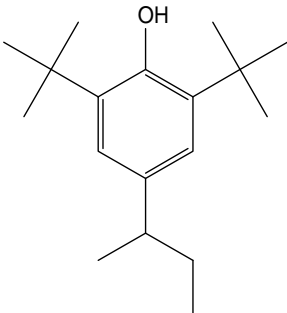
| No. | Name | The Chemical Substances Control Law | | The PRTR Law | | Surveyed media | | |
|-----|---|-------------------------------------|---|---------------------|--------------------|----------------|----------|-----|
| | | | | Before the revision | After the revision | Surface water | Wildlife | Air |
| [1] | Chloroanilines | | | | I 89 | | | |
| | <i>o</i> -Chloroaniline | II Monitored III Monitored | Priority Assessment Chemical Substances | I 71 | | ○ | | |
| | <i>m</i> -Chloroaniline | II Monitored III Monitored | | I 73 | | ○ | | |
| | <i>p</i> -Chloroaniline | II Monitored III Monitored | | I 72 | | ○ | | |
| [2] | <i>o</i> -Dichlorobenzene | II Monitored III Monitored | Priority Assessment Chemical Substances | I 139 | I 181 | ○ | | |
| [3] | 2,6-Di- <i>tert</i> -butyl-4- <i>sec</i> -butylphenol | I Monitored | Monitored | | | ○ | ○ | ○ |
| [4] | Perfluoroalkyl acid | | | | | | | |
| | Perfluorododecanoic acid | I Monitored | Monitored | | | | ○ | |
| | Perfluorotetradecanoic acid | I Monitored | Monitored | | | | ○ | |
| | Perfluorohexadecanoic acid | I Monitored | 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".

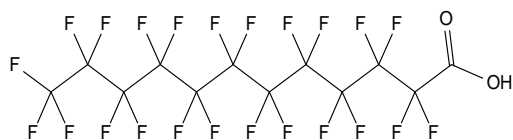
Chemical and physical properties of target chemicals of the Detailed Environmental Survey are as follows.

| | | |
|--|---|---|
| <p>[1] Chloroanilines [1-1] <i>o</i>-Chloroaniline</p> |  | <p>Molecular formula: C₆H₆ClN CAS: 95-51-2 ENCS: 3-194 MW: 127.57 mp: -1.94°C¹⁾ bp: 208.84°C¹⁾ sw: 8.76g/kg(25°C)²⁾ Specific gravity: 1.2114(22/4°C)¹⁾ logPow: 1.90³⁾</p> |
| <p>[1-2] <i>m</i>-Chloroaniline</p> |  | <p>Molecular formula: C₆H₆ClN CAS: 108-42-9 ENCS: 3-194 MW: 127.57 mp: -10.4°C¹⁾ bp: 230.5°C¹⁾ sw: 5.4g/kg(20°C)²⁾ Specific gravity: 1.2150(22/4°C)¹⁾ logPow: 1.88³⁾</p> |
| <p>[1-3] <i>p</i>-Chloroaniline</p> |  | <p>Molecular formula: C₆H₆ClN CAS: 106-47-8 ENCS: 3-194 MW: 127.57 mp: 72.5°C¹⁾ bp: 232°C¹⁾ sw: 2.75g/kg(20°C)²⁾ Specific gravity: 1.169(77/4°C)¹⁾ logPow: 1.83³⁾</p> |
| <p>[2] <i>o</i>-Dichlorobenzene</p> |  | <p>Molecular formula: C₆H₄Cl₂ CAS: 95-50-1 ENCS: 3-41 MW: 147.00 mp: -17.03°C¹⁾ bp: 180.5°C¹⁾ sw: 0.15 g/kg(25°C)²⁾ Specific gravity: 1.3059(20/4°C)¹⁾ logPow: 3.43³⁾</p> |
| <p>[3] 2,6-Di-<i>tert</i>-butyl-4-<i>sec</i>-butylphenol</p> |  | <p>Molecular formula: C₁₈H₃₀O CAS: 17540-75-9 ENCS: 3-540 MW: 262.43 mp: 18.9°C⁴⁾ bp: 275°C⁴⁾ sw: Uncertain Specific gravity: 0.902(25°C)⁴⁾ 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, logPow: *n*-octanol-water partition coefficient, kPa: kilopascal (1 atom = 101.3kPa).

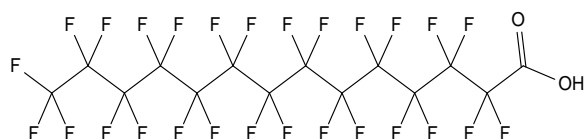
[4] Perfluoroalkyl acid

[4-1] Perfluorododecanoic acid



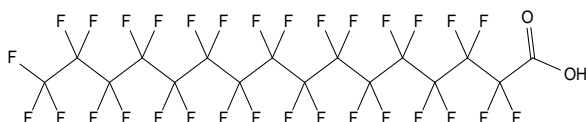
Molecular formula: C₁₂HF₂₃O₂
CAS: 307-55-1
ENCS: 2-2658
MW: 614.10
mp: Uncertain
bp: Uncertain
sw: Uncertain
Specific gravity: Uncertain
logPow: Uncertain

[4-2] Perfluorotetradecanoic acid



Molecular formula: C₁₄HF₂₇O₂
CAS: 376-06-7
ENCS: 2-2658
MW: 714.11
mp: Uncertain
bp: Uncertain
sw: Uncertain
Specific gravity: Uncertain
logPow: Uncertain

[4-3] Perfluorohexadecanoic acid



Molecular formula: C₁₆HF₃₁O₂
CAS: 67905-19-5
ENCS: 2-2658
MW: 814.13
mp: Uncertain
bp: Uncertain
sw: Uncertain
Specific gravity: Uncertain
logPow: Uncertain

References

- 1) O'Neil, The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals 14th Edition, Merck Co. Inc. (2006)
- 2) Haynes, CRC Handbook of Chemistry and Physics, 92nd Edition, CRC Press LLC (2011)
- 3) Hansch et al., Exploring QSAR - Hydrophobic, Electronic and Steric Constants, American Chemical Society (1995)
- 4) Environment Canada, Phenol, 2,6-bis(1,1-dimethylethyl)-4-(1-methylpropyl)-, Screening Assessment for the Challenge (2010)

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 | Surveyed media | | |
|-------------------|---|----------------|----------|----------|
| | | Surface water | Sediment | Wildlife |
| Hokkaido | Hokkaido Research Organization Environmental and Geological Research Department Institute of Environmental Sciences | ○ | ○ | |
| Sapporo City | Sapporo City Institute of Public Health | ○ | | |
| Iwate Pref. | Research Institute for Environmental Sciences and Public Health of Iwate Prefecture | ○ | ○ | |
| Sendai City | Sendai City Institute of Public Health | ○ | ○ | |
| Ibaraki Pref. | Ibaraki Kasumigaura Environmental Science Center | ○ | | |
| 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 | ○ | ○ | ○ |
| Yokohama City | Yokohama Environmental Science Research Institute | ○ | ○ | ○ |
| Kawasaki City | Kawasaki Municipal Research Institute for Environmental Protection | ○ | ○ | ○ |
| Niigata Pref. | Niigata Prefectural Institute of Public Health and Environmental Sciences | ○ | ○ | ○ |
| 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 Institute | ○ | ○ | ○ |
| Mie Pref. | Mie Prefecture Health and Environment Research Institute | ○ | ○ | |
| Shiga Pref. | Lake Biwa Environmental Research Institute | ○ | | |
| Kyoto Pref. | Kyoto Prefectural Institute of Public Health and Environment | ○ | ○ | |
| Kyoto City | Kyoto Prefectural Institute of Public Health and Environment | ○ | ○ | |
| Osaka Pref. | Research Institute of Environment, Agriculture and Fisheries, Osaka Prefectural Government | ○ | ○ | ○ |
| Osaka City | Osaka City Institute of Public Health and Environmental Sciences | ○ | ○ | |
| Hyogo Pref. | Hyogo Prefectural Agricultural Administration and Environment Division, Environment Bureau | ○ | ○ | |
| Kobe City | Environmental Conservation and Guidance Division, Environment Bureau | ○ | ○ | |
| Nara Pref. | Nara Prefectural Institute for Hygiene and Environment | ○ | ○ | |
| Wakayama Pref. | Wakayama Prefectural Research Center of Environment and Public Health | ○ | ○ | |
| Okayama Pref. | Okayama Prefectural Institute for Environmental Science and Public Health | ○ | ○ | ○ |
| Hiroshima City | Hiroshima City Institute of Public Health | ○ | | |
| Yamaguchi Pref. | Yamaguchi Prefectural 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 Science | ○ | ○ | |
| Kitakyushu City | Kitakyushu City Institute of Environmental Sciences | ○ | | |
| Fukuoka Pref. | Fukuoka City Institute for Hygiene and the Environment | ○ | ○ | |
| Saga Pref. | Saga Prefectural Environmental Research Center | ○ | ○ | |
| Oita Pref. | Oita Prefectural Environmental Preservation Division, Life and Environment Department | ○ | ○ | ○ |

(Note) Organisations responsible for sampling are described by their official names in FY 2011.

(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. The breakdown is summarized as follows.

| Surveyed media | Numbers of local communities | Numbers of target chemicals | Numbers of surveyed sites | Numbers of samples at a surveyed site |
|----------------|------------------------------|-----------------------------|---------------------------|---------------------------------------|
| Surface water | 37 | 3 | 50 | 1 |
| Sediment | 28 | 2 | 36 | 3 |
| Wildlife | 9 | 1 | 11 | 3 |
| All media | 37 | 4 | 62 | |

Table 2-1-1 List of surveyed sites (surface water) and target chemicals in the Detailed Environmental Survey in FY 2011

| Local communities | Surveyed sites | Target chemicals | | |
|-------------------|--|------------------|-----|-----|
| | | [1] | [2] | [3] |
| Hokkaido | Ishikarikakokyo Bridge, Mouth of Riv. Ishikari(Ishikari City) | | ○ | |
| Sapporo City | Nakanuma of Riv. Toyohira(Sapporo City) | ○ | | |
| | Daiichishinkawa-bashi Bridge, Riv. Shin(Sapporo City) | ○ | | |
| Iwate Pref. | Riv. Toyosawa(Hanamaki City) | | | ○ |
| Sendai City | Hirose-ohashi Bridge, Riv. Hirose(Sendai City) | ○ | | |
| Ibaraki Pref. | Tonekamome-ohashi Bridge, Mouth of Riv. Tone(Kamisu City) | ○ | ○ | ○ |
| Gunma Pref. | Tako Bridge of Riv. Kabura(Takasaki City) | | | ○ |
| Saitama Pref. | Shiki-ohashi Bridge, Riv. Yanase(Shiki City) | | ○ | ○ |
| | Kachi-hashii Bridge, Riv. Ichino(Yoshimi Town) | ○ | | |
| 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 Bridge over Riv. Tsurumi(Yokohama City) | ○ | ○ | ○ |
| | Yokohama Port | ○ | ○ | ○ |
| Kawasaki City | Mouth of Riv. Tama(Kawasaki City) | ○ | ○ | |
| | Keihin Canal, Port of Kawasaki | ○ | ○ | |
| Niigata Pref. | Lower Riv. Shinano(Niigata City) | ○ | | ○ |
| Ishikawa Pref. | Mouth of Riv. Sai(Kanazawa City) | ○ | | ○ |
| Nagano Pref. | Lake Suwa(center) | | | ○ |
| Shizuoka Pref. | Shimizu Port | | ○ | ○ |
| | Riv. Tenryu(Iwata City) | ○ | | |
| Aichi Pref. | Nagoya Port | | ○ | |
| 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, Miyamae Bridge, Riv. Katsura(Kyoto City) | | ○ | ○ |
| Osaka Pref. | Mouth of Riv. Yamato(Sakai City) | ○ | ○ | ○ |
| Osaka City | Kema Bridge, Riv. Oh-kawa (Osaka City) | | ○ | ○ |
| | Osaka Port | | ○ | ○ |
| Hyogo Pref. | Offshore of Himeji | | ○ | ○ |
| Kobe City | Kobe Port(center) | ○ | ○ | |
| Nara Pref. | Riv. Yamato(Ooji Town) | | ○ | ○ |
| Wakayama Pref. | Kinokawa-ohashi Bridge, Mouth of Riv. Kinokawa(Wakayama City) | ○ | | ○ |
| | Wakayamashimotsu Port | ○ | | |
| Okayama Pref. | Otoidezeki of Riv. Asahi(Okayama City) | ○ | | |
| | Offshore of Mizushima | | ○ | ○ |
| Hiroshima Pref. | Fukuyama Port | | ○ | |
| Yamaguchi Pref. | Tokuyama Bay | ○ | ○ | ○ |
| | Offshore of Hagi | | ○ | |
| Kagawa Pref. | Takamatsu Port | ○ | | ○ |
| Ehime Pref. | Mishima area, Riv. Iwamatsu(Uwajima City) | | | ○ |
| Fukuoka Pref. | Kabura-bashi Bridge, River Raizan(Maebaru City) | ○ | ○ | |
| | Offshore of Omuta | ○ | ○ | ○ |
| Kitakyushu City | Dokai Bay | ○ | | |
| Fukuoka City | Hakata Bay | | | ○ |
| Saga Pref. | Imari Bay | ○ | | |
| Oita Pref. | Mouth of Riv. Oita(Oita City) | ○ | ○ | ○ |

[1] Chloroanilines, [2] *o*-Dichlorobenzene, [3] 2,6-Di-*tert*-butyl-4-*sec*-butylphenol

Table 2-1-2 List of surveyed sites (sediment) and target chemicals in the Detailed Environmental Survey in FY 2011

| Local communities | Surveyed sites | Target chemicals | |
|-------------------|--|------------------|-----|
| | | [3] | [4] |
| 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) | ○ | ○ |
| Tokyo Met. | Mouth of Riv. Arakawa(Koto Ward) | ○ | ○ |
| | Mouth of Riv. Sumida(Minato Ward) | ○ | ○ |
| Yokohama City | Kamenoko Bridge over Riv.Tsurumi(Yokohama City) | ○ | ○ |
| | Yokohama Port | ○ | ○ |
| Kawasaki City | Mouth of Riv. Tama(Kawasaki City) | ○ | ○ |
| | Keihin Canal, Port of Kawasaki | ○ | ○ |
| Niigata Pref. | Lower Riv. Shinano(Niigata City) | ○ | ○ |
| Ishikawa Pref. | Mouth of Riv. Sai(Kanazawa City) | ○ | ○ |
| Nagano Pref. | Lake Suwa(center) | ○ | ○ |
| Shizuoka Pref. | Shimizu Port | ○ | ○ |
| | Riv. Tenryu(Iwata City) | ○ | ○ |
| Aichi Pref. | Nagoya Port | ○ | ○ |
| Nagoya City | Minatoshinbashi Bridge, Riv. Hori (Nagoya City) | ○ | ○ |
| Mie Pref. | Yokkaichi Port | ○ | ○ |
| Kyoto Pref. | Miyazu Port | ○ | ○ |
| Kyoto City | Miyamae-bashi Bridge, Miyamae Bridge, Riv. Katsura(Kyoto City) | ○ | ○ |
| Osaka Pref. | Mouth of Riv. Yamato(Sakai City) | ○ | ○ |
| Osaka City | Kema Bridge, Riv. Oh-kawa (Osaka City) | ○ | ○ |
| | Osaka Port | ○ | ○ |
| Hyogo Pref. | Offshore of Himeji | ○ | ○ |
| Kobe City | Kobe Port(center) | ○ | ○ |
| Nara Pref. | Riv. Yamato(Ooji 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 | ○ | ○ |
| Kagawa Pref. | Takamatsu Port | ○ | ○ |
| Fukuoka Pref. | Offshore of Omuta | ○ | ○ |
| Fukuoka City | Hakata Bay | ○ | ○ |
| Saga Pref. | Imari Bay | ○ | ○ |
| Oita Pref. | Mouth of Riv. Oita(Oita City) | ○ | ○ |

[3] 2,6-Di-*tert*-butyl-4-*sec*-butylphenol,[4] Perfluoroalkyl acid



Figure 2-1-1 Surveyed sites (surface water and sediment) in the Detailed Environmental Survey in FY 2011

Table 2-1-3 List of surveyed sites (wildlife) and target chemicals in the Detailed Environmental Survey in FY 2011

| Local communities | Surveyed sites | Wildlife species | Target chemicals |
|-------------------|---|------------------|------------------|
| | | | [3] |
| Tokyo Met. | Tokyo Bay | Sea bass | ○ |
| Yokohama City | Riv. Tsurumi(Yokohama City) | Carp | ○ |
| | 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 | ○ |
| 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 | ○ |

[3] 2,6-Di-*tert*-butyl-4-*sec*-butylphenol



Figure 2-1-2 Surveyed sites (wildlife) in the Detailed Environmental Survey in FY 2011

(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)).

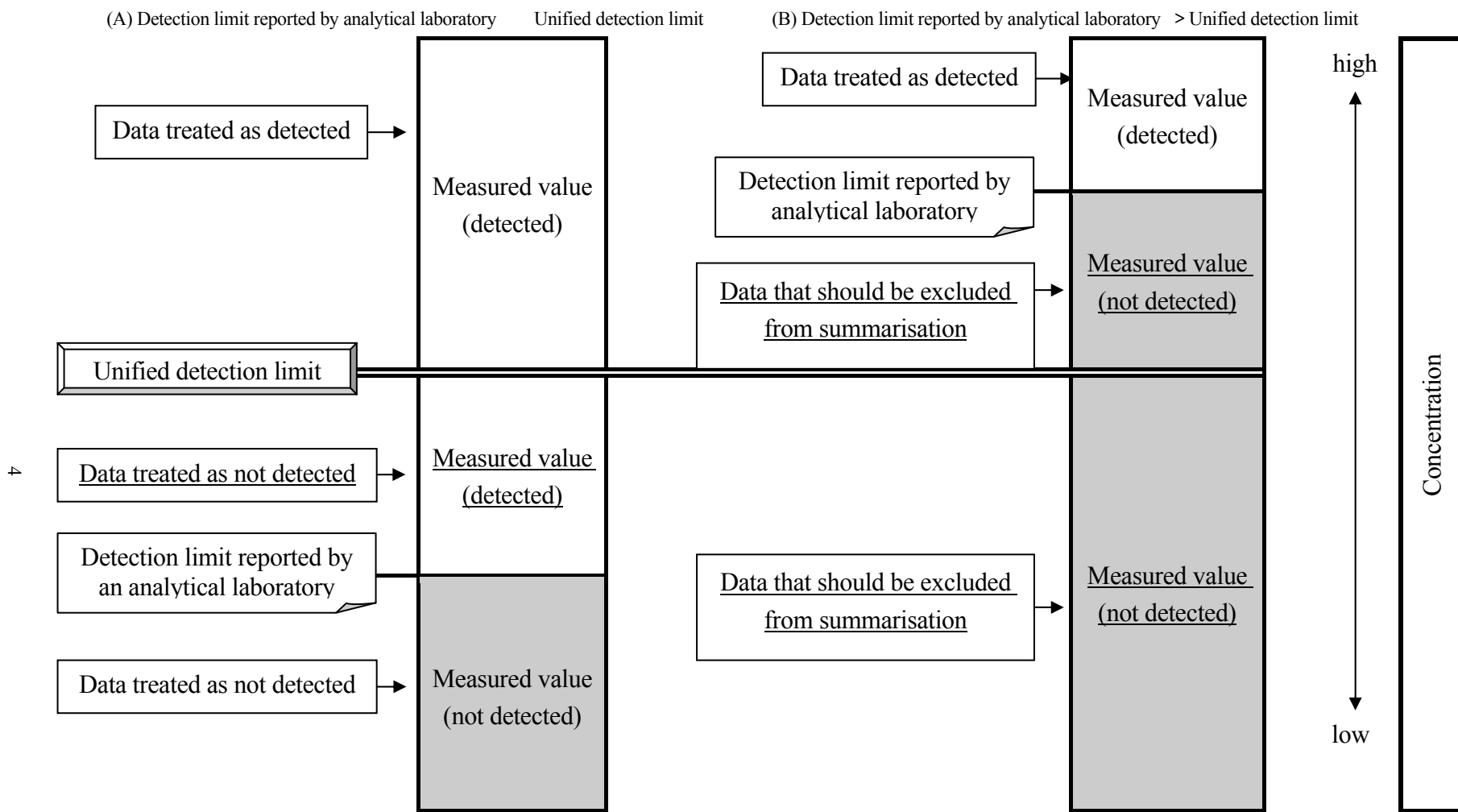
When the instrument detection limit (IDL) and the method detection limit (MDL) are given in the analytical method, which is described in reports on the investigation of the development of analytical methods for chemicals and adopted in the Detailed Environmental Survey (hereafter, the Detailed Environmental 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, 2 out of the 3 target chemicals (groups) were detected.

- [1-1] *o*-Chloroaniline: 1 of the 28 valid sites
- [1-2] *m*-Chloroaniline: 4 of the 25 valid site
- [1-3] *p*-Chloroaniline: 5 of the 28 valid sites
- [2] *o*-Dichlorobenzene: 5 of the 31 valid sites

In sediment, 1 out of the 2 target chemicals (groups) was detected.

- [4-1] Perfluorododecanoic acid: 22 of the 35 valid sites
- [4-2] Perfluorotetradecanoic acid: 15 of the 35 valid sites
- [4-3] Perfluorohexadecanoic acid: 5 of the 35 valid sites

In wildlife (bivalves or fish), 1 target chemical was not detected.

Table 2-2 Summary of the detection ranges and the detection limits in the Detailed Environmental Survey in FY 2011

| No. | Target chemicals | Surface water [ng/L] | | Sediment [ng/g-dry] | | Wildlife [ng/g-wet] | |
|-------|---|-------------------------------|-------------------------------|-------------------------------|-----------------|-------------------------------|-----------------|
| | | Detection range and frequency | Detection range and frequency | Detection range and frequency | Detection limit | Detection range and frequency | Detection limit |
| [1] | Chloroanilines | | | | | | |
| [1-1] | <i>o</i> -Chloroaniline* | nd ~ 72 1/28 | 21 | | | | |
| [1-2] | <i>m</i> -Chloroaniline* | nd ~ 7.9 4/25 | 1.9 | | | | |
| [1-3] | <i>p</i> -Chloroaniline* | nd ~ 20 5/28 | 5.1 | | | | |
| [2] | <i>o</i> -Dichlorobenzene* | nd ~ 100 5/31 | 7.4 | | | | |
| [3] | 2,6-Di- <i>tert</i> -butyl-4- <i>sec</i> -butylphenol | nd 0/27 | 0.34 | nd 0/35 | 0.82 | nd 0/11 | 0.41 |
| [4] | Perfluoroalkyl acid | | | | | | |
| [4-1] | Perfluorododecanoic acid | | | nd ~ 2.7 22/35 | 0.023 | | |
| [4-2] | Perfluorotetradecanoic acid | | | nd ~ 1.7 15/35 | 0.036 | | |
| [4-3] | Perfluorohexadecanoic acid | | | nd ~ 0.59 5/35 | 0.048 | | |

(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.