List of Rhine Substances
2014
List of Rhine Substances 2014

1. Introduction

The wording of the programme on the sustainable development of the Rhine, in short programme “Rhine 2020” item 3 of paragraph “Approach and measures” of chapter 2.3 (water quality improvement) states: “Update the list of substances relevant for the Rhine and the targets according to the developing state of knowledge, integrating the quality objectives the WFD (2000/60/EC) sets for priority substances and priority hazardous substances as well as the OSPAR priority substances.”


A description of how the list of substances 2011 was updated to the list of substances 2014 follows below.

2. Development

Until 2005, the list of substances figuring in the RAP was the basis for the programme Rhine 2020.

The entering into force of the Water Framework Directive on December 22, 2000 set the tone for developments during the past 10 years. At the end of 2001, the List of 33 Priority (hazardous) Substances (Annexe X WFD) was adopted. In its venue 9/10 October 2003 in Arlon, the Coordination Committee Rhine adopted a “List of Substances Relevant for the Rhine” (15 substances or groups of substances) which, according to the system of the WRRL, fall under the scope of Annex VIII. For 13 of these 15 substances the ICPR has determined environmental quality standards (EQS Rhine).

Furthermore, the OSPAR has updated its list of substances for priority action. In 2004, the OSPAR Commission decided, to discontinue the systematic analysis of substances and not to address measures with priority within the OSPAR Commission. This decision is maintained until one of the OSPAR contracting states or the industry demands to treat a substance for which there are no EU regulations. So far, none of the OSPAR contracting parties has used this possibility.

Furthermore, beginning 2007, the Internationale Arbeitsgemeinschaft der Rheinwasserwerke (IAWR) proposed substances relevant for drinking water, which should be integrated into an updated list of Rhine substances.

These developments were taken into account when updating the RAP list of substances to the list of Rhine substances 2007. The report describing the selection procedure for the list of Rhine substances 2007 in details was published on internet as ICPR report no. 161 (www.icpr.org). In addition to the List of Rhine Substances it was decided to test some OSPAR and IAWR substances with respect to their relevance for the Rhine.


It is among others due to this development, that the list of Rhine substances 2007 was revised and updated to the state 2011 (ICPR report no. 189) taking into account and updating the ICPR report no. 161.

On 12 August 2013, the EQS Directive (Directive 2013/39/EU) was updated and entered into force 13 September 2013. Besides stricter EQS of 8 substances so far classified as priority substances, 12 new priority substances were included. These aspects were taken into account when drafting the List of Rhine Substances 2014 and the Checklist 2014.
3. **Substances no longer relevant for the Rhine catchment**

Following the implementation of the Rhine Action Programme, the implementation of the Programme Rhine 2020 so far and the WFD, some substances are no longer problematic for Rhine water quality, that is, the monitoring values at the international main monitoring stations Weil am Rhein, Lauterbourg/Karlsruhe, Bimmen and Lobith were less than half of the value of the assessment standards (EQS or EQS Rhine or ICPR target value) during four successive years (2009-2012). Table 1 lists those substances, which have not been integrated into the List of Rhine Substances 2014. Substances, which were still listed on the List of Rhine Substances in 2011 and are no longer listed in 2014 are indicated in *italics*. The origin of the substances in the different lists of substances is indicated in annex 1.

**Status of these Substances**

For these substances, it is no longer required to carry out annual monitoring. It is recommended to regularly monitor these substances, e.g. every 6 years (comparable to the monitoring cycle for priority substances without significant inputs).
Table 1: Substances no longer listed on the List of Rhine Substances 2014

<table>
<thead>
<tr>
<th>Substance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>alachlor</td>
<td>endosulfane / alpha-endosulfane</td>
</tr>
<tr>
<td>atrazine</td>
<td>fenitrothion</td>
</tr>
<tr>
<td>azinphos-ethyl</td>
<td>fenthion</td>
</tr>
<tr>
<td>azinphos-methyl</td>
<td>Hexachlorocyclohexane (HCH):</td>
</tr>
<tr>
<td>bentazon</td>
<td>- alpha-hexachlorocyclohexane</td>
</tr>
<tr>
<td>benzene</td>
<td>- beta-hexachlorocyclohexane</td>
</tr>
<tr>
<td>Bezafibrate</td>
<td>- delta-hexachlorocyclohexane</td>
</tr>
<tr>
<td>Chloroanilines:</td>
<td>- gamma-HCH (lindane)</td>
</tr>
<tr>
<td>- 2-chloroaniline</td>
<td>nonylphenol</td>
</tr>
<tr>
<td>- 3-chloroaniline</td>
<td>malathion</td>
</tr>
<tr>
<td>- 4-chloroaniline</td>
<td>MCPA</td>
</tr>
<tr>
<td>- 3,4-chloroaniline</td>
<td>Mecoprop</td>
</tr>
<tr>
<td>Chloronitrobenzenes:</td>
<td>octylphenol</td>
</tr>
<tr>
<td>- 1-chloro-2-nitrobenzene</td>
<td>ethyl parathion</td>
</tr>
<tr>
<td>- 1-chloro-3-nitrobenzene</td>
<td>methyl parathion</td>
</tr>
<tr>
<td>- 1-chloro-4-nitrobenzene</td>
<td>Polycyclic aromatic hydrocarbons (PAH):</td>
</tr>
<tr>
<td>chloroform (trichloromethane)</td>
<td>- anthracene</td>
</tr>
<tr>
<td>chlorofenvinphos</td>
<td>- fluoranthene</td>
</tr>
<tr>
<td>chloropyriphos</td>
<td>- naphthalene</td>
</tr>
<tr>
<td>Chloro toluene:</td>
<td>pentachlorobenzene</td>
</tr>
<tr>
<td>- 2-chloro toluene</td>
<td>pentachlorophenol</td>
</tr>
<tr>
<td>- 3-chloro toluene</td>
<td>simazine</td>
</tr>
<tr>
<td>1,4-dichlorobenzene</td>
<td>Tetrachloroethene (tetrachloroethylene)</td>
</tr>
<tr>
<td>dichloromethane (methylene chloride)</td>
<td>tetrachloromethane (carbon tetrachloride)</td>
</tr>
<tr>
<td>2,4-dichlorodiphenoxyacetic acid</td>
<td>Trichlorobenzene (TCB):</td>
</tr>
<tr>
<td>dichloroprop</td>
<td>- 1.2.3-trichlorobenzene</td>
</tr>
<tr>
<td>dimethoate</td>
<td>- 1.2.4-trichlorobenzene</td>
</tr>
<tr>
<td>diuron</td>
<td>- 1.3.5-trichlorobenzene</td>
</tr>
<tr>
<td>DEHP (bis(2-ethylhexyl)phthalate)</td>
<td>trichloroethene (trichloroethylene)</td>
</tr>
<tr>
<td>Dichlorodiphenyltrichloroethane (DDT):</td>
<td>1.1.1-trichloroethane</td>
</tr>
<tr>
<td>- 2.4-DDD</td>
<td>trifluralin</td>
</tr>
<tr>
<td>- 4.4-DDD</td>
<td>Organic tin compounds:</td>
</tr>
<tr>
<td>- 2.4-DDE</td>
<td>- dibutyltin cation</td>
</tr>
<tr>
<td>- 4.4-DDE</td>
<td>- tetrabutyltin</td>
</tr>
<tr>
<td>- 2.4-DDT</td>
<td>- tributyltin cation</td>
</tr>
<tr>
<td>Drins</td>
<td>- triphenyltin cation</td>
</tr>
<tr>
<td>- aldrin</td>
<td></td>
</tr>
<tr>
<td>- dieldrin</td>
<td></td>
</tr>
<tr>
<td>- endrin</td>
<td></td>
</tr>
<tr>
<td>- isodrin</td>
<td></td>
</tr>
</tbody>
</table>

4. List of Rhine Substances 2014 and Checklist 2014

The lists of substances are restricted to specific pollutants. Basically, the general chemical-physical parameters including the nutrients nitrogen and phosphorous and further hydrological measured variables are analysed within the basic monitoring programme of the monitoring stations. The basic monitoring programme also includes information about monitoring requirements, such as frequency, monitoring in water or suspended matter.

4.1 List of Rhine Substances 2014

The List of Rhine Substances 2014 figures in Table 2. Individual justifications why a substance does /does not figure in the list and the reference to the origin of the substance lists are included in Annex 1.

Status of the List of Rhine Substances 2014

Within the Rhine monitoring programme "Chemistry", the substances figuring on the List of Rhine Substances 2014 must be annually monitored at the main international monitoring stations.

4.2 Checklist 2014

The Checklist 2014 is based on the Checklist 2011. Three substances, bisphenol A, 1,4-dioxan and acesulfam were taken over from the list of Rhine substances 2011. Since these substances did up to now not figure in the Rhine monitoring programme, the monitoring data justifying this classification were taken from other sources and are documented in Annex 2.

Furthermore, the substances dichlorvos and C10-13-chloalkanes were also taken over from the checklist 2011 and integrated into the checklist 2014 (justification see annexe 1). Nine plant protection agents and four industrial chemicals were eliminated from the checklist 2011, as they are no longer relevant for the Rhine water quality. The new priority substances/groups of substances of the Directive 2013/39/EU have been integrated into the checklist 2014. Furthermore, ammonium-N has been integrated into the checklist. An EQS Rhine has been determined for ammonium-N. The checking, whether the standard is respected or not, requires to assess the accompanying parameters pH value and water temperature. So far, no definitive assessment has been possible.

Before updating the List of Rhine Substances 2014 in 3 years, the ICPR will check, whether the substances figuring in the Checklist 2014 (Table 3) are to be included into the List of Rhine Substances 2017. When updating the list, not only the substances figuring on the Checklist 2014, but developments at EU level, in particular with respect to new priority (hazardous) substances must be taken into account.

Status of the Checklist 2014

It is not obligatory to include the groups of substances/substances of the checklist into the annual Rhine Monitoring Programme Chemistry, but data from different sources will be collected in order to assess the relevance of these substances for the Rhine catchment. If ICPR work requires checking further substances, the checklist will be updated accordingly.
Table 2: List of Rhine Substances 2014

<table>
<thead>
<tr>
<th>Parameters for the assessment of the chemical state (WFD and/or Rhine 2020)</th>
<th>CAS No.</th>
<th>Specific parameters for the assessment of the ecological state (WFD and/or Rhine 2020)</th>
<th>CAS No.</th>
<th>Substances relevant for drinking water production</th>
<th>CAS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>brominated diphenylether</td>
<td>32534-81-9</td>
<td>arsenic</td>
<td>7440-38-2</td>
<td>acesulfam</td>
<td>55589-62-3</td>
</tr>
<tr>
<td>lead and compounds</td>
<td>7439-92-1</td>
<td>chlorotolurone</td>
<td>15545-48-9</td>
<td>amidotrizoe acid</td>
<td>117-96-4</td>
</tr>
<tr>
<td>cadmium and compounds</td>
<td>7440-43-9</td>
<td>chromium</td>
<td>7440-47-3</td>
<td>AMPA</td>
<td>1066-51-9</td>
</tr>
<tr>
<td>hexachlorobenzene</td>
<td>118-74-1</td>
<td></td>
<td></td>
<td>bisphenol A</td>
<td>80-05-7</td>
</tr>
<tr>
<td>isoproturone</td>
<td>34123-59-6</td>
<td>PCB</td>
<td>n.a.</td>
<td>carbamazepine</td>
<td>298-46-4</td>
</tr>
<tr>
<td>nickel and compounds</td>
<td>7440-02-0</td>
<td>copper</td>
<td>7440-50-8</td>
<td>diclophenac</td>
<td>15307-86-5</td>
</tr>
<tr>
<td>∑PAH (sum of) benzo(b)fluoranthene, benzo(k)fluoranthene</td>
<td>n.a.</td>
<td>zinc</td>
<td>7440-66-6</td>
<td>1.4 dioxan</td>
<td>123-91-1</td>
</tr>
<tr>
<td>∑PAH (sum of) benzo(ghi)perylene + Indeno(1,2,3-cd)pyrene</td>
<td>n.a.</td>
<td></td>
<td></td>
<td>diglyme</td>
<td>111-96-6</td>
</tr>
<tr>
<td>benzo(a)pyrene</td>
<td>50-32-8</td>
<td></td>
<td></td>
<td>DTPA</td>
<td>67-43-6</td>
</tr>
<tr>
<td>mercury and compounds</td>
<td>7439-97-6</td>
<td></td>
<td></td>
<td>EDTA</td>
<td>60-00-4</td>
</tr>
<tr>
<td>PFT (PFOS)</td>
<td>45298-99-6</td>
<td></td>
<td></td>
<td>ETBE</td>
<td>637-92-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>glyphosate</td>
<td>1071-83-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>iopamidole</td>
<td>62883-00-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>iopromide</td>
<td>73334-07-03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2-methoxy-2-methylpropane (MTBE)</td>
<td>1634-04-4</td>
</tr>
</tbody>
</table>
### Table 3: Status of the Checklist 2014

<table>
<thead>
<tr>
<th>Plant protection agents</th>
<th>CAS No.</th>
<th>Industrial chemical agents</th>
<th>CAS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>aclonifen</td>
<td>74070-46-5</td>
<td>C10-13-chloroalkanes (SCCP)</td>
<td>85535-84-8</td>
</tr>
<tr>
<td>bifenox</td>
<td>42576-02-03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dichlorvos</td>
<td>62-73-7</td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>quinoxyfen</td>
<td>124495-18-7</td>
<td>hexabromcyclododecan (HBCDD)</td>
<td>25637-99-4</td>
</tr>
</tbody>
</table>

**Biocides**

<table>
<thead>
<tr>
<th>Plant protection agents</th>
<th>CAS No.</th>
<th>Industrial chemical agents</th>
<th>CAS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>cybutryne</td>
<td>28159-98-0</td>
<td>dioxin + dl-polychlorinated byphenyls (PCB)</td>
<td></td>
</tr>
<tr>
<td>cypermethrin</td>
<td>52315-07-08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dicofol</td>
<td>115-32-2</td>
<td>ammonium-N</td>
<td>14798-03-9</td>
</tr>
<tr>
<td>heptachlor/heptachlor epoxide</td>
<td>76-448/76-448</td>
<td></td>
<td></td>
</tr>
<tr>
<td>terbutryne</td>
<td>886-50-0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Origin of the lists of substances and justification for their integration into the List of Rhine Substances 2014 or the Checklist 2014

### Origin of the lists of substances

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>acesulfam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>alachlor</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt; -</td>
<td>Far below EQS</td>
</tr>
<tr>
<td>aclonifen</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>P</td>
<td>So far, no validated monitoring values are available for this substance.</td>
</tr>
<tr>
<td>ammonium-N</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; P</td>
<td>In excess of half the value of the ICPR target value. No statement with respect to the assessment using EQS Rhine possible.</td>
</tr>
<tr>
<td>AMPA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>Elevated concentrations monitored in the Rhine</td>
</tr>
<tr>
<td>amidotrizoe acid</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>Elevated concentrations monitored in the Rhine</td>
</tr>
<tr>
<td>arsenic</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; +</td>
<td>In excess of half the value of the EQS Rhine.</td>
</tr>
<tr>
<td>atrazine</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>&lt; -</td>
<td>Far below EQS</td>
</tr>
<tr>
<td>azinphos-ethyl</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt; -</td>
<td>Far below ICPR target value</td>
</tr>
<tr>
<td>azinphos-methyl</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>Expert judgement (no positive detection in the water body, no discharges known)</td>
</tr>
<tr>
<td>bentazone</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt; -</td>
<td>Far below EQS Rhine</td>
</tr>
</tbody>
</table>

### Justification

Legend

>: The monitoring values are above the EQS or the EQS Rhine or ICPR target values

<: The monitoring values are below the EQS or the EQS Rhine or ICPR target values

P: Integrated into check-list

+: Integrated into List of Rhine Substances 2014

-: Not integrated into List of Rhine Substances 2014

Due to the high concentrations, rising trends and the tracer function for the share of wastewater.

Far below EQS

So far, no validated monitoring values are available for this substance.

In excess of half the value of the ICPR target value. No statement with respect to the assessment using EQS Rhine possible.

Elevated concentrations monitored in the Rhine

Elevated concentrations monitored in the Rhine

In excess of half the value of the EQS Rhine.

Far below ICPR target value

Far below EQS Rhine
## Origin of the lists of substances

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>benzene</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>&lt;</td>
<td>-</td>
<td></td>
<td>Far below EQS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bezafibrate</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
<td></td>
<td>Monitoring values are largely below the limit of determination.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bifenox</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>P</td>
<td></td>
<td></td>
<td>No validated monitoring values available for this substance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bisphenol A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>+</td>
<td></td>
<td></td>
<td>Relevant for many EU Member States In excess of target values of drinking-water treatment plants in the Rhine catchment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lead and compounds</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>&gt;</td>
<td>+</td>
<td></td>
<td>Slightly in excess of ICPR target value (sediment protection)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>brominated diphenyl ethers</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>+</td>
<td></td>
<td></td>
<td>EQS just respected. Trend monitoring required according to EU directive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C10-13-chloroalkanes (SCCP)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>P</td>
<td></td>
<td></td>
<td>No standardized methods of analysis applicable in practice available.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cadmium and compounds</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>&gt;</td>
<td>+</td>
<td></td>
<td>In excess of ICPR target value (sediment protection)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>carbamazepine</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>+</td>
<td></td>
<td></td>
<td>The substance was monitored in the Rhine and particularly in tributaries with an elevated share of wastewater Persistent substance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-chloroaniline</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;</td>
<td>-</td>
<td></td>
<td>Far below ICPR target value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-chloroaniline</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;</td>
<td>-</td>
<td></td>
<td>Far below ICPR target value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-chloroaniline</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>&lt;</td>
<td>-</td>
<td></td>
<td>Below EQS Rhine</td>
<td></td>
<td></td>
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### Justification

Legend

>: The monitoring values are above the EQS or the EQS Rhine or ICPR target values
<: The monitoring values are below the EQS or the EQS Rhine or ICPR target values
P: Integrated into check-list
+: Integrated into List of Rhine Substances 2014
-: Not integrated into List of Rhine Substances 2014
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### Substances

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<tr>
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<td>chloro toluene</td>
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<td>chorotoluurone</td>
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<td>chromium</td>
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<td>ICPR target value (sediment protection) just respected</td>
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<td>cybutryne</td>
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<td>X X</td>
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<td>Insufficient methods of analysis.</td>
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<td>dicofol</td>
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<td>X X</td>
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<td>In the Rhine, this substances is measured in very low concentrations.</td>
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<td>dichloromethane (methylene chloride)</td>
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<td>dichloroprop</td>
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# Origin of the lists of substances

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<th>Substances</th>
<th>List 2014</th>
<th>Justification</th>
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<tbody>
<tr>
<td><strong>dichlorvos</strong></td>
<td>X X X X P</td>
<td>So far, no positive detection, but new priority substance according to Directive 2013/39/EU.</td>
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<td><strong>diclophenac</strong></td>
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<td><strong>bis (2-ethylhexyl)phthalate (DEHP)</strong></td>
<td>X X X X &lt; -</td>
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<tr>
<td><strong>DDT</strong> (dichlordiphenyltrichloroethane)</td>
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<td>2.4-DDD</td>
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<td>4.4-DDD</td>
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<tr>
<td>4.4-DDE</td>
<td>X X X X</td>
<td>&lt; -</td>
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<tr>
<td>2.4-DDT</td>
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<td>4.4-DDT</td>
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<td><strong>dimethoate</strong></td>
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<tr>
<td><strong>1.4 dioxan</strong></td>
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## Origin of the lists of substances

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<td>Dioxin + dl-polychlorinated byphenyls (PCB)</td>
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<td>P</td>
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<td>-</td>
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<td>-</td>
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<td>-</td>
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<td>DTPA</td>
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<td>The substance has been detected in the Rhine for many years.</td>
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<td>EDTA</td>
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<td>The substance has been detected in the Rhine for many years.</td>
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<td>Endosulfane / alpha-endosulphane</td>
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<td>&lt;</td>
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### Origin of the lists of substances

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<tr>
<td>ETBE and MTBE</td>
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<td><strong>Justification</strong></td>
<td>The Conference of Rhine Ministers 2013 stated that the trend towards reduced MTBE/ETBE peak values is continuing and that the total approach towards reducing inputs proves to be successful. In order to follow-up whether this success is permanent, the substance is being kept in the List of Rhine Substances and thus in the monitoring programmes. If the success of reduction measures is confirmed, the substance may eventually be taken from the list the next time it will be updated.</td>
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<td>fenitrothion</td>
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<td>Expert judgement (no positive detection in the water body, no discharges known).</td>
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<tr>
<td>fenthion</td>
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<td>glyphosate</td>
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<td>In the Rhine, this substance is measured in low concentrations.</td>
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<td>The monitoring values are above the EQS or the EQS Rhine or ICPR target values</td>
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<td>Integrated into check-list</td>
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#### Substances

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<td>gamma-HCH (lindane)</td>
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<td>Far below EQS</td>
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<td>heptachlor/heptachlor epoxide</td>
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<td>Insufficient methods of analysis</td>
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<td>Far below EQS for water, but EQS for biota is still to be checked.</td>
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<td></td>
<td>Far below EQS. Trend monitoring (monitoring programme suspended matter).</td>
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<tr>
<td>iopamidole</td>
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<td>Elevated concentrations monitored in the Rhine.</td>
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<td>iopromide</td>
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<td>Elevated concentrations monitored in the Rhine.</td>
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<td>Below MAV-EQS. Distinctly detectable isoproturon pollution every year during tillage of winter and summer crop.</td>
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<td>Slightly in excess of ICPR target value (sediment protection) In excess of drinking water quality criteria (according to Directive 98/83/EC).</td>
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<td>naphthalene</td>
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<td>Far below EQS.</td>
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<td>nickel and compounds</td>
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<td>Slightly in excess of ICPR target value (sediment protection)</td>
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### Origin of the lists of substances

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<td>nonylphenoles / 4-(para)-n-nonylphenol</td>
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<td>Far below EQS</td>
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<td>Far below EQS-Rhine</td>
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<tr>
<td>ethyl parathion</td>
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<td>$\Sigma$PAH (sum of) benzo(b)fluoranthene, benzo(k)fluoranthene</td>
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<td>X</td>
<td>X</td>
<td></td>
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<td>+</td>
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<td>X</td>
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<td></td>
<td></td>
<td>&gt;</td>
<td>+</td>
<td>Far above EQS</td>
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Legend:
- >: The monitoring values are above the EQS or the EQS Rhine or ICPR target values
- <: The monitoring values are below the EQS or the EQS Rhine or ICPR target values
- P: Integrated into check-list
- +: Integrated into List of Rhine Substances 2014
- -: Not integrated into List of Rhine Substances 2014
### Origin of the lists of substances

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<td></td>
<td>Far above EQS according to Directive 2013/39/EU</td>
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<td></td>
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<td>&lt; -</td>
<td></td>
<td>Far below EQS</td>
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<td>P</td>
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<td>For this substance, validated monitoring values are only available for few monitoring stations</td>
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<td>X</td>
<td>X</td>
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<td>Far below EQS.</td>
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### Origin of the lists of substances

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<tbody>
<tr>
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<td>X</td>
<td>X X X</td>
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<td>X</td>
<td>X X</td>
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<td>&gt;</td>
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</tr>
<tr>
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<td>X</td>
<td>X X</td>
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<td></td>
<td></td>
<td>&gt;</td>
<td>-</td>
<td>Far below EQS.</td>
</tr>
<tr>
<td>1,1,1-trichloroethane</td>
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<td>&gt;</td>
<td>-</td>
<td>Far below ICPR target value</td>
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<tr>
<td>trifluralin</td>
<td>X</td>
<td>X</td>
<td>X X X</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td></td>
<td>Expert judgement (no positive detection in the water body, no discharges known).</td>
</tr>
<tr>
<td><strong>Organic tin compounds</strong></td>
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<td></td>
</tr>
<tr>
<td>dibutyltin cation</td>
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<td></td>
<td></td>
<td></td>
<td>&gt;</td>
<td>+</td>
<td>Far in excess of ICPR target value (sediment protection)</td>
</tr>
<tr>
<td>tetrabutyltin</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt;</td>
<td>+</td>
<td>Far below ICPR target value</td>
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<td>+</td>
<td>Far below ICPR target value</td>
</tr>
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<td>triphenyltin cation</td>
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<td></td>
<td></td>
<td>&gt;</td>
<td>+</td>
<td>Far below ICPR target value</td>
</tr>
<tr>
<td>zinc</td>
<td>X</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt;</td>
<td>+</td>
<td>Far in excess of ICPR target value (sediment protection)</td>
</tr>
</tbody>
</table>
**Legend:**

- **Rhine 2020:** Substances under the Rhine Action Programme (RAP) 1987-200 and/or the Programme Rhine 2020
- **WFD – Annex VIII:** Substances relevant for the Rhine (according to WFD, Annex VIII, 1-9)
- **WFD – Annex IX:** Substances of WFD, Annex IX
- **WFD – Annex X:** Priority (hazardous) substances of WFD, Annex X
- **Directive /2008/105/EC:** Substance of Annex I, Part A of the daughter directive 2008/105/EC
- **Directive /2013/39/EC:** Substances of the daughter directive 2013/39/EU
- **Drinking water:** Substances relevant for drinking water (according to ICPR report no. 161)
- **OSPAR:** OSPAR substance with need for priority action
- **Assessment standard:** Results of the comparison of the monitoring values with the equivalent assessment standard (environmental quality standard (EQS), EQS Rhine or ICPR target values)
  - >: Monitoring values above assessment standard
  - <: Monitoring values below assessment standard

**List 2014 – Check-list**

This column indicates whether a substance has been taken over from the List of Rhine substances 2011 or the Directive 2013/39/EU or whether it has been taken over into the Checklist 2014.

- **P:** Integrated into checklist
- **+ :** Integrated into List of Rhine Substances 2014
- **- :** Not integrated into List of Rhine Substances 2014

**Justification:**

This column indicates why a substance figures in the List of Rhine Substances 2014 or in the Checklist 2014. The justification is normally based on the monitoring results of the available last five monitoring years.
### Annex 2

Data evaluation for substances of the Checklist 2011 integrated into the List of Rhine Substances 2014

#### Table 1: Acesulfam monitoring values for the monitoring year 2010

<table>
<thead>
<tr>
<th>Measuring location</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basel-Birsfelden / Rhine</strong> (ARW)</td>
<td>N = 13</td>
</tr>
<tr>
<td></td>
<td>N &lt; Limit of detection</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td></td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
</tr>
<tr>
<td></td>
<td>Sampling method</td>
</tr>
<tr>
<td><strong>Karlsruhe / Rhine</strong> (ARW)</td>
<td>N = 13</td>
</tr>
<tr>
<td></td>
<td>N &lt; Limit of detection</td>
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<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td></td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
</tr>
<tr>
<td></td>
<td>Sampling method</td>
</tr>
<tr>
<td><strong>Mainz / Rhine</strong> (ARW)</td>
<td>N = 13</td>
</tr>
<tr>
<td></td>
<td>N &lt; Limit of detection</td>
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<tr>
<td></td>
<td>Minimum</td>
</tr>
<tr>
<td></td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
</tr>
<tr>
<td></td>
<td>Sampling method</td>
</tr>
<tr>
<td><strong>Cologne / Rhine</strong> (ARW)</td>
<td>N = 13</td>
</tr>
<tr>
<td></td>
<td>N &lt; Limit of detection</td>
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<tr>
<td></td>
<td>Minimum</td>
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<td>Average</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
</tr>
<tr>
<td></td>
<td>Sampling method</td>
</tr>
<tr>
<td><strong>Düsseldorf-Flehe / Rhine</strong> (ARW)</td>
<td>N = 13</td>
</tr>
<tr>
<td></td>
<td>N &lt; Limit of detection</td>
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<tr>
<td></td>
<td>Minimum</td>
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<td>Average</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
</tr>
<tr>
<td></td>
<td>Sampling method</td>
</tr>
<tr>
<td><strong>Lobith / Rhine</strong> (RIWA)</td>
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<td>N &lt; Limit of detection</td>
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<td>Sampling method</td>
</tr>
<tr>
<td><strong>Frankfurt / Main</strong> (ARW)</td>
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<td>Minimum</td>
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<td></td>
<td>Maximum</td>
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<td>Sampling method</td>
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**Legend:** N = number of samples  E = individual sample  M = composite sample
**Graph 1:** Acesulfam monitoring values of drinking water works for the monitoring year 2010

<table>
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<th>Location</th>
<th>MW</th>
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<tr>
<td>Basel-Birsfelden</td>
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<td>Karlsruhe</td>
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<tr>
<td>Mainz</td>
<td>1.5</td>
<td>2.5</td>
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<tr>
<td>Köln</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Düsseldorf-Flehe</td>
<td>3.5</td>
<td>4</td>
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<tr>
<td>Lobith</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Frankfurt/Main</td>
<td>4</td>
<td>4.5</td>
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</table>

**Legend:**
- MW = Average
- Max = Maximum
Table 2: Acesulfam monitoring values for the monitoring year 2011

<table>
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<th>Measuring location</th>
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<td>Basel-Birsfelden</td>
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</tr>
<tr>
<td>N</td>
<td>13</td>
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<tr>
<td>minimum</td>
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<td>(ARW)</td>
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<td>N</td>
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<tr>
<td>Mainz</td>
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<tr>
<td>(ARW)</td>
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<td>(BfG)</td>
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<td>Düsseldorf-Flehe</td>
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<td>N</td>
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<td>N</td>
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Graph 2: Acesulfam monitoring values and load (black points) for the monitoring year 2011

Table 3: Bisphenol A monitoring values for the monitoring year 2011 (different monitoring year: marked red)
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<th>Values</th>
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<td>Sampling method</td>
</tr>
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<td></td>
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<td>N &lt; Limit of detection</td>
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<tr>
<td></td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
</tr>
<tr>
<td></td>
<td>Sampling method</td>
</tr>
<tr>
<td>Mannheim / Neckar</td>
<td>N</td>
</tr>
<tr>
<td>(LUBW)</td>
<td>N &lt; Limit of detection</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>Sampling method</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td>(HLUG) 2010</td>
<td>N &lt; Limit of detection</td>
</tr>
<tr>
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<tr>
<td></td>
<td>Average</td>
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<tr>
<td>Lahnstein / Lahn</td>
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<td>(LUWG-RLP) 2009</td>
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<td>Minimum</td>
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<tr>
<td></td>
<td>Average</td>
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<td></td>
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</tr>
<tr>
<td>Fankel / Mosel</td>
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<td></td>
<td>Sampling method</td>
</tr>
<tr>
<td>Koblenz/Moselle</td>
<td>N</td>
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<tr>
<td>(BfG)</td>
<td>N &lt; Limit of detection</td>
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<tr>
<td></td>
<td>Minimum</td>
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<tr>
<td></td>
<td>Average</td>
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<tr>
<td></td>
<td>Maximum</td>
</tr>
<tr>
<td></td>
<td>Sampling method</td>
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</tbody>
</table>

**Legend:**
- **N** = number of samples
- **E** = individual sample
- **M** = composite sample
**Graph 3:** Bisphenol A monitoring values for the monitoring year 2011

Legend: MW = Average  
Max = Maximum

**Table 4:** 1,4-dioxan-monitoring values for the monitoring years 2011, 2012 and 2013

<table>
<thead>
<tr>
<th>Measurement location</th>
<th>values (µg/l)</th>
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<tr>
<td><strong>Weil a. Rh.</strong></td>
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<tr>
<td>2012</td>
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<tr>
<td>Minimum</td>
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<tr>
<td>Average</td>
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<tr>
<td>Maximum</td>
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<tr>
<td><strong>Cologne</strong></td>
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<tr>
<td>(ARW) July/August 2011</td>
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<td>N &lt; Limit of detection</td>
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<td>Minimum</td>
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<tr>
<td>Average</td>
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<tr>
<td>Maximum</td>
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<td>E</td>
</tr>
<tr>
<td><strong>Lobith</strong></td>
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<tr>
<td>(RIWA) 2012</td>
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<td><strong>Bischofsheim / Main</strong></td>
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<td></td>
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<tr>
<td>Average</td>
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<tr>
<td>Maximum</td>
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<tr>
<td>Sampling method</td>
<td>E</td>
</tr>
</tbody>
</table>
**Graph 4:** 1,4-dioxan-monitoring values for the monitoring years 2011, 2012 and 2013

**Legend:**
- MW = Average
- Max = Maximum
- Reference year for measurement values see table 4