List of Rhine Substances 2014

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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.”

"Rhine 2020", the follow-up programme to the Rhine Action Programme (RAP 1987-2000), was adopted by the Conference of Rhine Ministers staged in Strasbourg in January 2001.

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.

On 16 December 2008, the EU adopted the Directive 2008/105/EC on environmental quality standards (EQS Directive) in water policy and determined environmental quality standards (EQS) for 33 priority (hazardous) substances.

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

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

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.

The result of the verification of substances of the programme Rhine 2020, the Directive 2008/105/EC and the Directive 2013/39/EU and of the substances relevant for drinking water figures in Annex 1.

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

List of Rhine Substances 2014					
Parameters for the assessment of the chemical state (WFD and/or Rhine 2020)	**CAS No.**	**Specific parameters for the assessment of the ecological state (WFD and/or Rhine 2020)**	**CAS No.**	**Substances relevant for drinking water production**	**CAS No.**
brominated diphenylether	32534-81-9	arsenic	7440-38-2	acesulfam	55589-62-3
lead and compounds	7439-92-1	chlorotolurone	15545-48-9	amidotrizoe acid	117-96-4
cadmium and compounds	7440-43-43-9	chromium	7440-47-3	AMPA	1066-51-9
hexachlorobenzene	118-74-1			bisphenol A	80-05-7
isoproturone	34123-59-6	PCB	n.a.	carbamazepine	298-46-4
nickel and compounds	7440-02-0	copper	7440-50-8	diclophenac	15307-86-5
ΣPAH (sum of) benzo(b)fluoranthene, benzo(k)fluoranthene	n.a.	zinc	7440-66-6	1.4 dioxan	123-91-1
ΣPAH (sum of) benzo(ghi)perylene + Indeno(1,2,3-cd)pyrene)	n.a.			diglyme	111-96-6
benzo(a)pyrene	50-32-8			DTPA	67-43-6
mercury and compounds	7439-97-6			EDTA	60-00-4
PFT (PFOS)	45298-90-6			ETBE	637-92-3
				glyphosate	1071-83-6
				iopamidole	62883-00-5
				iopromide	73334-07-03
				2-methoxy-2-methylpropane (MTBE)	1634-04-4

Table 3: Status of the Checklist 2014

Checklist 2014			
Plant protection agents	**CAS No.**	**Industrial chemical agents**	**CAS No.**
aclonifen	74070-46-5	C10-13-chloroalkanes (SCCP)	85535-84-8
bifenox	42576-02-03		
dichlorvos	62-73-7	**Others**	
quinoxyfen	124495-18-7	hexabromcyclododecan (HBCDD)	25637-99-4
Biocides			
cybutryne	28159-98-0	dioxin + dl-polychlorinated byphenyls (PCB)	
cypermethrin	52315-07-08		
dicofol	115-32-2	ammonium-N	14798-03-9
heptachlor/ heptachlor epoxide	76-448/ 76-448		
terbutryne	886-50-0		

Annex 1

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 →	Rhine 2020	WFD – Annex VIII	WFD – Annex IX	WFD – Annex X	Directive 2008/105/EC	Directive 2013/39/EU	Drinking water	OSPAR	Assessment standard	List 2014 Checklist	**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
Substances											
acesulfam							X			+	Due to the high concentrations, rising trends and the tracer function for the share of wastewater.
alachlor				X	X	X			<	-	Far below EQS
aclonifen				X		X				P	So far, no validated monitoring values are available for this substance.
ammonium-N	X	X							>	P	In excess of half the value of the ICPR target value. No statement with respect to the assessment using EQS Rhine possible.
AMPA							X			+	Elevated concentrations monitored in the Rhine
amidotrizoe acid							X			+	Elevated concentrations monitored in the Rhine
arsenic	X	X							>	+	In excess of half the value of the EQS Rhine.
atrazine	X			X	X	X			<	-	Far below EQS
azinphos-ethyl	X								<	-	Far below ICPR target value
azinphos-methyl	X									-	Expert judgement (no positive detection in the water body, no discharges known)
bentazone	X	X							<	-	Far below EQS Rhine

Origin of the lists of substances →	Rhine 2020	WFD – Annex VIII	WFD – Annex IX	WFD – Annex X	Directive 2008/105/EC	Directive 2013/39/EU	Drinking water	OSPAR	Assessment standard	List 2014 Checklist	**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
Substances											
benzene	X			X	X	X			<	-	Far below EQS
bezafibrate							X			-	Monitoring values are largely below the limit of determination.
bifenox						X				P	No validated monitoring values available for this substance.
bisphenol A							X			+	Relevant for many EU Member States In excess of target values of drinking-water treatment plants in the Rhine catchment.
lead and compounds	X			X	X	X	X		>	+	Slightly in excess of ICPR target value (sediment protection)
brominated diphenyl ethers				X	X	X				+	EQS just respected. Trend monitoring required according to EU directive
C10-13-chloroalkanes (SCCP)				X	X	X		X		P	No standardized methods of analysis applicable in practice available.
cadmium and compounds	X		X	X	X	X		X	>	+	In excess of ICPR target value (sediment protection)
carbamazepine							X			+	The substance was monitored in the Rhine and particularly in tributaries with an elevated share of wastewater Persistent substance
2-chloroaniline	X								<	-	Far below ICPR target value
3-chloroaniline	X								<	-	Far below ICPR target value
4-chloroaniline	X	X							<	-	Below EQS Rhine

Origin of the lists of substances →	Rhine 2020	WFD – Annex VIII	WFD – Annex IX	WFD – Annex X	Directive 2008/105/EC	Directive 2013/39/EU	Drinking water	OSPAR	Assessment standard	List 2014 Checklist	**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
Substances											
3,4-chloroaniline	X								<	-	Far below ICPR target value
chloronitrobenzene	X								<	-	Far below ICPR target value
chloroform (trichloromethane)	X		X		X	X			<	-	Far below EQS.
chlorofenvinphos				X	X	X			<	-	Far below EQS.
chloropyriphos				X	X	X				-	Expert judgement (no positive detection in the water body, no discharges known)
chloro toluene	X								<	-	Far below ICPR target value
chlorotolurone	X	X							>	+	Far below EQS Rhine (in excess of limit value for drinking water)
chromium	X	X							>	+	ICPR target value (sediment protection) just respected
cybutryne				X		X				P	Insufficient methods of analysis.
cypermethrin				X		X				P	Insufficient methods of analysis.
dicofol				X		X	X			P	No validated monitoring values available for this substance.
1.4-dichlorobenzene	X									-	In the Rhine, this substances is measured in very low concentrations.
dichloromethane (methylene chloride)				X	X	X			<	-	Far below EQS.
2.4-dichlorophenoxyacetic acid	X								<	-	Far below ICPR target value
dichloroprop		X							<	-	Far below EQS-Rhine

Origin of the lists of substances →	Rhine 2020	WFD – Annex VIII	WFD – Annex IX	WFD – Annex X	Directive 2008/105/EC	Directive 2013/39/EU	Drinking water	OSPAR	Assessment standard	List 2014 Checklist	**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
Substances											
dichlorvos	X	X		X		X				P	So far, no positive detection, but new priority substance according to Directive 2013/39/EU.
diclophenac							X			+	The substance was monitored in the Rhine and particularly in tributaries with an elevated share of wastewater
bis (2-ethylhexyl)phthalate (DEHP)				X	X	X		X	<	-	Far below EQS.
Diglyme							X			+	Substance has been detected in the Rhine for many years, partly conspicuous within immediate alarm surveillance.
DDT (dichlordiphenyltrichloroethane)	X		X		X	X					
2.4-DDD	X								<	-	Far below EQS
4.4-DDD	X		X		X	X			<	-	Far below EQS
2.4-DDE	X		X		X	X			<	-	Far below EQS
4.4-DDE	X		X		X	X			<	-	Far below EQS
2.4-DDT	X		X		X	X			<	-	Far below EQS
4.4-DDT	X		X		X	X			<	-	Far below EQS
dimethoate		X								-	Expert judgement (no positive detection in the water body, no discharges known)
1.4 dioxan							X			+	Due to high concentrations and excess of target values of drinking water works in the Rhine catchment.

Origin of the lists of substances →	Rhine 2020	WFD – Annex VIII	WFD – Annex IX	WFD – Annex X	Directive 2008/105/EC	Directive 2013/39/EU	Drinking water	OSPAR	Assessment standard	List 2014 Checklist	**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
Substances											
dioxin + dl-polychlorinated byphenyls (PCB)				X		X				P	No validated monitoring values available for these substances.
diurone	X			X	X	X	X		<	-	Below EQS
drins											
aldrin	X		X		X	X			<	-	Far below EQS
dieldrin	X		X		X	X			<	-	Far below EQS
endrin	X		X		X	X			<	-	Far below EQS
isodrin	X		X		X	X			<	-	Far below EQS
DTPA							X			+	The substance has been detected in the Rhine for many years.
EDTA							X			+	The substance has been detected in the Rhine for many years.
endosulfane / alpha-endosulphane	X			X	X	X		X	<	-	Far below EQS

Origin of the lists of substances →	Rhine 2020	WFD – Annex VIII	WFD – Annex IX	WFD – Annex X	Directive 2008/105/EC	Directive 2013/39/EU	Drinking water	OSPAR	Assessment standard	List 2014 Checklist	**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
Substances											
ETBE and MTBE							X			+	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.
fenitrothion	X									-	Expert judgement (no positive detection in the water body, no discharges known).
fenthion	X									-	Expert judgement (no positive detection in the water body, no discharges known).
glyphosate							X			+	In the Rhine, this substances is measured in low concentrations.
hexachlorocyclohexane (HCH)			X								
alpha-hexachlorocyclohexane	X				X	X			<	-	Far below EQS
beta-hexachlorocyclohexane	X				X	X			<	-	Far below EQS
delta-hexachlorocyclohexane	X				X	X			<	-	Far below EQS

Origin of the lists of substances →	Rhine 2020	WFD – Annex VIII	WFD – Annex IX	WFD – Annex X	Directive 2008/105/EC	Directive 2013/39/EU	Drinking water	OSPAR	Assessment standard	List 2014 Checklist	**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
Substances											
gamma-HCH (lindane)	X			X	X	X			<	-	Far below EQS
heptachlor/heptachlor epoxide						X				P	Insufficient methods of analysis
hexachlorobenzene	X		X		X	X			<	+	Far below EQS for water, but EQS for biota is still to be checked.
hexabromcyclododecan (HBCDD)						X				P	No validated monitoring values available for this substance.
Hexachlorbutadiene	X		X		X	X			<	-	Far below EQS. Trend monitoring (monitoring programme suspended matter).
iopamidole							X			+	Elevated concentrations monitored in the Rhine.
iopromide							X			+	Elevated concentrations monitored in the Rhine.
isoproturone	X			X	X	X	X		<	+	Below MAV-EQS. Distinctly detectable isoproturon pollution every year during tillage of winter and summer crop.
copper	X	X							>	+	Slightly in excess of ICPR target value (sediment protection) In excess of drinking water quality criteria (according to Directive 98/83/EC).
naphthalene				X	X	X			<	-	Far below EQS.
nickel and compounds	X	X		X	X	X			>	+	Slightly in excess of ICPR target value (sediment protection)

Origin of the lists of substances →	Rhine 2020	WFD – Annex VIII	WFD – Annex IX	WFD – Annex X	Directive 2008/105/EC	Directive 2013/39/EU	Drinking water	OSPAR	Assessment standard	List 2014 Checklist	**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
Substances											
nonylphenoles / 4-(para)-n-nonylphenol				X	X	X			<	-	Far below EQS
malathione	X								<	-	Far below EQS
MCPA		X							<	-	Far below EQS-Rhine
Mecoprop		X							<	-	Far below EQS Rhine
MTBE							X			+	see ETBE
octylphenols / 4-tert-octylphenol				X	X	X			<	-	Far below EQS
ethyl parathion	X									-	Expert judgement (no positive detection in the water body, no discharges known)
methyl parathion	X									-	Expert judgement (no positive detection in the water body, no discharges known)
Polycyclic aromatic hydrocarbons (PAH)											
ΣPAH (sum of) benzo(b)fluoranthene, benzo(k)fluoranthene	X			X	X			X	>	+	Slightly below EQS
ΣPAH (sum of) benzo(ghi)perylene + indeno(1,2,3-cd)pyrene)				X	X				>	+	Far above EQS

Origin of the lists of substances →	Rhine 2020	WFD – Annex VIII	WFD – Annex IX	WFD – Annex X	Directive 2008/105/EC	Directive 2013/39/EU	Drinking water	OSPAR	Assessment standard	List 2014 Checklist	**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
Substances											
benzo(a)pyrene				X	X	X			>	+	Far above EQS according to Directive 2013/39/EU
anthracene				X	X	X			<	-	Far below EQS
fluoranthene				X	X	X			<	-	Far below EQS.
PCB	X	X						X	>	+	Far above ICPR target value.
pentachlorobenzene				X	X	X			<	-	Far below EQS. Trend monitoring (monitoring programme suspended matter)
pentachlorophenol	X		X		X	X			<	-	Far below EQS
perfluoroctanesulphonate (PFOS)				X		X	X		>	+	Far above EQS according to Directive 2013/39/EU
Mercury and compounds	X		X	X	X	X		X	>	+	Far above EQS (for biota).
quinoxyfen		X				X				P	For this substance, validated monitoring values are only available for few monitoring stations
simazine	X			x	X	X			<	-	Far below EQS
terbutryne						X				P	For this substance, validated monitoring values are only available for few monitoring stations
tetrachloroethene (tetrachloroethylene)	X		X		X	X			<	-	Far below EQS.

Origin of the lists of substances →	Rhine 2020	WFD – Annex VIII	WFD – Annex IX	WFD – Annex X	Directive 2008/105/EC	Directive 2013/39/EU	Drinking water	OSPAR	Assessment standard	List 2014 Checklist	**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
Substances											
tetrachloromethane (carbon tetrachloride)	X		X		X	X			<	-	Far below EQS.
trichlorobenzene (TCB)	X		X		X	X			<	-	Far below EQS.
trichloroethene (trichloroethylene)	X		X		X	X			<	-	Far below EQS.
1.1.1-trichloroethane	X								<	-	Far below ICPR target value
trifluralin	X			X	X	X		X		-	Expert judgement (no positive detection in the water body, no discharges known).
Organic tin compounds											
dibutyltin cation	X	X							<	-	Far below EQS-Rhine
tetrabutyltin	X								<	-	Far below ICPR target value
tributyltin cation	X			X	X	X			<	-	Far below EQS.
triphenyltin cation	X								<	-	Far below ICPR target value
zinc	X	X							>	+	Far in excess of ICPR target value (sediment protection)

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

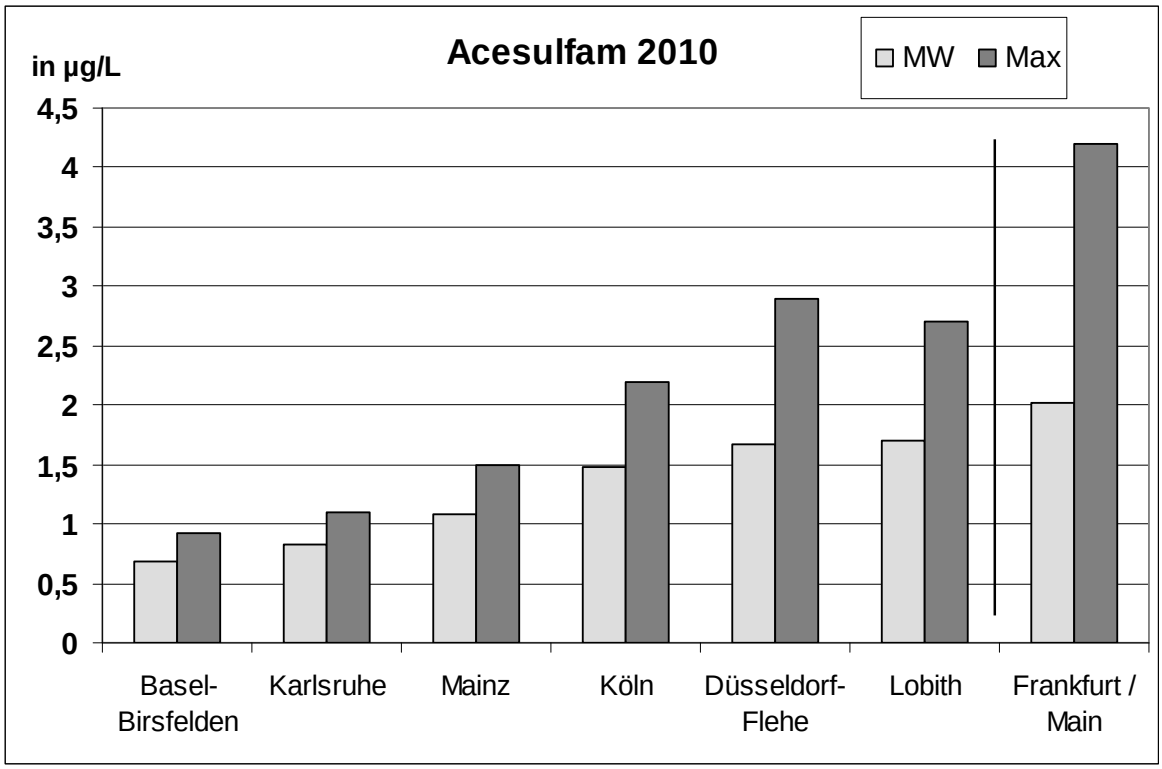
Data evaluation for substances of the Checklist 2011 integrated into the List of Rhine Substances 2014

Table 1: Acesulfam monitoring values for the monitoring year 2010

Measuring location		Values
Basel-Birsfelden / Rhine	N	13
(ARW)	N < Limit of detection	0
	Minimum	0.4 µg/l
	Average	0.68 µg/l
	Maximum	0.93 µg/l
	Sampling method	E28
Karlsruhe / Rhine	N	13
(ARW)	N < Limit of detection	0
	Minimum	0.48 µg/l
	Average	0.83 µg/l
	Maximum	1.1 µg/l
	Sampling method	E28
Mainz / Rhine	N	13
(ARW)	N < Limit of detection	0
	Minimum	0.53 µg/l
	Average	1.08 µg/l
	Maximum	1.5 µg/l
	Sampling method	1M28
Cologne / Rhine	N	13
(ARW)	N < Limit of detection	0
	Minimum	0.67 µg/l
	Average	1.48 µg/l
	Maximum	2.2 µg/l
	Sampling method	1M28
Düsseldorf-Flehe / Rhine	N	13
(ARW)	N < Limit of detection	0
	Minimum	0.73 µg/l
	Average	1.66 µg/l
	Maximum	2.9 µg/l
	Sampling method	1M28
Lobith / Rhine	N	16
(RIWA)	N < Limit of detection	0
	Minimum	0.62 µg/l
	Average	1.71 µg/l
	Maximum	2.7 µg/l
	Sampling method	
Frankfurt / Main	N	13
(ARW)	N < Limit of detection	0
	Minimum	1.2 µg/l
	Average	2.02 µg/l
	Maximum	4.2 µg/l
	Sampling method	1M28

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



Legend: MW = Average
Max = Maximum

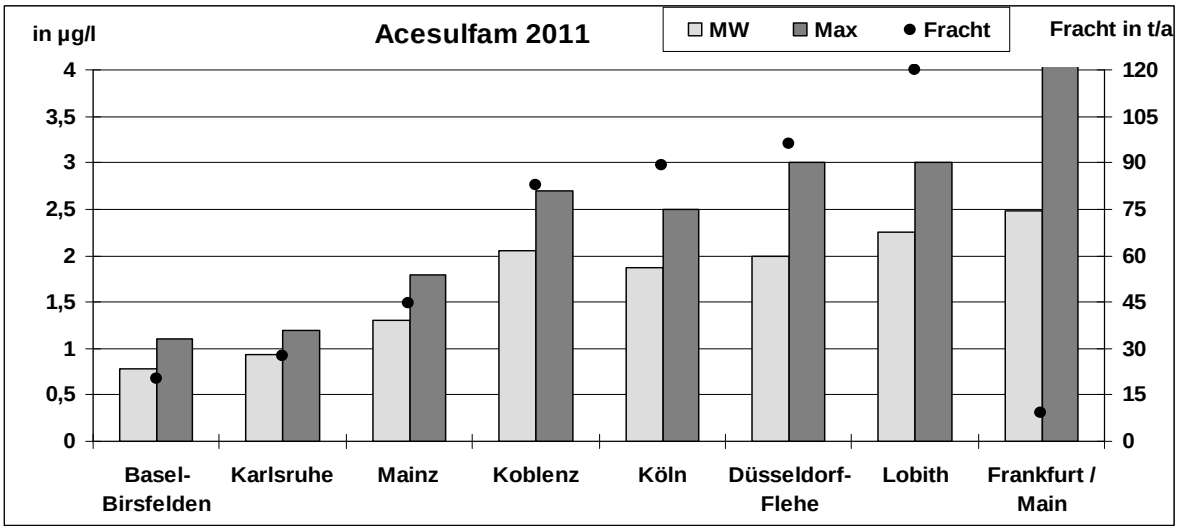
Table 2 : Acesulfam monitoring values for the monitoring year 2011

Measuring location		Values
Basel-Birsfelden	N	13
(ARW)	N < Limit of detection	0
	Minimum	0.32
	Average	0.78
	Maximum	1.1
	Sampling method	E28
Karlsruhe	N	13
(ARW)	N < Limit of detection	0
	Minimum	0.6
	Average	0.93
	Maximum	1.2
	Sampling method	E28
Mainz	N	13
(ARW)	N < Limit of detection	0
	Minimum	0.66
	Average	1.30
	Maximum	1.8
	Sampling method	1M28
Koblenz	N	13
(BfG)	N < Limit of detection	0
	Minimum	1.0
	Average	2.05
	Maximum	2.7
	Sampling method	28M
Cologne	N	13
(ARW)	N < Limit of detection	0
	Minimum	0.49
	Average	1.87
	Maximum	2.5
	Sampling method	1M28
Düsseldorf-Flehe	N	13
(ARW)	N < Limit of detection	0
	Minimum	0.51
	Average	1.99
	Maximum	3
	Sampling method	1M28
Lobith	N	13
(RIWA)	N < Limit of detection	0
	Minimum	0.62
	Average	2.25
	Maximum	3.0
	Sampling method	Monthly average
Frankfurt / Main	N	13

(ARW)	N < Limit of detection	0
	Minimum	0.35
	Average	2.48
	Maximum	4.1
	Sampling method	1M28

Legend:
N = number of samples
E = individual sample
M = composite sample

Graph 2: Acesulfam monitoring values and load (black points) for the monitoring year 2011



Legend: MW = Average
Max = Maximum

Table 3: Bisphenol A monitoring values for the monitoring year 2011 (different monitoring year: marked red)

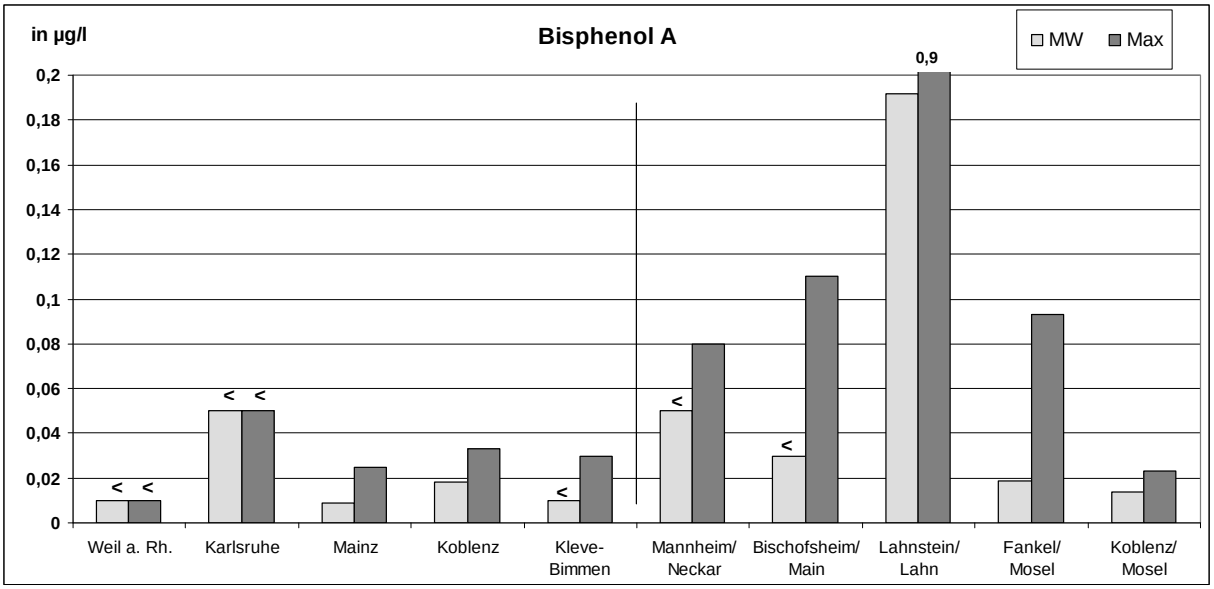
Measurement location		Values
Karlsruhe	N	13
(LUBW)	N < Limit of detection	13
	Minimum	0.05
	Average	0.05
	Maximum	0.05
	Sampling method	E28
Mainz	N	13
(LUWG-RLP)	N < Limit of detection	4
2009	Minimum	<0.005
	Average	0.009
	Maximum	0.025
	Sampling method	E28
Koblenz	N	13
(BfG)	N < Limit of detection	1

Measurement location		Values
	Minimum	<0.005
	Average	0.018
	Maximum	0.033
	Sampling method	1M28
Kleve-Bimmen	N	13
(LUA)	N < Limit of detection	2
	Minimum	<0.01
	Average	0.017
	Maximum	0.03
	Sampling method	E28
Mannheim / Neckar	N	13
(LUBW)	N < Limit of detection	11
	Minimum	<0.05
	Average	<0.05
	Maximum	0.08
	Sampling method	E28
Bischofsheim / Main	N	52
(HLUG)	N < Limit of detection	
2010	Minimum	<0.03
	Average	<0.03
	Maximum	0.11
	Sampling method	
Lahnstein / Lahn	N	13
(LUWG-RLP)	N < Limit of detection	0
2009	Minimum	0.011
	Average	0.192
	Maximum	0.90
	Sampling method	E28
Fankel / Mosel	N	13
(LUWG-RLP)	N < Limit of detection	0
2009	Minimum	0.005
	Average	0.019
	Maximum	0.093
	Sampling method	E28
Koblenz/Moselle	N	13
(BfG)	N < Limit of detection	0
	Minimum	0.008
	Average	0.014
	Maximum	0.023
	Sampling method	1M28

Legend:

N = number of samples
E = individual sample
M = composite sample

Graph 3: Bisphenol A monitoring values for the monitoring year 2011

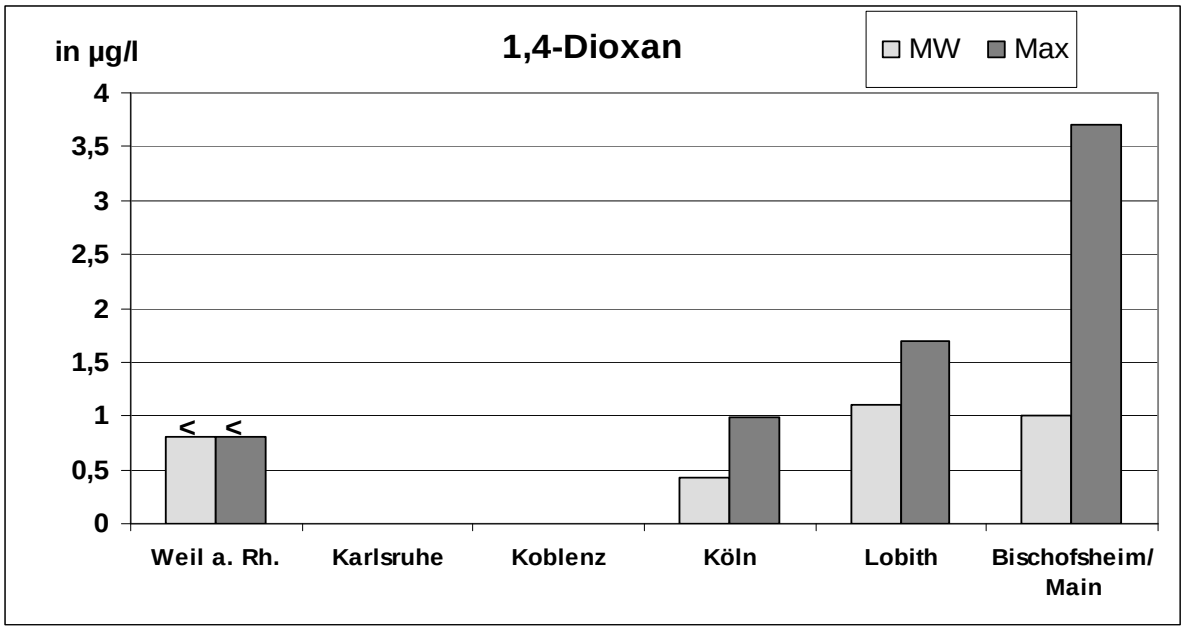


Legend: MW = Average
Max = Maximum

Table 4: 1.4-dioxan-monitoring values for the monitoring years 2011, 2012 and 2013

Measurement location		**values (µg/l)**
Weil a. Rh.	N	23
2012	N < Limit of detection	23
	Minimum	<0.8
	Average	<0.8
	Maximum	<0.8
	Sampling method	1M14
Cologne	N	14
(ARW) July/August 2011	N < Limit of detection Minimum Average Maximum Sampling method	0 0.12 0.43 0.99 E
Lobith	N	13
(RIWA) 2012	N < Limit of detection Minimum Average Maximum Sampling method	1 <0.5 1.01 1.7 E28
Bischofsheim / Main	N	12
2013	N < Limit of detection Minimum Average Maximum Sampling method	3 <0.5 1.0 3.7 E

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