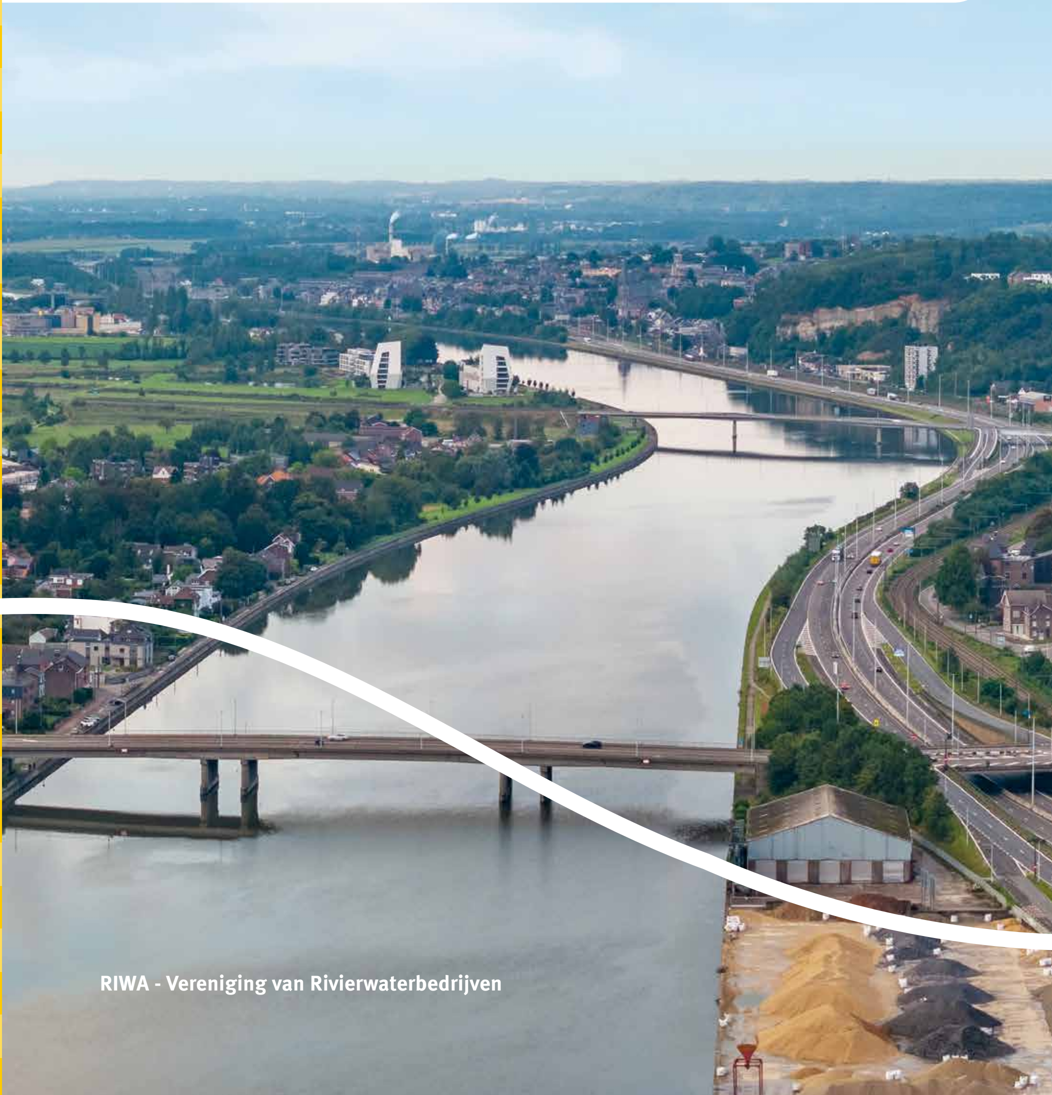
Annual Report 2025
The Meuse

RIWA MEUSE

Pollution and drought disrupt drinking water production from the Meuse – companies and authorities must take action.



RIWA - Vereniging van Rivierwaterbedrijven

Contents

Introduction

Water quality must improve: the knowledge is available, and the time has come to take action

As mentioned in the introduction, the Meuse supplies drinking water to seven million people in the Netherlands and Belgium. But the quality of water from this valuable source is inadequate. Given the extensive knowledge we now possess on pollutants and what needs to be done to make the water cleaner, the time has come to take action!

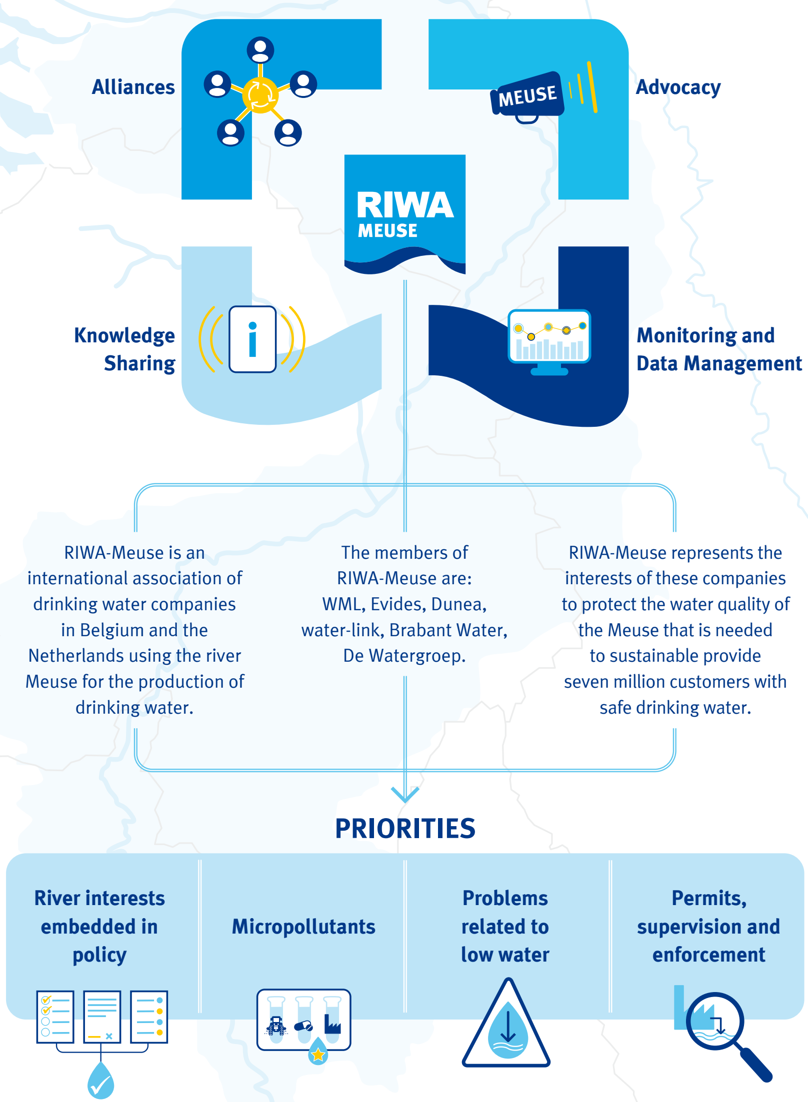
he Association of River Water Companies RIWA (Rhine, Meuse and Scheldt) is celebrating its 75th anniversary this year. Since its foundation back in 1951, the association has been working to protect surface water as a source of the public drinking water supply. Seventy-five years on, there is still much work to do. We still have to deal with a deterioration in the water quality of our rivers. Added to this, the demand for water is increasing due to population and economic growth; the changing climate is putting even more pressure on water quality and the availability of river water.

RIWA-Maas focuses on the Meuse and unites six drinking water companies in the Netherlands and Belgium. Every year, RIWA-Maas informs you about the status of water quality, the main challenges and possible solutions.

Breaching standards

In this report, we shed light on the quality of water in the Meuse in 2025 based on a large number of measurements of many different substances. Just as in previous years, we detected numerous substances in the Meuse in excessive concentrations this year. Many of these substances are 'organic micropollutants'. They can be, even in small concentrations, very harmful and have no natural place in our aquatic environment. Despite this, these pollutants continue to enter the Meuse in excessive concentrations every year, in the form of many different industrial substances, consumer products, residues of medicines and pesticides.

The Mission of RIWA-Meuse



RIWA-Maas tests all these substances against the ERM target values. This is the benchmark against which we assess the water quality of rivers so that drinking water can be produced sustainably, using natural purification techniques. This report shows which substances we encounter in excessive concentrations, what the consequences are and what we can do about them.

Abstraction stops

Pollutants forced drinking water companies to halt the abstraction of Meuse water for drinking water production dozens of times in 2025. Due to an industrial discharge of the pesticide propamocarb, Waterleiding Maatschappij Limburg (WML) was unable to abstract Meuse water for approximately three months. The downstream drinking water companies Evides and Dunea were also forced to stop abstracting Meuse water because of this same pollutant.

On this occasion, WML used water from the reservoirs instead, says Joyce Nelissen, director of WML, in an interview for this report. This is not sustainable in the long term as it could have a negative impact on nature. This is why the company switched to groundwater; however, not all drinking water companies have this option.

This incident also highlights another serious problem: no-one has a complete picture of what exactly ends up in the surface water. The source of the pollution with the pesticide mentioned earlier was particularly difficult to trace because the discharge was found to originate from abroad. The source of the Meuse is in France and it flows via Belgium and the Netherlands to the sea.

No overview of discharges

In early 2026, the Netherlands Court of Audit also concluded that the government lacks a national overview of permitted and actual wastewater discharges by companies. Unfortunately, this means that we have a limited insight into potential risks to water quality. The same applies to opportunities to improve quality.

What is required to better protect the Meuse as a source of drinking water for 7 million people?

View and handle on waste water discharges

For an effective protection of the Meuse a complete insight into what is being discharged and where is required.

- Make one current, public and uniform register of direct and indirect discharges in the entirety of the international Meuse catchment area.
- Record mandatorily in permits which substances are being discharged, in which amounts, on which locations, and under which competent authority.
- Update permits periodically and make it clear that harmful discharges on water are a last resort only.

Tackle harmful substances at the source

Also in 2025 many substances exceeded the target values for the Meuse as a source for drinking water.

- Prioritise preventing and reducing persistent, mobile and toxic substances, like TFA and other PFAS.
- Carry out the recommend measures from the Meuse River Dossier and the risk assessment from RIVM at an accelerated pace.
- Reinforce the granting of permits, supervision, and enforcement, such that non-permitted or harmful discharges can be tracked down and stopped quicker.

Climate robust protection of the Meuse

Drought, prolonged heat, and low river discharge make the Meuse more vulnerable to pollutants. Less water means less dilution, while the demand for clean water increases.

- Make discharge permits climate robust and limit emissions especially during low river flows and drought.
- Develop international agreements on water availability, the distribution of water and prioritisation during water scarcity.

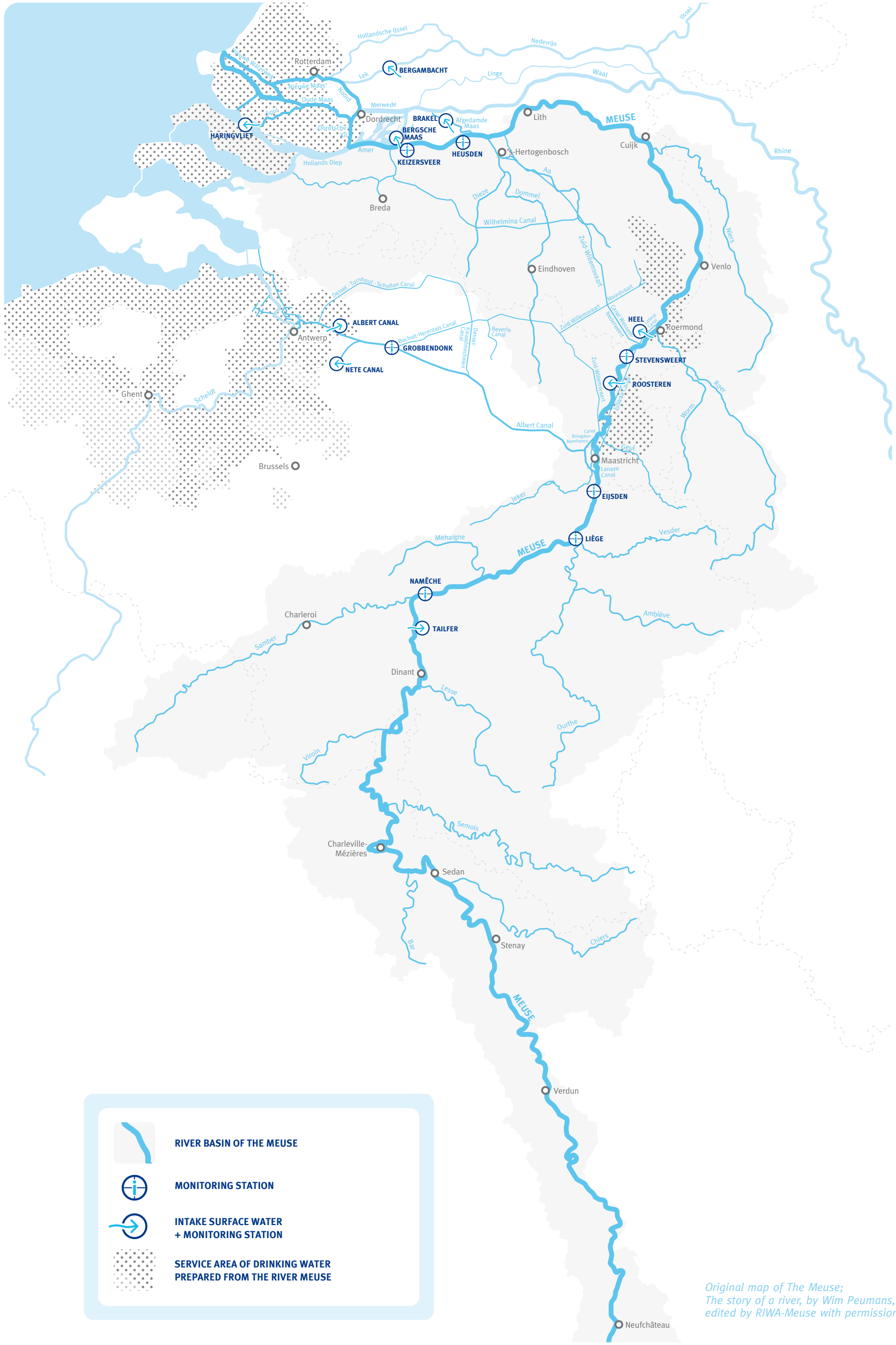
In the meantime, Thomas Biersteker, a Hydraulic Engineering student at TU Delft, was already creating the overview in question for the Meuse river basin, commissioned by RIWA-Maas. The data he used came from many different organisations. What did he find? Data is often not up to date, information is not recorded uniformly and the location of discharges is often unclear. We can conclude from this research that discharges need to be registered better and more uniformly.

Fragmented organisation

It is clear that much still needs to be done in the international Meuse river basin to achieve the WFD (Water Framework Directive) objectives. The 2015 deadline has already been postponed twice and must be met by 2027. In his thesis (for which he won the Waternetwerk Masterscriptieprijs (water network Master's thesis prize), Arend Wadman concludes that the division of tasks and responsibilities within government makes the situation even more complex. Wadman is now a lawyer and in this report he explains why the water boards and central government need to have the right to deliver a binding opinion on permit applications. Wadman believes that water interests would then be taken more seriously, which could lead to improvements in the short term.

How is water management organised in Flanders? Is there less fragmentation there and could we learn from them? We asked Bernard De Potter, President of the International Meuse Commission and the most senior official at the Flanders Environment Agency. He stresses the need for stronger international collaboration, especially given climate change and the large volume of new chemical substances.

It was very hot, dry and sunny in both the Netherlands and Flanders last year. This resulted in less water flowing through the river, causing pollutants to be less diluted. The number of new or 'emerging' substances found in our water system is increasing as well. These are chemical compounds for which no standards have been set down in legislation and regulations yet but in many cases are harmful to humans and the environment.



Original map of The Meuse; The story of a river, by Wim Peumans, edited by RIWA-Meuse with permission.

Collaborate far more

In recent years, collaboration has increased significantly in the Meuse river basin. RIWA-Maas is one of the partners in the Clean Meuse Water Chain (SMWK). The endeavour of the SMWK is to reduce organic micropollutants in the Meuse in collaboration with the drinking water companies, water boards, the Ministry of Infrastructure and Water Management and Rijkswaterstaat (the executive agency of the Ministry of Infrastructure and Water Management (RWS)).

This partnership celebrated its 10th anniversary in 2025. In this report, Marjolein Jacobs-van Eerd, the partnership coordinator, explains what has been achieved in the last 10 years. For example, a joint monitoring network has been created. Thanks to this and closer collaboration, it is now easier to detect harmful discharges. This network will enable us to meet the reduction targets and improve water quality. SMWK will expand the collaboration in the years ahead. We will work with provinces, municipalities, environmental services, companies and industry organisations to gain more control over water quality. Households and foreign partners will be involved too.

Time for action

Attention to the importance of 'clean water' has increased in recent years. This is evident from recent research reports from the Dutch government, like the Netherlands Court of Audit and also the National Institute for Public Health and the Environment (RIVM) and RWS. It is also apparent from the growing attention in society and the media: in newspapers, on the radio and shown on TV in documentaries.

RIWA-Maas continues to identify new developments, share knowledge and put the importance of good river water quality on the agenda. We have the knowledge and we know which measures we need to take. We are calling upon the central government, the provinces and European partners to strengthen insight into and control of discharges, to combat administrative fragmentation and to prioritise the protection of water quality!

Maarten van der Ploeg, Director of RIWA-Maas.

A

The Meuse as a source of drinking water

RIWA-Meuse
Association of River Water Companies

Who we are

RIWA-Maas unites six drinking water companies in the Netherlands and Belgium. Together, they extract approximately 450 billion litres of water from the Meuse every year. They use it to produce drinking water for urban areas including Antwerp, Rotterdam and The Hague as well as parts of Limburg, Zeeland and West Flanders.

Our mission

RIWA-Maas aims to protect the quality of surface water in the Meuse river basin, which is the source of drinking water for seven million people. A well-protected source enables water companies to produce drinking water of uncompromising quality, sustainably and using natural purification technologies. The water quality that RIWA-Maas aims to achieve is described in the European River Memorandum (ERM) and is published on the RIWA-Maas website.

What we are working on

RIWA-Maas identifies developments and trends that could pose a risk to water quality in the Meuse. For example, the many industrial, agricultural and urban sources of pollution. To ensure sufficient availability of Meuse water, RIWA-Maas is studying the impact of the changing climate on drinking water production. It is actively working with others on joint solutions to reduce pollutants and ensure preparedness for the consequences of climate change.

RIWA-Maas draws on facts to inform a broad public about developments that impact the water quality and quantity in the Meuse river basin. Efforts to protect the Meuse as a source of drinking water span four countries and a wide range of policy areas and fields. RIWA-Maas is able to rely on a large international network to achieve its objectives.

Our members:

Want to know more?

See riwa-maas.org

What was the status of the Meuse as a source of drinking water in 2025? Which events affected water quality? This section focuses on the measurements and their results, abstraction stops and the impact of pollutants and weather on water quality.

A1 A list of the facts about measurements in the Meuse

In 2025, RIWA-Maas members and RWS conducted a total of 76.818 measurements on 806 parameters at various monitoring points along the Meuse (the various substances and properties of the water that are measured, such as oxygen, temperature or chemical substances). Of these 806 parameters, 679 were testable. 69 (10.2%) of these 679 parameters breached the ERM target value once or more at one or more monitoring points. In 2025, 127 parameters were not testable because of the absence of any standards or target values for them (at that time).

Of the 69 breached parameters, 37.7% (26) are a part of the ‘industrial substances and consumer products’ category and 27.5% (19) to the ‘medicines and endocrine disrupting chemicals’ category. These two categories consist mainly of non-standardised substances also known as ‘emerging’ or new substances.

A2 Abstraction stops and restrictions

When the quality of the source that drinking water companies use is inadequate, water abstraction from the source in question is temporarily suspended or reduced; this is a so-called abstraction stop or restriction. In 2025, the drinking water companies that use the Meuse as a source of drinking water implemented a total of 56 abstraction stops and restrictions in the Meuse due to water pollutants. Normal operations were interrupted or disrupted (also see Annex 2: Abstraction stops and restrictions due to water pollution) due to pollutants for a total of 4610 hours (192 days in total, for all the abstraction points). See Figure 1 for a summary of the number of abstraction restrictions and their duration from 2007 to 2025.

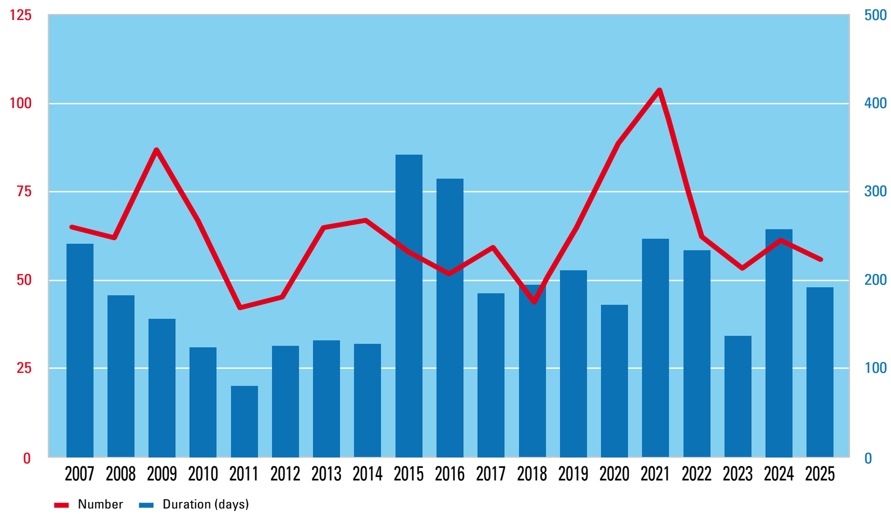
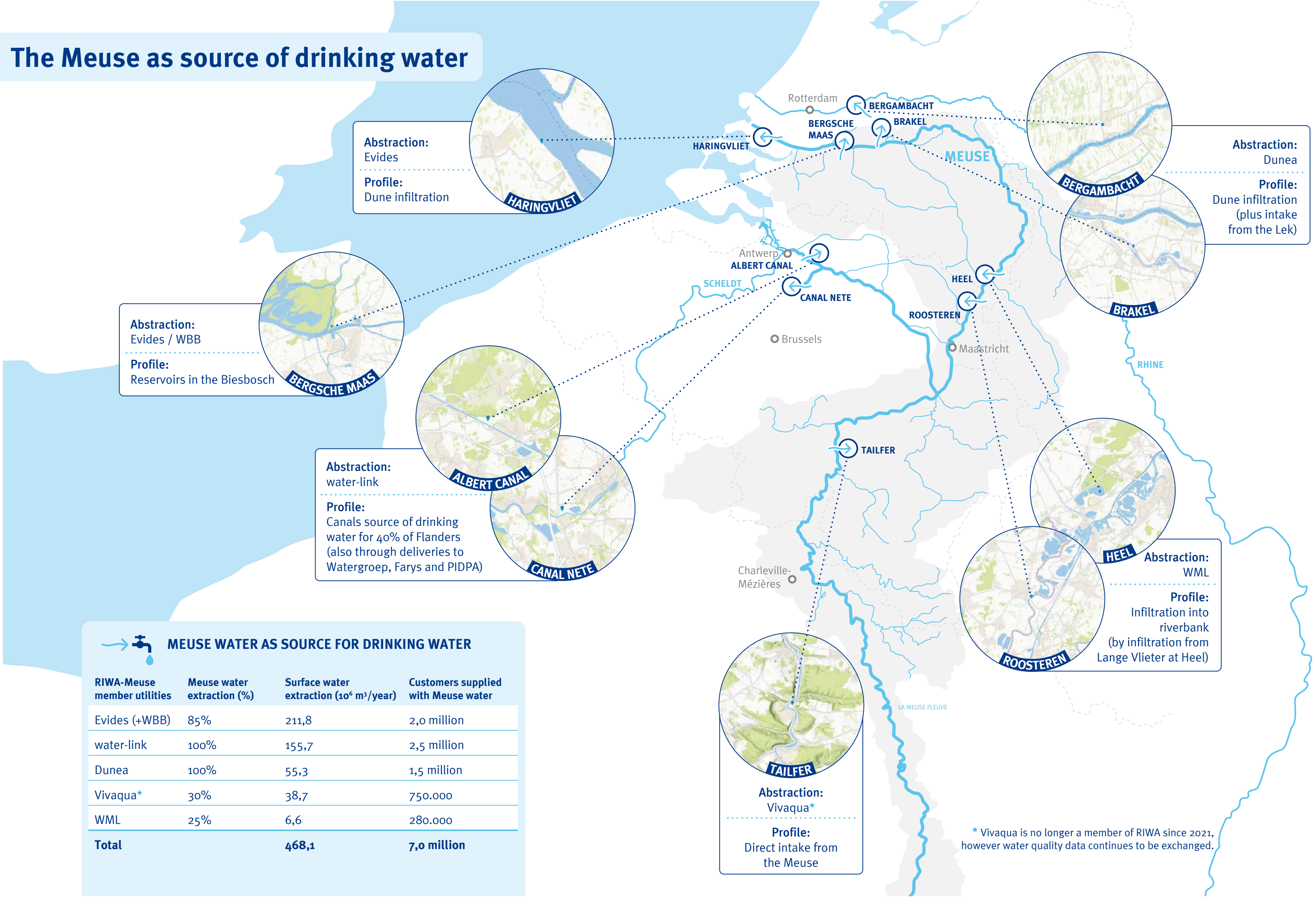


Figure 1: Duration and number of abstraction restrictions due to pollutants (cumulative) along the river Meuse, 2007-2025.

Whether and how often drinking water companies stop their water abstraction activities (an abstraction stop) differs per location. As a general rule, the furthest upstream abstraction point at Tailfer in Wallonia is never shut off. Further down the river, in Flanders, the Belgian drinking water company Water-Link rarely needs to stop water abstraction from the Albert Canal due to the cushioning effect the canal system has on water quality. Because water stays in the canal longer and passes through the locks gradually, pollutant peaks are levelled out.

Across the Dutch border, WML frequently stops their abstraction at the Heel abstraction point. In 2025, there was just one long-term abstraction restriction at the Brakel abstraction point. Dunea started to use a number of different sources in 2025, which has made it less reliant on the availability of Meuse water. For example, it alternates between the Afgedamde Maas (Dammed-up Meuse) and the Lek (Rhine water) or water is a mix from these sources.

The Meuse as source of drinking water



* Vivaqua is no longer a member of RIWA since 2021, however water quality data continues to be exchanged.

MEUSE WATER AS SOURCE FOR DRINKING WATER

RIWA-Meuse member utilities	Meuse water extraction (%)	Surface water extraction (10^6 m^3/year)	Customers supplied with Meuse water
Evides (+WBB)	85%	211,8	2,0 million
water-link	100%	155,7	2,5 million
Dunea	100%	55,3	1,5 million
Vivaqua*	30%	38,7	750.000
WML	25%	6,6	280.000
Total		**468,1**	**7,0 million**

The Evides abstraction points at Gat van de Kerksloot/Keizersveer[1] (until 2021) and the Bergsche Maas/Hank (from 2021) are the best gauges of the condition of the river because only Meuse water is available there. Water abstraction from the Haringvliet consists mainly of Rhine water.

Propamocarb

Since the beginning of August 2025, RWS has measured elevated concentrations of propamocarb at intervals in the Meuse at Eijsden; WML has observed the same in Roosteren and Heel. Propamocarb is a pesticide that is used to combat mould in potato cultivation. WML temporarily stopped abstracting Meuse water for the production of drinking water because of these elevated concentrations. This suspension lasted intermittently until early November 2025. The highest concentration measured was 4 µg/L in Eijsden on 25 September (see Figure 2).

In August 2025, the extremely low level of the Meuse was thought to be the reason for the persistent pollution. The belief was that propamocarb was not being washed away because of the prolonged drought. However, the pollution persisted after the precipitation in the following weeks , which lead us to consider continued discharges originating from Wallonia, between the Flemalle and Outremeuse locks.

In early 2026, following an extensive investigation, the Service Public de Wallonie (SPW) located a company as the suspected discharger of the substance propamocarb into the river. To trace the source of the pollution, researchers analysed water samples from 80 monitoring points in the Meuse. Because the company had committed an offence, environmental protection officers from SPW drew up an official report. The file was then transferred to the public prosecutor's office in Liège (see Subsection C1).

1 *The actual abstraction point was situated at Gat van de Kerksloot; the Keizersveer monitoring point was representative for this abstraction point.*

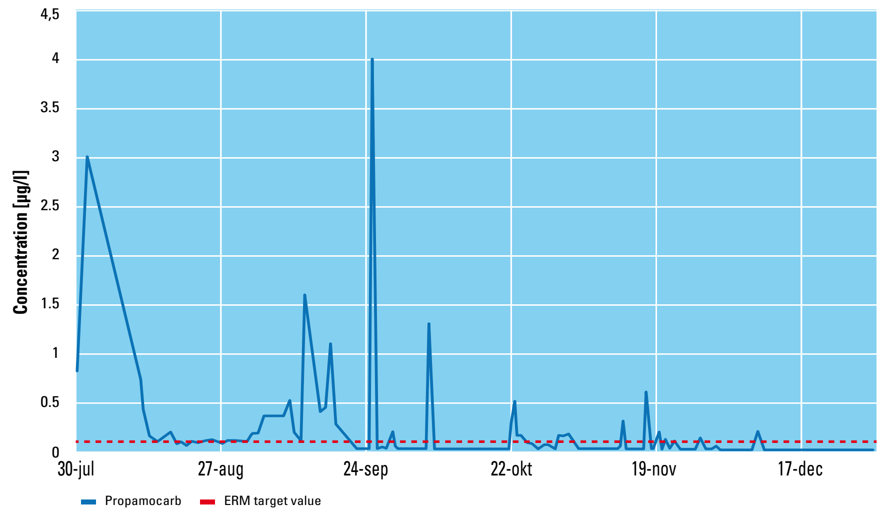


Figure 2: Concentrations of propamocarb in the Meuse at Eijsden in the second half of 2025.

Failure of Land van Cuijk waste water treatment plant

On 25 November 2025, the Aa en Maas water board reported that the Land van Cuijk waste water treatment plant (RWZI) had failed unexpectedly, resulting in untreated wastewater entering the Meuse at a rate of approximately 3,500 m³/hour. To reduce risks to drinking water production, it was decided, based on additional monitoring and forecasts, to preventively stop abstraction at Bergsche Maas. Additional sampling revealed that indicator pathogens were significantly elevated at Grave but decreased sharply during transit/residence time in the river. No breaches of legal standards were detected at the abstraction pumping station and water quality parameters like oxygen and acidity remained stable. Additional analyses (microbiology, bioassays or anthropogenic substances) proved unnecessary. Despite the absence of any breaches of legal standards, it is advisable to preventively stop abstraction if a similar situation arises in the future. Indicator organisms alone are measured for pathogens; if an RWZI fails, there is always a chance of the presence of other pathogens that fall outside the measurement range. Evides resumed abstraction after several *days of decreasing concentrations and stable low levels. Thanks to timely monitoring, preventive measures and good communication between the water board and drinking water companies, the incident did not have any impact on drinking water quality or security of supply. Abstraction from the Bergsche Maas stopped for seven days.*

A3 Monitoring and measurement results

Every three years, RIWA-Maas evaluates the substances measured in the Meuse that we consider relevant for the drinking water sector. RIWA-Maas does this based on a broad monitoring programme. The most recent evaluation was carried out in 2024.

In 2007, RIWA-Maas added a priority system to the series of parameters that are required by law. This system is intended to facilitate the more targeted monitoring of substances and the ability to take proper advantage of new developments. RIWA-Maas evaluates the system every three years; the most recent evaluation took place in 2024. The report published in 2025, entitled ‘Drinking water-relevant substances in the Meuse 2024’ describes how we did this[2].

For monitoring purposes, RIWA-Maas has classified substances into three categories since 2015:

- Drinking water-relevant substances: substances on which RIWA-Maas focuses its advocacy. A substance is drinking water relevant if it could become a problem for our drinking water;
- Substances with the potential to be relevant for the production of drinking water: substances that have not been measured yet, or not sufficiently;
- Substances that are no longer relevant for the production of drinking water.

2 *https://www.riwa-maas.org/publicatie/an-update-of-the-lists-with-substances-that-are-relevant-for-the-production-of-drinking-water-from-the-river-meuse-2/.*

The results of the monitoring carried out in 2025 can be found in Annex 1 of the present report. The substance properties ‘Persistence’, ‘Mobility’ and ‘Toxicity’ (PMT) pose a risk to the production of drinking water; as such, we will consider them first. We will then discuss the substances detected in the Meuse in 2025 in concentrations above the ERM target value. It is possible to produce drinking water in a sustainable way, with natural purification methods from water that meets the ERM target values.

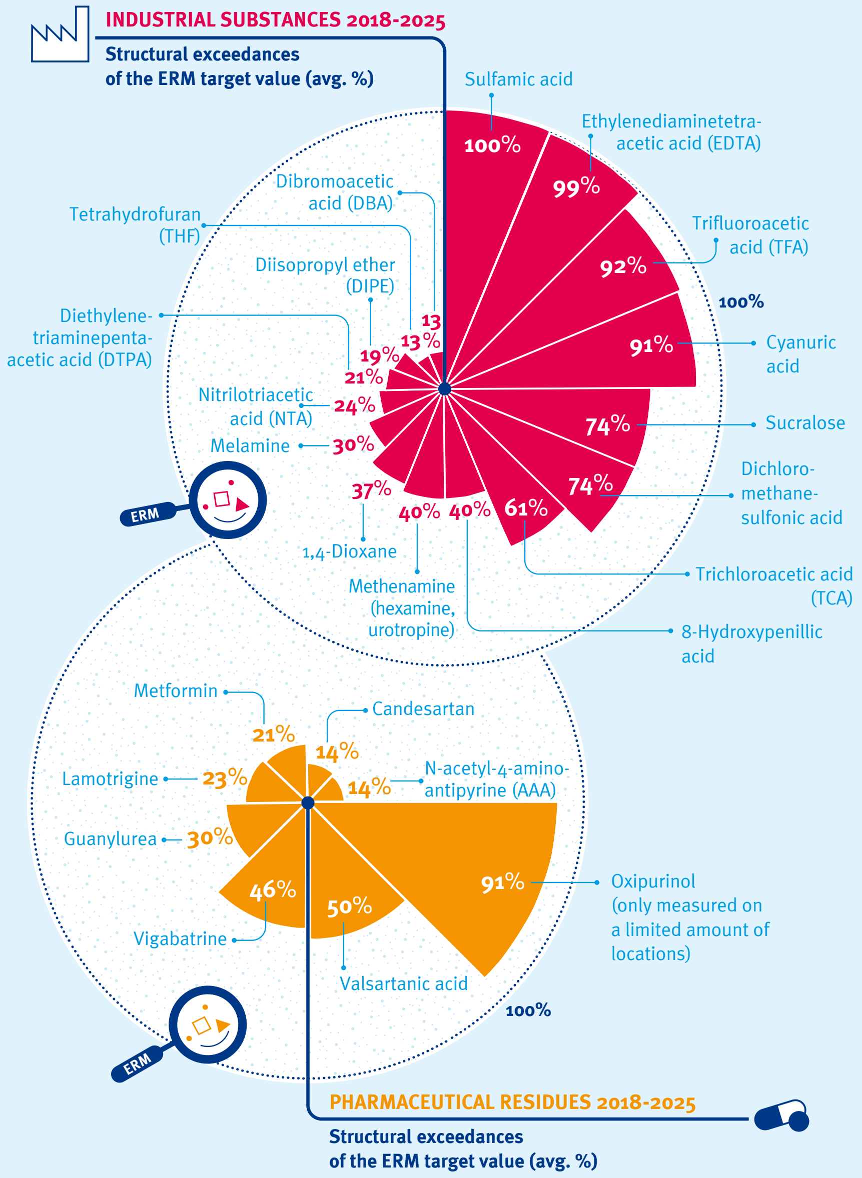
A3.1 Per- and polyfluoroalkyl substances (PFAS)

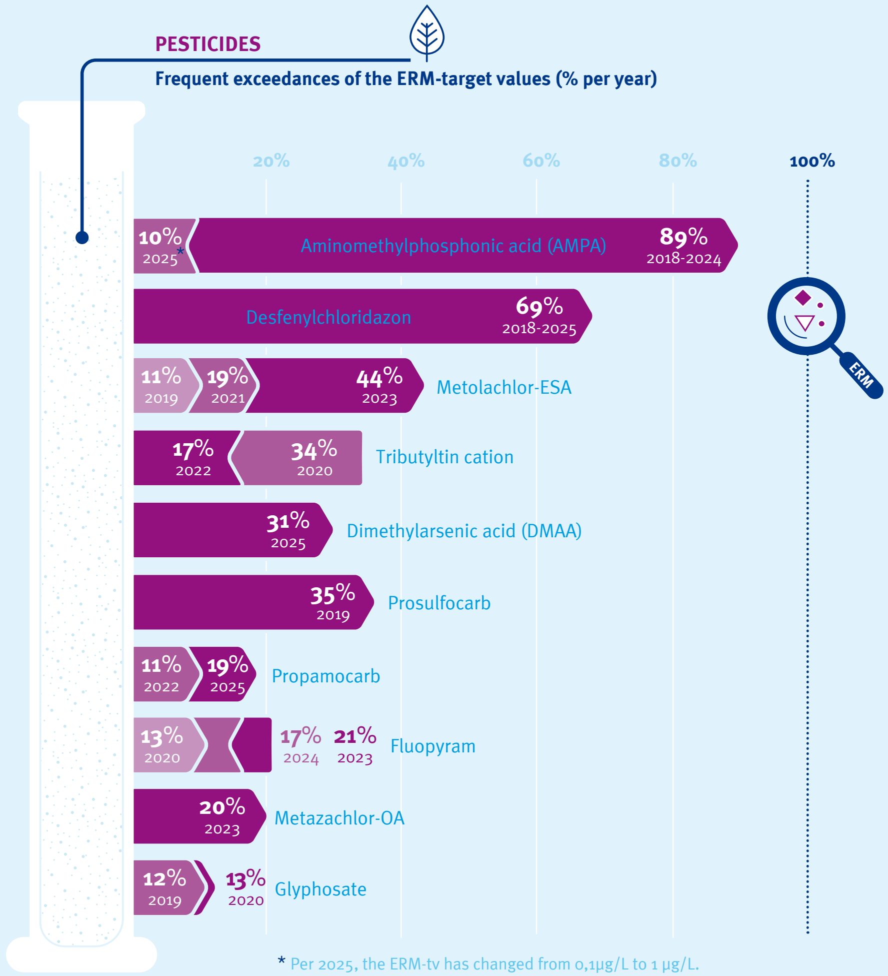
Per- and polyfluoroalkyl substances (PFAS) are at the top of the list of drinking water-relevant substances. The ERM target value for anthropogenic non-natural substances that affect biological systems is 0.1 micrograms per litre, unless a lower value is required due to advances in toxicological understanding. This is the case for PFAS. New scientific insights have shown that PFAS are more harmful to health than previously thought.

The revised EU Drinking Water Directive[3] contains a choice of which standard to apply for PFAS: total PFAS (500 nanograms per litre) or the sum of 20 PFAS (100 nanograms per litre). Belgium and the Netherlands chose the sum of 20 PFAS, as shown in Table 1. In 2021 and 2024, these 20 PFAS were assessed as a group that is drinking water relevant. On 15 November 2024, 633 PFAS, including the 20 PFAS from the EU Drinking Water Directive and trifluoroacetic acid (TFA), were added to the RIVM list of Substances of Very High Concern (SVHCs)[4].

3 *Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption (recast).*
4 *https://rvszoeksysteem.rivm.nl/ZZSlijst/ZZSgroep/ZZS_PFAS.*

Treshold exceeding substances 2018-2025





* Per 2025, the ERM-tv has changed from 0,1µg/L to 1 µg/L.

Drinking water companies that use the Meuse as a source test the water quality of the Meuse to the target values from the European River Memorandum. Water that meets these values can sustainably, and with natural purifcation methods be used for the preparation of drinking water. Between 2018 and 2025 various kinds of industrial substances, pesticidces, and pharmaceutical residues structurally or frequently exceeded the ERM-target values. Many of these subtances form a risk for the production of drinking water, and need to be kept out of the water envinronment.

Table 1: 20 PFAS from Part B of the EU Drinking Water Directive 2020/2184 and their PMT scores from the RIVM screening tool.

20 PFAS EU Drinking Water Directive	PMT score	PPMT score	M score	T score
Perfluorobutanoic acid (PFBA)	0.57	0.62	0.61	0.48
Perfluoropentanoic acid (PFPeA)	0.63	0.83	0.55	0.54
Perfluorohexanoic acid (PFHxA)	0.65	0.93	0.49	0.61
Perfluoroheptanoic acid (PFHPA)	0.63	0.98	0.42	0.61
Perfluoroctanoic acid (PFOA)	0.60	0.99	0.36	0.61
Perfluorononanoic acid (PFNA)	0.57	1.00	0.31	0.61
Perfluorodecanoic acid (PFDA)	0.54	1.00	0.25	0.61
Perfluoroundecanoic acid (PFUnDA)	0.50	1.00	0.21	0.61
Perfluorododecanoic acid (PFDoDA)	0.47	1.00	0.17	0.61
Perfluorotridecanoic acid (PFTrDA)	0.44	1.00	0.14	0.61
Perfluorobutane sulfonic acid (PFBS)	0.63	0.92	0.51	0.53
Perfluoropentane sulfonic acid (PFPeS)	0.69	0.97	0.45	0.77
Perfluorohexane sulfonic acid (PFHxS)	0.60	0.99	0.39	0.55
Perfluoroheptane sulfonic acid (PFHpS)	0.57	1.00	0.33	0.55
Perfluorooctane sulfonic acid (PFOS)	0.53	1.00	0.27	0.55
Perfluorononane sulfonic acid (PFNS)	0.50	1.00	0.23	0.55
Perfluorodecane sulfonic acid (PFDS)	0.47	1.00	0.18	0.55
Perfluoroundecane sulfonic acid (PFUdAS)	0.43	1.00	0.15	0.55
Perfluorododecane sulfonic acid (PFDoAS)	0.40	1.00	0.12	0.55
Perfluorotridecane sulfonic acid (PFTDAS)	0.37	1.00	0.09	0.55

<0.33 low to moderate P/M/T concern, 0.33-0.5 high P/M/T concern, >0.5 very high P/M/T concern

See Figure 3 for the development in concentrations of the sum of the 20 PFAS from the EU Drinking Water Directive in the Lateral Canal at Heel in 2025.

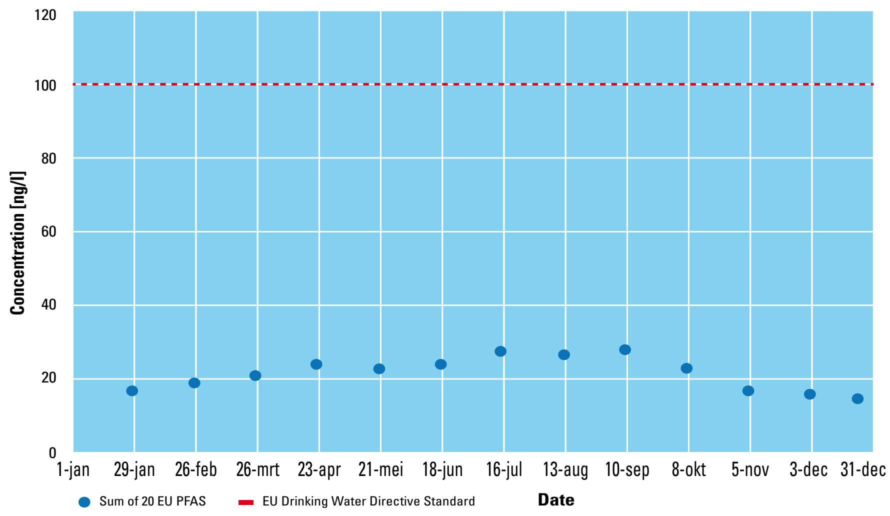


Figure 3: Concentrations of the sum of the 20 PFAS from the EU Drinking Water Directive in the Lateral Canal at Heel in 2025

Trifluoroacetic acid

See Figure 4 for the development in the concentrations of TFA in the Bergsche Maas in 2025. The indicative drinking water guideline value of 2.2 µg/L for TFA applies if just TFA is present in the sample in question[5]. If multiple PFAS (including TFA) are measured in a sample, the concentrations must be aggregated after a correction for potency. The indicative drinking water guideline value for the sum of all PFAS measured is 4.4 ng/L, expressed in PFOA equivalents (PEQs).

5 *https://www.rivm.nl/documenten/bijlage-bij-rivm-brief-aan-ilt-indicatieve-drinkwaterrichtwaarde-trifluorazijnzuur-tfa*

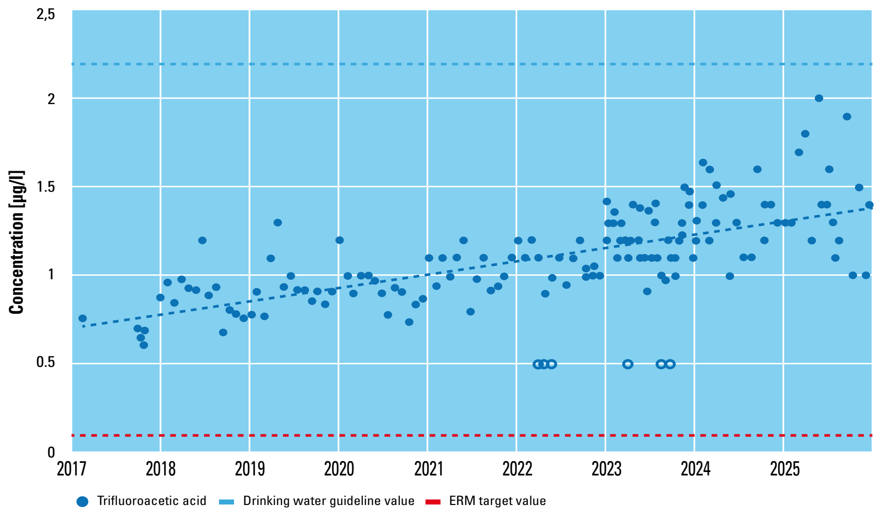


Figure 4: Concentrations of TFA in the Bergsche Maas 2017-2025.

The highest measured value of TFA in the Bergsche Maas in 2025 was 2 µg/L; in other words, this PFAS represented more than 90% of the PFOA equivalents at that time. The clear upward trend in the concentration of TFA in the Bergsche Maas in recent years (the dotted line in Figure 4) is a cause for concern. For many years it was assumed that TFA was persistent but not directly toxic. Dunea also notes a significant increase in TFA at Brakel over the past five years. The European chemicals watchdog ECHA has recently revised the classification to 'may damage the unborn child' and 'may impair fertility'. This has led to a stricter approach and calls for bans on pesticides that degrade into TFA. In Directive (EU) 2026/805, in which the European Union (EU) drastically revises the rules for water quality, TFA has been added to priority substances alongside PFAS.

elative Potency Factor

PFAS usually do not occur in the form of individual substances but as a combination of multiple PFAS. This also means that all these PFAS contribute to the total toxicity of the combined substances. Therefore, as many PFAS as possible must be included in a risk assessment.

RIVM has developed the RPF method for this purpose. This facilitates the assessment of PFAS as a group in the combined substances that people ingest. The abbreviation RPF stands for Relative Potency Factor. It enables comparison of the harmfulness of various PFAS with PFOA. This substance is used as a reference because the health-based limit value for PFAS is based on scientific research in which harmful effects have been linked to PFOA. RPFs are calculated based on the effects of PFAS on the liver. By multiplying the concentration of an individual PFAS in a drinking water sample by its RPF, the concentration is expressed in PEQs.

The sum of PEQs can be compared with the health-based limit value for PFAS. In 2022, the Dutch government established a drinking water guideline value of 4.4 ng/L for PFAS, expressed as PEQs. In the future, this guideline value will be included as a statutory quality requirement in the Dutch Drinking Water Decree (which regulates the quality and safety of drinking water in the Netherlands).

Target Values of the European River Memorandum

Drinking water companies from the river basins of the Meuse, Rhine, Danube, Elbe, Ruhr and Scheldt have had the European Memorandum River (ERM) formulated in order to safeguard the quality of surface water that is used for the production drinking water. Surface water that meets the ERM Target Values can be used to sustainably produce drinking water, making use of natural purification technologies.

EUROPEAN RIVER MEMORANDUM

JOINED STRATEGY AND VISION

in the production of drinking water from surface water, according to the principles of sustainability, precaution, and prevention.

Ruhr
Elbe
Scheldt
Rhine
Meuse
Danube

18
ERM-countries

TARGET VALUES

! Important ERM principles

Prioritising drinking water supply

Sustainable management of water resources

Preventative protection of water bodies

Responsible discharging of wastewater

Insight into harmful substances

ERM
Industrial substances

ERM
Pharmaceuticals

ERM
Pesticides
Other

WATER QUALITY ASSESSMENT

RIWA MEUSE

Water quality indicators for

170
DRINKING WATER COMPANIES

188
MILLION CUSTOMERS

A3.2 Measurement results in 2025

Table 2: Overview of substances breaching the ERM target value in 2025 (maximum concentrations), in order of percentage of breaching measurements.

Parameter	CASRN	ERM-	tv	TAI	NAM	LUI	EYS	ROO	STV	HEE	HEU	BRA	BSM	HAR	n/	N	%
Industrial substances and consumer products															686	2147	31,9%
Ethylenediaminetetraacetic acid (EDTA)	60-00-4	1	µg/l				8,10	12		11		14	31	7	84	84	100%
Sulfamic acid	5329-14-6	0,1	µg/l					20		25		33	44	70	62	62	100%
Cyanuric acid	108-80-5	0,1	µg/l				<1	3,30		1,70		0,77	2,00	1,80	62	63	98,4%
Sucralose	56038-13-2	1	µg/l				<1	3,00		5,00	7,10	6,90	10,00	3,30	63	68	92,6%
Dichloromethanesulfonic acid	53638-45-2	0,1	µg/l					0,62		0,33		0,16	0,35	0,23	51	61	83,6%
Trifluoroacetic acid (TFA)	76-05-1	100	ng/l					1800		1700		2000	2000	1500	56	73	76,7%
Trichloroacetic acid (TCA)	76-03-9	0,1	µg/l								0,35	0,31	0,38	0,16	37	55	67,2%
Methenamine (hexamine, urotropine)	100-97-0	1	µg/l		3,06	7,15	2,57	9,80		6,30		0,72	1,60	2,30	41	107	38,3%
Nitrilotriacetic acid (NTA)	139-13-9	1	µg/l		<5	<1	6,70	<1		4,10		3,20	5,30	4,20	33	92	35,8%
8-Hydroxypellitic acid	3053-85-8	0,1	µg/l							<0,05			0,78	0,08	11	42	26,1%
Diethylenetriaminepentaacetic acid (DTPA)	67-43-6	1	µg/l		<5	<1	<10	<1		<1		9,20	13,00	1,40	23	91	25,2%
Galaxolide (HHCB)	1222-05-5	0,1	µg/l		0,23	0,13									2	8	25%
Dibromoacetic acid	631-64-1	0,0104	µg/l								0,34	0,39	0,52	<0,06	12	53	22,6%
Melamine (1,3,5-triazine-2,4,6-triamine)	108-78-1	1	µg/l		0,38	0,72	0,75	7,30		1,90	2,00	1,50	3,60	1,50	100	447	22,3%
Tolyltriazole	29385-43-1	1	µg/l		0,37	2,12									5	26	19,2%
Dibromomethanesulfonic acid	859073-88-4	0,1	µg/l					<0,1		<0,1		0,32	0,18	0,52	9	62	14,5%
Diisopropyl ether (DIPE)	108-20-3	1	µg/l		<0,1	8,51	11,00	2,60	1,24	0,60	0,70	0,02	0,82	0,07	19	140	13,5%
Aniline	62-53-3	0,1	µg/l					0,08		0,06		0,05	0,08	0,16	6	50	12%
Dimethyl disulfide	624-92-0	0,1	µg/l				0,13			0,05		0,24	0,09	0,04	2	63	3,1%
Trifluoromethanesulfonic acid	1493-13-6	0,1	µg/l					0,62		0,02		0,02			1	33	3%
Dichloroacetic acid	79-43-6	0,1	µg/l					0,43		<0,1	0,06	0,02	0,08	0,10	2	74	2,7%
Acesulfame potassium (Acesulfame-K)	55589-62-3	1	µg/l					0,56		0,53			0,49	1,10	1	46	2,1%
Tetrahydrofuran (THF)	109-99-9	1	µg/l					0,62		0,33			1,30	0,26	1	56	1,7%
Ethyl sulfate	540-82-9	0,1	µg/l					0,11		<0,1		<0,1	<0,1	<0,1	1	62	1,6%
Benzotriazole	95-14-7	1	µg/l		0,99	1,08	0,26	0,45		0,50	0,69	0,46	0,71	0,43	1	104	0,9%
p-Cymene (1-isopropyl-4-methylbenzene)	99-87-6	0,1	µg/l		<0,1	<0,1		<0,05		<0,05	0,06	0,08	0,12	<0,05	1	125	0,8%

ERM-tv = ERM target value, TAI = Tailfer, NAM = Namêche, LUI = Liège, EYS = Eijsden, ROO = Roosteren, STV = Stevensweert, HEE = Heel, BRA = Brakel, HEU = Heusden, KEI = Keizersveer, BSM = Bergsche Maas, HAR = Haringvliet.

Continuation of Table 2: Overview of substances breaching the ERM target value in 2025 (maximum concentrations), in order of percentage of breaching measurements.

Parameter	CASRN	ERM-	tv	TAI	NAM	LUI	EYS	ROO	STV	HEE	HEU	BRA	BSM	HAR	n/	N	%
Pharmaceuticals and endocrine-disrupting substances															299	1459	20,4%
Oxypurinol	2465-59-0	0,1	µg/l								1,70	1,20			26	29	89,6%
Valsartan acid	164265-78-5	0,1	µg/l					0,17		0,28	0,38	0,32	0,53	0,28	50	76	65,7%
Lamotrigine	84057-84-1	0,1	µg/l					0,15		0,13	0,16	0,12	0,19	0,13	40	76	52,6%
Vigabatrin	60643-86-9	0,1	µg/l					0,94		0,80			0,75	0,63	22	46	47,8%
Lithium	7439-93-2	7,7	µg/l Li			7,80	12,80			8,29		9,39	9,80	11,00	41	125	32,8%
Candesartan	139481-59-7	0,1	µg/l				0,02	0,02		0,03	0,15	0,10	0,15	0,17	23	78	29,4%
Dibutyl phthalate (DBP)	84-74-2	0,1	µg/l									0,19			1	4	25%
Metformin	657-24-9	1	µg/l		1,23	1,68	1,73	1,70		1,10	1,10	0,60	0,95	0,57	29	121	23,9%
Guanylurea	141-83-3	1	µg/l				1,12	1,70		1,20	1,00	0,26	2,90	1,50	20	94	21,2%
N-acetyl-4-aminoantipyrine (AAA)	83-15-8	0,1	µg/l					0,06		0,04	0,09	0,06	0,11	0,17	11	76	14,4%
Valsartan	137862-53-4	0,1	µg/l		0,13	0,10	0,04	0,08		0,08	0,17	0,06	0,17	0,13	15	104	14,4%
ER-CALUX as 17β-estradiol equivalents		0,25	ng/l		0,31	2,10		0,13		0,10			0,39	0,12	5	48	10,4%
Tramadol	27203-92-5	0,1	µg/l	0,03	0,14	0,14	0,11	0,11		0,07	0,07	0,04	0,09	0,06	9	117	7,6%
Paracetamol	103-90-2	0,1	µg/l					0,24		0,09	0,10	0,04	0,13	0,03	2	76	2,6%
Ketamine	6740-88-1	0,1	µg/l					0,02		0,04			0,11	0,02	1	46	2,1%
Sitagliptin	486460-32-6	0,1	µg/l					0,03		0,03	0,07	0,04	0,09	0,11	1	76	1,3%
Bisphenol A (BPA)	80-05-7	0,1	µg/l		0,02	0,03	0,04	0,15		0,06		<0,008	0,05	0,02	1	78	1,2%
Metoprolol	37350-58-6	0,1	µg/l	0,02			<0,004	0,01		0,02	0,08	0,02	0,12	0,06	1	91	1,1%
Telmisartan	144701-48-4	0,1	µg/l		0,10	0,06		0,04		0,03	0,06	0,04	0,09	0,05	1	98	1%

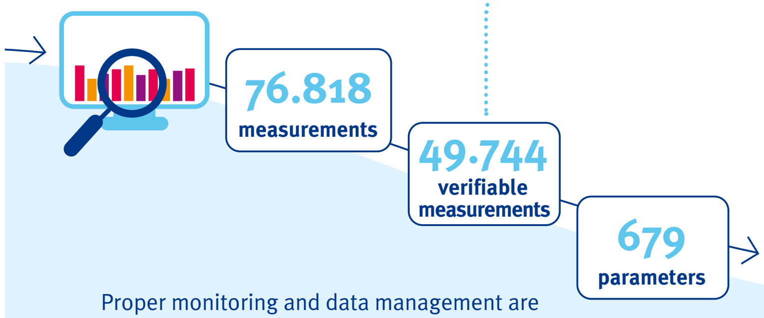
Parameter	CASRN	ERM-	tv	TAI	NAM	LUI	EYS	ROO	STV	HEE	HEU	BRA	BSM	HAR	n/	N	%
Pesticides, biocides and metabolites															211	1746	12%
Desphenyl-chloridazon	6339-19-1	0,1	µg/l	0,12	0,29	0,29		0,35		0,33	0,35	0,27	0,35	0,19	88	113	77,8%
Dimethylsulfamic acid (DMAA)	75-60-5	0,1	µg/l				0,16								4	13	30,7%
Fluopyram	658066-35-4	0,1	µg/l								0,07	0,21			7	31	22,5%
Propamocarb	24579-73-5	0,1	µg/l		<0,02	0,34		0,89		0,54	0,07	0,02	0,09	<0,05	81	433	18,7%
Flonicamid	158062-67-0	0,1	µg/l								0,02	0,16			4	31	12,9%
Aminomethylphosphonic acid (AMPA)	1066-51-9	1	µg/l	0,82	0,72	1,00	<0,5	1,40	1,52	1,10	1,37	0,82	0,94	0,40	14	134	10,4%
Dicamba	1918-00-9	0,1	µg/l					<0,1		0,27	0,01	<0,01	0,90	<0,1	2	60	3,3%
Cyprodinil	121552-61-2	0,1	µg/l								<0,02	0,23	<0,02		1	31	3,2%
(S)-Metolachlor	87392-12-9	0,1	µg/l								0,10	0,09			1	31	3,2%
Flufenacet	142459-58-3	0,1	µg/l		0,06	0,11									1	38	2,6%
Glyphosate	1071-83-6	0,1	µg/l	0,05	0,13	0,09	<0,1	0,13	0,11	0,06	0,09	0,03	0,07	0,03	3	135	2,2%
Metazachlor-ESA	172960-62-2	0,1	µg/l		0,10	0,11				0,07	0,09	0,07	0,08	0,25	2	99	2,0%
Dimethenamid-P	87674-68-8	0,1	µg/l	0,07	0,04	0,10					0,11	0,04			1	81	1,2%
Metazachlor-OA	1231244-60-2	0,1	µg/l		0,08	0,10				<0,05	0,05	0,04	0,07	0,06	1	99	1%
Prosulfocarb	52888-80-9	0,1	µg/l					0,09		0,10	0,06	0,03	<0,05	<0,05	1	417	0,2%

Parameter	CASRN	ERM-	tv	TAI	NAM	LUI	EYS	ROO	STV	HEE	HEU	BRA	BSM	HAR	n/	N	%
General parameters and nutrients															331	1469	22,5%
Dissolved Organic Carbon (DOC)		3	mg/l C	3,74			8,2		3,86	3,6	9,52	4,87	4,9	5,1	165	202	81,6%
Bromide	24959-67-9	0,07	mg/l Br	0,04	0,08	0,47	0,5			0,14		0,1	0,16	0,2	36	109	66,9%
Chlorate	7790-93-4	1	µg/l ClO3	30	196	359		66		26		15	27	21	51	92	55,4%
Total Organic Carbon (TOC)		4	mg/l C				<20	3,4		3,9		12	5,1	4,3	56	134	41,7%
Bromate	15541-45-4	0,05	µg/l BrO3	0,5						<0,1		0,1	0,11	1,3	15	59	25,4%
AOX (ads. org. bnd. halog.)		25	µg/l Cl				42						51		5	37	13,5%
EC (electrical conductivity, 20°C)		70	mS/m	44,9	65,9	68,4		61		58		55,3	56,4	73	1	219	0,4%
Nitrate	14797-55-8	25	mg/l NO3	14		16,9	31		16,96	14		12,4	16,82	13,72	1	251	0,4%
Chloride	16887-00-6	100	mg/l Cl	22	77	90	81		58	55	61	60	60	110	1	366	0,2%

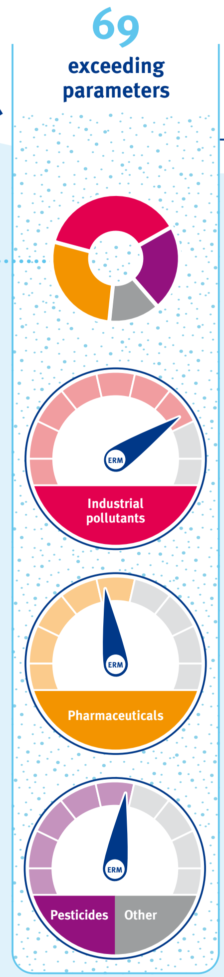
ERM-tv = ERM target value, TAI = Tailfer, NAM = Namêche, LUI = Liège, EYS = Eijsden, ROO = Roosteren, STV = Stevensweert, HEE = Heel, BRA = Brakel, HEU = Heusden, KEI = Keizersveer, BSM = Bergsche Maas, HAR = Haringvliet.

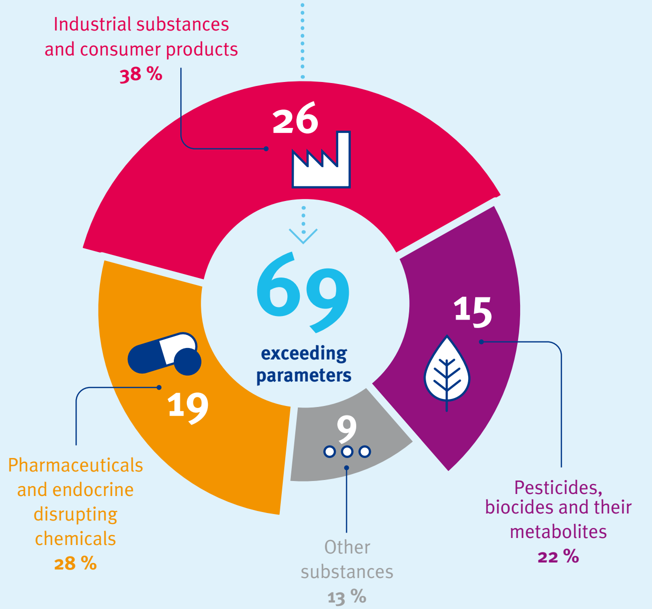
Monitoring the water quality of the Meuse

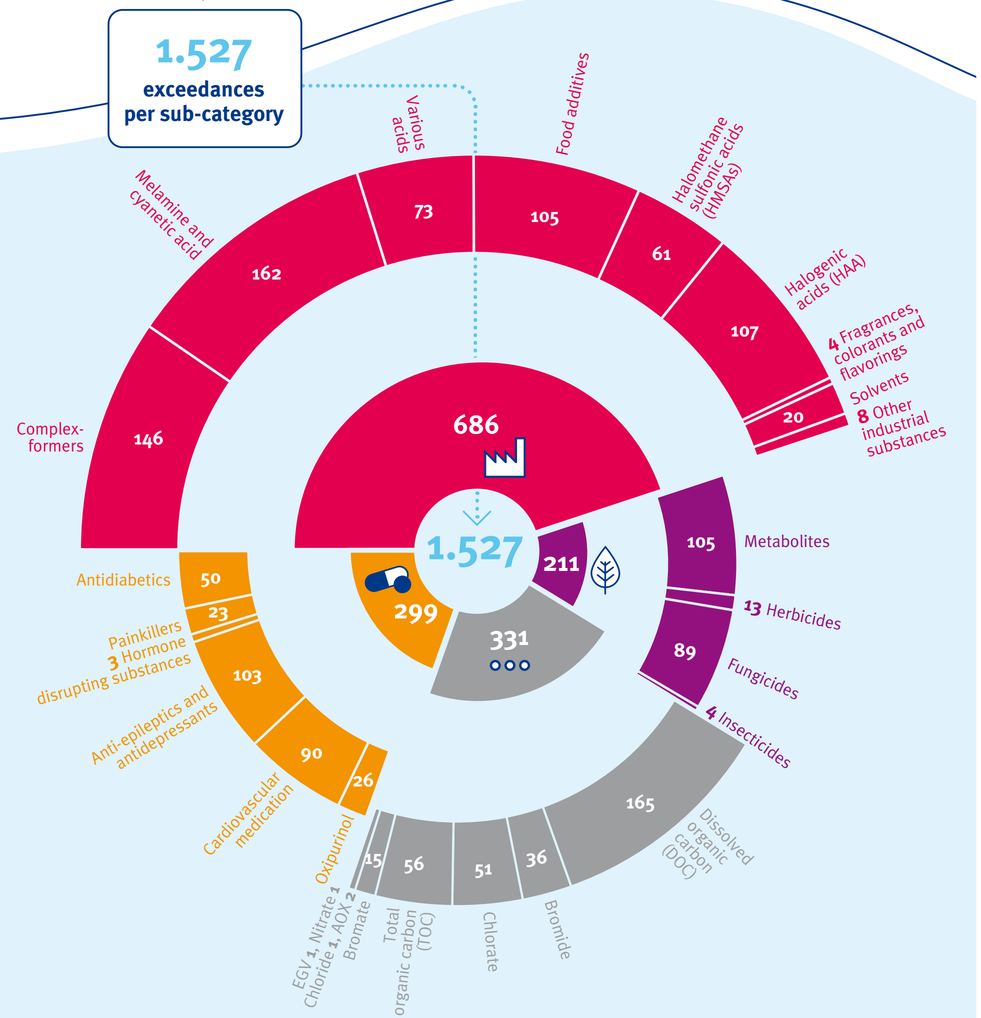
RIWA-Meuse assesses the water quality of the Meuse according to the target values of the European River Memorandum. Surface water that meets the ERM Target Values can be used to sustainably produce drinking water, making use of natural purification technologies.



Proper monitoring and data management are crucial to safeguard the water quality of the Meuse as a source of drinking water.







A3.3 Number of measurements

In 2025, the RIWA-Maas members and RWS conducted a total of 76.818 measurements on 806 parameters at various monitoring points along the Meuse (see Table 3). The substances monitored were tested against the ERM target values. These values are mainly used to test emerging substances that are not subject to a legal standard in the context of drinking water legislation (yet).

Table 3: Overview of water quality measurements in the Meuse in 2025.

Monitoring point (km)	Number of measurements	Number of parameters	Number of testable parameters
Tailfer (520)	2.805	141	137
Namêche (540)	4.756	345	260
Liège (600)	6.680	389	265
Eijsden (615)	8.814	473	276
Roosteren (660)	3.773	572	494
Stevensweert (675)	1.942	235	178
Heel (690)	10.253	769	553
Heusden (845)	6.587	425	343
Brakel (845)	10.043	694	458
Bergsche Maas (865/868)	11.923	805	553
Haringvliet (870)	9.242	747	532
Total	**76.818**	**806**	**679**

A3.4 Testing against the ERM

To test the substances that are not subject to a legal standard yet, the drinking water companies use the ERM target value, the benchmark in the ERM. Drinking water companies in the river basins of the Meuse, Rhine, Danube, Elbe, Ruhr and Scheldt drafted the ERM for surface water. If this target value is met in the surface water, it is possible to prepare drinking water in a sustainable way, with natural purification methods.Drinking water companies also test pesticides and their degradation products (metabolites) against the ERM target value. The ERM target value for active substances and their human health relevant metabolites is equal to the legal standard of 0.1 micrograms per litre (µg/L).

The ERM states that substances with a positive toxicological assessment must be tested against 1 µg/L, whereas a number of these substances were previously tested against a target value of 0.1 µg/L. Hence why the drinking water companies that use Meuse water decided to use a different ERM target value for a number of parameters taking effect in 2021. Substances with an indicative drinking water guideline value of more than 10 µg/L are tested against 1 µg/L. These substances are listed in Annex 3. Following the publication of the report entitled ‘Risk assessment of emerging substances in surface water sources of drinking water (2017-2020)’, the (indicative) drinking water guideline values for problem substances identified in the Water Framework Directive protocol were supplemented or amended (also see Subsection B2).

A total of 679 of the 806 parameters measured in 2025 were testable. 69 (10.2%) of these 679 parameters breached or equalled the ERM target value once or more at one or more of the monitoring points (see Table 2). A total of 127 parameters were not testable due to the absence of an ERM target value for them. ERM target value breaches were observed a total of 1,527 times; this is equal to 3.1% of the testable measurements (49,744).

Drinking water guideline value

he term 'drinking water guideline value' is used to set a safe, health-based risk limit for an individual substance in drinking water where this has not already been done by law. This term was chosen to create clarity because of the many different terms in use for this value. The drinking water guideline value is also referred to as the '(substance-specific) target value for drinking water', '(preliminary) health-based value based on toxicological data', 'health-based limit value', 'health-based advisory value', '(indicative) drinking water standard', 'provisional Guideline Value (pGLV)', or '(indicative) Human Limit Value for drinking water (i-HL)'.

Therefore, a drinking water guideline value is not a statutory quality requirement. A distinction is made between sound and indicative drinking water guideline values. The difference lies primarily in the more limited dataset and the more limited evaluation of toxicity data associated with an indicative drinking water guideline value. If necessary, additional safety factors are applied. Also, an indicative drinking water guideline value may include consideration of the duration of exposure to the substance, whereas a sound drinking water guideline value applies to lifelong exposure.

Source: Van der Aa NGFM, Van Leerdam RC, Van de Ven BM, Janssen PJCM, Smit CE, Versteegh JFM. 2017. Evaluatie signaleringsparameter nieuwe stoffen drinkwaterbeleid. Bilthoven, Nederland: RIVM. Rapport 2017-0091.

Result: number of ERM breaches

Table 4 shows the quantities and percentages of the substance categories in which the ERM target values were breached in 2025.

In 2025, EDTA and sulfamic acid breached the ERM target value in all measurements.

Table 4: Overview of ERM target value exceedances by substance category.

	Industrial substances and consumer products	Residues of medicines and endocrine disrupting chemicals	Pesticides, biocides and their metabolites*
Permanent 100%	2 (7.7%)	0 (0%)	0 (0%)
Structural 50-99%	5 (19.2%)	3 (15.8%)	1 (6.7%)
Frequent 10-49%	11 (42.3%)	9 (47.4%)	5 (33.3%)
Incidental 1-9%	8 (30.8%)	7 (36.8%)	9 (60%)
Total	**26 (100%)**	**19 (100%)**	**15 (100%)**

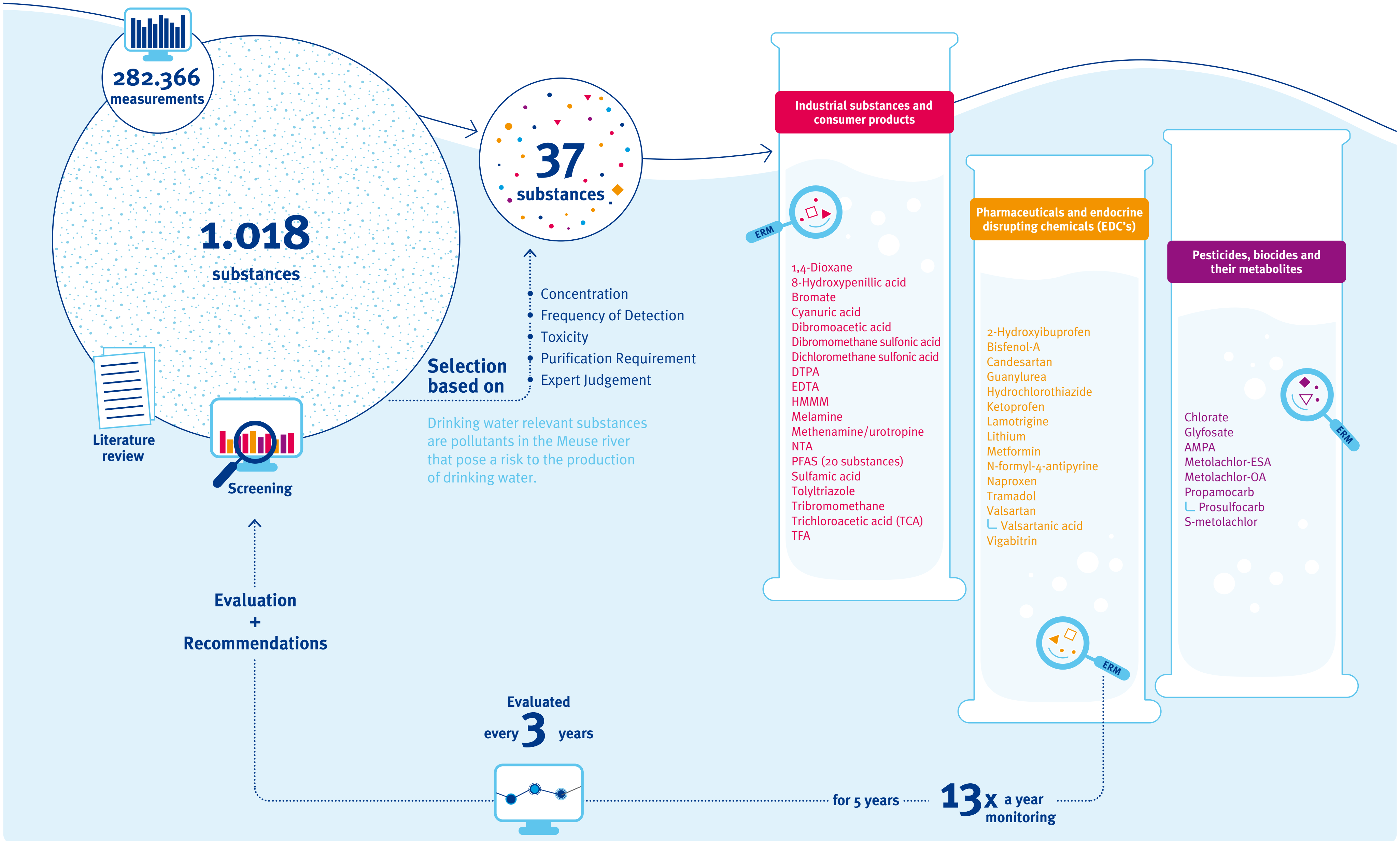
** just the standard measurements of propamocarb were included*

The main route by which a substance can end up in water is decisive for its classification into a category. For example, AMPA is classified under Pesticides and their metabolites, while cooling water additives are also known to degrade into AMPA. However, we have chosen not to classify AMPA under 'Industrial substances and consumer products' as well because this application does not lead to the highest emissions and we want to avoid double counting.

A similar situation applies to several PFAS. Some active substances in medicines (sitagliptin) and pesticides (fluopyram, flonicamide) meet the OECD definition of PFAS. Although PFAS are classified as 'Industrial substances and consumer products', we still classify these substances in their specific categories to avoid double counting.

The same also applies to the degradation product TFA, which we do not classify under pesticides and their metabolites but under industrial substances and consumer products (also see Section A3.3). The industrial substances dibutyl phthalate (DBP) and bisphenol-A are known as endocrine disrupting chemicals (EDCs) and, as such, are classified under 'Residues of medicines and endocrine disrupting chemicals'.

Drinking water relevant substances



Analysis: severity of breach

Not all breaches of the ERM benchmark are equally relevant. RIWA-Maas distinguishes between three types of breaches:

- Chronic breaches: substances that breach the ERM target value every year;
- ‘Flashing light’ breaches: substances that breach the ERM target value one year but not the next year;
- New breaches: substances that we are seeing for the first time (e.g. due to new analysis methods).

A3.5 The weather in 2025: hot, dry and sunny in Belgium and the Netherlands

Hot...

It was very hot in the Netherlands and Belgium in 2025. The Royal Netherlands Meteorological Institute (KNMI) has been measuring the temperature, precipitation and sunshine in De Bilt since 1901. The Royal Meteorological Institute of Belgium (KMI) has been doing the same in Uccle since 1833.

In 2025, the average temperature in the Netherlands was 11.4 °C. It was the sixth hottest year since recording started; a temperature of 10.5 °C is normal. In 2025, the average temperature in Belgium was 12.0 °C (usually: 11.0 °C). This value makes 2025 the fourth hottest year in Belgium since records started, along with 2014, and just behind the record years 2020 and 2022 (12.2 °C) and behind 2023 (12.1 °C).

...dry...

It was also very dry in the Netherlands and Belgium in 2025. An average of 613 mm of rain fell in the Netherlands; 795 mm is normal. The Netherlands experienced severe drought in the spring and summer of 2025, with the south-west of the country being particularly affected. The south was very dry. The driest KNMI weather station was Eindhoven; precipitation there was 469 mm compared to the normal 751 mm. In terms of maximum precipitation deficit during the summer half-year (April to September), the year ranks eighth among the driest

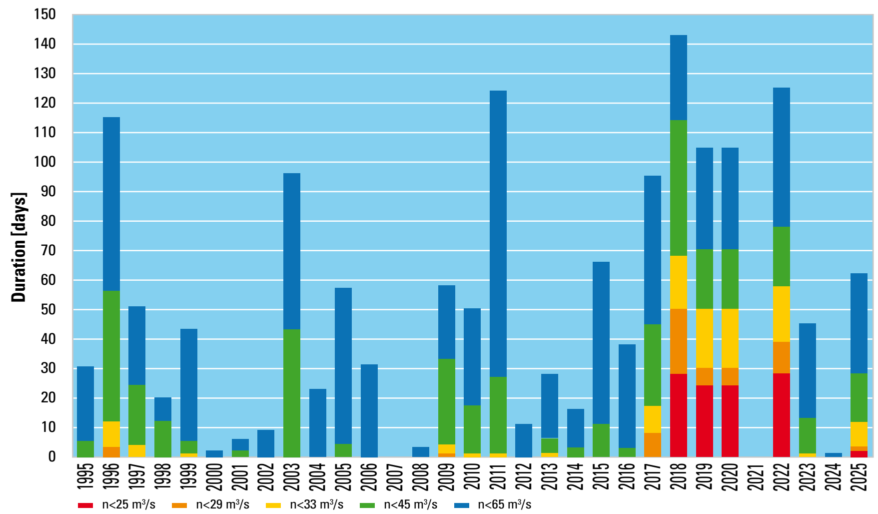


Figure 5: Duration of discharges below the daily average of the Meuse at Megen (source: Rijkswaterstaat).

years. The precipitation deficit is a measure of drought and follows from the difference between evaporation and precipitation. In the Netherlands, the difference is calculated in millimetres, based on the difference between the amount of precipitation and the reference crop evaporation calculated (the amount of water that a standard (imaginary) crop evaporates into the air under certain weather conditions).

In 2025, Belgium had its driest year since 1976. Precipitation there was just 620.6 mm (normally: 837.3 mm). This is almost half the record amount of precipitation (1,170.7 mm) that Belgium experienced in 2024. It was very dry in spring 2025 in particular. With a total precipitation of just 54.4 mm in the spring in Belgium, it was the second driest since records started in 1833. An even drier spring was experienced back in 1893, when just 37.6 mm of precipitation was measured. Taken together, the spring and summer of 2025 were also the driest spring and summer (184.4 mm) in the current reference period and the second driest since 1892 (133.5 mm).

In dry years, less water flows through the Meuse for longer periods than in wet years. Figure 5 shows that there were longer periods of low flow in 2025 than in 2024 and 2023 but significantly longer periods of low flow in 2022.

...and sunny

With approximately 2,124 hours of sun, 2025 was the second sunniest year in the Netherlands since records started. The sunniest year was 2022 with 2,230 hours of sunshine. Significant evaporation was experienced too due to the high levels of solar radiation: the energy that the sun emits, a combination of infrared and UV radiation. In 2025, Belgium experienced a total of 1,841 hours of sunshine (usually: more than 1,603 hours), making it the fourth sunniest year in the current reference period: 1991-2020 (record: 2,020 hours in 2003).

Rising temperatures

Warming stripes are a colourful representation by KNMI of how temperatures in the Netherlands have changed since 1901. Each coloured stripe represents a year of temperatures in De Bilt. The colour of the stripes represents the average temperature in a particular year. Blue shades correspond to relatively cool years and red shades to relatively hot years. The stripe for 2025 is red, putting it in the top 10 of hottest years. Seven years from the past decade (2016-2025) are in the top 10. It is clear that temperatures are rising in the Netherlands.

The climate is out of balance

On Monday 23 March 2026, the anniversary of the World Meteorological Organization (WMO), the WMO announced that the climate has never been more out of balance than it was in 2025. More heat is being retained on Earth than the amount of heat being radiated: greenhouse gases are trapping this heat. No less than 91% of the excess heat is stored in the ocean, 1% remains in the atmosphere, landmasses absorb 5% and 3% causes land ice to melt. The meltwater eventually ends up in the oceans, causing sea levels to rise. Other consequences of the imbalance include more frequent and more extreme heatwaves and droughts, wildfires and extreme precipitation.

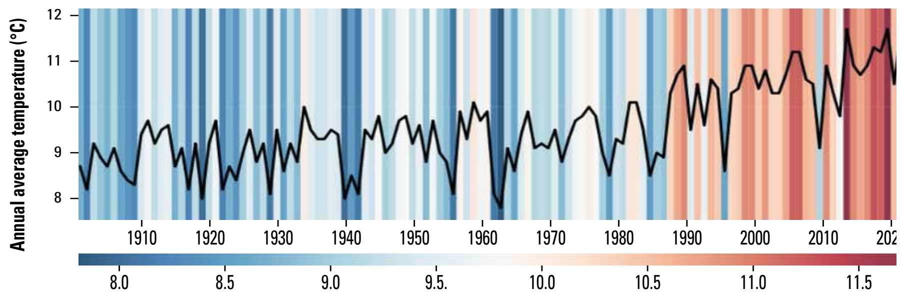


Figure 6: The KNMI warming stripes 1901-2025 in chart form (source: KNMI).

In a 30-year period, from 1971 to 2000, the Earth has warmed by 0.2 degrees every 10 years. The temperature has risen by 0.3 degrees every 10 years in the last 30 years. If temperatures continue to rise at this rate, Earth will have warmed by 1.5 degrees in five years (2030) compared to the pre-industrial era (1850-1900). In 2018, the UN Intergovernmental Panel on Climate Change (IPCC) was still working on the assumption that this would not happen until 2040 or later. See Section D for a discussion of the impact of climate change on the Meuse as a source of drinking water.

Sources:
https://www.knmi.nl/nederland-nu/klimatologie/maand-en-seizoensoverzichten/2025/jaar
https://www.meteo.be/uploads/media/695e22a414baa/klimatologisch-jaaroverzicht-2025.pdf
https://www.knmi.nl/over-het-knmi/nieuws/klimaatstreepjescode-krijgt-nieuw-streepje-voor-2025

B

Recent developments for consideration

B1. Arcadis and RWS: Rivierdossier waterwinningen Maas

On 11 December 2025, RWS (in its capacity as the client) published the Rivierdossier waterwinningen Maas. This river dossier, which Arcadis prepared, focuses on the sustainable safeguarding of surface water extraction for drinking water production from the Dutch part of the Meuse. The factors that might hinder the sustainable safeguarding of surface water extraction were identified in a joint process with RWS (responsible party), the drinking water companies, RIWA-Maas and the provinces of Limburg and North Brabant. As such, the river dossier shows the extent to which targets may (potentially) not be met and, consequently, the extent to which the challenge the parties face where the sustainable safeguarding of extraction is concerned. This challenge forms the basis for agreements on measures for the protection of the Meuse as a drinking water source in the fourth Meuse River Basin Management Plan 2028-2033.

RIWA-Maas hopes that the necessary time and resources will be deployed during the 2028–2033 planning period to implement the measures required to adequately protect the Meuse as a source of drinking water.

B2. RIVM: risk assessment of emerging substances in surface water for drinking water (2017-2020).

Problem substances according to the Water Framework Directive protocol

On 10 February 2026, RIVM published a report on the risk assessment of emerging substances in surface water when producing drinking water. To ensure that drinking water quality continues to be good, water managers and drinking water companies monitor surface water for the presence of 'emerging' chemical substances. These are new pollutants that are not currently subject to any surface water standard. A 'signal value' of 0.1 micrograms per litre has been established for these substances to facilitate their timely detection. If discovered to be above this concentration, steps are taken to ascertain whether the substance poses a risk to health through drinking water.

From 2017 to 2020 inclusive, 64 substances were measured in concentrations higher than the signal value. These substances originate primarily from industries, residues of medicines and pesticides. RIVM has assessed the risk posed by these substances and another problematic substance: lithium. Concentrations in surface water of five of the 65 substances were too high for the production of safe drinking water using simple purification methods. As such, action is required in those places where the substances enter the water. For example, reducing discharges into surface water.

Based on the risk assessment carried out in this report, RIVM makes the following recommendations to RWS as the water manager:

1. Take measures to reduce concentrations of the substances in risk category 1 (namely bromate, dibromoacetic acid, lithium, N,N-dimethylsulfamide and trichloroacetic acid (TCA)) in surface water that is used for the production of drinking water;
2. Continue to monitor valsartanic acid in surface water that is used for the production of drinking water. This recommendation is made in the context of requirements for substances in risk category 2 according to the protocol for monitoring and assessing drinking water sources WFD (*Protocol voor monitoring en toetsing drinkwaterbronnen KRW (WFD protocol)*)
3. Consider TFA, metolachlor-C metabolite and metolachlor-S metabolite when determining follow-up actions for substances in risk category 3.

The following recommendations are made for the Ministry of Infrastructure and Water Management:

4. recommendation 1) present in Dutch drinking water and interpret the potential health risks. RIVM is already conducting an initial assessment of the concentrations of lithium present, as commissioned by the Ministry of Infrastructure and the Ministry of Health, Welfare and Sport;
5. From a health perspective, the recommendation is to revise the standard for the sum value of halogenated acetic acids (HAAs) in the Dutch Drinking Water Decree. The drinking water guideline values for dibromoacetic acid and TCA derived here are many times lower than this sum value;

6. Because TCA also has other applications (e.g. medical), the recommendation is to ascertain whether the measurement obligation currently described in the Dutch Drinking Water Regulation (only measure if a disinfection method is used that produces chlorate; this is primarily chlorine dioxide) is sufficient;
7. Pay systematic attention to the risk assessment of emerging substances that breach the signal value in drinking water sources. It is important to eliminate any backlog in the risk assessment as soon as possible because the risk assessment is necessary to determine whether and which actions are necessary to improve the quality of surface water for the production of drinking water. This contributes to the achievement of the objectives of the WFD.

Pay systematic attention to the risk assessment of emerging substances that breach the signal value in drinking water sources.

A general recommendation for the improvement of the risk assessment follows below:

8. The addition of a system for the inclusion of 1) the cumulative effect of all known substances in the drinking water source and 2) the formation of transformation and bio-transformation products in simple and advanced drinking water purification plants.

RIWA-Maas is happy with the RIVM report and supports all the recommendations. It would be good for the recommendations to be included in the 2028–2033 Meuse River Dossier Implementation Programme for Water Abstractions, an implementation programme containing concrete actions to protect the Maas as a source of drinking water. It is absolutely essential to eliminate the backlog in the risk assessment of emerging substances that breach the signal value in drinking water sources - not just to achieve the objectives of the WFD but, more so, to better protect the Meuse as a source of drinking water.

B3. Aqwa and RWS: the Persistence and Mobility of anthropogenic substances determined based on monitoring data

An increasing number of substances with Persistent, Mobile and potentially Toxic properties (PMT) are entering the water. These substances are difficult to purify and, as such, pose a major threat to drinking water. With this in mind, Aqwa (a consulting and research agency in the field of water quality) has conducted research on this group of substances. It did this for the PMT theme group in the Working Group for Tackling Emerging Substances (*Werkgroep Aanpak Opkomende Stoffen (WAOS)*) of the administrative water council (*Bestuurlijk Overleg Water*). RWS published the report[1].

To this end, the RIVM developed a PMT screening tool in 2023. It consists of an overview containing more than 6,000 substances with PMT properties, the occurrence of which in the Dutch water system has been assessed as well. The tool is continuously being expanded with additional substances. It is also being used to identify the risks of emerging substances.

Aqwa included the following objectives in its research:

- To determine which substances penetrate into the existing drinking water purification steps;
- To determine whether this corresponds with the expected effect based on the P_{PMT} score and M score;
- To learn lessons from this determination and make recommendations for the improvement of measurements in order to gain a better understanding of the differences and causes of those differences, or to improve the theoretical approach.

An approach has been developed, processing criteria have been established and a total of 61 substances have been assessed. The assessment reveals that Persistence depends on the location (or the system). For example, it was found that the Persistence of substances in systems with a soil or dune passage

1 *https://open.rijkswaterstaat.nl/zoeken/@299913/persistentie-mobiliteit-antropogene.*

(the route that water takes through a purification step) is often lower than in systems with a reservoir passage. The research also shows that the determination of the Persistence and Mobility of emerging substances in practice is useful for the determination of the effectiveness of purification and, in extreme cases (with a very high PMT score and high concentrations), to establish potential changes to the purification process.

To establish a prioritisation of emerging substances, the report recommends the following approach:

- Determine the PMT score of emerging substances, in accordance with the RIVM PMT screening tool;
- Check whether substances with a high PMT score exist in the environment and end up in the surface water. This can be scored using the so-called E-score, the emission score from Pijcke & Hendriksen (2025 publication in preparation);
- If substances have a high PMT score, ascertain whether they can be measured (target analysis) and whether they can be detected via screening. If this is the case, proceed to step 5; otherwise, proceed to step 4;
- If it is not possible to detect a substance in laboratories yet, check whether a method (possibly a screening method) with the lowest possible reporting threshold can be established for the substance in question;
- Where substances can be detected, carry out measurements in surface water sources for a minimum of one year, at a frequency of at least 13 times per year, to determine whether their occurrence is actually frequent;
- If substances do occur frequently, it is useful to conduct further investigations and keep the reporting threshold of the analysis as low as possible;
- Determine the flow rate[2] of the water abstracted on a daily basis;

.

Where water is abstracted, measure the concentrations of substances that are demonstrably and frequently present in the source (minimum frequency 13 times per year) for a minimum of three years. Also measure both the raw water to be purified and the drinking water produced 13 times for a period of at least one year (if it is known that a substance can be formed from other substances, it is wise to analyse these precursors in the source);.

After one and three years, determine logistical Persistence and location-specific substance retention during purification (LSSZ) based on the analysis results obtained. Assess the data and decide whether the substance is relevant for further investigation (in the event of a P or M score of more than 0.25).

RIWA-Maas believes that its members can identify (potentially) problematic substances in practice via the broad application of monitoring in raw water, water to be purified and drinking water. This provides the competent authority with valuable input and could contribute to effective substance policy. This information also provides points of reference for the improvement of the permitting, supervision and enforcement process. This strengthens the protection of surface water that is used as a source of drinking water.

B4. Netherlands Court of Audit: focus on industrial discharges

In the Water Framework Directive (WFD), European Member States have laid down standards for the quantities of chemical substances that may be present in surface water. In 2000, the Member States agreed that all surface waters must be in good chemical condition by 2015 at the latest, with a possible extension to 2027.

The standards above are often not met. In the EU, 61% of surface water bodies do not meet the standards for chemical quality. In the Netherlands, 97% of Dutch surface waters failed to meet the standards in 2025. It is unlikely that the Netherlands will achieve the WFD targets in 2027. To give one example, agencies like RIVM and the Human Environment and Transport Inspectorate (ILT) warn that concentrations of PFAS and other chemical substances are too high. The pollution of surface water can have consequences for the health of people, animals and plants. Pollutants exert pressure on the drinking water supplytoo:

2 *The volume of water flowing through the river for a certain unit of time.*

in recent years, water abstraction from the Meuse has had to be suspended multiple times due to poor water quality.

There are all kinds of causes for the current poor condition of surface waters; the Netherlands Court of Audit has investigated industrial discharges.[3] The Minister of Infrastructure and Water Management is responsible for the quality of national waters. The Netherlands Court of Audit report shows that the Minister does not know the extent to which these discharges are responsible for poor water quality. The Minister has entrusted permitting and the supervision and enforcement of industrial discharges into national waters to RWS. Under European regulations (the Pollutant Release Transfer Register Regulation (PRTR)), companies are also required to report their emissions if threshold values are breached.

The Netherlands Court of Audit provides an insight into policy results, specifically the state of affairs regarding the concentration of 15 typical industrial substances, compared with the objectives of the WFD and the results of supervision by RWS. No progress has been made with most of these 15 typical industrial substances at the majority of the 61 monitoring points studied. It also appears that RWS lacks a central data system in which companies, permits, permitted discharges and actual discharges are kept track of. As a result, there is no national overview of which companies are discharging what into national waters or of whether such discharges are permitted given the permits granted. This also makes it more difficult to implement targeted changes to move closer to the achievement of the WFD objectives.

The Netherlands Court of Audit set out the following main recommendations and necessary points for improvement:

- Improve the information position: RWS needs a central and up-to-date overview of exactly which companies discharge what substances into national waters. This insight is currently very limited;
- Strengthen licensing, supervision, and enforcement (LSE): current supervision is labelled as 'inadequate and concerning'. A data-driven LSE system must be established so that offences are detected faster;
- Address substance ‘blind spots’: the Minister must identify the impact of industrial discharges on water quality better because the Netherlands is currently not achieving the objectives of the WFD for chemical quality;
- Improve data exchange: inadequate information exchange between organisations must be resolved immediately to combat environmental crime and unauthorised discharges.

3 *https://www.rekenkamer.nl/documenten/2026/03/04/focus-op-industriele-lozingen.*

The Minister of Infrastructure and Water Management stated that he felt supported by the research of the Netherlands Court of Audit in the prioritisation and urgency of continuing to improve the LSE chain (water quality). RIWA-Maas wholeheartedly agrees and hopes that all water managers will jointly put their shoulders to the wheel, as the Minister also writes in his response to the research.

B5. Water Land: Towards one battle for water

The book Waterland - *Naar een strijd vóór water* is the result of a project by the interdepartmental management programme (*Indepartmentale Management Leergang (IML)*), a programme for (future) senior civil servants in Dutch central government. The book describes the future of water quality in the Netherlands, presented through the imaginary 'Waterland'.

The book explains that the Netherlands has traditionally fought a battle against water (floods) but must now primarily wage a battle in the interests of water. The quality of drinking water is under pressure due to pollution and climate change. Drinking water is essential for society, the economy and health. Although Dutch drinking water is currently of a high quality, risks are increasing rapidly. Major causes include industrial discharges, agriculture, residues of medicines and drug waste. Salinisation and drought also degrade water quality. Purification techniques can mitigate this in part, but costs are rising and sources are becoming depleted. Therefore, prevention is vital: pollution must be tackled at the source.

The authors also write that water management is currently based on a collaborative 'arrangement' between governments and parties. This arrangement is a polder model: it focuses on consensus but has little enforcement power. Tasks and responsibilities are fragmented and implemented on a non-binding basis. The WFD requires the Netherlands to achieve good water quality by 2027. However, the objectives will not be met without the introduction of additional measures.

The LSE system, licensing, supervision, and enforcement, is essential. In practice, however, it is often fragmented and ineffective."

With this in mind, the authors are advocating for a stricter arrangement. The following important basic principles will continue to apply: drinking water is public property and the government has ultimate responsibility for it. Extra emphasis will be placed on: water as a source of life, water as a part of spatial choices, as well as the precautionary principle.

One key recommendation in the book is to strengthen management in three roles:
1. Central government as the framework provider (legislation, goals and funding);
2. Provinces as the connectors (integrating interests);
3. Water boards as the drivers (implementation and pace).

These roles already exist but need to be defined stronger and clearer than before, the authors believe. Water boards must be given more powers to enforce progress. Central government must be able to intervene if collaboration stalls. An area-based approach is crucial. Water quality varies by region and requires an individual approach. Collaboration is necessary between agriculture, nature, housing and water. The discontinuation of national programmes has weakened this approach. Provinces also lack the resources needed to achieve water, climate and nature goals.

Water problems vary from one province to another:
- Salinisation in coastal areas;
- Agricultural pollutants in rural areas;
- Pressure on drinking water in urban areas;
- Drought and groundwater shortages, in some areas more than in others.

Citizen participation plays an important role in water management in the Netherlands. Historically, citizens have formed water boards. Even now, citizen initiatives raise awareness and exert pressure on policy. For example, concerns about pesticide use have led to political debate. Citizens can contribute to monitoring and pressure on policy. Greater involvement increases support for measures.

The LSE system is essential. It regulates discharges, supervision and enforcement. However, in practice, it is often fragmented and ineffective. Key shortcomings:
- Responsibilities are unclear;
- Too little enforcement;
- Outdated permits without a time limit;
- Very limited incentives for polluters.

Therefore, the book proposes the following improvements:
- One coordinating party per area;
- Temporary permits that are reviewed periodically;
- More use of enforcement instruments.

The authors also believe that the 'polluter pays' principle should be applied more strongly. This currently applies insufficiently particularly in agriculture. A 'reverse burden of proof' is proposed as well: polluters must prove that they are not causing damage. This will promote prevention and transparency. Other measures are:
- the increased use of bans on harmful substances;
- the better application of existing sanctions;
- the involvement of citizens and businesses in supervision.

The WFD is leading at European level, but it does have its limitations. It focuses on the condition of water, not always on a source approach. In its Clean Water Act, the United States focuses more on preventing pollution. The authors of Waterland advocate a greater emphasis on source policy in Europe, based on the principle that 'What doesn't go in, doesn't need to come out'. New European rules focus on stricter monitoring and substance lists.

However, political support for strict environmental policies continues to fluctuate, as the book also mentions. International collaboration is crucial, particularly because the Netherlands is situated downstream and is dependent on neighbouring countries: pollution upstream eventually makes its way to the Netherlands. Collaboration takes place via river commissions (Rhine, Meuse, Ems and Scheldt). They coordinate and monitor but only have limited powers.

Therefore, the authors consider the following improvements necessary:
- More supranational powers;
- Less dependence on national politics;
- More structural funding.

The Netherlands should play a leading role in this. EU support is important for effectiveness.

In short, the quality of drinking water is under pressure and action is required. The current system must be improved. Success factors from the fight against water (such as collaboration and the long term) can be applied to the fight in the interests of water. The core of the solution:
- Stronger region;
- More binding;
- More prevention;
- Better collaboration (national and international).

All the parties involved must take joint responsibility for the above. Only then will clean and affordable drinking water continue to be guaranteed.

The impact of discharges on the Meuse

"Structural Vulnerability in the Meuse Basin requires decisive action"

Joyce Nelissen
Director of WML
Chair of the board of RIWA-Maas

C1.Interview with Joyce Nelissen

Director of WML, Chair of the board of RIWA-Maas

An illegal discharge of propamocarb in Walloon forced drinking water company WML to stop abstracting water from the Meuse for three months. Joyce Nelissen, Director of WML and Chair of the board of RIWA-Maas, reflects on this incident as an example of a structural issue: the governance of an international catchment area that 7 million people depend on.3

The drinking water that WML produces consists of groundwater (three-quarters) and Meuse water (one-quarter). More than 560,000 households and more than 14,000 businesses in Limburg get their drinking water from WML. In 2025, the drinking water company had to stop the abstraction of Meuse water for three months due to pollution caused by the pesticide propamocarb. Two other drinking water companies that use Meuse water (Evides and Dunea) were also affected by this harmful discharge.

The pollution came to light via the WML mussel monitor, Joyce Nelissen explains. At the abstraction point, in addition to the regular measurements, mussels monitor water quality in the Meuse; their behaviour monitored with the use of sensors. “As soon as they ingest contaminated water, they literally close up; that’s a signal for us to initiate an abstraction stop, as a precursor to an abstraction stop.”

WML takes in Meuse water and stores this in their reservoir De Lange Vlieter. A low water level in the reservoir can have negative effects on the sensitive nature surrounding it. After four weeks, WML had to switch to deep groundwater extraction. Groundwater extraction forms the permanent back-up which allows the continuity of the drinking water supply to be guaranteed at all times.

Complex source detection in cross-border catchment area

In the meantime, the source of the pollution had to be identified. This proved difficult, which is why the abstraction stop lasted so long. Drinking water companies initially report a situation like this to the Human Environment and Transport Inspectorate (ILT). WML then took additional samples and Aqualab Zuid analysed them in the laboratory.

The Eijsden measuring station on the border found that the substance had originated from Belgium. WML subsequently alerted Rijkswaterstaat (RWS), which is the competent authority and manager of the Meuse in the Netherlands. It contacted the Service Public de Wallonie SPW, its counterpart on the Walloon side of the border.

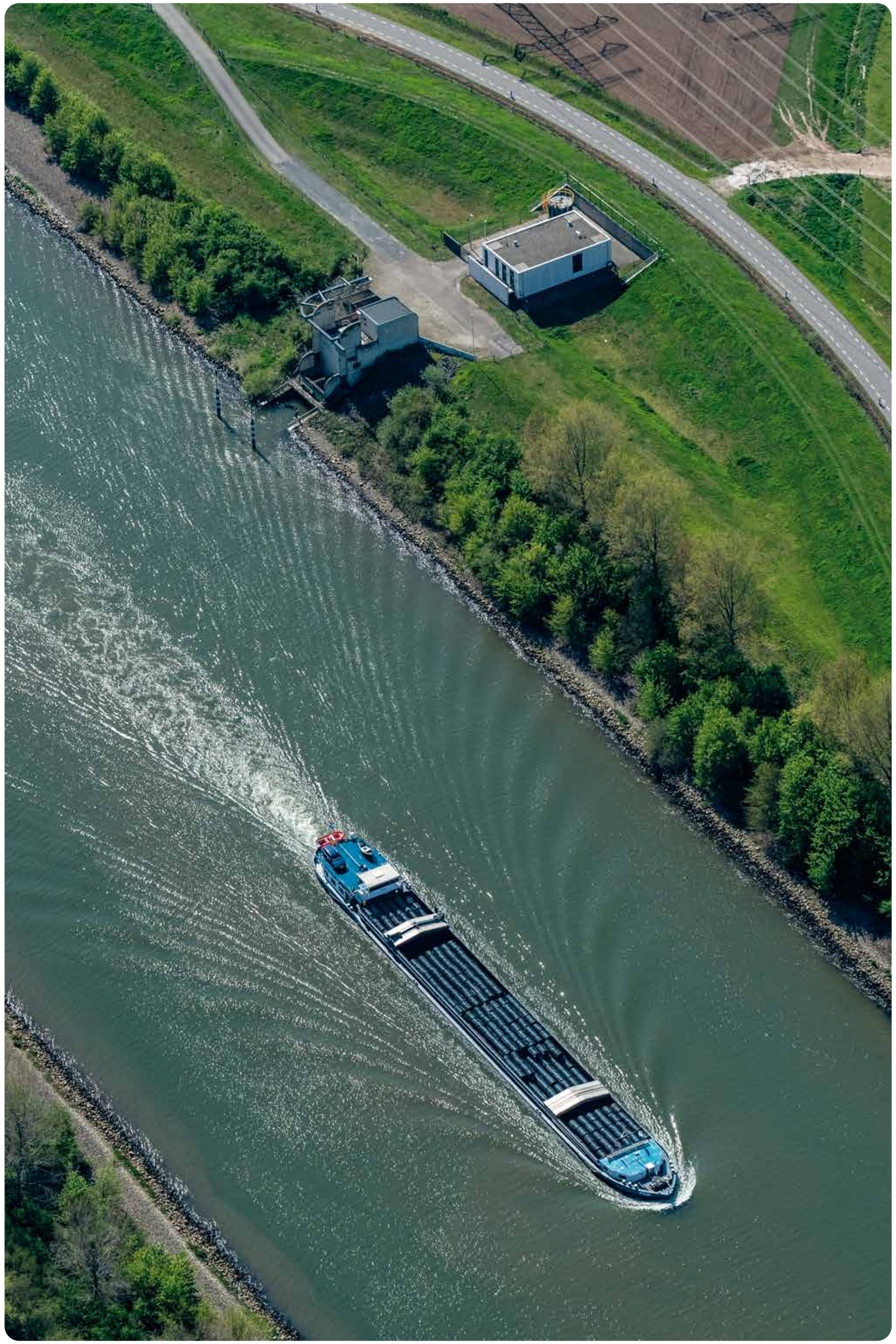
SPW had to collect a large number of samples, which a laboratory in Lyon then analysed. An added difficulty arose when it was found that the pollution would sometimes appear and then disappear for days. Eventually, the source was found to be a company near Liège, which was responsible for an illegal discharge of propamocarb: a pesticide used to combat mould in potato cultivation (also see Subsection A2).

Shared catchment area, shared responsibility

Nelissen has previously experienced serious pollution originating from Wallonia: in 2019. On this occasion, the substance was prosulfocarb, a herbicide.

“Back then, we had to start by explaining the impact that a discharge like this upstream was having on the production of drinking water downstream,” Nelissen recalls. “Seven million people in the Netherlands and Belgium rely on drinking water produced from Meuse water. This fact requires a level of administrative cooperation that does justice to such a responsibility.“

In Wallonia and France, drinking water is not produced from Meuse water. “The direct impact of a pollutant on the drinking water supply is most tangible for parties downstream. But thanks to the experience we had back in 2019, there



is now more mutual understanding and, and the lines of cooperation between the involved parties are much shorter nowadays. This is exactly the long term result that RIWA-Meuse aims for.”

Tracing the source

Incidental pollutants are found both upstream of Eijsden, where the Meuse flows into the Netherlands, as well as in the Netherlands. It is also complex to trace sources of harmful substances in the Netherlands, Nelissen has noticed. This is especially true if a substance is not being discharged continuously but at specific times - a batch discharge. Or if a substance is a special or even unique substance.

Another factor is whether a substance is being discharged directly into the river or indirectly via the sewer system into an RWZI (Sewage Treatment Plant). The source is far more difficult to identify in the latter case. However, the shorter inland lines of communication are easier. “As water authorities, it’s not difficult for us to locate each other, but it still remains quite complex to trace the source of a pollutant.”

International agreements

The propamocarb incident raises the following question: are there lessons to be learnt from this for future cases? Can we detect and stop harmful discharges abroad more quickly in the future? Nelissen responds: “We’re dealing with just one river basin and need clear and executable international agreements.”

Nelissen mentions the International Meuse Commission (IMC), a partnership between the Member States and regions involved in the protection and use of water in the international river basin district of the Meuse[1]. IMC recently urged for the European Commission to be given a seat at the table within the partnership.

1 Germany, Flanders Region, Walloon Region, Brussels Capital Region, France, Luxembourg and the Netherlands.

More uniformity

Water quality standards for a substance - its maximum permissible concentration in the water - sometimes vary by country or region. “This makes international source tracing extra complex. We come up against this problem a lot here in Limburg. More uniformity in standards for harmful substances at European level could prevent disputes.” Propamocarb is permitted in the EU but may not be used everywhere or in unlimited quantities.

A comprehensive monitoring network for harmful substances throughout the Meuse river basin would also help detect sources, Nelissen believes. Upstream and downstream parties could then quickly exchange information; as with, for example, the drinking water companies in RIWA-Maas or the collaboration between drinking water companies, RWS, the Water Boards and I&W in the Schone Maaswaterketen (SMWK).

The incident involving the prolonged discharge of propamocarb underscores the importance of source protection, Nelissen explains. "What does not end up in the Meuse, does not need to be cleaned from it either. More purification means higher costs and more intensive energy usage, raw resources, water and chemicals. Source protection is not just an environmentalk issue, it is also a requirement for an affordable and reliable drinking water supply.

Growing demand

Due to population and economic growth and construction targets in the housing sector, demand for drinking water is set to increase in the years ahead. In 2023, RIVM estimated that the Netherlands will need approximately 100 million cubic meters of extra water annually by 2030. This is despite the fact that less water is available due to the drier and warmer conditions caused by climate change.

Water availability and quality are two themes that in policy are often addressed separately. However, a decrease in the water in the Meuse is often accompanied by a deterioration in water quality as well: harmful and poorly biodegradable pollutants dilute less. Rapid source detection then becomes even more important. Nelissen responds: “Quantity and quality literally go hand in hand. Lower water levels mean a lower amount of dilution of pollutants – the purification task increases when the amount of source water decreases. This coupling should more consistently be taken into account in the national and European water policy.”

Demand for clean water is growing, while climate change is making water increasingly scarce.

Finding an alternative source for drinking water production is not easy either. Water sources are scarce and the production locations and pipeline have been built based on the current situation; it will take time to build a new location. On top of this, the quality of an alternative source cannot be guaranteed to suffice for the production of drinking water.

Conflicting interests

In the Netherlands we have to deal with fundamental challenges for the drinking water sector, Nelissen states. “We are used to working with the long term in mind: production locations and distribution networks require an investment horizon of tens of years in advance. This asks for regulatory space and quicker permitting procedures, and for guarantees that the source quality remains at sufficient levels.”

However, this brings spatial considerations into play,, she explains. “Provinces have to weigh multiple stakes, like: economic development, agriculture, nature and drinking water. We have to be present as drinking water companies in an early enough stage to be able to sufficiently defend the drinking water stakes. If these drinking water stakes are done in hindsight, the most relevant choices will have already been made.”

Priority or not?

Having said this, authorities do have to comply with the Dutch Drinking Water Act: incorporating the major public interest of the drinking water supply into their considerations. With drinking water being a basic necessity, everyone in society must have access to it. “This means that drinking water must structurally be guaranteed at relevant policy tables – not as a sector interest that needs to be fought for again and again, but as a precondition in spatial and environmental processes. The long term challenges of the sector require authorities that take the time horizon seriously.”

The Fragmentation of authorities, provinces for groundwater and RWS for the major rivers, makes it so that drinking water companies need to argue for their interests at various policy tables at the same time. “This asks for permanent presence in the early stages of planning, and for a sector that knows how to argue its position with facts and prognoses.

Atlas for a Clean Meuse

The Association of River Water Companies RIWA (Rhine, Meuse and Scheldt) is celebrating its 75th anniversary this year. Since its foundation in 1951, the association has been working to protect surface water as a source of drinking water. After the entry into force of the Water Framework Directive (WFD) in 2000, the Rhine, Meuse and Scheldt sections of RIWA started to concentrate on the individual river basins, to enable them to focus more on unique water quality issues, the international partners involved and various sources of pollution.

After four years, 2026 is Joyce Nelissen's last year as the Chair of RIWA-Meuse. This role rotates among the member drinking water companies. Nelissen sees the Atlas for a Clean Meuse as an important milestone. This digital tool bundles data on water quality, discharges and sources of pollution in the Meuse river basin and is available on the SMWK website. “There is a close collaboration between the Water Board of Brabant and Limburg, Dunea, Evides, WML, RWS and RIWA-Meuse. It is precisely this cooperation that creates more understanding for each others problems and challenges. It’s very impressive how it’s been possible to reduce so many streams of information into one clear overview in the form of the Atlas. It increases transparency and insight into what can be found in the Meuse.”

More pollution, more attention

As director of WML, Nelissen has seen an increase of pollution in the Meuse in the past years, including the amount of new substances. “At the same time the policy attention for source quality has grown, in part due to the work of the association. RIWA-Meuse has positioned itself as an authoritative partner for constructive discussions on various levels: at ministries, lobby tables and international bodies serious talks take place on the structural challenges in the catchment area.

Ultimately, the competent authorities are responsible for solving the problem and that requires good legislation and regulations, she emphasises. “But if we don’t stand up for the importance of a clean Meuse, raise the alarm, put it on the political agenda and contribute to efforts to find solutions, nothing will happen. We need to have staying-power and keep stressing why it’s so important not to discharge harmful substances.”

Nelissen believes that the discharge of propamocarb confirms the importance of drinking water companies uniting as a sector. “RIWA-Meuse is the institutional voice of the drinking water companies that depend on the Meuse water as a source of drinking water. This voice is only trustworthy if we have the best insight into what is happening in the catchment area available to us – from all the way upstream to the drinking water abstraction points. Knowledge, collaboration and the continued calling for attention to this go hand in hand. This is what we want to build upon in the coming years.”

“Management of the Meuse requires closer international collaboration”

Bernard De Potter
Director-General Flanders Environment Agency
Chairman of the Internationale Maascommissie

C2. Interview with Bernard De Potter

Chairman of IMC (Internationale Maascommissie)

The Meuse flows through multiple countries, but water management is fragmented. How is Flanders tackling this and where do opportunities lie for better collaboration? RIWA-Maas spoke with Bernard De Potter, Chairman of IMC. "Collaboration is vital due to climate change and new substances."

In both the Netherlands and Flanders, the Meuse plays a major role as a source of drinking water, alongside its importance for the economy, recreation, ecology and shipping. The Meuse is the most important source for 40% of the Flemish drinking water supply: drinking water company Water-Link produces drinking water from water from the Albert Canal, which is fed by the Meuse. Besides water from the Scheldt River, De Watergroep also uses Meuse water as a source of drinking water. Hence why Water-Link and De Watergroep are members of RIWA.

Recently, Dutch-government advisory committees have published various reports about water quality (see Chapter B of this report). The conclusion is stark: the Netherlands has insufficient control over industrial wastewater discharges into both surface water and sewer system. There is a lack of any total overview, permits are outdated, supervision is inadequate and enforcement is insufficient.

In the Netherlands, many different authorities play a role in water quality: RWS, water boards, provinces, environmental services and municipalities. RIWA-Maas wondered how powers are allocated in Flanders: is it less fragmented and is control better there?

How permitting is organised in Flanders

We put this question to Bernard De Potter, Chair of IMC in 2025 and 2026. He is also the administrator general of the Flemish Environment Agency (VMM), a Flemish government organisation responsible for water management and environmental quality, amongst other things[2]. He is also the Chair of the Coordination Committee on Integrated Water Policy (CIW)[3] and of the Flemish Drought Commission.

2 *https://vmm.vlaanderen.be/over-vmm.*

There used to be various permit systems in Flanders, De Potter explains. They have now been simplified into a single environmental permit per company. The municipality is responsible for limited environmental impact, the province for average impact and the Minister for major or cross-border impact.

The permitting authority receives advice from a commission, such as the regional or provincial environmental permit commission, which compiles the advice of various bodies. Advisory bodies include VMM (the impact on surface and groundwater, thus on the water system), the Agency for Nature and Forests (the impact on nature and biodiversity) and the Department of Environment (spatial impact and nuisance). Drinking water companies do not have general advisory authority but are asked for functional advice for projects located in drinking-water protection zones.

Flanders does not have water authorities. However, there are various water managers, including polders, water boards, municipalities, provinces and Flemish government entities (VMM, De Vlaamse Waterweg).

Permitted discharge levels

Since 1 April 2026, supervision and enforcement in Flanders have been streamlined via the entry into force of the Flemish enforcement framework decree (*Kaderdecreet Handhaving*).[4] Environmental enforcement has been in effect since then too.[5] In Flanders, the supervision and enforcement of environmental permits rests with the Enforcement Division of the Department of Environment for the largest companies (Class 1) and with the municipalities for smaller companies (Classes 2 and 3 and unclassified establishments). The Manure Bank of the Flemish Land Agency is also responsible for the supervision of agricultural businesses.[6]

3 *https://www.integraalwaterbeleid.be/nl/over-ciw.*
4 *https://www.vlaanderen.be/agentschap-justitie-en-handhaving/handhavingsbeleid-in-vlaanderen/kaderdecreet-vlaamse-handhaving.*
5 *https://www.vlaanderen.be/omgevingshandhaving.*
6 *https://www.vlm.be/nl/themas/Waterkwaliteit/Mestbank/Achtergrond/wat-doet-de-mestbank/Paginas/default.aspx.*

VMM maintains an internal database containing all permitted parameters (the substances or water properties for which standards or discharge limits are established in permits). The total permitted load is also recorded for each parameter (which volumes of a substance may be discharged). This ensures that the maximum quantity of each substance that may enter the water is clear at any given moment. VMM periodically provides inspectors at the Department of Environment with lists of companies that pose a potential risk; these inspectors can then carry out inspections.

Environmental enforcement

The Department of Environment periodically draws up the environmental enforcement programme as an integrated and risk-driven planning tool for environmental enforcement. It is drafted in close coordination with enforcement partners (like VMM, ANB, local authorities and inspection services) and is based on policy priorities, environmental risks and the capacity available. Priority themes and actions are determined based on the analysis of compliance issues, signals from the field and strategic objectives; these themes and actions are then translated into a programmatic approach involving concrete enforcement actions, follow-up and reporting.[7]

VMM operationalises the application of Article 11.5 of the WFD via a targeted evaluation and, where necessary, changes to permits for companies with a significant impact on water quality. This evaluation dovetails with the substantiation of less stringent objectives (Article 4.5 of the WFD) and is approached on a project basis, prioritising the most impactful discharges.

Alarm system for incidents

The international Meuse and Scheldt warning and alarm system (*Waarschuwingsen Alarmsysteem Maas en Schelde (WAS)*) is in place for acute cross-border pollution. “As the Chair, I made it clear to the delegation leaders of IMC how important I believe this tool is.” De Potter says.

7 *https://www.vlaanderen.be/publicaties/omgevingshandhavingsplan*

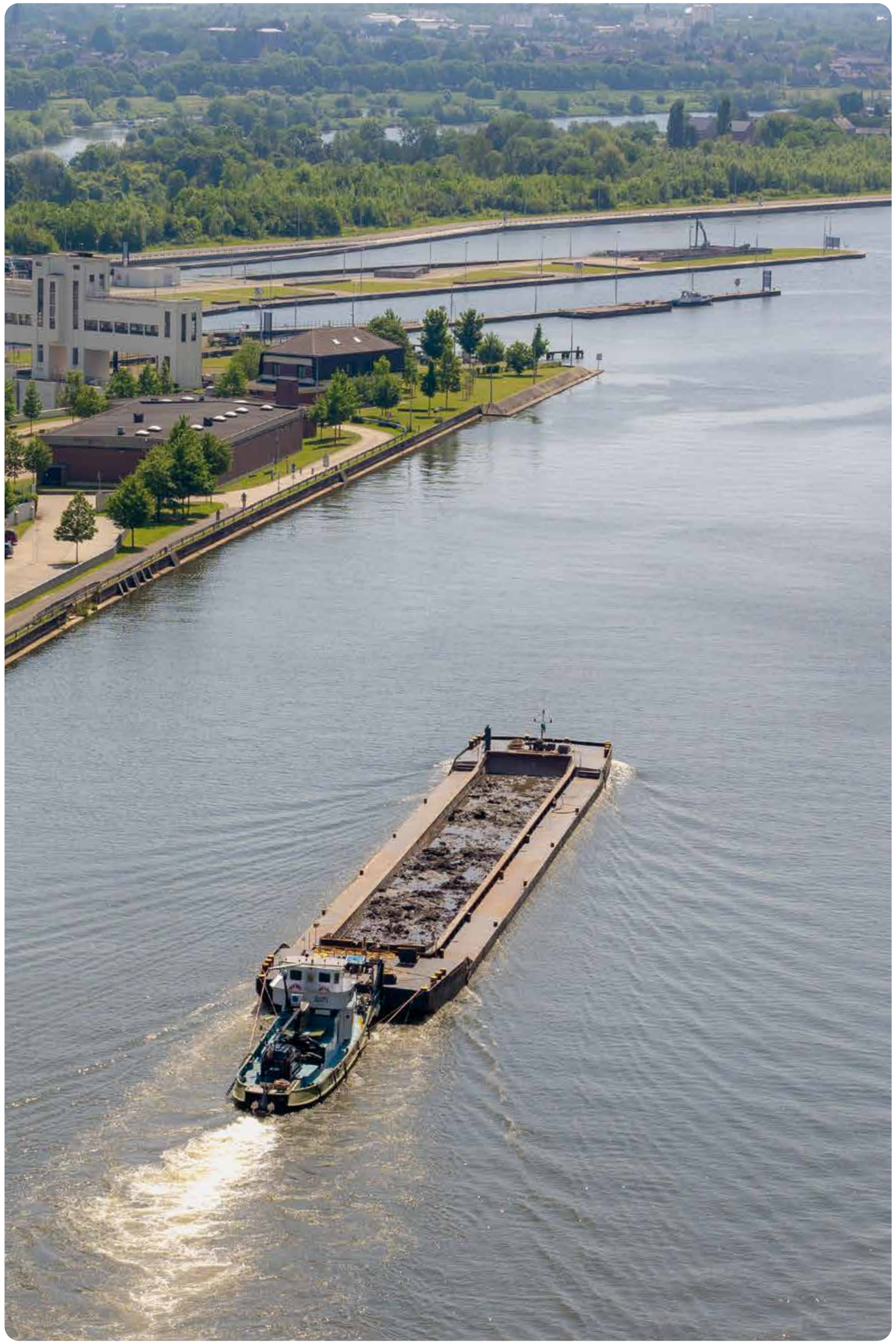
Water managers are informed of any incidents that happen. In the event of the failure of an RWZI of a company, for example, resulting in polluted wastewater entering surface water. In a situation like this, the necessary remedial measures can be taken quickly. The system is tested annually; in 2025, pollution with the pesticide propamocarb was reported in the Meuse (also see Subsections A2 and C1.).

Intervention is swift in the event of incidents, but the situation is different where chronic pollution is concerned, De Potter explains. In the event of chronic pollution, harmful substances are constantly present in the water in small quantities. “in that case we need to coordinate who monitors this and how often. In recent years, attention for the group of SVHCs has increased significantly, prompted in part by the detection of PFAS pollution. No environmental quality standard has been established for many of these substances yet. It is also difficult to interpret specific concentrations of some non-standardised substances and assess the danger they pose. In short: we still have a huge challenge ahead of us.”

All in all, is Flanders more in control than the Netherlands is? De Potter does not want to put it this way. As he sees it, water policy is fragmented in both countries. “I think that we are both trying to make the best of the situation within our own frameworks. Given the limited resources available, it continues to be unclear to all the parties how to tackle the challenges we face with the appropriate tools. We have frequent consultations with the Netherlands about the approach: what is the environmental impact and health risk of these substances and how do you set standards?”

Learning from the other countries

In the meantime, trade-offs regularly have to be made between various objectives. For example, important water conservation projects appear to conflict with the no-deterioration principle of the WFD. De Potter: “It’s still a learning process.”



De Potter also says: “Drawing on our informal contacts and networks, we are attempting to identify whether good practices exist in the approach to water reuse, for example. If best practices are in place in one of the 27 Member States, we would like to hear about them. However, it is not easy to learn from each other because the institutional context differs significantly. The situation is complex everywhere.”

Lack of a total overview

The Netherlands is largely reliant on upstream areas for the supply of Meuse water. Flanders relies entirely on France and Wallonia to supply water to the Albert Canal. However, a total overview of industrial wastewater discharges at river basin level is lacking, because the water authorities are only active in their own particular areas.

Since last year, discharge permits for the Meuse basin for both Flanders and the Netherlands have been grouped in the SMWK Atlas.[8] De Potter: “It would be great if this overview could be extended to cover the river basin as a whole.”

Greater involvement of Europe

In the event of a harmful discharge, would it be possible to identify the source of pollution faster if a separate party, like the EU, were to be responsible for coordination? De Potter sees little merit in this idea. “Every government must take responsibility. The introduction of a third party would only lead to new, more complex issues.”

However, De Potter does advocate greater involvement of the European Commission in IMC. “Belgium and the Netherlands have insisted that the European Commission participate in the IMC, just as it does in the International Commission for the Protection of the Rhine and the International Danube Commission.” He also thinks that the proposal to bring together the relevant ministers from the river basin in 2027 is a good one. “If they collectively say that something needs to be done, action is usually taken.”

8 https://atlas-smwk.hub.arcgis.com/

Consultations are already taking place within the European Union about the implementation of the WFD, as well as about permitting standards and frameworks. “However, the transfer of know-how is difficult because the institutional context is so decisive.”

Drought measures

In Flanders, the reactive assessment framework for priority water use during water scarcity has been in place since 2021. The government uses it to determine which measures are to be taken when water is scarce. In the Netherlands, the water distribution priority sequence (*Verdringingsreeks bij waterschaarste*) determines the priority sequence for water use: safety first, followed by drinking water and energy, then other functions like agriculture, industry, shipping and recreation.

In the reactive assessment framework, an advisory group consisting of amongst others hydrologists, meteorologists and water managers assesses situations based on various indicators and the water balance: the equilibrium between the amount of water in a river and demand from the various users. The data is obtained from models and the actual situation, including precipitation amounts, water levels and flow rates in watercourses and groundwater levels. When certain indicators fall below specific thresholds, a package of measures is activated.

Code red

Colour codes indicate the severity of a drought situation. Code green means that there is enough water. In this situation, the experts provide monthly advice. Code yellow means vigilance and local drought. The advisory group will meet every two weeks and mayors, governors or water managers will take measures locally.

In a Code orange situation, the Flemish Drought Commission will become responsible for coordination; the governors of the various provinces will make agreements among themselves. Measures like extraction-bans on the withdrawing of water from watercourses will then be imposed, or restrictions on use will be imposed. For example, watering the garden or washing the car.

The river basin is interconnected. Solutions won’t be possible unless we work together.”

Code red signifies a crisis situation where essential functions are at risk, such as shipping on the Albert Canal and drinking water production. De Potter believes that a framework for the assessment of water scarcity should be established at a level that covers the entire river basin: involving France, Wallonia, Flanders and the Netherlands.

Collaboration

If low levels of water are being supplied via rivers and canals, tensions can arise between regions. However, tensions could also arise between sectors like the drinking water supply, energy, industry, agriculture, nature and shipping sectors.

Collaboration is already taking place but could be more intensive. De Potter mentions the 1995 Meuse discharge treaty between Flanders and the Netherlands; its aim is to achieve an equal distribution between Dutch and Flemish use during periods of low flow. Collaboration also takes place between managers during times of drought. A concrete assessment framework has been drawn up (including a package of measures) for water management on the Meuse and the Albert Canal during periods of drought (for example, pumping water back to limit water loss in water-locks). In this respect, the coordination necessary between De Vlaamse Waterweg and the other competent entities is also provided for.

During periods of drought, IMC also periodically publishes a low water report detailing the situation throughout the river basin. However, the commission focuses primarily on the implementation of the WFD. De Potter: “The directive dates back to 2000, when droughts weren’t an issue yet. Now they are.” Deltares is currently conducting a study, commissioned by the Dutch government, into the impact of climate change on the Meuse; the study is to be completed in early 2027.

Serious game

The need for collaboration recently became very clear during the plenary session of the IMC. The delegation members played the Meuse water dialogue game on the consequences of climate change for the availability and quality of Meuse water, developed by RIWA-Maas.

The WFD dates back to 2000, when droughts weren’t an issue yet. Now they are.”

Various interests converge in the game. For example, drinking water production, energy supply, shipping and industry. Participants discuss what should be done to be able to continue meeting the demand for water at an international level during times of drought. For example, power plants must run, shipping must continue and the production of drinking water for seven million people must be guaranteed.

Dialogue enables participants to gain a better understanding of the interests of others and to actively contribute to the identification of solutions. De Potter also learnt more about the impact of downstream economic activities, such as the construction of a large data centre in the German part of the river basin and barriers to hydroelectricity in the French part. “Gaining a better understanding of all the dependencies was a real eye-opener.”

The impact of climate change

De Potter said that the game made two things clear: “Firstly: climate change is already having an impact and its impact is set to increase. Secondly: the river basin is interconnected. Solutions won’t be possible unless we work together.”

Solutions could involve civil engineering, he explains, such as large buffer reservoirs. “These are possible downstream but are generally very expensive, as well as less efficient and less effective.” Nature-based solutions are among options available as well. For example the creation of infiltration areas so that rainwater penetrates into the ground and does not flow away to the sea. “They need to be created upstream. This will require us to sit down together and make agreements - including agreements on funding, of course.”

De Potter believes that this serious game would also be interesting for a provincial authority, a water board, or with various levels of another government organisation from ministers up to and including operational staff. “In any event, the intensity of collaboration will need to increase,” he says. “I think everyone agrees on this, given the challenges we face: both climate change and the large volume of new chemical substances.”

"10 years of SMWK: addressing pollution in the Meuse together"

Marjolein Jacobs-van Eerd
Coordinator SMWK (De Schone Maaswaterketen)

C3. Interview with Marjolein Jacobs-van Eerd

Coordinator SMWK (De Schone Maaswaterketen)

Water managers and drinking water companies in the Meuse river basin are working together in SMWK to improve the quality of water in the Meuse. Marjolein Jacobs-van Eerd, Coordinator of the partnership, explains what has been achieved since 2015 and what it will focus on in the years ahead. “We show that collaboration in the water chain is possible and as well as necessary to move forward.”

SMWK celebrated its 10th anniversary in 2025. Its partners consist of drinking water companies and water boards in the Meuse river basin, the Ministry of Infrastructure and Water Management, RWS and RIWA-Maas. The goal is to reduce the number of organic micropollutants in the Meuse: chemical substances that are harmful to the health of people, animals and the environment.

Join forces

The partnership originated with a few employees of drinking water companies and water managers in the Meuse region. “They realised that they had similar interests and could not solve their problems alone,” Jacobs-van Eerd says. “The following question arose: why do we work so separately of each other; can't we join forces?”

At the time, the drinking water companies and water boards were looking for ways to remove harmful residues of medicines from the water. They decided to launch a joint project in which a purification technique developed by drinking water companies was tested at the Papendrecht RWZI. This technique, which uses pulverised coal, was found to work well. Even more important than testing the technique, Jacobs-van Eerd says, “was getting to know each other, gaining an understanding of each other’s organisations and interests, and exploring together how we could collaborate with each other.”

Monitor water quality

In 2021, the partners developed an action programme with the following objective: a 30% reduction in micropollutants in the Meuse by 2040 compared to levels observed in 2023. Since then, SMWK has focused not just on residues of medicines but on industrial substances and pesticides as well.

SMWK has established a joint monitoring network to track whether the reduction objective is being met and how water quality develops in the interim. The organisation measures 38 substances at 30 monitoring points four times in a year. The substances in question were chosen because they are representative of pollution in the Meuse.

We show that collaboration in the water chain is possible and as well as necessary to move forward.

The results are set out in the Atlas for a Clean Meuse. Jacobs-van Eerd: “This database enables us to monitor water quality and reduction objectives better and also trace the sources of pollution of harmful substances.”

In 2027, SMWK will reflect on trends in water quality and the progress the partnership is making in terms of its achievement of the reduction objective. The presence of some substances is already visibly declining. Such as the insecticide imidacloprid for example, because it is now banned. However, it is still being used as a veterinary medicine and in consumer products like ant bait traps. There are other substances that SMWK is monitoring due to concerns, such as certain PFAS, PFOS and a number of residues of medicines.

Investigate and inform

Besides the monitoring network for 38 substances, SMWK studies the water in other ways and jointly tests innovative methods. Non-target screening identifies thousands of substances and shows which types of substances are present in the water. Another method is bioassays, which demonstrate the effects of harmful substances on aquatic animals and plants. SMWK is also testing whether passive monitoring in the sewer system could help identify indirect dischargers.

This information enables SMWK to intervene in a targeted manner and tackle the sources of pollution. This could mean: investigating further to identify the origin of a discharge, informing companies, industry organisations or households, or asking the competent authority to supervise and enforce.

Short lines of communication

SMWK has developed a unique and valuable network, Jacobs-van Eerd says. “Monitoring and substance experts, permit issuers but also data engineers now know how to contact each other in the Meuse region. To coordinate topics or to act together in the event of emergencies. The lines of communication are short.”

Via SMWK, permit issuers regularly come together in a knowledge network to exchange experiences and expertise and discuss specific cases. The organisation has also developed a checklist and various tools for permit issuers, which are available on the website. SMWK is currently doing research to identify how the relevant organisations in the Meuse region could work towards a future-proof permitting system. “The permitting process is very complex and there are many problems in terms of capacity, knowledge and expertise. We see opportunities here to join forces at Maas river basin level.”

Discharges into the sewer system

Recently, the partnership has not just focused on direct discharges into surface water but also on indirect discharges. These discharges into the sewer system eventually reach the Meuse via RWZIs. The origin of these harmful substances is often difficult to track and purification is difficult as well as expensive. Therefore, addressing the issue at the source is the most cost-effective approach for society.

As such, SMWK recently worked with the Meuse River Basin Program Office to develop an approach to detect indirect discharges and identify the appropriate permits. Jacobs-van Eerd: “It’s crazy that it's 2026 and we still don’t know which discharges we have issued permits for: we don’t know which pollutants are present in our sewer system. This sometimes literally involves diving into the archives and systems.”

Since January, SMWK partners have also been able to use a hotspot tool for potential industrial discharges (*Hotspottool potentiële industriële lozingen*). Enforcement agencies like environmental services and water boards can use it to perform a quick scan: an assessment of possible harmful discharges by area, sector and company. This can help them track the source of a harmful discharge. Jacobs-van Eerd says that this has been met with an enthusiastic response.

Work with companies

SMWK also works with companies and industry organisations. At events like the annual Meuse business day (Maasbedrijvendag), SMWK provides information about the importance of understanding what wastewater contains. This helps get closer to achieving the objectives of the European WFD by 2027, amongst other things. SKWK analysed the wastewater of pharmaceutical company Aspen Oss in 2024. “This company wants to lead the way and be transparent about its wastewater,” Jacobs-van Eerd explains. “Discharge capacity for companies is becoming increasingly limited and they have a duty of care towards their employees and the environment in which their businesses operate. We can see a growing need for clean water for companies, but water availability is declining. Circularity, water reuse and sufficient quantities of clean water are becoming increasingly important priorities for companies. We are happy to share thoughts and ideas and invite companies to be transparent about their wastewater streams.”

More awareness

Jacobs-van Erd stresses that communicating, raising awareness about harmful substances, is an important task of SMWK. The partnership does this at meetings but also via its website, in news reports, vlogs and on its LinkedIn page.

"We show that the substances that households or companies use can have an impact on water quality. Companies and households often lack knowledge. In my own home, I also find it difficult to know which products I can and which I cannot use." However, Jacobs-van Erd has seen an improvement in awareness in the recent years. "We also make it clear that it is not possible to purify everything and that, if it can be purified, the process is often very expensive. In short: it is better to prevent harmful discharges."

Build a data platform

Since 2025, SMWK has been working with a separate Data Management working group, alongside working groups for Monitoring and Interpretation, Source Tracing and Approach and Communication. "We are working towards a data-driven Meuse river basin," Jacobs-van Eerd says. "We are already sharing data with each other but want to build a data platform to exchange more up-to-date data from the 11 partners and link it to other data sources."

This will enable SMWK to pinpoint the source of a harmful substance faster and gain a more up-to-date picture of water quality. It is not simple as "every organisation works with its own systems, in its own way." "But", she says: "SMWK has a connecting role and we are a driver too: we can give a boost to a specific topic and show that it is possible and has added value, as is currently the case with the development of a shared data platform."

Learn from Flanders

The Meuse flows via France and Belgium to the Netherlands; therefore, some pollution originates from abroad. With this in mind, SMWK likes to collaborate with upstream partners. For example by sharing knowledge and expertise at international meetings and by organising meetings itself. They include the annual International Meuse Symposium on water quantity and quality challenges in the Meuse river basin.

In recent years, it has proved very useful to exchange knowledge and experiences with Flemish drinking water companies/knowledge institutes as well as with VMM, which is responsible for water management and environmental quality. For example, VMM provided SMWK with information about direct and indirect discharges from the Flemish permits. This data has been published in the Atlas for a Clean Meuse. VMM already had a good overview of the indirect discharges for which permits had been issued; this overview is still lacking in the Netherlands. VMM also publishes the results of wastewater measurements at companies on a website that is accessible to the public. In the Netherlands, these measurements are also carried out by the competent authority, but they are not published. Jacobs-van Eerd: "Here in the Netherlands, we can learn from what Flanders is doing."

New substances, climate change

The partners are currently working on a new action programme, with new focus points, for the next seven years. Source detection and a source approach will continue to be at the heart of the partnership to reduce the presence of harmful substances in the Meuse. Consideration will be given to climate change as well. "We know that water quality depends on the volume of water flowing through the Meuse and also that more, longer-lasting dry periods lie ahead."

SMWK will also evaluate whether the 38 indicator substances that are being monitored are still the right substances to monitor, or whether other, potentially new substances should be given priority because they have a high PMT score (Persistent, Mobile and Toxic).

Jacobs-van Eerd continues: "We are also working together to try to bring about a change in the way we think about permitting. Companies are issued with permits that allow them to discharge their waste streams when it actually does not make any sense to discharge them into water. The complete elimination of harmful substances is a utopia, but you can look at other possibilities first and see discharging into water as the very last resort. This requires a change in mindset."

Strengthen collaboration

In the years ahead, SMWK not only wants to strengthen collaboration with provinces, municipalities and environmental services in the Meuse region, but

SCHONEMAAS WATERKETEN

PARTNERS IN SMWK:

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Waterschap Brabantse Delta
Waterschap De Dommel
Waterschap Rivierenland
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also with businesses, industry organisations and households. “Because we need the chain as a whole to improve the situation, we want to make collaboration more concrete, less ad hoc,” Jacobs-van Eerd explains.

SMWK also wants to work more with Wallonia and France. “For example, it would be great to have a clear picture of the discharge permits issued in the Atlas for a Clean Meuse, not just for the Netherlands and Flanders but for the entire Meuse river basin. And if we are able, share more data on water quality and sources of pollution.”

Other river basins

The partnership that already exists in respect of the Meuse has not been established for other river basins in the Netherlands yet. Jacobs-van Eerd: “We see the SMWK as a kind of test bed. We show that change in the water chain is possible. We usually start small, with a tiny part of the Meuse river basin and then scale up within the Meuse region. I think this would be possible in river basins in the rest of the Netherlands as well.”

Scaling up is already taking place outside the Maas region. For example, Omgevingsdienst NL, the national association of the 28 environmental services, has recommended the methodology for the detection of indirect dischargers to all environmental services and this is being actively disseminated via their knowledge network. SMWK is contributing to this too. “We think it’s important to share our knowledge and expertise. We are also learning from our collaboration with others.”

Finally, Jacobs-van Eerd says the following about the partnership: “You can feel a very positive energy and drive in SMWK. We have the confidence to work together and to look beyond our own organisational interests. We have seen that we achieve much more when we bring together all the players, knowledge and expertise. We can only solve complex challenges in the water chain, such as sufficient quantities of good-quality water in the future, together.”

“Strengthen the position of water managers”

Arend Wadman
Winner of the Waternetwerk Thesis Prize 2025
Lawyer specializing in general administrative law and environmental law

C4. Interview with Arend Wadman

Winner of the Waternetwerk Thesis Prize 2025, lawyer at AKD

The Netherlands will not meet the environmental objectives of the WFD due to the division of tasks and responsibilities within the government. This is the conclusion that lawyer Arend Wadman arrives at in his thesis, for which he won the *Waternetwerk Scriptieprijs*. RIWA-Maas asked him to discuss his research and presented him with some current issues. "Give water managers the right to deliver a binding opinion."

The Water Framework Directive: navigating towards a watertight division of powers (*De Kaderrichtlijn Water: Koersen op een waterdichte bevoegdheidsverdeling*). This is the title of the thesis that Arend Wadman wrote in 2024 for his Master's in Constitutional and Administrative Law at Leiden University.

In 2025, Wadman won the *Waternetwerk Masterscriptieprijs* from the Royal Netherlands Water Network (KNW). The jury found his thesis innovative and urgent. It exposes issues in the watersector and the text is easily readable for non-lawyers despite the complex subject matter. Wadman is currently working on an academic article on his thesis for the Milieu & Recht legal journal.

Water law

While doing an internship at water board Delfland, Wadman discovered water law as an interesting area of law. "Water touches upon everything we do in the Netherlands. I noticed that it's a niche within environmental law. Very few people in the Netherlands have a deep understanding of it."

Wadman now works as a lawyer at the law firm AKD, where he assists both government bodies (including water boards) and companies with legal issues, ranging from environmental pollutants and spatial planning to compliance with environmental standards. "This enables us to see both perspectives."

Strengthen the role of water managers

In his thesis, Wadman focused on indirect discharges: discharges into the sewer system that end up in rivers and ditches via treatment plants. Little research had been done on this at that time. "Indirect discharges are sometimes overlooked, so it seemed to me that there was still some environmental gain to be made there." His main recommendation is to make the tasks and responsibilities of water boards, provinces and central government legally 'watertight'. In other words, the role of water managers must be strengthened in order to safeguard water quality.

Adjust the division of powers

But how? Currently, municipalities and provinces issue permits for indirect discharges by companies into the sewer system, often via environmental services. Water boards and central government, as the water manager, are responsible for water quality but only see how good the water quality is at the purification stage. "The party with the best insight into water quality and the greatest interest in it should actually have a say in the matter," Wadman explains. "If this were the case, rules and powers would align better with the goal: cleaner water and the achievement of the objectives of the WFD."

However, Wadman explains that there is a problem: it will take years to adjust the division of powers and make water managers the competent authority for indirect discharges. Wadman: "The legislative process is very long-winded, especially because the Dutch Environment and Planning Act has just been enacted and authorities are still in the process of aligning their working methods to it." The Dutch Environment and Planning Act has been regulating the living environment since 2024. More is involved here than just the legislative process. For example, administrative coordination and implementation capacity too: the water manager would have to recruit additional staff for this purpose. "This isn't impossible, but in my opinion, would move too slowly to have a substantial effect before December 2027." The WFD objectives must be achieved by 2027 at the latest.

Right to deliver a binding opinion

In the short term, Wadman proposes what he considers to be “minimal adjustments and maximum consequences that seem more obvious.” Water managers - water boards and central government - have the right to deliver an opinion under the Dutch Environment and Planning Act. If too many harmful substances are present in a discharge, a water manager can advise the environmental services not to issue the permit or attach stricter conditions to it. “In practice, this is very non-binding and is rarely utilised.”

The idea: parties with their feet on the ground know what is happening at a local level. A noble aspiration, but not always feasible in practice.

The competent authority is only obliged to provide the water manager the opportunity to deliver an opinion in the event of indirect discharges that require a permit. However, there is no obligation to deliver an opinion. Permit issuers do not have to ensure that an opinion is delivered; they are only required to offer the opportunity for an opinion to be delivered. If an opinion is delivered, it may be deviated from with a proper justification. So, Wadman advises: “Introduce a (binding) right to deliver an opinion from which parties are not allowed to deviate. This will ensure that water interests must be taken seriously.”

Limited priority

Wadman is only seeing ‘limited’ attention to water quality among municipalities and provinces. “They have many responsibilities. Water doesn't really have priority. So, there isn’t much of a budget for it and limited FTEs.” He notices the same with water managers. “In the mid-1980s, water managers had full power in respect of indirect discharges. Since the introduction of the Dutch Environment and Planning Act, there’s just a non-binding right to deliver an opinion. They can see water quality deteriorating but don’t have the resources to do anything about it.”

No-one is responsible

Wadman believes that the inadequate quality of Dutch water and the failure of the Netherlands to meet the WFD objectives are also due to the ‘fragmented organisation’ of all the tasks and responsibilities. “If everyone is responsible, no-one is responsible.” In his thesis, Wadman included a map of the municipalities and water boards. Amongst other things, it shows that water board Rivierenland deals with 26 municipalities, five environmental services and four provinces. “They all have their own way of doing things. For example, the way in which indirect discharges are registered can sometimes vary per environmental service.”

Coordination by river basin?

In 2026, the book Waterland - *Naar een strijd vóór water*[9];it was the result of an interdepartmental management programme at the Netherlands School of Public Administration. The book advocates just one party with a coordinating role per river basin. Does Wadman think this would improve the current situation too? “Clear coordination could help,” he says, “but I don’t know if a new organisation would help. There's a risk that yet another new layer of administration would be created.”

As a lawyer, Wadman points out that the idea does not align with the Dutch Environment and Planning Act. “It’s based on the ‘decentralised unless’ principle. So, the focus is on the municipality first, then on the province or water board and then finally, on central government, the party with ultimate responsibility. The idea: parties with their feet on the ground know what is happening at a local level. A noble aspiration, but not always feasible in practice.”

A coordinating role will have little impact if a party is unable to take decisive action, Wadman stresses as well. “Stronger direction and compelling legal instruments do facilitate faster intervention. In short: strengthen the position of water managers.”

9 *See Subsection A4.5.*

A reverse burden of proof

Waterland also recommends the introduction of a reverse burden of proof. Currently, the government assesses whether a discharge is harmful, but this could also be reversed: a company is required to demonstrate that what it is doing is not harmful.

The WFD is a directive, but the environmental objectives are result-driven obligations.

What are Wadman's thoughts on this as a lawyer? "Nuanced. There are arguments in favour. For example, the company has information about what is being discharged because it produces the substances, not the government. But there are also arguments against." He explains that this requires an explicit choice by the legislator because the current system has been structured differently under the Dutch Environment and Planning Act. In this system, there is more emphasis on duties of care, the regulations attached to permits and concrete assessment criteria.

Wadman also points out that the regulatory burden increases significantly if companies are asked to prove that their discharges are not harmful. "At the European level, we are seeing that a great deal of legislation is being weakened to give companies more leeway, in order to protect the competitiveness of European industry in light of high energy costs."

Dutch legislator

Before the introduction of the Dutch Environment and Planning Act in 2024, water boards had the power to hold municipalities accountable for discharges of harmful substances into the sewer system by companies. The municipality was responsible and required to enforce regulations due to its duty to protect the environment, including drinking water sources. Does Wadman expect that this power will be restored to water boards via the European Urban Wastewater Treatment Directive? This Directive has been approved at the European level and Member States are required to translate it into national legislation by 31 July 2027 at the latest.

Wadman does not think so. "The revised Directive is moving in the direction of the previous situation. But I am not so sure that this will result in the introduction of a permit requirement." In principle, under the Dutch Environment and Planning Act, there is no permit requirement. A company is allowed to discharge substances; a permit only needs to be applied for or a notification needs to be submitted in certain cases. "The Directive seems to deliberately leave some scope for a Member State's own interpretation. So, it depends on what the Dutch legislator decides to do."

Greater role for water boards

Wadman explains that this is because of the difference between a directive and a regulation. A regulation at European level is binding, while a Member State can interpret a directive as it sees fit. "And, to complicate matters: the WFD is a directive, but the environmental objectives are result-driven obligations." However, Wadman does have the impression that the new Directive will give water boards, as managers of the RWZIs, a greater role. "There may not be a permit requirement but rather a notification requirement, prior authorisation or inspection. This would increase the involvement of water boards. Exactly how is still unclear."

The situation in practice

The European Commission is currently working on a revision of the WFD, which must be completed in 2026. "Drinking water companies are concerned", Wadman knows. "The revision could lead to weaker guarantees of surface water and groundwater - important sources of drinking water - protection." Meanwhile, case law is constantly evolving. "The manner as to which the European Court of Justice, the Dutch administrative courts and the Council of State are interpreting certain key concepts from the WFD are becoming more concrete. With the 2027 deadline in sight, this is having ever more concrete consequences for governments and companies."

Environmental organisations or local residents

A prohibition on deterioration already applies for water quality. An improvement requirement is in place too: thus, the WFD targets must have been achieved by 2027. In view of this impending deadline, Wadman expects that many companies and administrative bodies (municipalities, provinces, water boards environmental services and the central government) will need to enlist the help of lawyers in the years ahead. Administrative bodies must ensure that permits, bespoke solutions, supervision and enforcement are 'WFD-proof'; companies may be affected by stricter permits, additional regulations or enforcement requests. Therefore, both groups will need legal advice. “It’s a very human thing: only feeling the urgency and taking action at the last moment.”

Companies may find themselves in trouble when permits become outdated or have not been updated and they are discharging too much by current standards. Wadman: “It’s similar to the nitrogen crisis. But with farmers and cows replaced with companies and products. Both have government permission, but then an environmental organisation, local residents, or sometimes even the government says: hold on a minute, you can't go on like this anymore; we’re going to file an enforcement request. And then government must make permit policy stricter and take action against the company.”

Where nitrogen is concerned, the source is very difficult to pinpoint because it spreads widely and can originate from many different farms or industries. The same applies to indirect discharges into water because many different discharges converge in a sewer system. “The source of direct discharges is usually clear.”

Who is responsible?

When pollutants are found to originate from abroad, it is even more difficult for drinking water companies to trace the source. This is also legally complex and, as a lawyer, Wadman has two takes on the situation. “On the one hand international source tracing is very important, because the Meuse is of course a transboundary river. Ultimately, the Netherlands is the most downstream country: we are left with pollution from other countries, although we ourselves contribute to it as well.”

On the other hand, it is very difficult to determine the exact origin of pollutants, especially if the source is not in the Netherlands. “The burden of proof is very complex: legally demonstrating the source responsible. Because the substances in water can mix, dilute or originate from multiple sources.”

It’s a very human thing: only feeling the urgency and taking action at the last moment.

Current theme

Moreover: water does not respect borders, but the powers of administrative bodies do. “The Dutch government does not have any intervention or enforcement powers in Belgium or France. Countries are obliged to collaborate under the WFD. In practice, this often involves consultation and data exchange, which is very time-consuming. “If collaboration is difficult, it will be difficult to tackle pollution as well. Neither Wallonia nor France produce drinking water with Meuse water. As such, it is not always in their interest to make standards stricter or to intervene because a company might be very important for employment in a particular region.” Added to this, it can take a long time for a harmful substance to make its way to the Netherlands from France or Wallonia. “In short, water quality is not just a technical or ecological exercise but a current legal and political issue.”

“The government has no control over water quality: we do not know who is discharging what and where”

Thomas Biersteker
Hydraulic Engineering student at TU Delft

C5. Interview with Thomas Biersteker

Hydraulic Engineering student at TU Delft

Which companies discharge their wastewater into the Meuse river basin and where? For years, RIWA-Maas has been advocating a public register where information about wastewater is transparently consolidated and made accessible publicly. The information available is often limited and scattered across various sources. Numerous lists of company information are circulating and each contains different information.

All Discharges into the Meuse at a Glance: An Overview.

RIWA-Maas asked Thomas Biersteker, a Hydraulic Engineering student at TU Delft, to combine all these lists into one clear overview. This assignment was arranged via Waterhandjes, an organisation that connects students with companies in the water sector. Was Biersteker successful and does he have any recommendations?

What exactly did the assignment entail?

“I was asked to produce an overview of discharge permits in the Dutch part of the Meuse river basin. This overview is essential if the effective protection of the Meuse as the source of drinking water for 7 million people is to be protected against harmful pollutants. Maarten van der Ploeg, Director of RIWA-Maas, is working with water chain partners to identify this information for the Meuse. Some of this information is already in the Atlas for a Clean Meuse, an SMWK initiative. However, the Atlas still lacks information about industrial wastewater discharges into the sewer system. This information is not easy to find because data is scattered across numerous lists. For this assignment, Maarten gave me seven datasets containing a total of more than 3,300 rows of company data: from RWS, water boards, environmental services and several other sources, including a dataset for the identification of PFAS discharges. While doing my research, I gained some programming knowledge, which enabled me to combine these datasets faster and smarter.”

Why is this overview important?

“Water quality in the Netherlands is currently inadequate. The government has no control over water quality: we do not know who is discharging what and where. The Netherlands Court of Audit arrives at the same conclusion in its report entitled 'focus on industrial discharges’ (Focus op industriële lozingen), which was published this year (also see Subsection B4 of this report). According to the Netherlands Court of Audit, this lack of overview is responsible for major societal, financial and ecological risks. A total overview would put permit issuers in a better position to assess whether it is wise to issue a new permit. For example, not wise at so-called 'hotspots': locations at which large amounts of harmful substances are already being discharged.”

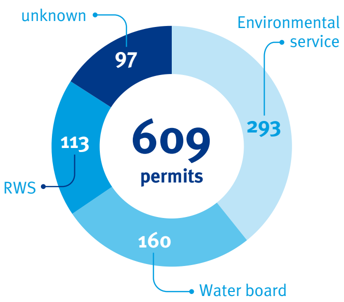
The government just needs to get to work on this issue. Agree which permit and discharge data will be registered, both how and where

Did you encounter any problems?

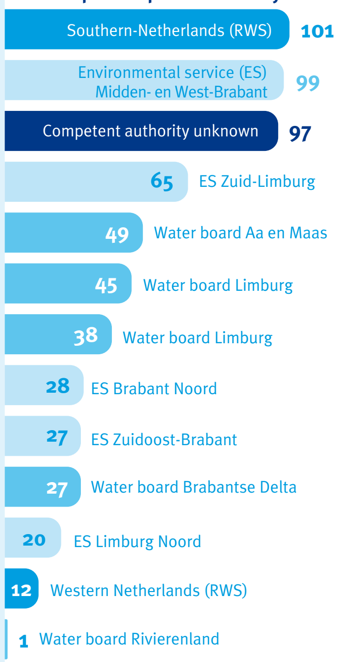
“A huge amount of data is available about permits and discharges, but it is scattered across various organisations. They all have their own systems and registration methods. Added to this, companies have the freedom to enter information themselves and do so in different ways. Some companies do not enter their full company name or the SBI code - the Dutch Chamber of Commerce code that indicates their economic activity. One dataset lists 'pig slaughterhouse', another 'food supply' and yet another leaves the field blank. The discharge location is often not stated clearly either: for example, it might say 'canal' or 'Wilhelmina Canal from Oosterhout to lock 3 west of Tilburg'. Companies often have multiple sites. For example, we came across an apartment in Den Bosch, which could never be the discharge location. The data is often not up to date either. We came across companies that no longer exist in the Dutch Chamber of Commerce records for example.”

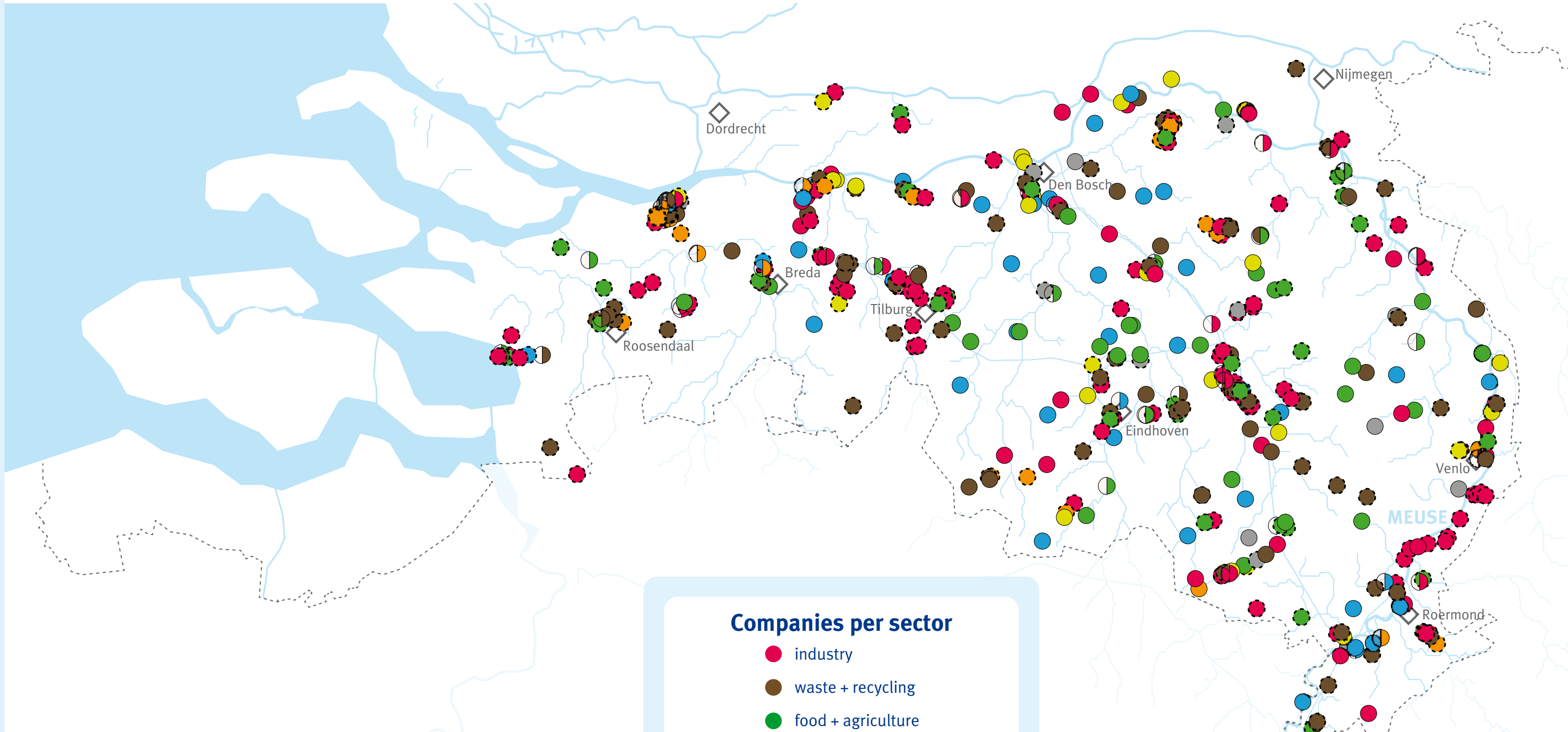
Wastewater discharge in the Meuse catchment area mapped

Competent authority

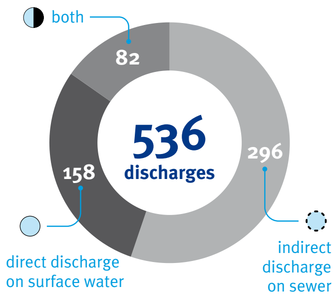


Amount of permits per competent authority

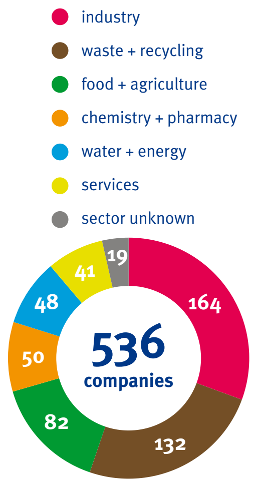




Route of Industrial wastewater emissions



Companies per sector



What kind of overview did you create?

“We focused on three things: companies with discharge permits, discharge locations and business activities. After removing duplicate data, we were ultimately left with circa 500 relevant companies. Some information is still missing because the registration method is currently not standardised. We have merged everything into a single file and converted it into a map of the entire Meuse river basin. We want to use it to start a debate.”

What's your opinion as a future water professional?

“You often hear that water quality in the Netherlands isn’t good. I hadn't expected the complete absence of a clear overview of discharges by companies. Halfway through the assignment, I found out that the Netherlands Court of Audit was investigating this exact same problem. That’s when I realised how topical it is. In the past, it has frequently been said that the government has insufficient control over harmful discharges. Perhaps I have the optimistic outlook of a student but after working on the assignment for about 8 to 10 days in a two-month period, I’ve been able to create a decent overview. I don't think the solution needs to be complicated either.”

What do you think the solution is?

“The government just needs to get to work on this issue. Agree which permit and discharge data will be registered, both how and where. Do this in a standardised way, the same for all companies and organisations as well as in one central system. Also very important: make the registration of the exact discharge location mandatory, in the form of coordinates. Finally, ensure that permits and company data are updated annually and that it’s clear which government organisation is the competent authority.”

Seventy-five years of RIWA, an overview of the Meuse as a source of drinking water

"After 75 years, RIWA's value remains clear: source protection, monitoring, and cooperation are more critical than ever."

Arco Wagenvoort and Arnoud Wessel
Evides drinking water company, technology and water sources Department

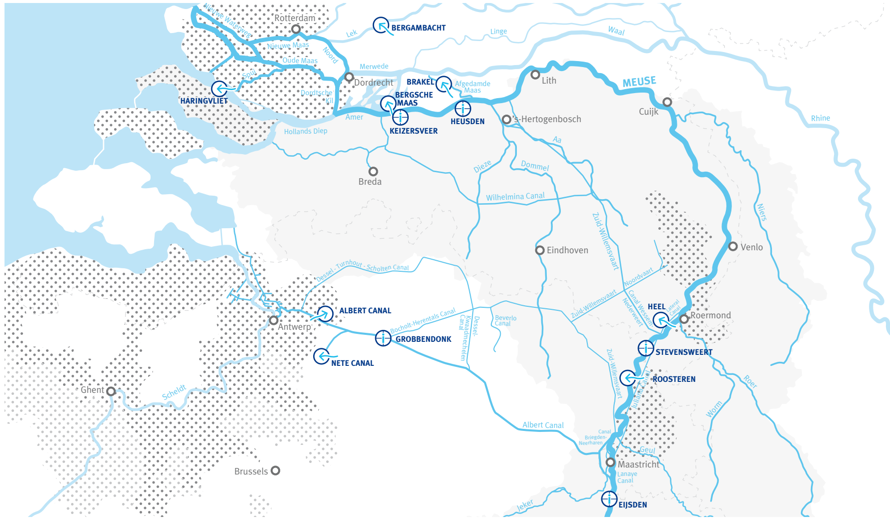
Since the 1970s, the rain-fed river Meuse has served as the source of drinking water production for Antwerp, Brussels, The Hague, parts of Limburg, the south-western part of the province of South Holland and Zeeland. Central Zeeland will be added to this list in 2030.

Authors: Arco Wagenvoort and Arnoud Wessel
Evides drinking water company, Technology and Sources Department

RIWA-Maas is the lobbying organisation for drinking water companies along the Meuse. Their aim is to purify the river water into drinking water for over seven million people using the simplest means possible (editor's note: in practice, various purification steps are necessary). Water quality data obtained from monitoring is an important tool here. Over time, major changes have become visible in the water quality of the river as a result of discharges from (waste) water treatment plants, changes to water system management and climate change. This is presenting the drinking water companies with new challenges.

RIWA aims to improve the water quality in the Meuse in line with Article 7 of the WFD. This means that water quality must further improve so that the level of purification treatment effort can be reduced long term.

We monitor water quality via the RIWA-Maas monitoring network (RIWA-Maas meetnet). This network was primarily established to identify water quality trends and to assess measurement results against water quality criteria. Examples are the limit values in the RIWA-Maas Memorandum (RIWA, 1995), the later ERM and the WFD. Monitoring currently consists of seven fixed monitoring points in Belgium and the Netherlands (Figure 1). This enables detection of sources of pollutants and acts as a national and international warning system. The usual monitoring is sometimes supplemented by measurement campaigns with specific objectives.



Meuse river basin and the areas reliant on the Meuse as a source for drinking water (dotted hatching).

Source: RIWA-Maas, Studio Ilva, Original map of The Meuse; The story of a river, by Wim Peumans, edited with permission.

reguliere monitoring worden van tijd tot tijd meetcampagnes met specifieke doelen uitgevoerd.

Purify wastewater

More than nine million people live in the Meuse river basin and their domestic wastewater eventually ends up in the river. In the final decades of the 20th century, a significant step was taken in the realization of RWZIs, which reduced the pollution of the river with eutrophic substances (also known as nutrients). In the last two decades, increasing investments have been made in a further reduction of organic micropollutants in (domestic) sewage using ozone, activated carbon and UV (Figure 8).

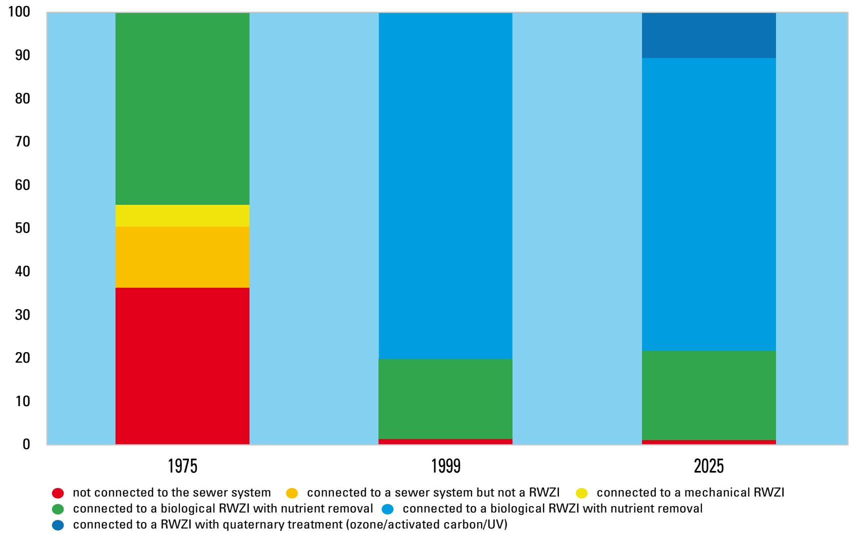


Figure 8: Wastewater treatment effort: figure compiled from online available data provided by water authorities.

Climate change

An upward trend is evident for water temperature. Based on a linear trend analysis, it has been determined that the average water temperature at Keizersveer has increased by 2.5 °C in/over the past 62 years (the temperature changes measured are included as a barcode (a minimum of 11 °C and a maximum of 15 °C) after the section titles). Extrapolation of this trend to 2050 results in an expected total increase of approximately 3.5 °C compared to the 1960s. These increases are 3.1 °C and 4.3 °C respectively for the maximum temperatures.

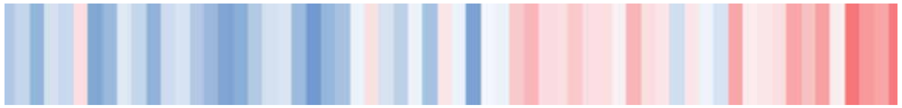


Figure 9: Observed Temperature Changes, with a Minimum of 11°C and a Maximum of 15°C

The annual average water temperature is increasing less rapidly than the extremes. The 90th percentile value in particular (10% of the measurement values are higher than this value) seems relevant here, as it is associated with warm summer periods and low flows.

If temperature increases continue, (bio)chemical processes will accelerate. Combined with low flow rates, more phosphate may be released from the riverbed. Drinking water companies along the Meuse use reservoirs to store water and improve its quality. The combination of higher water temperatures and increasing phosphate concentrations increases the growth potential of algae and cyanobacteria in the reservoirs. As a result, the load of algae and cyanobacteria on the treatment process may increase significantly.

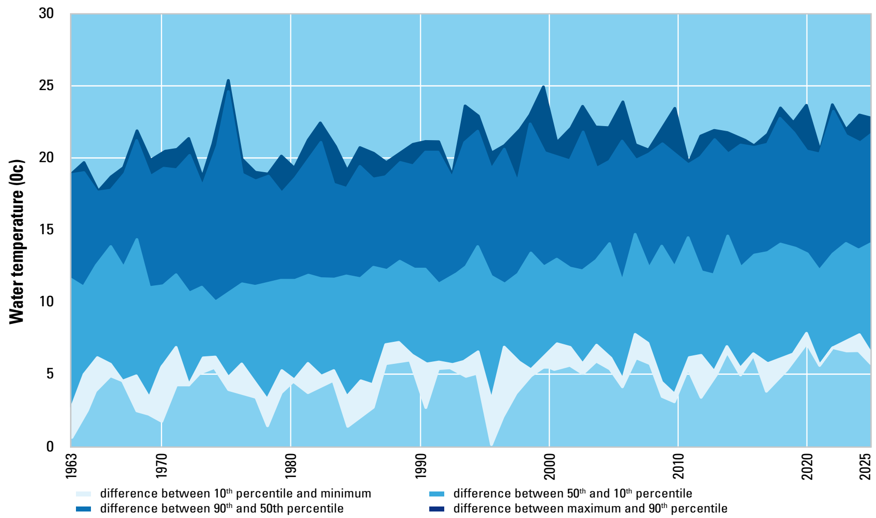


Figure 10: The water temperature range of the Meuse at Keizersveer per year between 1963 and 2025.

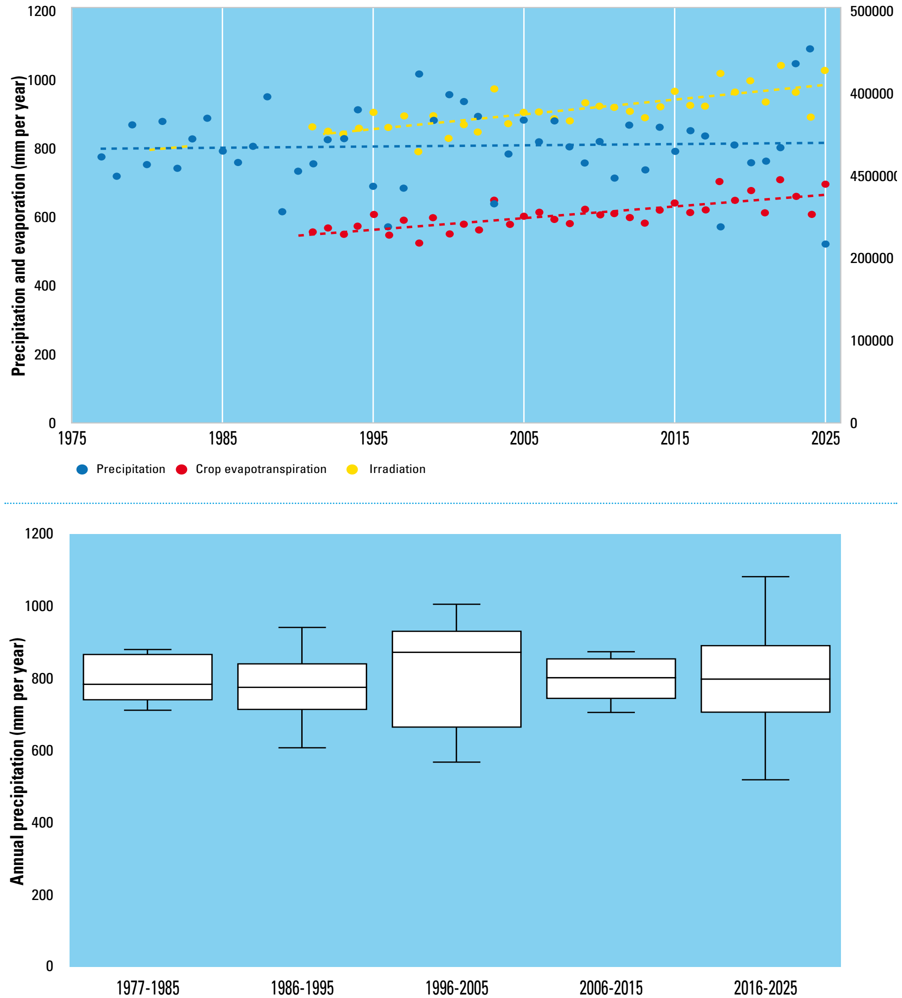


Figure 11: Annual precipitation sum, cumulative crop evapotranspiration, and total global radiation trends (top figure) and decadal variations in annual precipitation range (bottom figure) at Gilze-Rijen weather station.

Other climate variables were examined as well. They show that irradiance and evaporation have clearly increased over time due to the higher temperatures (Figure 11). In contrast, no trend is evident for total average precipitation. However, there is clearly more variation in total annual precipitation.

In the last decades of the previous century, acidity was virtually constant at approximately pH 7.7. There has been a clear increase in acidity in the first two decades of this century. A direct cause has not been found, but it may be the result of:

- The reduction of atmospheric pollutants responsible for acidification (including reductions in SO2), starting in the 1990s;
- Acidity may also have increased due to changes to the river, such as the construction of overflow areas and water retention, resulting in the longer residence time of the water and the growth of plants and phytoplankton;
- Since 2009, the quagga mussel (Dreissena rostrifomis bugensis) has been found on stones in the river, the population has developed massively since then and may also be affecting acidity.

Historically low flows

RWS has flow data on the Meuse at Megen. It has been translated into average daily flow rates, expressed in m³/s. The average flow rate is approximately 300 m³/s across the entire measurement series (1995-2025). The 10th percentile is approximately 60 m³/s, which means that the flow is lower than this value on 10% of days. When looking specifically at the years 2017-2020 and 2022, the 10th percentile drops to approximately 30 m³/s.

Until 2017, the minimum average daily flow rate was 25 m³/s. This minimum was matched in 2017, after which the minimum average daily flow rate was repeatedly below the minimum in the subsequent dry years. In 2022, a new absolute minimum was reached, being an average daily flow rate of 12 m³/s.

Within the series that are being considered, 2022 was the driest year in terms of flow: the flow was below 100 m3/s 50% of the time. In contrast, 2024 was the wettest year, with flow rates being above 400 m³/s for 50% of the time.

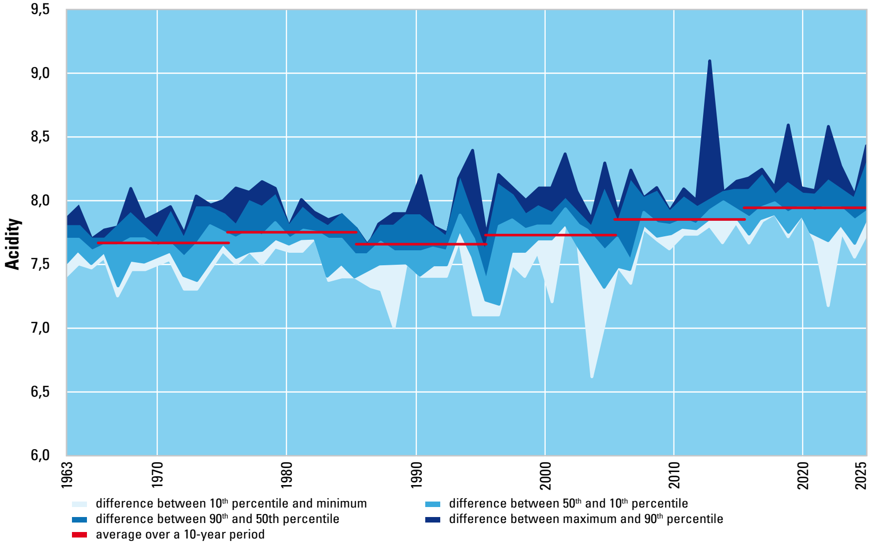


Figure 12: The acidity range of the Meuse at Keizersveer per year between 1963 and 2025.

A divergent pattern would appear to be the case in 2025. Despite relatively limited precipitation levels, the river flow was stable. This can be explained by the fact that groundwater systems were substantially replenished in 2024. These systems supply water to the river at a delayed rate. The increased calcium concentrations in the Meuse in 2025 support this picture.

In the article titled ‘Impact of summer droughts on the water quality of the Meuse river’ (2007), Van Vliet and Zwolsman put the low river flow of the Meuse in 2003 in perspective by comparing it to the extreme dry conditions of 1976. In doing so, 2003 is positioned as an exceptionally dry year hydrologically but not without precedent. However, recent data shows that situations like this have been more frequent in recent years. Meuse flow at Megen in 2017 to 2020 inclusive and 2022 are comparable to 2003, or even lower. This indicates that low flows, which were previously considered exceptional, are happening more frequently due to climate change and as such are becoming more structural in nature.

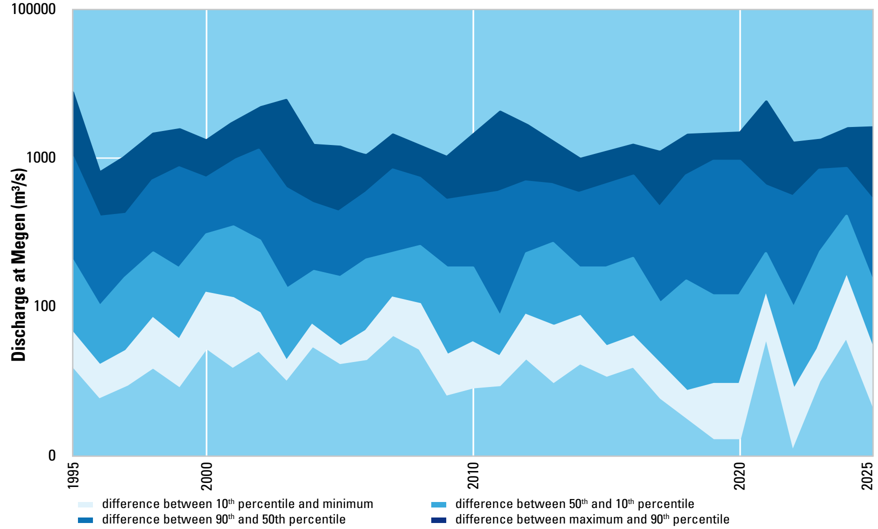


Figure 13: The range of the average daily flow rate of the Meuse at Megen 1995-2025.

The measurement series available shows that low flows, as well as the average and the median (50th percentile), are decreasing over time. The 90th percentile is also showing an upward trend. This is more difficult to determine for the maximum flow at Megen. In recent years with very high flows (for example, July 2021), the flow rates breached the range of the measuring equipment. Because of this, the reported maximum values may underestimate actual peak flows.

Nutrients

Since RIWA was founded, the nutrient pollution of surface water has decreased significantly due to the attention being given to water quality. However, nutrients continue to be an important issue for drinking water companies that use reservoirs because as they can cause the growth of algae and cyanobacteria in these reservoirs. Phosphate is the most relevant parameter in this regard, as it typically is the limiting nutrient for algae and cyanobacteria growth.

Phosphorous pollution has decreased significantly over time (by more than 80%). Important factors that have contributed to this improvement follow below:

- The ban on phosphates in detergents (1980s);
- The introduction of dephosphorization at RWZIs (1990s);
- Measures in industry and abroad (1980s-1990s);
- Manure legislation in agriculture (from 1998 onwards).

Despite a clear decrease in phosphate levels, drinking water companies observe that phosphate is still present in relatively large concentrations, and therefore the growth of algae and cyanobacteria is not fully limited. A total phosphate content of 0.14 mg/LP can lead to more than 180 µg/L of chlorophyll in phytoplankton. An increase in algae and cyanobacteria can have a negative impact on the performance of RWZIs. For example, due to filter clogging, extra purification steps to remove the formation of unwanted by-products, odour/taste problems and toxins.

Temperature also influences the development of these organisms. The expectation is that rising water temperatures will further increase growth conditions for cyanobacteria over time. Hydrological conditions play a role as well. With rising temperatures (Figure 8) and more frequent low river flows (Figure 13), the expectation is that phosphate may increasingly be released from the riverbed. This could further stimulate the growth of algae and cyanobacteria. In 2022, a distinct bloom of cyanobacteria (Microcystis in particular) was observed (Image 1); in recent years, cyanobacteria have also been visually observed.

Against this backdrop, Evides Waterbedrijf is increasingly investing in monitoring, knowledge development and the implementation of control measures. The aim is to detect the development of cyanobacteria early, take measures and stay ahead of future problems.

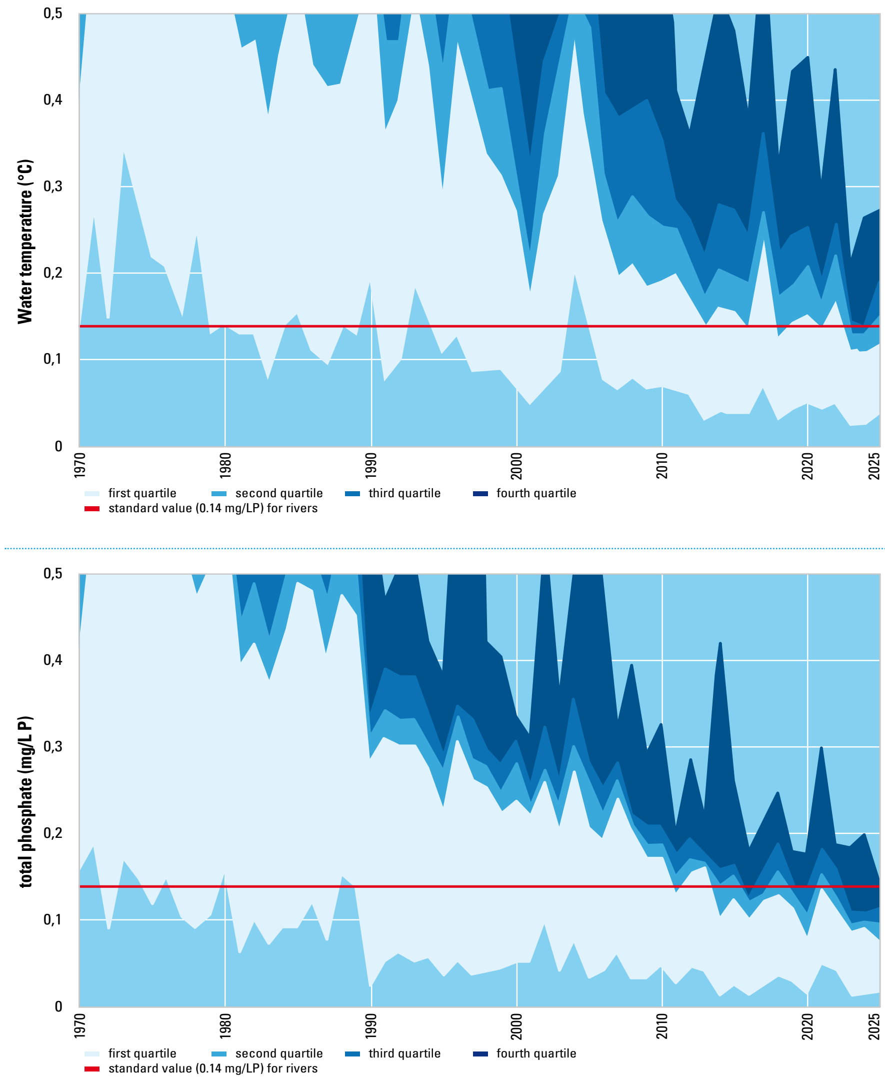


Figure 14: Trend of phosphate in the Meuse from 1970 to 2025 (Eijsden top figure and Keizersveer bottom figure).

Image 1: Floating layer of cyanobacteria in the Meuse near Cuijk (Photograph E. Lucassen)

Targeted measurements, as a learning opportunity

Evides is working intensively to map chemical substances in water and interpret the compounds that are found. When little is known about the properties of a substance, conservative assumptions are applied. This applies particularly to toxicity assessments, where the sector is deliberately exercising caution to minimise potential risks to public health.

There has been a rapid development in analysis techniques in recent years, enabling the measurement of an ever-increasing number of substances. The drinking water companies are adding new analyses to the measurement programmes. In theory, this will lead to the analysis of a larger number of substances. However, the law provides scope for the optimisation of monitoring programmes by focusing primarily on substances that occur or are drinking water relevant and by reducing the measurement effort required to analyse substances that do not occur (or very little). The method applied is called Risk-Based Monitoring (RGM). As a result, monitoring programmes are aligned more to the substances that are actually found, thereby creating room to develop and perform new analyses.

Cadmium

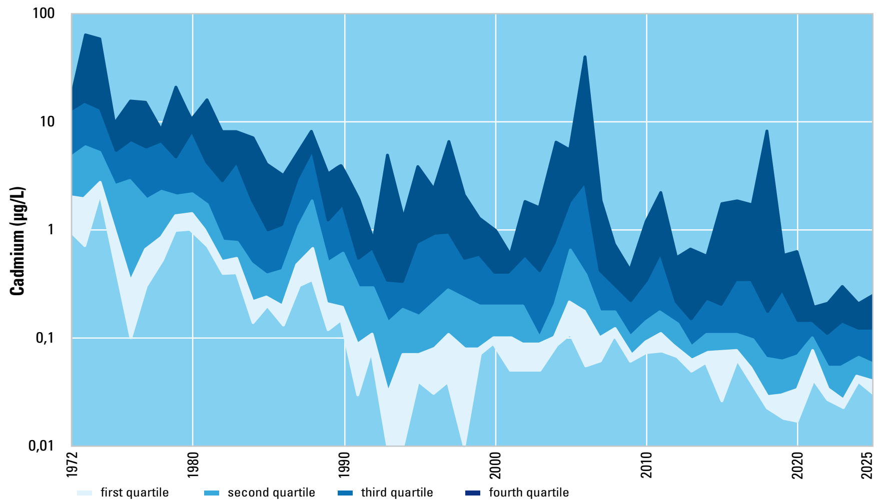
In the 1970s, there was a number of undesirable situations involving cadmium. At the Eijsden and Keizersveer monitoring points, RWS has measurement data for cadmium dating back to 1972. Cadmium concentrations were significantly higher at Eijsden than at Keizersveer. The high concentrations reported in the 1970s are now a thing of the past. Today, cadmium is detected only incidentally and concentrations remain below the current drinking water threshold of 5 µg/L. A similar pattern applies to other heavy metals.

Pesticiden

Pesticides are used for various applications and, as such, have different mechanisms of action and effects. Pesticides capture the imagination of consumers: the primary purpose of these substances is to control organisms that are harmful to agricultural crops or inhibit their development.

The degree of risk to drinking water varies by type of product. For example, humans are often more toxicologically sensitive to substances aimed at controlling animals (for example, insecticides) than selective herbicides. However, this does not mean that drinking water companies take herbicides less seriously. Although biological processes in plants and animals differ significantly, similarities can exist with processes in microorganisms. Moreover, humans depend on a healthy microbial ecosystem, both inside and outside the body.

For this reason, Evides (like other drinking water companies) adopts the precautionary principle to all pesticides, even when a relatively low risk to humans is assumed based on available knowledge. Where pesticides specifically target insects or other animals, Evides applies a lower internal standard than the Dutch Drinking Water Act prescribes as a precautionary measure.



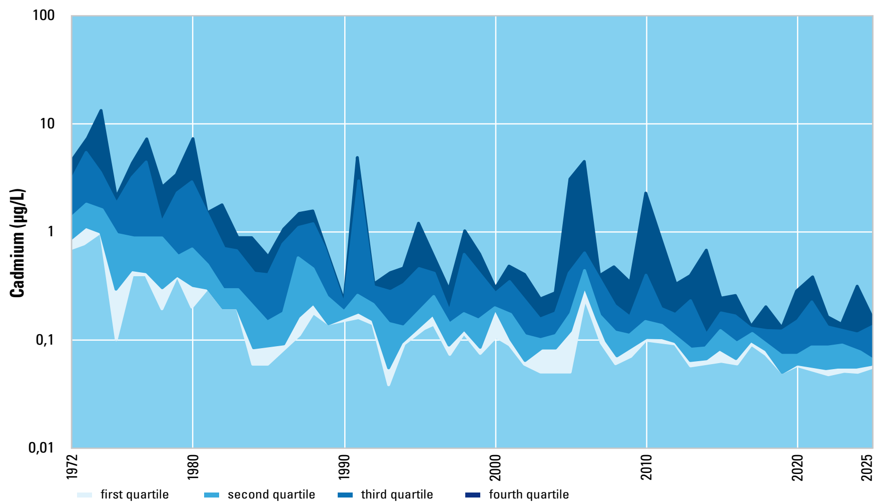


Figure 15: Trend of cadmium in the Meuse at Eijsden (top) and Keizersveer (bottom) from 1972 to 2025 (note: the concentration axis is logarithmic).

In the past, various pesticides have been banned in the EU due to their harmful effects on humans and the environment. Some well-known examples follow below:

- DDT (banned almost everywhere worldwide since the 1970s): insecticide and a highly bioaccumulating substance that build up in food chains and is considered carcinogenic to humans;
- Aldrin and dieldrin (banned in the EU and US between the 1970s and 1990s and worldwide since the end of the last century): insecticides and very persistent substances that degrade very little in the environment and have both carcinogenic and neurotoxic effects on humans and animals;
- Atrazine (EU ban in 2004): herbicide but also an EDC that leads to sex changes (hermaphroditism) in amphibians and fish, amongst other things;
- Neonicotinoids like imidacloprid (EU restrictions since 2018): insecticides linked to large-scale bee mortality;
- Glyphosate (partial ban in 2016 and still authorised until 2033): herbicide, banned in public green spaces and for private individuals, primarily due to public debate about health risks. Water boards, municipalities and other authorities have largely put a stop to the use of chemical pesticides via national legislation. This process consisted of two main phases: (i) From 31 March 2016 onwards: a ban on chemical weed control on paved surfaces (such as streets and pavements), (ii) From November 2017/2018 onwards: the ban was extended to all other public green spaces.
- Thanks to these regulations, the use of chemical pesticides by public authorities has decreased drastically: use decreased by 82% compared to 2013 and by 93% compared to 1992 (Figure 16).
- Chlorpyrifos (EU ban in 2020): insecticide linked to damage to the brain development of foetuses and children.

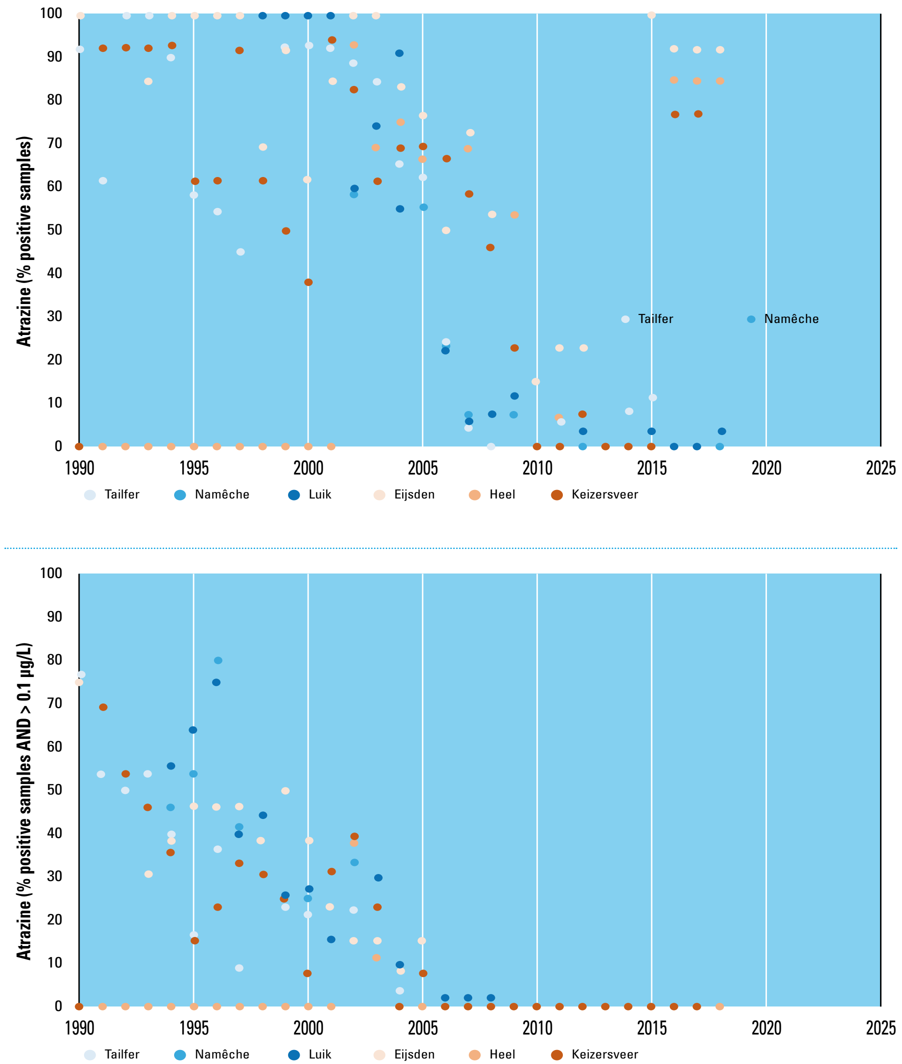


Figure 16: The presence of atrazine in the Belgian and Dutch parts of the Meuse over time.

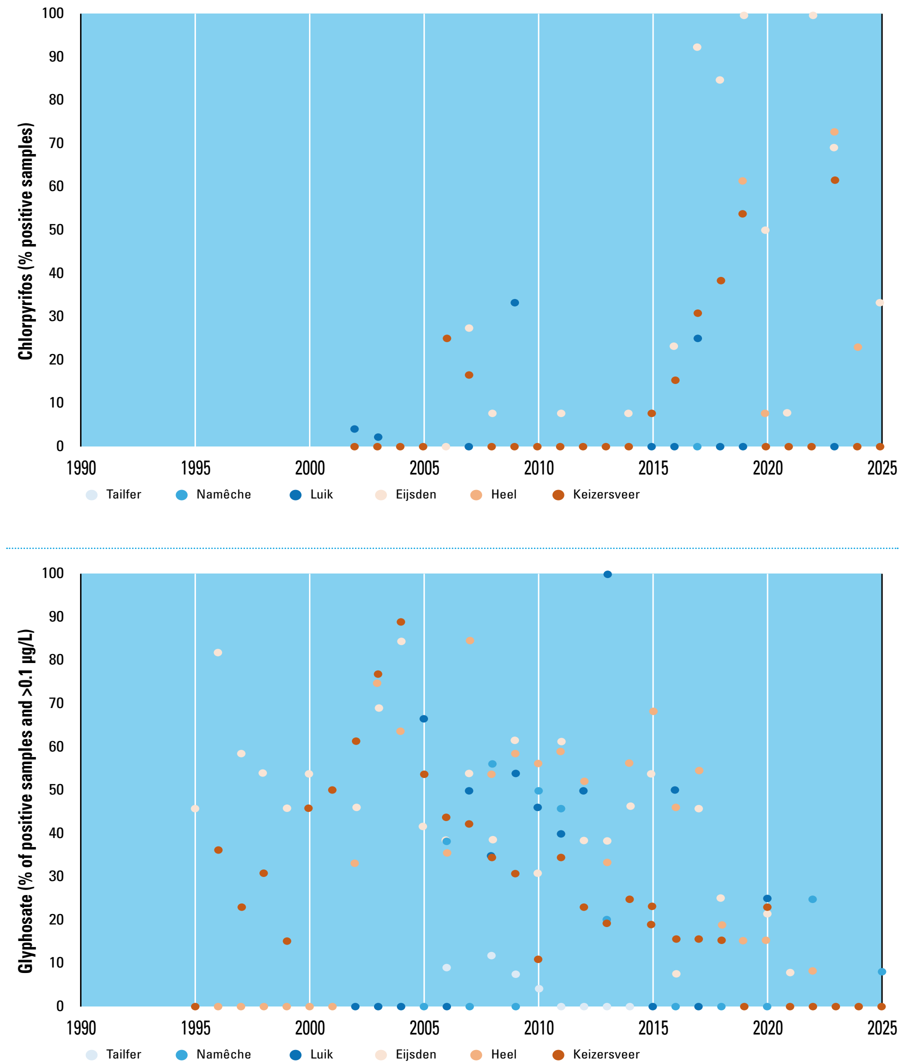


Figure 17: The presence of glyphosate and chlorpyrifos in the Belgian and Dutch parts of the Meuse over time.

Although these substances are no longer permitted in the EU, the same does not always apply worldwide. For example, the use of atrazine is still permitted in the United States and Canada, amongst other countries. Nor can be it ruled out entirely that old substances that have been banned in Europe are still in circulation via illegal trade or existing stock and are still being sold in countries outside the EU, or are ending up in the environment in other ways (for example, during tank cleaning in Wallonia, which came to light in 2019 when prosulfocarb in the Meuse was responsible for long abstraction stops). The chance of such substances being found in European rivers is generally considered small. They were/are detected just incidentally during monitoring and then almost always in very low concentrations.

The percentage of positive samples in the Meuse river basin in Belgium and the Netherlands is shown in Figure 16. The herbicide atrazine was being used widely at the end of the last century. Since the beginning of this century, atrazine has been detected just incidentally and always below the drinking water threshold of 0.1 µg/L. Due to the use of RGM, no recent data for atrazine has been obtained from target analyses.

Evides uses so-called suspect target screening. This analysis technique identifies a large number of substances simultaneously - often more than 2,000 - in a single measurement, including pesticides that are now banned. If the presence of a substance is detected during such screenings, Evides investigates further and, if necessary takes appropriate measures and joint action with other drinking water companies/water partners.

In these screenings, substances are reported in relative concentrations and, in part, relative to standards. One of these standards is atrazine. Thus, if atrazine is present in the water, the relative concentration becomes absolute. This type of analysis has been used on the Meuse since 2019 and has not detected this substance from 2019 onwards. However, the substance was found in the Rhine at the Haringvliet monitoring point, a combination of Meuse and Rhine water (but it did not breach the standard). This demonstrates that RGM is a powerful method for the optimisation of monitoring programmes.

Chlorpyrifos is an insecticide that can have a major impact on organisms and is drinking water relevant for humans. In 2007, approximately 64 kg of chlorpyrifos and 12 kg of cypermethrin leaked into the river following an industrial discharge by a Belgian manufacturer. As a result, concentrations at Eijsden significantly breached standards and fish mortality was observed in the Meuse at Eijsden. Daphnia magna also detected this pollution in a continuous monitoring system. It established the occurrence of acute effects even at concentrations lower than 1 µg/L. One decade later, chlorpyrifos (target analysis) had been added to the monitoring programmes.

Medicines

The situation is fundamentally different for pharmaceuticals. For human pharmaceuticals in particular, a great deal of knowledge is generally available about their effect on humans because these substances are extensively tested before being authorised. Added to this, potentially dangerous pharmaceuticals are not freely available; they are only dispensed via regulated channels within the healthcare sector. Therefore, the organisation of healthcare in the Netherlands and Europe contributes to the relatively limited concerns that Evides has about the presence of pharmaceuticals in the environment from a public health perspective.

Having said this, it must be acknowledged that multiple interests are at play in the water chain. The responsibility of organisations like RWS and the water boards extend beyond the protection of drinking water sources. They are also charged with ensuring general water quality, which includes protecting the environment and ecology. From this perspective, pharmaceuticals may be ecologically relevant even if they do not pose a direct risk to drinking water consumers.

Although Evides currently considers pharmaceuticals a relatively low high-risk group of substances, the aim continues to be to obtain the most complete picture possible of all substances present in the water. For this reason, pharmaceuticals are included as standard in monitoring and analysis programmes; this will continue into the future.

Industrial substances and consumer products
The high quality expected of drinking water in Europe requires the preventive protection of surface water, particularly because the purification techniques to be used to remove pollutants present in raw water are never fully effective. Moreover, certain purification techniques can lead to new chemical transformation products or residual streams. Therefore, the pollution of surface water with substances that do not occur naturally in the water should be kept to an absolute minimum (RIWA-Maas mission).

In line with pharmaceuticals, significantly less is known about the human toxicity of the substances in this category. Given this fact, drinking water companies are very critical of parameters in this category as a precautionary measure. Drinking water companies also apply stricter standards to raw water than the Dutch Drinking Water Act requires.

Interpretation of anthropogenic substances in the river now and in the future

Tension between precaution and reality
The precautionary principle is always the fundamental starting point for Evides. However, the drinking water sector is also operating in a highly anthropogen-influenced living environment. The intensive interaction between human activity and natural sources inevitably leads to the presence of man-made substances in surface waters; well-known examples in rivers are EDTA and sulfamic acid.

Although the presence of these anthropogenic substances in the environment is fundamentally undesirable, it is a reality in current practice. Keeping this in mind, Evides is focusing expressly on the toxicological interpretation of individual substances and systematic classification in practice. If unusually high concentrations of a substance are found in the raw water that cannot be classified (yet), the precautionary principle comes into effect immediately. For example, stopping the abstraction of Meuse water.

From substance categories to property classification
In practice, it is not always possible to unambiguously classify substances into one single specific category. However, clear classification is essential for the context, risk assessment and communication.

In addition to and in accordance with European regulations, RIVM, RIWA-Maas and other water partners/social parties, the focus within Evides is shifting increasingly from categorisation by substance group to classification based on specific substance properties.

The so-called PMT properties are key here:

- P (Persistent): the substance degrades poorly in the environment;
- M (Mobile): the substance is highly water-soluble, spreads rapidly and is potentially difficult to purify using standard techniques;
- T (Toxic): the substance has acute or chronic toxic properties for humans or the environment.

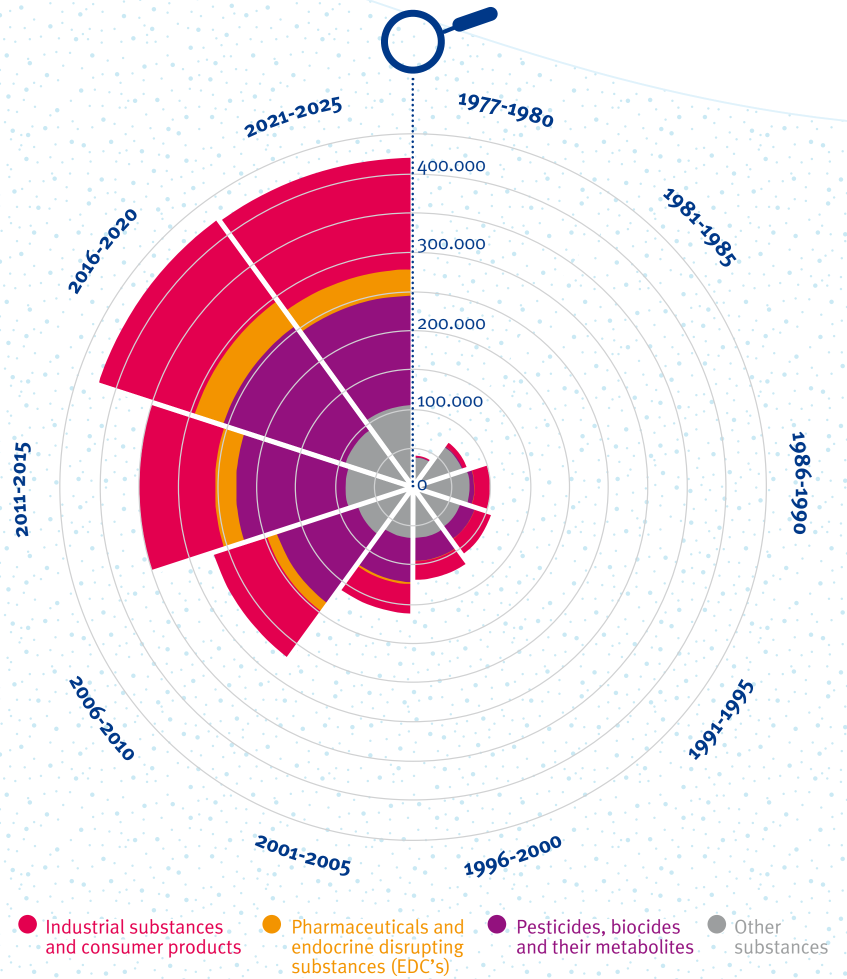
Within the RIWA-Maas partnership, a specific criterion is added too:

- nV (non-Volatile): the substance has a greater affinity with water than air and will not migrate into the air over time.

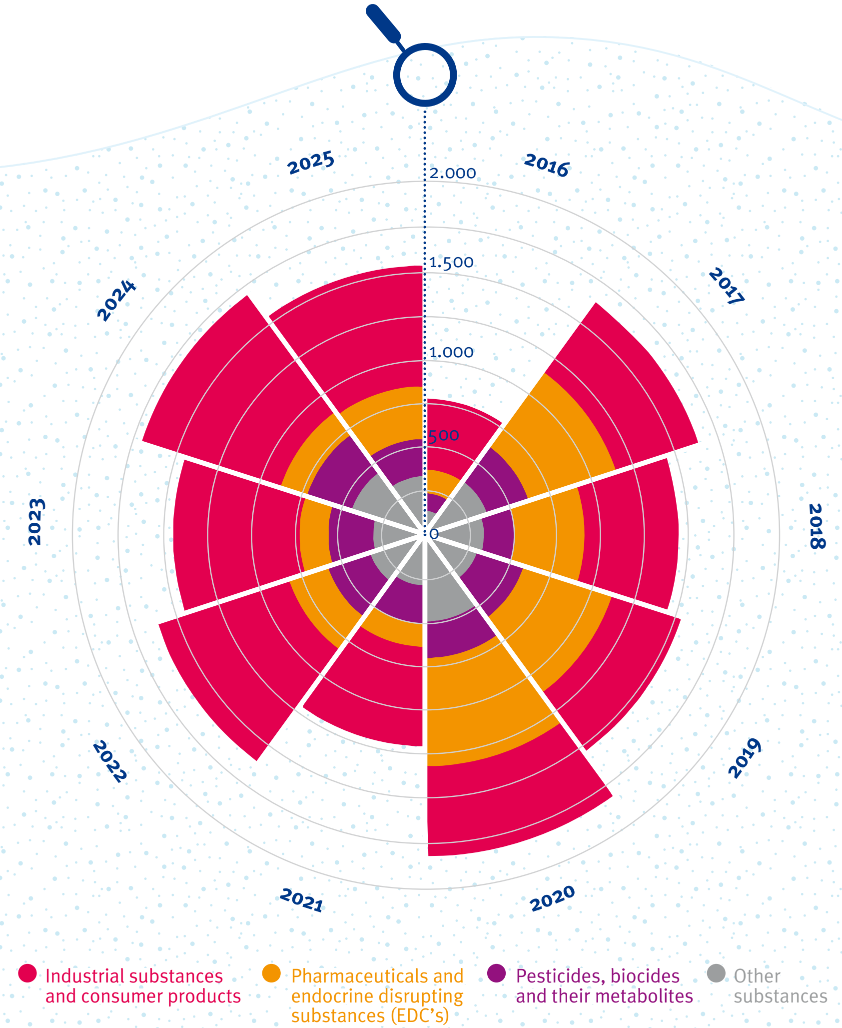
The philosophy behind this system is simple: if a substance has all these properties in practice, it is a genuine problem substance that requires priority. If a compound does not meet the criteria for Persistence (P), Mobility (M) or non-Volatility (nV), the substance is unable to reach the drinking water, or just to a very limited extent, and the chance of a drinking water problem is minimal. In the event of a genuine problem substance steps are taken to assess its toxicity, in order to determine whether the substance in question is also drinking water relevant.

Throughout the years

Amount of measurements per category
1977-2025



Amount of exceedances per category
2016-2025



Operationalisation of monitoring and toxicological interpretation
Evides has extensively optimised its monitoring programme by systematically examining the source, the water before purification and after; this enables it to effectively test P, M and nV properties in practice. A layered approach is adopted to the monitoring and interpretation of the Toxicity (T) in raw water:

- In-line biomonitoring: the continuous monitoring of water quality with biological systems like the Musselmonitor (Mosselmonitor®) and Daphniatoximeter;
- In-vitro bioassays: the periodic performance of screening tests with specific human or ecological cell lines;
- Scientific assessment: results are assessed not just against the relevant legal standards but also against current scientific knowledge.

If RIVM has not derived an indicative drinking water guideline value for a specific substance, Evides applies the Threshold of Toxicological Concern (TTC) approach as a precaution. If this threshold is breached, it is not automatically a cause for concern but acts as an internal trigger mechanism. It enables Evides to immediately initiate a targeted toxicological interpretation or engage expert organisations like KWR Water Research Institute, Het Waterlaboratium or RIVM to conduct a formal toxicological assessment.

Vigilance required and new weapons in development

75 years after its foundation, RIWA is still providing added value. Monitoring, source monitoring and collaboration continue to be essential. Focus areas are shifting as a result of new developments, such as climate change and changes to water quantity management; this is causing certain parameters to gain or regain importance.

In the early years, RIWA focused primarily on heavy metals, oxygen consumption and nutrients; today, water quality has improved significantly in these aspects. Technological development has continued too. Today, water laboratories have increasingly advanced analysis techniques at their disposal. This is also essential because industry is increasingly able to produce a growing number of chemical substances that are often already present in the environment before health risks have been determined, as the authorisation framework is not sufficiently robust yet.

This parallel development is presenting the drinking water sector with new challenges. Given this fact, Evides and its water laboratory are investing substantially in the development of innovative analysis methods. Previously, measurements were performed almost exclusively in a targeted manner - thus, just on pre-selected substances (target analyses). Now, attention has explicitly shifted to the detection of unknown compounds via so-called non-target screening. Thanks to these techniques, water laboratories are increasingly able to detect new, previously unknown substances. If such substances are found more frequently, water laboratories are increasingly able to actually identify them.

Focus areas are shifting as a result of new developments. This is causing certain parameters to gain or regain importance.

Collaboration in this field is being intensified both nationally and internationally. Although non-target screening is already yielding valuable insights for drinking water companies, the expectation is that this approach will develop significantly in the years ahead. As such, it plays a key role in the monitoring of raw water, thereby safeguarding drinking water quality and protecting consumer interests.

For many years, it seemed that the problems of the past really did belong in the past. Although it is not expected that we will be confronted with the nutrient pollution of the past again, it is clear that we are not out of the woods yet. If a river has just minimal current, particularly during dry, hot summers and due to low river flows, new problems could arise with the overall nutrient balance in the river. In the last 10 years, we have repeatedly observed river-flow and water-temperature situations that are not representative of the past. Here at

Evides, we know that this will increasingly be the case as a result of climate change and may, among other things, lead to increased growth of toxic cyanobacteria in our reservoirs. In a 2007 article entitled ‘Impact of summer droughts on the water quality of the Meuse river’, Van Vliet and Zwolsman warn of the impact of severe drought. Given the recent dry years, this 2007 article continues to be relevant. Also, the discharge permitting system currently provides insufficient consideration to these decreasing discharges and the consequences for water quality during periods of very low flows.

New challenges in the chain: the side effects of advanced purification and climate dynamics

Besides the discharge of anthropogenic substances via RWZIs, the further development of the wastewater chain requires attention too. Although Evides emphatically welcomes the implementation of a fourth treatment stage at RWZIs, the choice of technology necessitates some critical observations. The use of ozonation presents risks, such as the undesirable formation of the byproduct bromate (a carcinogenic substance) through the oxidation of bromide. Moreover, oxidative processes can lead to the transformation of stable, easily removable compounds into complex and potentially more toxic transformation products that necessitate an increase in drinking water purification treatment efforts.

At the same time, climate change is redefining the ecological dynamics of sources. The combination of higher water temperatures, more frequent periods of low river flow and the release of historical phosphate pollution from the riverbed is increasing the risk of large-scale cyanobacteria and algal blooms. As such, the nutrient issue is definitely back.

For Evides, all the above underscores the need to monitor and protect its sources in a targeted manner, at the intensity required.

Sustained efforts by RIWA-Maas and its members, intensive collaboration with social partners and the further development of initiatives like SMWK are essential to Evides. This is because the drinking water companies themselves lack the instruments necessary to enforce good water quality. They rely on administrative bodies and dischargers to do this. Evides is calling upon authorities (central government, water boards, provinces and municipalities) to implement their duty of care diligently. The government must create conditions that enable drinking water companies to continue to supply drinking water. This means not only making plans, but also implementing them, enforcing them and, for example, adapting policy and enshrining it in legislation.

Evides is calling upon authorities (central government, water boards, provinces and municipalities) to implement their duty of care diligently.

Only in this way will the Meuse remain a reliable source of drinking water, both now and in the future.

Annexes

Annex 1

Substances breaching the ERM target value in 2025.

Many environmentally-foreign substances (pollutants) are found in Meuse water. In 2025, 69 substances breached the ERM target value in target analyses. This happened 1,527 times in 6,821 measurements that were conducted for these 69 substances - in 22.4% of cases. It is possible to produce drinking water in a sustainable way with natural purification methods from river water that meets the ERM target values.

To gain an impression of the types of substances that drinking water companies had to deal with in 2025, a 'mugbook' follows below. These are substances in the Meuse that breached the ERM target values in the year in question. The RIVM PMT screening tool was used to look up the PMT scores of these substances, where available.

The substance groups were as follows:

- Industrial substances and consumer products;
- Residues of medicines and endocrine disrupting chemicals;
- Pesticides and their metabolites
  (residues remaining after a substance as degraded or been converted).

Legend

Substance groups

Industrial substances and consumer products

Residues of pharmaceuticals and endocrine-disrupting chemicals

Pesticides, biocides and their metabolites

DWR Drinking water-relevant

CASRN The CAS-number is the unique identification number for chemical and biological substances. CAS stands for Chemical Abstracts Service. RN stands for registration number.

PMT

PMT stands for Persistent (not or hardly degradable in the environment), Mobile (well soluble in water and therefore easily transported through the environment) and Toxic (toxic to humans and/or ecosystem).

PMT PMT-score: low to average < 0,33

PMT PMT-score: high 0,33-0,5

PMT PMT-score: very high > 0,5

CLP

In the EU the required Classification, Labelling and Packaging (CLP) of around 8000 substances is legislated. One label can include one or more danger pictograms:

Health danger/ danger to ozone

Acute toxicity

Flammable

Serious health hazard

Corrosive

Hazardous to the environment

Which industrial substances and consumer products end up in the Meuse?

Solvents
- Diisopropyl ether (DIPE)
- Tetrahydrofuran

Halomethane sulfonic acids
- Dichloromethanesulfonic acid
- Dibromomethanesulfonic acid
- Trifluoromethanesulfonic acid

Halogenated acetic acids
- Trifluoroacetic acid (TFA)
- Trichloroacetic acid
- Dibromoacetic acid
- Dichloroacetic acid

Food additives
- Methenamine (hexamine, urotropine)
- Sucralose
- Acesulfame-K

Various acids
- 8-Hydroxypenillic acid
- Sulfamic acid

Complexing agents
- EDTA
- NTA
- DTPA
- Tolyltriazole
- Benzotriazole

Fragrances, colorants, and flavorings
- Galaxolide (HHCB)
- Dimethyldisulfide

Melamine and Cyanuric acid
- Melamine
- Cyanuric acid

Other industrial substances
- 1-Isopropyl-4-methyl-benzene
- Aniline
- Ethyl sulfate

Industrial substances and consumer products

Parameter	CASRN	ERM-	tv	TAI	NAM	LUI	EYS	ROO	STV	HEE	HEU	BRA	BSM	HAR	n/	N	%
Industrial substances and consumer products															686	2147	31,9%
Ethylenediaminetetraacetic acid (EDTA)	60-00-4	1	µg/l				8,10	12		11		14	31	7	84	84	100%
Sulfamic acid	5329-14-6	0,1	µg/l					20		25		33	44	70	62	62	100%
Cyanuric acid	108-80-5	0,1	µg/l				<1	3,30		1,70		0,77	2,00	1,80	62	63	98,4%
Sucralose	56038-13-2	1	µg/l				<1	3,00		5,00	7,10	6,90	10,00	3,30	63	68	92,6%
Dichloromethanesulfonic acid	53638-45-2	0,1	µg/l					0,62		0,33		0,16	0,35	0,23	51	61	83,6%
Trifluoroacetic acid (TFA)	76-05-1	100	ng/l					1800		1700		2000	2000	1500	56	73	76,7%
Trichloroacetic acid (TCA)	76-03-9	0,1	µg/l								0,35	0,31	0,38	0,16	37	55	67,2%
Methenamine (hexamine, urotropine)	100-97-0	1	µg/l		3,06	7,15	2,57	9,80		6,30		0,72	1,60	2,30	41	107	38,3%
Nitrilotriacetic acid (NTA)	139-13-9	1	µg/l		<5	<1	6,70	<1		4,10		3,20	5,30	4,20	33	92	35,8%
8-Hydroxypellitic acid	3053-85-8	0,1	µg/l							<0,05			0,78	0,08	11	42	26,1%
Diethylenetriaminepentaacetic acid (DTPA)	67-43-6	1	µg/l		<5	<1	<10	<1		<1		9,20	13,00	1,40	23	91	25,2%
Galaxolide (HHCB)	1222-05-5	0,1	µg/l		0,23	0,13									2	8	25%
Dibromoacetic acid	631-64-1	0,0104	µg/l								0,34	0,39	0,52	<0,06	12	53	22,6%
Melamine (1,3,5-triazine-2,4,6-triamine)	108-78-1	1	µg/l		0,38	0,72	0,75	7,30		1,90	2,00	1,50	3,60	1,50	100	447	22,3%
Tolyltriazole	29385-43-1	1	µg/l		0,37	2,12									5	26	19,2%
Dibromomethanesulfonic acid	859073-88-4	0,1	µg/l					<0,1		<0,1		0,32	0,18	0,52	9	62	14,5%
Diisopropyl ether (DIPE)	108-20-3	1	µg/l		<0,1	8,51	11,00	2,60	1,24	0,60	0,70	0,02	0,82	0,07	19	140	13,5%
Aniline	62-53-3	0,1	µg/l					0,08		0,06		0,05	0,08	0,16	6	50	12%
Dimethyl disulfide	624-92-0	0,1	µg/l				0,13			0,05		0,24	0,09	0,04	2	63	3,1%
Trifluoromethanesulfonic acid	1493-13-6	0,1	µg/l					0,62		0,02		0,02			1	33	3%
Dichloroacetic acid	79-43-6	0,1	µg/l					0,43		<0,1	0,06	0,02	0,08	0,10	2	74	2,7%
Acesulfame potassium (Acesulfame-K)	55589-62-3	1	µg/l					0,56		0,53			0,49	1,10	1	46	2,1%
Tetrahydrofuran (THF)	109-99-9	1	µg/l					0,62		0,33			1,30	0,26	1	56	1,7%
Ethyl sulfate	540-82-9	0,1	µg/l					0,11		<0,1		<0,1	<0,1	<0,1	1	62	1,6%
Benzotriazole	95-14-7	1	µg/l		0,99	1,08	0,26	0,45		0,50	0,69	0,46	0,71	0,43	1	104	0,9%
p-Cymene (1-isopropyl-4-methylbenzene)	99-87-6	0,1	µg/l		<0,1	<0,1		<0,05		<0,05	0,06	0,08	0,12	<0,05	1	125	0,8%

Industrial substances and consumer products

In 2025, 69 parameters breached the ERM target values once or more. Industrial substances were the culprit in 37.7% of cases (26). Of the 2,147 measurements that were done for these 26 substances, 686 (32%) breached the ERM target value (see Table 6).

Table 6 on page 149: Industrial substances and consumer products breaching the ERM target value in 2025 (maximum concentrations, in order of percentage of breaching measurements).

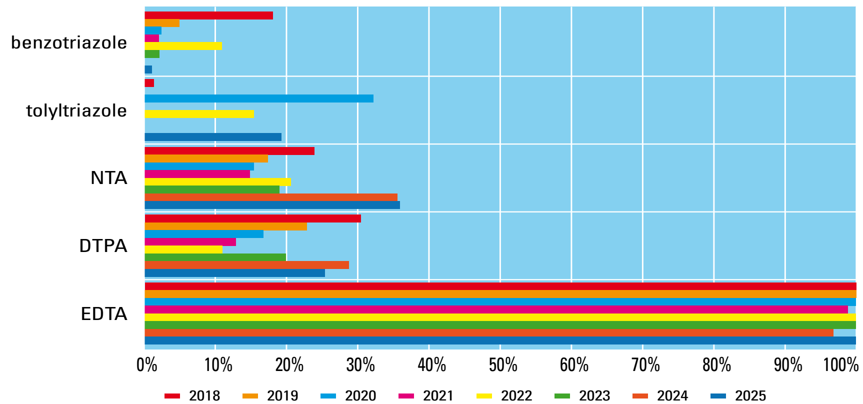


Figure 1: Percentage of ERM target value breaches by complex formers 2018-2025.

Complex formers

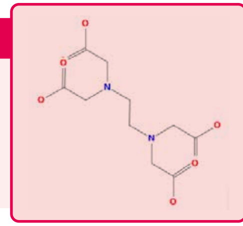
Complex formers (chelates) are chemical substances that form soluble, complex molecules with certain metal ions. These metal ions are inactivated such that they cannot react in a normal way with other elements or ions to form a precipitate or deposit. They are used as ingredients in cleaning agents like limescale removers and strippers and as stabilisers in bleaches and soap products.

EDTA (CASRN 60-00-4)

PMT-score 0,23 (P=0,02 | M=0,95 | T=0,68)

Drinking water-relevant

CLP



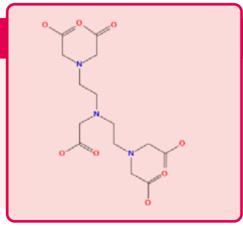
Application: the complex former EDTA (ethylenediaminetetraacetic acid) is used in detergents, cosmetics, water softening and medicine to trap and remove calcium and other metals, including heavy metals like arsenic, copper and mercury.

Origin: this substance mainly ends up in surface water via RWZIs.

Distribution of pollution: EDTA was found to be well above the ERM target value of 1 µg/L at all the monitoring points where it was measured. EDTA has been detected above the ERM target value on a persistent to permanent basis for years. The indicative drinking water guideline value for EDTA is 600 µg/L; it was not breached.

Notable: since 1990, this substance has been detected at concentrations between 0 and 30 µg/L in drinking and surface water. The EDTA compound is only slightly toxic to humans but releases heavy metals from silt and keeps them dissolved in water. EDTA has been assessed as drinking water relevant (see the infographic on page 43) and is one of the 38 substances that SMWK measures.

DTPA (CASRN 67-43-6)



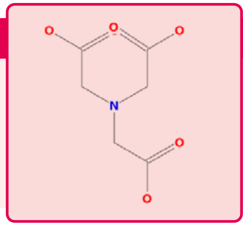
PMT-score 0,26 (P=0,03 | M= 0,96 | T=0,68)

Drinking water-relevant

CLP

Application: from the 1960s onwards, DTPA (diethylenetriaminepentaacetic acid or pentetic acid) has been used to combat internal pollution with radio-active material. DTPA and its derivatives are used to form complexes with gadolinium, which in turn are used as contrast agents in MRI scans. DTPA is also used in the extraction of soil samples.
Origin: this substance mainly ends up in surface water via RWZIs.
Distribution of pollution: DTPA was detected above the ERM target value at Brakel, Bergsche Maas and Haringvliet. Since July 2022, DTPA has been on the Netherlands' list of SVHCs. DTPA has frequently been detected above the ERM target value for years now. The indicative drinking water guideline value for DTPA is 700 µg/L; it was not breached.
Notable: in the past (2018), Dunea and Evides had an exemption that permitted them to continue to use surface water with DTPA at Brakel and Keizersveer (Gat van de Kerksloot) for the production of drinking water. Like EDTA, DTPA forms stable complexes with many metals. DTPA has been assessed as drinking water relevant and is one of the 38 substances that SMWK measures.

NTA (CASRN 139-13-9)



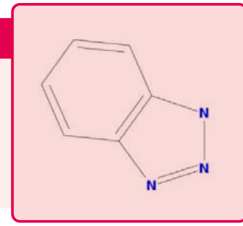
PMT-score 0,13 (P=0,01 | M=0,94 | T=0,18)

Drinking water-relevant

CLP

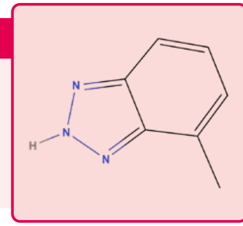
Application: NTA (nitrilotriacetic acid) is used to soften water and to prevent or remove limescale deposits. It is frequently added to water in boilers. From the late 1960s onwards, NTA was increasingly used as a replacement for phosphates in detergents.
Origin: this substance mainly ends up in surface water via cooling water discharges and RWZI.
Distribution of pollution: NTA was detected above the ERM target value in measurements at Heel, Brakel, Bergsche Maas and Haringvliet. The indicative drinking water guideline value for NTA is 400 µg/L; it was not breached.
Notable: NTA is highly biodegradable, better than EDTA. Nitrilotriacetic Acid Trisodium Salt is mainly used in soaps and detergents. The International Agency for Research on Cancer (IARC), which is part of the United Nations World Health Organization (WHO), believes that NTA is a possible human carcinogen (IARC class 2B).

1,2,3-Benzotriazole (CASRN 95-14-7)



PMT-score 0,27 (P=0,11 | M=0,54 | T=0,35)

Tolyltriazole (CASRN 29385-43-1)



PMT-score 0,35 (P=0,15 | M=0,51 | T=0,56)

Drinking water-relevant

Application: the chelating agents[1] benzotriazole and tolyltriazole (a mixture of 4- and 5-methyl-1-H benzotriazole) are used as corrosion inhibitors in cooling water and antifreeze/anti-icing agents (including deicing aircraft), amongst other things, and as protective agents for silverware in washing-up liquid.
Origin: these substances mainly end up in surface water via RWZIs.
Distribution of pollution: tolyltriazole and benzotriazole were detected above the ERM target value at Liège. The indicative drinking water guideline value for benzotriazole (700 µg/L) and tolyltriazole (350 µg/L) was not breached.

1 *From a chemical point of view, chelation is the same as complex formation on the understanding that, in chemistry, the concept of complex formation is applied to mono-, di- and polydentate ligands, while chelation explicitly excludes the monodentate ligands (source: Wikipedia).*

Notable: in the past, WML (2018) and Evides (2019) had an exemption that permitted them to continue to use surface water with benzotriazole from the Meuse for the production of drinking water. Benzotriazole and tolyltriazole are two of the 38 substances monitored by the SMWK. Tolyltriazole has been assessed as a substance that is drinking water relevant (see the sinfographic on page 43).

Halogenated acetic acids (HAZ, HAAs)

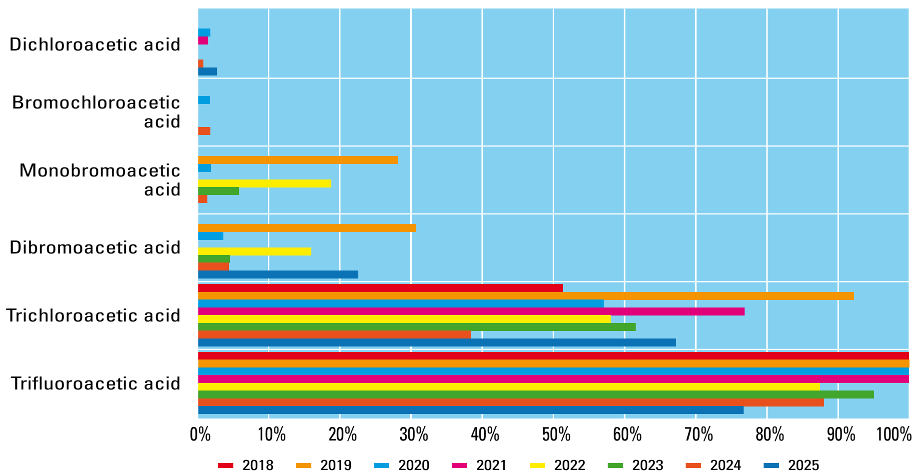


Figure 2: Percentage of ERM target value breaches by HAAs 2018-2025..

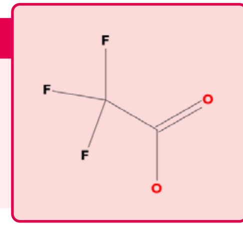
Application: halogenated acetic acids (HAZ, HAAs) are known byproducts of water chlorination.

Trifluoroacetic acid (TFA, CASRN 76-05-1)

PMT-score 0,34 (P=0,16 | M=0,75 | T=0,34)

Drinking water-relevant

CLP



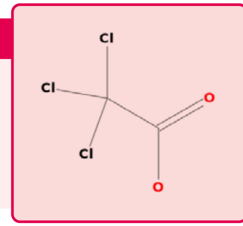
Trifluoroacetic acid (TFA) is a degradation product of hydrofluorocarbons (HFCs; also referred to as F-gases), which are used in applications including air conditioners, heat pumps, refrigerators, foam blowing agents and propellant gases in aerosols. TFA can also be a metabolite of pesticides and medicines, amongst other things, or of the substance 4:2 fluorotelomer sulphonate. TFA is used in the production of trifluoroacetic fluoride and 2,2,2-trifluoroethanol too. In some HPLC analyses, this acid is added to the mobile phase to reduce the occurrence of 'tailing'. This acid is also frequently used as a building block in the synthesis of pharmaceutical substances and agricultural chemicals and as a catalyst in polymerisations and condensation reactions. On the boundary between organic chemistry and biochemistry, trifluoroacetic acid is used during in vitro peptide synthesis to remove the protective tert-butoxycarbonyl group from amino groups. TFA salts (trifluoroacetates) are used in the production of ceramic materials as well. TFA is also a much-used solvent in NMR spectroscopy and used to calibrate mass spectrometry equipment.

Trichloroacetic acid (TCA, CASRN 76-03-9)

PMT-score 0,54 (P=0,36 | M=0,68 | T=0,62)

Drinking water-relevant

CLP

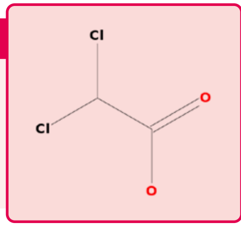


Trichloroacetic acid (TCA) has many applications, including its use as a solvent in the plastics industry, the production of sodium trichloroacetic acid (a herbicide), an etchant in metal processing, an additive in mineral lubricant oils and a catalyst for polymerisation reactions (source: Wikipedia). In biochemistry, TCA is used to precipitate out proteins and other macromolecules. Other applications are in the medical (treatment of skin conditions and the removal of warts) and cosmetic spheres (chemical peeling). TCA has been detected in the Meuse since 1986.[2]

Dichloroacetic acid (DCA, CASRN 79-43-6)

PMT-score 0,40 (P=0,11 | M=0,72 | T=0,82)

CLP



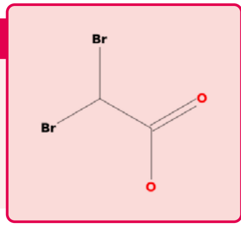
Dichloroacetic acid (DCA) is one of the most important and dominant substances within the group of haloacetic acids (HAAs), which is a subcategory of disinfectant byproducts (DBPs). It is also an inhibitor of the enzyme pyruvate dehydrogenase kinase. It is primarily used as a reagent in laboratories and is known for its controversial role as self-medication in alternative cancer therapies.

Dibromoacetic acid (DBA, CASRN 631-64-1)

PMT-score 0,33 (P=0,06 | M=0,73 | T=0,81)

Drinking water-relevant

CLP



Dibromoacetic acid (DBA) is unintentionally formed when bromide-containing water is disinfected with chlorine-containing or oxidizing chemicals. This happens, for example, during the purification of drinking water or the cleaning of swimming pool water. DBA has an indicative drinking water guideline value of 10.4 ng/L (0.0104 µg/L), which is also the ERM target value.

Origin: TFA mainly ends up in surface water via industrial RWZIs. TFA has also been encountered in groundwater and rainwater. An article in the scientific journal Environment International states that the use of pesticides with a C-CF3 group in agriculture results in the formation and emission of a substantial amount of TFA. The chlorination of water in industrial processes is probably the source of other HAAs in the Meuse.

Distribution of pollution: TFA was detected above the ERM target value at Brakel. In recent years, TFA has structurally to permanently been detected above the ERM target value for years now. The indicative drinking water guideline value of TFA is 2.2 µg/L[3] if no other PFAS are present and have not been breached. TFA has been assessed as drinking water relevant. TCA was detected above the ERM target value at Heusden, Brakel, Bergsche Maas and Haringvliet, DBA at Heusden, Brakel and Bergsche Maas, DCA at Roosteren (it equalled the target value at Bergsche Maas and Haringvliet).

Notable: OSPAR[4] added TFA to the list of SVHCs on 15 November 2024 because TFA falls under the SVHC substance group PFAS[5]. TFA and DBA are two of the five substances for which, after a risk assessment, RIVM has called for action at the sources emitting the substances. For example, reducing discharges into surface water (see Subsection B2 of this report).

2 *H2O article by Versteegh, J.F.M, Peters, R.J.B. & De Leer, E.W.B. (1990), https://edepot.wur.nl/376185.*

3 *https://www.rivm.nl/documenten/bijlage-bij-rivm-brief-aan-ilt-indicatieve-drinkwaterrichtwaarde-trifluorazijnzuur-tfa*

4 *Convention for the Protection of the Marine Environment of the North-East Atlantic of the Oslo and Paris Commissions (the 'OSPAR Convention').*

5 *https://rvszoeksysteem.rivm.nl/stof/detail/3481.*

Melamine and cyanuric acid

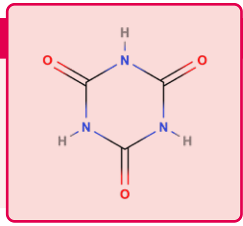
Melamine (CASRN 108-78-1)

PMT-score 0,64 (P=0,53 | M=0,80 | T=0,61)

Drinking water-relevant

CLP

Cyanuric acid (CASRN 108-80-5)



PMT-score 0,30 (P=0,14 | M=0,56 | T=0,33)[6]

Drinking water-relevant

CLP

Application: the synthetic substance melamine is mainly used in the production of plastics. Under high pressure (›7 MPa) and a temperature of more than 370°C, isocyanic acid is formed, yielding cyanuric acid via an exothermic reaction. The cyanuric acid condenses with ammonia into melamine and water. Finally, the liquid melamine cools into the intended end product: a white crystalline powder. Melamine is formed from urea, with ammonia and carbon dioxide as byproducts.[7] Melamine plastics are strong, hard, light and resistant to strong acids amongst other things. Consumer products into which melamine is processed include plastic plates, cups, dishes and cutlery and also so-called miracle sponges. The Netherlands Food and Consumer Product Safety Authority (NVWA) recommends no longer using crockery made from bamboo with melamine plastic. For example, coffee cups and bowls.[8] Cyanuric acid is primarily used as a chemical intermediate (raw material) for the production of the following three chlorinated derivatives: dichloroisocyanuric acid (CASRN 2782-57-2), trichloroisocyanuric acid (CASRN 87-90-1) and sodium dichloroisocyanurate (CASRN 2893-78-9). Cyanuric acid, as a product or end product, is frequently used as a stabiliser in the swimming pool industry. Cyanuric acid forms a weak bond with the free chlorine (N-Cl) in pool water, which protects it against the ultraviolet rays that would otherwise degrade it.

Origin: in 1964, DSM built the first melamine factory on the site that is now known as Chemelot, a large industrial complex for the chemicals industry, located between Stein and Geleen in the Netherlands province of Limburg. OCI Nitrogen has a melamine factory on the Chemelot site. It is the only melamine production location in the Netherlands and makes products like Melamineby-OCI™ and Melafine®. OCI Nitrogen is by far the largest production site for melamine in the world. Due to both emissions from this production site and the use of products containing melamine, this substance ends up in surface water via RWZIs.

Distribution of pollution: melamine was detected above the ERM target value at Roosteren, Heel, Heusden, Brakel, Bergsche Maas and Haringvliet. Cyanuric acid breached the ERM target value at Roosteren, Heel, Bergsche Maas and Haringvliet. Melamine has an indicative drinking water guideline value of 0.28 µM. This value applies to the sum of melamine, melem and melam. This value factors in the simultaneous presence of cyanuric acid. If it has been demonstrated that the concentration of cyanuric acid is below 10 µg/L (0.08 µM), a drinking water guideline value of 2.0 µM applies for the sum of melamine, melem and melam. The values stated only apply if the concentration of cyanuric acid is lower than the sum of melamine, melem and melam.

Notable: melamine has been assessed as drinking water relevant and is one of the 38 substances that SMWK measures. On 20 October 2025, RWS reported an incident at Chemelot in Limburg in which approximately 5,000 kg of melamine powder was released into the air. Based on the measures taken, RWS believes that just a limited amount of this powder will end up in the river following precipitation. Measurements by WML confirm that a brief increase in melamine was observed in the Meuse water.

6 RIVM, persoonlijke mededeling, E. Rorije, stand van de PMT-score database intern dd. 26-06-2026.
7 https://www.helpdeskwater.nl/publish/pages/158977/studie_bedrijfslozingen_melamine_en_cyanuurzuur_in_nederland.pdf
8 https://nos.nl/artikel/2368846-nvwa-stop-met-gebruik-bekers-en-kommen-van-melamine-en-bamboe.

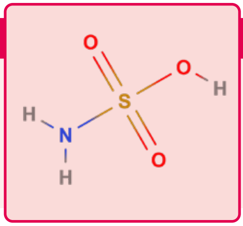
Various acids

Sulfamic acid (CASRN 5329-14-6)

Anorganische verbinding (geen PMT-score)

DWR **Drinking water-relevant**

CLP

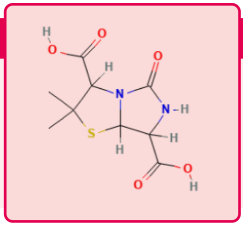


Application: the inorganic substance sulfamic acid is an ingredient in many acidic cleaning agents for the removal of deposits: limescale deposit in coffee machines and on chrome or stainless steel in places like milking sheds and breweries, in steam boilers, cement residue on tiles and urine scale on sanitaryware. Sulfamic acid is also used in the synthesis of artificial sweeteners (cyclamic acid and sodium cyclamate).
Origin: the use of cleaning agents in both industry and households is probably responsible for the concentrations observed.
Distribution of pollution: sulfamic acid was detected far above the ERM target value in all measurements at Roosteren, Heel, Brakel, Bergsche Maas and Haringvliet. The indicative drinking water guideline value for sulfamic acid is 1,400 µg/L[9]; it was not breached.

8-Hydroxypenillic acid (CASRN 3053-85-8)

PMT **PMT-score 0,23 (P=0,06 | M=0,64 | T=0,33)**

DWR **Drinking water-relevant**



Application/Origin: RIVM classifies 8-hydroxypenillic acid under (animal) medicines.[10] In the past, this substance was used as an additive in the purification process of the IAZI of Sitech Services BV (now Circle Infra Partners) in Sittard/Geleen.[11] As the substance is not found at the Heel abstraction point, this is not the origin of the breaches observed now.

9 https://rvs.rivm.nl/sites/default/files/2025-09/Advies_14951A00_drw_rw_sulfaminezuur_2.pdf
10 https://rvszoeksysteem.rivm.nl/stof/detail/5206
11 https://rvs.rivm.nl/sites/default/files/2019-03/2.%20drw%208-hydroxypenillic%20acid.pdf.

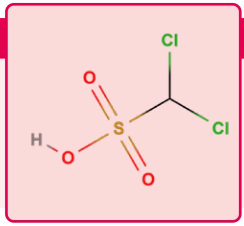
Distribution of pollution: 8-Hydroxypenillic acid was detected above the ERM target value at Bergsche Maas. The indicative drinking water guideline value for this substance is 10 µg/L; it was not breached.

Halomethane sulfonic acids (HMSAs)

Dichloro-methanesulfonic acid (cl2-msa, CASRN 53638-45-2)

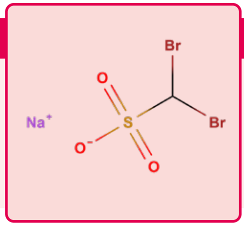
PMT **PMT-score N.A. (P=0,21 | M=0,72 | T=N.A.)** [6]

DWR **Drinking water-relevant**



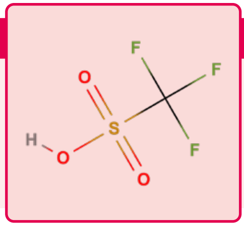
Dibromomethanesulfonate (br2-msa, CASRN 859073-88-4)

PMT **PMT-score N.A. (P=0,13 | M=0,70 | T=N.A.)**



Trifluoromethanesulfonic acid (f3-msa, TfOH, CASRN 1493-13-6)

PMT **PMT-score 0,42 (P=0,31 | M=0,72 | T=0,33)** [6]



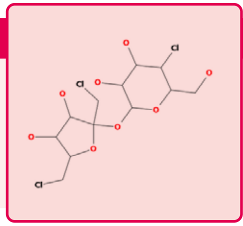
Application: halomethane sulfonic acids (HMSAs) are newly-discovered polar disinfectant byproducts. Due to its acid strength, trifluoromethanesulfonic acid (abbreviation: f3-msa or TfOH) is mainly applied in chemical reactions, as a catalyst or source for the triflate group. TfOH is one of the strongest known acids and, as such, is deemed to be a so-called 'super acid'. According to the OECD definition, TfOH is a PFAS, because of which it is classified as a Substance of Very High Concern (SVHC).
Origin: HMSAs occur frequently and at high levels in drinking water and can potentially be very Persistent and very Mobile (vPvM).

Distribution of pollution: dichloro-methanesulfonic acid was detected above the ERM target value at Roosteren, Heel, Brakel, Bergsche Maas and Haringvliet. Dibromomethane sulfonic acid was detected above the ERM target value at Brakel, Bergsche Maas and Haringvliet. Trifluoromethanesulfonic acid was detected at concentrations above the ERM target value at Roosteren.

Food additives

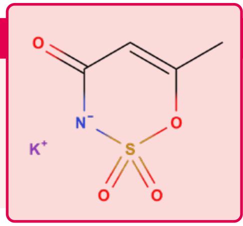
Sucralose (E955) (CASRN 56038-13-2)

PMT PMT-score 0,62 (P=0,45 | M=0,87 | T=0,61)



Acesulfame-K [E950] (CASRN 55589-62-3)

PMT PMT-score 0,39 (P=0,14 | M=0,76 | T=0,51) [13]



Application: the artificial sweeteners sucralose (E955) and acesulfame (E950) are used as sugar replacements in various food products and soft drinks.
Origin: these substances mainly end up in surface water via domestic RWZIs. They are stable and not degraded or absorbed in the body. This property means that they do not degrade (easily) in the environment, an RWZI or a simple drinking water purification plant either.
Distribution of pollution: sucralose was detected at concentrations above the ERM target value at Roosteren, Heel, Heusden, Brakel, Keizersveer and Haringvliet. Acesulfame K was detected in concentrations above the ERM target value at Roosteren, Heel, Bergsche Maas and Haringvliet. The indicative drinking water guideline values for sucralose (5,000 µg/L) and acesulfame K (3,200 µg/L) were not breached.

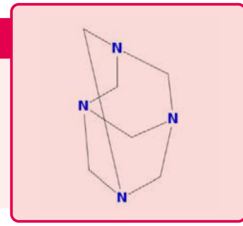
Notable: sucralose has been included in Annex III of the REACH Regulation due to a suspicion of carcinogenicity, hazard to the aquatic living environment, mutagenicity (the ability of a substance to cause changes (mutations) in the DNA) and Persistence (source: European Chemicals Agency (ECHA). REACH is a European regulation on the production of and trade in chemical substances.

Methenamine [E239] (CASRN 100-97-0)

PMT PMT-score 0,63 (P=0,81 | M=0,93 | T=0,34)

DWR Drinking water-relevant

CLP



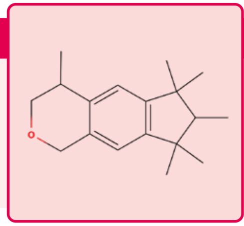
Application: methenamine (urotropine, hexamine) is one of the trivial names used for a compound that is frequently used in phenol resin and many other industrial applications and also as a preservative against mould (E239 in products including caviar, rollmop herring, tinned fish and pickled herring). Methenamine is also the main constituent of solid fuel tablets, known by the name Esbit, frequently used in stoves for campers, mountain climbers and the military and in miniature steam engines, amongst other things. Methenamine may also be used as a corrosion inhibitor and antibiotic.
Origin: this substance mainly ends up in surface water via RWZIs.
Distribution of pollution: methenamine was detected above the ERM target value at Namêche, Liège, Eijsden, Roosteren, Heel, Bergsche Maas and Haringvliet. The indicative drinking water guideline value for methenamine is 500 µg/L; it was not breached.
Notable: since 2010, methenamine has been monitored in the water abstracted at Brakel. It is regularly detected above the ERM target value (this was not the case in 2025). Since 2012, this substance has also been detected systematically above the ERM target value at Keizersveer and Haringvliet. Methenamine has been assessed as drinking water relevant.

Perfumes, colourants and flavourings

Galaxolide (HHCB, CASRN 1222-05-5)

PMT-score 0,34 (P=0,65 | M=0,19 | T=0,33)

CLP

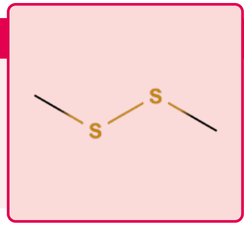


Application: galaxolide is an International Flavors & Fragrances brand name for a synthetic fragrance that forms part of the group of polycyclic musk fragrances (HHCB, 1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta-γ-2-benzopyran). It is found in products like perfume, soap, shampoo, detergents, fabric softener, deodorant, air fresheners, etc.
Origin: this substance mainly ends up in surface water via RWZIs.
Distribution of pollution: galaxolide was detected above the ERM target value at Namêche and Liège.

Dimethyl disulfide (DMDS, CASRN 624-92-0)

PMT-score 0,21 (P=0,09 | M=0,58 | T=0,17)

CLP



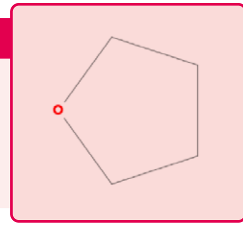
Application: dimethyl disulfide (DMDS) has been authorised as a flavouring in some food products and is used as a corrosion inhibitor in some iron production processes. In oil refineries, DMDS is used to activate catalysts for hydrotreating processes, specifically hydrodesulfurization (desulphurisation aided by hydrogen gas). It is also used to prevent coke formation in steam crackers. Arkema is the largest producer of dimethyl disulfide and wants to use it as an alternative to methyl bromide in agriculture, specifically for the fumigation of soil to clear it of nematodes, mould and weeds before planting agricultural crops. In 2007, Arkema submitted a registration application for this product, with the brand name Paladin, to the U.S. Environmental Protection Agency and obtained authorisation for its experimental use in certain states in the United States. DMDS is also produced by plants of the cruciferae family.
Origin: this substance mainly ends up in surface water via RWZIs.
Distribution of pollution: DMDS was detected above the ERM target value at Eijsden and Brakel.

Solvents

Tetrahydrofuran (THF, CASRN 109-99-9)

PMT-score 0,35 (P=0,08 | M=0,65 | T=0,80)

CLP

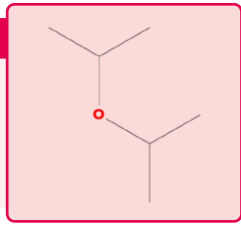


Application: the solvent tetrahydrofuran (THF) is used in the chemicals industry. It can be polymerised by strong acids or electrophiles (like trityl tetrafluoroborate) into a linear polymer, poly(tetramethylene ether) glycol or PTMEG (also known as polytetramethylene oxide). This glycol is mainly used for the production of elastomer polyurethanes, in particular polyurethane fibres like elastane (Spandex, Lycra).
Origin: this substance mainly ends up in surface water via RWZIs.
Distribution of pollution: THF was detected above the ERM target value at Roosteren, Heel, Bergsche Maas and Haringvliet.

Di-isopropyl ether (DIPE, CASRN 108-20-3)

PMT-score 0,35 (P=0,10 | M=0,56 | T=0,75)

CLP



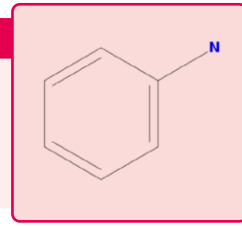
Application: a known industrial discharge in the Wallonian part of the river basin has been responsible for the presence of the substances fluoride, DIPE and tributyl phosphate in the Meuse for decades now. The company Société de Prayon has developed and patented an extraction process that uses the solvents di-isopropyl ether (DIPE, 85-95%) and tributyl phosphate (5-15%) to upgrade technical grade phosphoric acid to food-grade phosphoric acid (source: Gilmour, 2013). This process has been in place in the factory at Engis since 1983; It currently has an installation that is able to process 120,000 tonnes per year (expressed as P_2O_5), in line with the so-called Prayon process. In the first pre-treatment step in the Prayon process, the impurities sulfate and fluoride in industrial-grade phosphoric acid are reduced to 0.3% and 0.1% respectively. Some of the fluoride is recovered from the process and sold in the form of hexafluorosilicic acid (H_2SiF_6).
Origin: waste water discharges by the company Société de Prayon in Engis.
Distribution of pollution: DIPE was detected above the ERM target value at Liège, Eijsden, Roosteren and Stevensweert. The indicative drinking water guideline value for DiPE is 1,400 µg/L; it was not breached anywhere.
Notable: Société de Prayon further optimised the fluoride recovery process in its factory at Engis by installing a vapour separator and air scrubber in October 2014. The aim is to deliver an extra yield of approximately 250 tonnes of fluoride per year, which would no longer be discharged. There has been just one breach of fluoride in recent years; the last time fluoride regularly breached the ERM target value was 2011: this applied to 34% of the measurements at Liège at that time. The drinking water companies are pleased that the presence of these pollutants has been improved, partly through reuse of the substances. They hope that this positive trend will continue and that all emissions will finally fall below the ERM target value. Société de Prayon has previously made it known that it plans to reduce discharges of DIPE in the future via an additional purification step.

Other industrial substances and consumer products

Aniline (CASRN 62-53-3)

PMT-score 0,39 (P=0,13 | M=0,60 | T=0,80)

CLP

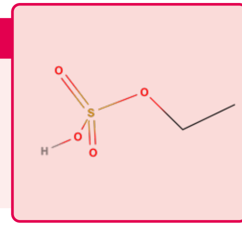


Application/Origin: aniline is a basic raw material for the chemical industry. It is primarily used in the production of dyes and methylene diphenyl diisocyanate (MDI); this, in turn, is a component of polyurethanes. Since 1897, the Badische Anilin- und Soda Fabrik (BASF) has been using aniline for the synthetic production of indigo, a dye that was previously only possible to obtain from plant-based raw materials (Heumann synthesis).
Distribution of pollution: aniline was only detected at a concentration above the ERM target value at Haringvliet. This points to a source in the Rhine river basin.

Ethyl hydrogen sulfate (CASRN 540-82-9)

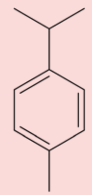
PMT-score 0,40 (P=0,11 | M=0,83 | T=0,70)

CLP



Application: ethyl hydrogen sulfate, also known as sulfovinic acid and ethyl sulfate, is an organic chemical compound that is used as an intermediate product in the production of ethanol from ethylene. It is the ethyl ester of sulfuric acid. Propane nitrile can be produced by converting ethyl sulphate in the presence of potassium cyanide. The nickel (II) salt of ethyl sulfate (CASRN 71720-48-4) is an SVHC (source: RIVM and ECHA). (source: RIVM and ECHA).
Origin: unknown.
Distribution of pollution: ethyl hydrogen sulphate was detected once at a concentration above the ERM target value at Roosteren.

1-isopropyl-4-methyl-benzene (CASRN 99-87-6)



PMT-score 0,31 (P=0,18 | M=0,25 | T=0,63)

CLP

Application: the fragrance 1-isopropyl-4-methylbenzene (p-cymene) occurs naturally in many types of essential oils. It is found in larger quantities in ajwain, savoury, dill, cumin seed, rosemary and thyme essential oils. It is also an intermediate industrial product for the production of chemicals like pesticides.
Origin: this substance mainly ends up in surface water via RWZIs. It is a potential SVHC (source: RIVM).
Origin: unknown.
Distribution of pollution: p-cymene was detected once at a concentration above the ERM target value at Bergsche Maas.

Substances subject to a drinking water standard

There are a number of substances that are subject to drinking water standards in addition to an ERM target value. We did not report on these substances in the past because the ERM target value is intended for substances that are not subject to a drinking water standard. One exception is the ‘Pesticides and their metabolites’ category. These substances are tested against the ERM target value, which is equal to the standard for drinking water and, in the Netherlands, also equal to the standard for surface water from which drinking water is made. Since 2021, all substances have been tested against their ERM target value, even if they are subject to a drinking water standard.

In 2025, breaches of the ERM target values were recorded for:

- trihalomethanes: sum of trihalomethanes, tribromomethane;
- chlorinated hydrocarbons: 1,2-dichloroethane, dichloromethane, trichloroethene, tribromomethane, tetrachloroethene, tetrachloroethene and trichloroethene (sum);
- polycyclic aromatic hydrocarbons (PAHs): PAH (sum 16 of EPA), naphthalene;
- monocyclic aromatic hydrocarbons (MAHs): 1,3 and 1,4-dimethylbenzene (sum of m-xylene and p-xylene), methylbenzene (toluene).

Which residues of pharmaceuticals and endocrine-disrupting chemicals end up in the Meuse?

Antidiabetics
- Metformin
- Guanylureum
- Sitagliptin

Painkillers
- N-acetyl-4-aminoantipyrine (AAA)
- Tramadol
- Paracetamol
- Ketamine

Anti-epileptics and/or antidepressants
- Vigabatrine
- Lamotrigine
- Lithium

Other substances
- Oxipurinol

Cardiovascular medication
- Valsartan acid
- Candesartan
- Valsartan
- Metoprolol
- Telmisartan

Hormone-disrupting substances
- Dibutyl phthalate
- ER-Calux
- Bisfenol A

Residues of medicines and endocrine disrupting chemicals

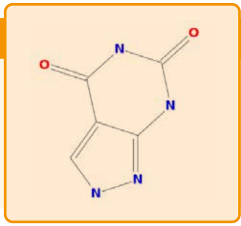
Parameter	CASRN	ERM-	tv	TAI	NAM	LUI	EYS	ROO	STV	HEE	HEU	BRA	BSM	HAR	n/	N	%
Pharmaceuticals and endocrine-disrupting substances															299	1459	20,4%
Oxypurinol	2465-59-0	0,1	µg/l								1,70	1,20			26	29	89,6%
Valsartan acid	164265-78-5	0,1	µg/l					0,17		0,28	0,38	0,32	0,53	0,28	50	76	65,7%
Lamotrigine	84057-84-1	0,1	µg/l					0,15		0,13	0,16	0,12	0,19	0,13	40	76	52,6%
Vigabatrin	60643-86-9	0,1	µg/l					0,94		0,80			0,75	0,63	22	46	47,8%
Lithium	7439-93-2	7,7	µg/l Li			7,80	12,80			8,29		9,39	9,80	11,00	41	125	32,8%
Candesartan	139481-59-7	0,1	µg/l				0,02	0,02		0,03	0,15	0,10	0,15	0,17	23	78	29,4%
Dibutyl phthalate (DBP)	84-74-2	0,1	µg/l									0,19			1	4	25%
Metformin	657-24-9	1	µg/l		1,23	1,68	1,73	1,70		1,10	1,10	0,60	0,95	0,57	29	121	23,9%
Guanylurea	141-83-3	1	µg/l				1,12	1,70		1,20	1,00	0,26	2,90	1,50	20	94	21,2%
N-acetyl-4-aminoantipyrine (AAA)	83-15-8	0,1	µg/l					0,06		0,04	0,09	0,06	0,11	0,17	11	76	14,4%
Valsartan	137862-53-4	0,1	µg/l		0,13	0,10	0,04	0,08		0,08	0,17	0,06	0,17	0,13	15	104	14,4%
ER-CALUX as 17β-estradiol equivalents		0,25	ng/l		0,31	2,10		0,13		0,10			0,39	0,12	5	48	10,4%
Tramadol	27203-92-5	0,1	µg/l	0,03	0,14	0,14	0,11	0,11		0,07	0,07	0,04	0,09	0,06	9	117	7,6%
Paracetamol	103-90-2	0,1	µg/l					0,24		0,09	0,10	0,04	0,13	0,03	2	76	2,6%
Ketamine	6740-88-1	0,1	µg/l					0,02		0,04			0,11	0,02	1	46	2,1%
Sitagliptin	486460-32-6	0,1	µg/l					0,03		0,03	0,07	0,04	0,09	0,11	1	76	1,3%
Bisphenol A (BPA)	80-05-7	0,1	µg/l		0,02	0,03	0,04	0,15		0,06		<0,008	0,05	0,02	1	78	1,2%
Metoprolol	37350-58-6	0,1	µg/l	0,02			<0,004	0,01		0,02	0,08	0,02	0,12	0,06	1	91	1,1%
Telmisartan	144701-48-4	0,1	µg/l		0,10	0,06		0,04		0,03	0,06	0,04	0,09	0,05	1	98	1%

Residues of medicines and endocrine disrupting chemicals

In 2025, 69 parameters breached the ERM target values once or more. In 27.5% of these cases, this was due to the residues of medicines and EDCs (19). Of the 1,459 measurements taken for these 19 substances, 299 (20.5%) breached the ERM target value (see Table 7).

Table 7 on page 171: Residues of medicines and endocrine disrupting chemicals breaching the ERM target value in 2025 (maximum concentrations, in order of percentage of breaching measurements).

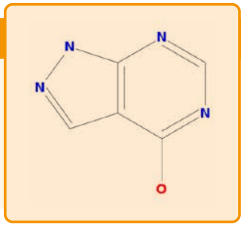
Oxypurinol (CASRN 2465-59-0)



PMT-score 0,26 (P=0,10 | M=0,52 | T=0,33)

CLP

Allopurinol (CASRN 315-30-0)



PMT-score 0,35 (P=0,18 | M=0,74 | T=0,33) [6]

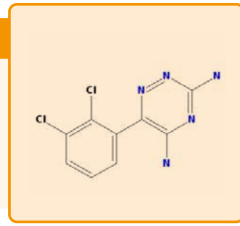
Application: oxypurinol is a metabolite of allopurinol, which inhibits the formation of uric acid by inhibiting the enzyme xanthine oxidase. Allopurinol prevents the body converting purine into uric acid. Purine can be found in certain foodstuffs and the body produces it as well. Allopurinol reduces the amount of uric acid in the blood. Doctors prescribe allopurinol for gout, kidney stones, kidney diseases and cancer. It is also used for certain metabolic conditions in which too much uric acid is produced. Allopurinol (Zyloric®), with 27,705,300 DDD[12], was ranked 72 in the top 100 of the most-prescribed medicines in the Netherlands in 2024 (source: zorgcijfersdatabank.nl/).

12 Defined Daily Dose.

Origin: allopurinol is converted rapidly (in two hours) into its active metabolite oxypurinol. The half life of this substance is 18 to 30 hours, which means that the effectiveness of allopurinol is largely achieved via its conversion product. Oxypurinol is excreted by the body and ends up in the surface water via sewer systems.
Distribution of pollution: oxipurinol breached the ERM target value measurements at Heusden and Brakel. Oxypurinol has an indicative drinking water guideline value of 8 µg/L; it was not breached.

Medications for epilepsy and depression

Lamotrigine (CASRN 84057-84-1)

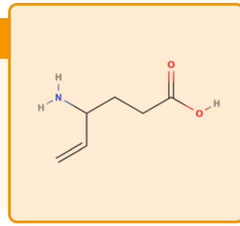


PMT-score 0,64 (P=0,77 | M=0,47 | T=0,74)

Drinking water-relevant

CLP

Vigabatrin (CASRN 60643-86-9)



PMT-score 0,18 (P=0,03 | M=0,89 | T=0,18)

Drinking water-relevant

CLP

Application: iamotrigine is a substance that calms overstimulated nerves in the brain in patients with epilepsy and manic depression (bipolar disorder). It is sometimes also used to treat neuralgia, post-traumatic stress disorder (PTSD), complex regional pain syndrome (CPRS, also called post-traumatic dystrophy), singultus (hiccups), muscle cramps and breast cancer (to combat hot flushes).
Origin: after being administered, this substance is excreted by the body and ends up in the surface water via sewer systems.
Distribution of pollution: iamotrigine was detected at the ERM target value at Roosteren, Heel, Bergsche Maas and Haringvliet.

Application: vigabatrin is a substance that calms overstimulated nerves in the brains of patients with epilepsy. It is one of the last therapeutic options used because it is less safe and also less well tolerated than other antiepileptic drugs (source: Farmacotherapeutisch Kompas).
Origin: after being administered, this substance is excreted by the body and ends up in the surface water via sewer systems.
Distribution of pollution: vigabatrin was detected at the ERM target value at Roosteren, Heel, Bergsche Maas and Haringvliet.

Lithium

Application: lithium is an element (light metal) that is closely related to sodium and potassium and calcium and magnesium. It is an effective mood stabiliser that psychiatrists prescribe for the treatment and prevention of manic episodes and severe depression, such as in bipolar disorder. It is sometimes also used to treat persistent cluster headaches. The precise mechanism of action is largely unknown, but it balances overactive nerve cells in the brain (source: Farmacotherapeutisch Kompas). Lithium is an important component in rechargeable batteries for various electronics and electric cars as well.
Origin: after being administered, this substance is excreted by the body and ends up in the surface water via sewer systems. It may also be released from batteries during the waste stage.
Distribution of pollution: lithium was detected above the ERM target value at Liège, Eijsden, Heel, Heusden, Bergsche Maas and Haringvliet.

Painkillers

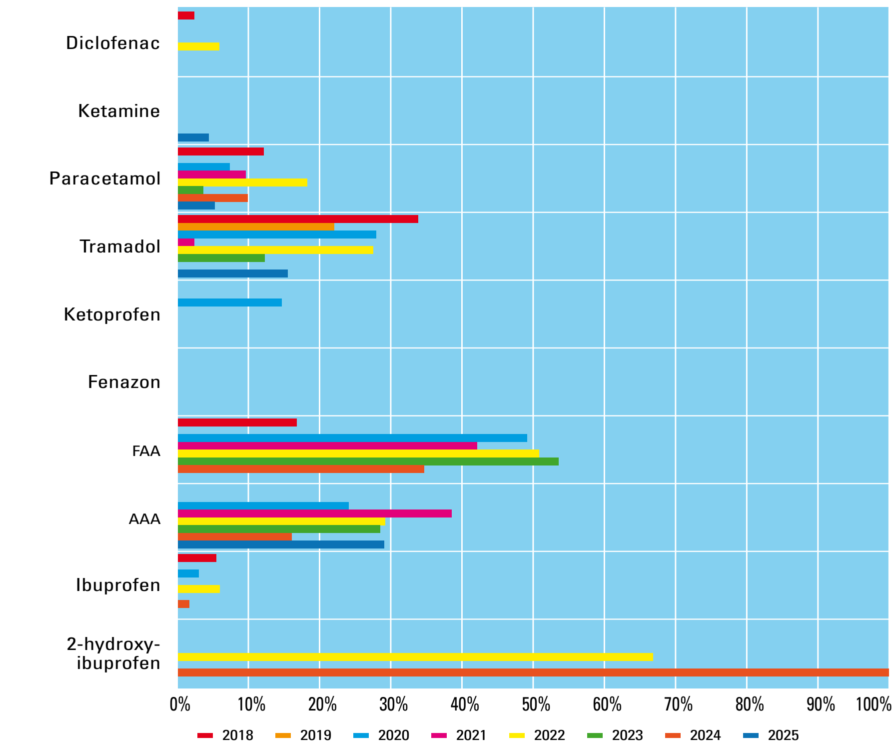
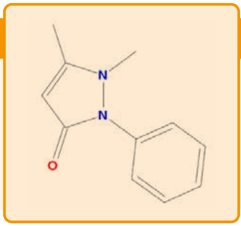


Figure 3: Percentage of ERM target value breaches by painkillers 2018-2025.

Phenazone (Antipyrine, CASRN 60-80-0)

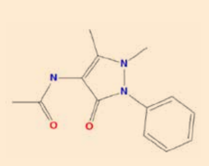
PMT

PMT-score 0,40 (P=0,16 | M=0,66 | T=0,61)



N-Acetyl-4-aminoantipyrine (AAA, CASRN 83-15-8)

PMT-score 0,48 (P=0,26 | M=0,70 | T=0,61)

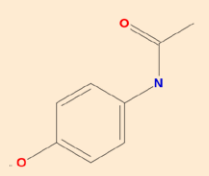


Application: Phenazone (antipyrine) is a medicine with a painkilling and anti-pyretic effect; it is now rarely used to treat pain and fever. However, it is frequently used in the testing of the effects of other medicines or illnesses on the medicine-degrading enzymes in the liver. Phenazone was first synthesised by Ludwig Knorr back in 1887; it was used as an analgesic and fever-reducing medication. N-Acetyl-4-aminoantipyrine (AAA) is a metabolite of phenazone.
Origin: after being administered, this substance is excreted by the body and ends up in the surface water via sewer systems.
Nature of pollution: phenazone breached the ERM target value in measurements at Liège, Bergsche Maas and Haringvliet, while AAA was only detected in breaches at Bergsche Maas and Haringvliet. AAA has an indicative drinking water guideline value of 10 µg/L and it was not breached.

Paracetamol (CASRN 103-90-2)

PMT-score 0,36 (P=0,13 | M=0,62 | T=0,57)

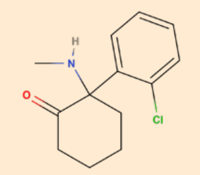
CLP



Application: paracetamol is an over-the-counter analgesic and fever-reducing medicine. The name paracetamol is derived from the chemical name para-acetylaminophenol.
Origin: after being administered, this substance is excreted by the body and ends up in the surface water via sewer systems.
Distribution of pollution: paracetamol breached the ERM target value in measurements at Roosteren and Bergsche Maas.

Ketamine (CASRN 6740-88-1)

PMT-score 0,55 (P=0,54 | M=0,45 | T=0,69) [13]



Application: ketamine is used as a painkiller and also as an anaesthetic in surgery on both humans and animals. In dosages lower than those used for general anesthesia, ketamine is also used as a medicine called Special K or Keta.
Origin: after use, this substance is excreted by the body and ends up in the surface water via sewer systems.
Distribution of pollution: ketamine breached the ERM target value once in measurements at Bergsche Maas.

Medicines for cardiovascular diseases (AIIRAs and beta blockers)

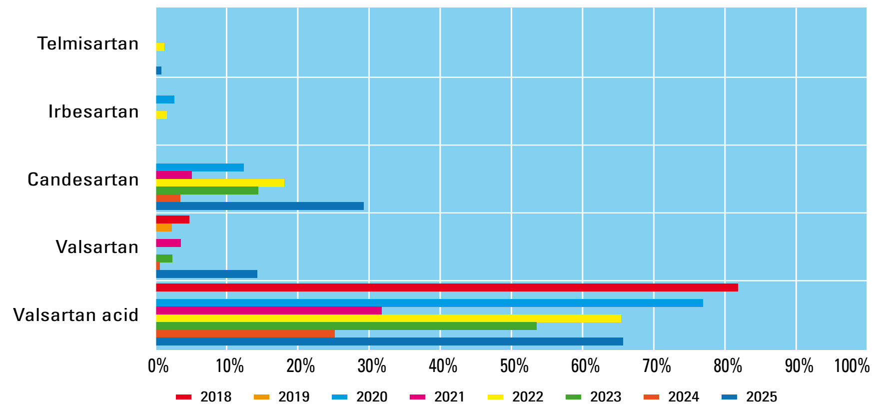
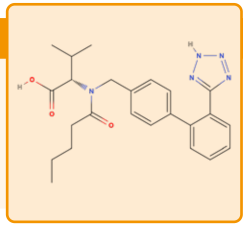


Figure 4: Percentage of ERM target value breaches by medicines for cardiovascular diseases 2018-2025.

Valsartan (CASRN 137862-53-4)

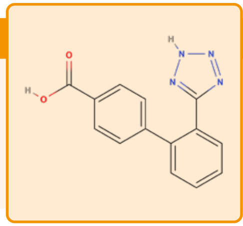


PMT-score 0,33 (P=0,14 | M=0,47 | T=0,56)

Drinking water-relevant

CLP

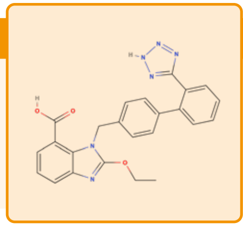
Valsartanic acid (CASRN 164265-78-5)



PMT-score 0,35 (P=0,21 | M=0,63 | T=0,33)

Drinking water-relevant

Candesartan (CASRN 139481-59-7)

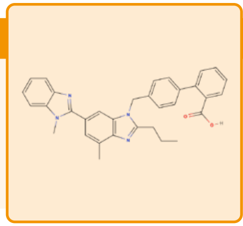


PMT-score 0,40 (P=0,54 | M=0,28 | T=0,42)

Drinking water-relevant

CLP

Telmisartan (CASRN 144701-48-4)



PMT-score 0,31 (P=0,73 | M=0,08 | T=0,53) [13]

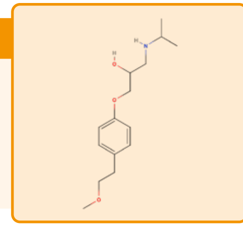
Application: the medicines valsartan, candesartan and telmisartan fall in the category of angiotensin II receptor antagonists (AIIRAs). the medicines valsartan, candesartan and telmisartan fall in the category of angiotensin II receptor antagonists (AIIRAs).They inhibit the action of a hormone in the blood that contracts blood vessels and increases blood pressure. They are prescribed for high blood pressure, heart failure and after cardiac infarcts. Valsartanic acid is a degradation product of valsartan. In 2024, valsartan (Diovan®) ranked 51 in the top 100 of the most prescribed medicines in the Netherlands with 39,626,500 DDD (source: zorgcijfersdatabank.nl). In 2024, candesartan ranked 24 in the top 500 of the most prescribed medicines in the Netherlands with 78,335,900 DDD (Atacand®). In 2024, telmisartan ranked 78 in the top 100 of the most prescribed medicines in the Netherlands with 23,809,900 DDD (Micardis®).

Application: after being administered, these substances are excreted by the body and end up in the surface water via sewer systems.

Distribution of pollution: valsartan acid, which is the degradation product of valsartan, breached the ERM target value in measurements at Roostereren, Heel, Heusden, Brakel, Bergsche Maas and Haringvliet. Valsartan breached the ERM target value in measurements at Namêche, Liège, Heusden, Bergsche Maas and Haringvliet. Candesartan breached the ERM target value at Heusden, Bergsche Maas and Haringvliet (it equalled the target value at Brakel). Telmisartan breached the ERM target value at Liège.

Notable: valsartan was in the news in 2017 and 2018 thanks to large-scale recalls of medicines by pharmacists worldwide. Blood pressure-lowering medicines in the sartans group contained elevated concentrations of carcinogenic nitrosamines, including N-nitrosodimethylamine (NDMA) and N-nitrosodiethylamine (NDEA). After this discovery, a study was immediately initiated to investigate the cause of the presence of this pollutant. This study led to the recommendation not to permit any measurable quantity of nitrosamines in sartans.

Metoprolol (CASRN 37350-58-6)



PMT-score 0,48 (P=0,26 | M=0,76 | T= 0,56)

Application: metoprolol is a beta blocker - a medicine with a beneficial effect on perfusion, cardiac rhythm disorders and high blood pressure.

Origin: after being administered, this substance is excreted by the body and ends up in the surface water via sewer systems.

Distribution of pollution: metoprolol breached the ERM target value once in measurements at Bergsche Maas.

Notable: concentrations of metoprolol last breached the ERM target value in 2022 and 2019. Before this, there was just one breach of the ERM target value, in 2016, at both the monitoring points Heel (0.12 µg/L) and Stellendam (2 µg/L).

Antidiabetic medicines

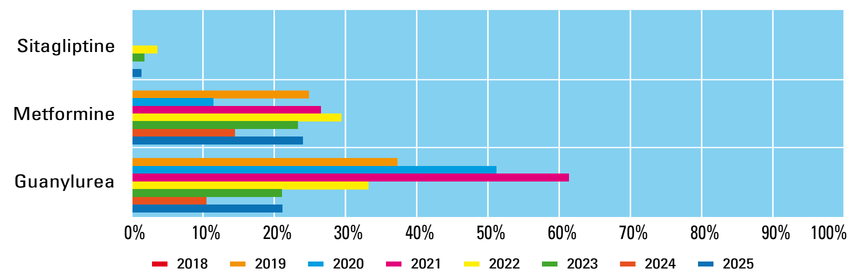
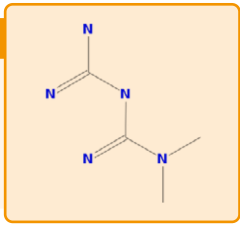


Figure 5: Percentage of ERM target value breaches by antidiabetic medicines.

Metformin (CASRN 657-24-9)



PMT-score 0,33 (P=0,12 | M=0,96 | T=0,34)

Drinking water-relevant

CLP

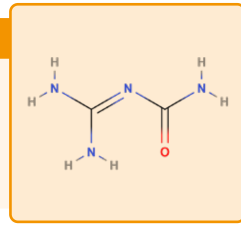
Application: the antidiabetic medicine metformin is used to lower blood sugar levels. It is one of the most-produced medicines in the world in terms of production volume.[13] Doctors prescribe metformin not just for diabetes mellitus but sometimes also for the reduced fertility caused by a deformity of the ovaries (Polycystic Ovary Syndrome, PCOS). In Belgium, 38 medicines containing this active substance have been authorised (source: https://fagg.be). In 2024, metformin, with a total of 164,924,100 DDD, was the 10th most prescribed medicine in the Netherlands (source: zorgcijfersdatabank.nl/). Metformin is not available over the counter.

Application: after being administered, these substances are excreted by the body and end up in the surface water via sewer systems.

Distribution of pollution: metformin was detected above the ERM target value at the monitoring points at Namêche, Liège, Eijsden, Roosteren, Heel and Heusden. The indicative drinking water guideline value for metformin is 196 µg/L; it was not breached.

13 *https://pubs.rsc.org/en/content/articlelanding/2009/em/b909311g/unauth.*

Guanylurea (CASRN 141-83-3)



PMT-score 0,29 (P=0,10 | M=0,78 | T=0,33)

Drinking water-relevant

CLP

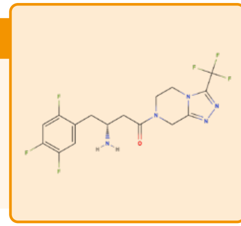
Application: guanylureum is the primary degradation product of metformin, which is not degraded further by bacteria or under the influence of light in aerobic conditions (source: Trautwein and Kümmerer, 2011, in Derksen en Ter Laak, 2013).

Origin: metformin introduced into surface water degrades into guanylurea, after which no further degradation happens. However, guanylurea does degrade effectively during soil passage.

Distribution of pollution: guanylurea was detected above the ERM target value at the monitoring points at Eijsden, Roosteren and Heel (and equalled the target value at Heusden). Guanylurea has an indicative drinking water guideline value of 22.5 µg/L; it was not breached.

Notable: the degradation product guanylurea has a lower indicative drinking water guideline value than the parent substance metformin.

Sitagliptin (CASRN 486460-32-6)



PMT-score 0,57 (P=0,99 | M=0,55 | T=0,33) [13]

Application: sitagliptin is a blood sugar lowering agent. It is a DPP-4 inhibitor. These inhibitors ensure the improvement of insulin levels after meals and that the body produces less sugar. Doctors prescribe sitagliptin for diabetes mellitus.

Origin: after being administered, this substance is excreted by the body and ends up in the surface water via sewer systems.

Distribution of pollution: sitagliptin was detected at just above the ERM target value at Haringvliet.

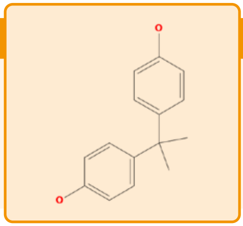
Notable: sitaglipin is a PFAS according to the OECD definition and can degrade into TFA.

Endocrine disrupting chemicals

Bisphenol A (BPA, CASRN 80-05-7)

PMT-score 0,43 (P=0,27 | M=0,32 | T=0,90)

CLP

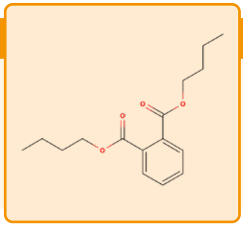


Application: bisphenol A (BPA) is used in the production of plastics like polycarbonate and thermal paper for receipts but is also used as a solvent in ink and as a flame retardant.
Origin: use of plasticisers.
Distribution of pollution: breached the ERM target value in one measurement at Roosteren.
Notable: the sale and import of baby bottles containing BPA has been banned in the EU since June 2011. In the EU, BPA is not allowed in eco-labelled products and it is banned in cosmetics too. On 12 December 2016, the EU enacted a regulation on the use of BPA in thermal paper. Thermal paper containing BPA has been banned in the EU market since 2 January 2020.

Dibutyl phthalate (DBP, CASRN 84-74-2)

PMT-score 0,16 (P=0,02 | M=0,29 | T=0,71)

CLP



Application: dibutyl phthalate (DBP) is one of the most widely used plasticisers, primarily for PVC (polyvinyl chloride). It is also added to adhesives, printing inks and other applications, including cosmetics (such as nail polish).
Origin: use of plasticisers.
Distribution of pollution: breached the ERM target value in one measurement at Brakel.

Notable: on 17 December 2018, the EU decided to end the use of and trade in products containing DBP, bis(2-ethylhexyl) phthalate (DEHP), benzyl butyl phthalate (BBP) and di-isobutyl phthalate (DIBP) in the EU (EU Regulation No. 2018/2005).

ER-CALUX®

Application: none (effect measurement).
Origin: CALUX® assays form a family of bioassays that use human or mammalian cells. They are genetically modified such that they produce light in response to exposure to substances that induce a specific effect. A reporter gene (luciferase) is then transcribed into the cell nucleus and translated into an enzyme that produces light after administration of its substrate, luciferin. The amount of light produced is proportional to the activity of the substances to which the cells have been exposed and is quantified in a luminometer. The "ER" in ER-CALUX® stands for estrogen responsive: this bioassay specifically signals the activation of estrogen receptors, which play a direct role in maintaining the hormone balance.
Distribution of pollution: ER-CALUX® breached the ERM target value in measurements at Namêche, Liège, Roosteren, Heel, Bergsche Maas and Haringvliet.
Notable: the ERM target value for ER-CALUX® is very low because the reference substance estradiol (E2) is hormonally disruptive in the body even at very low concentrations.

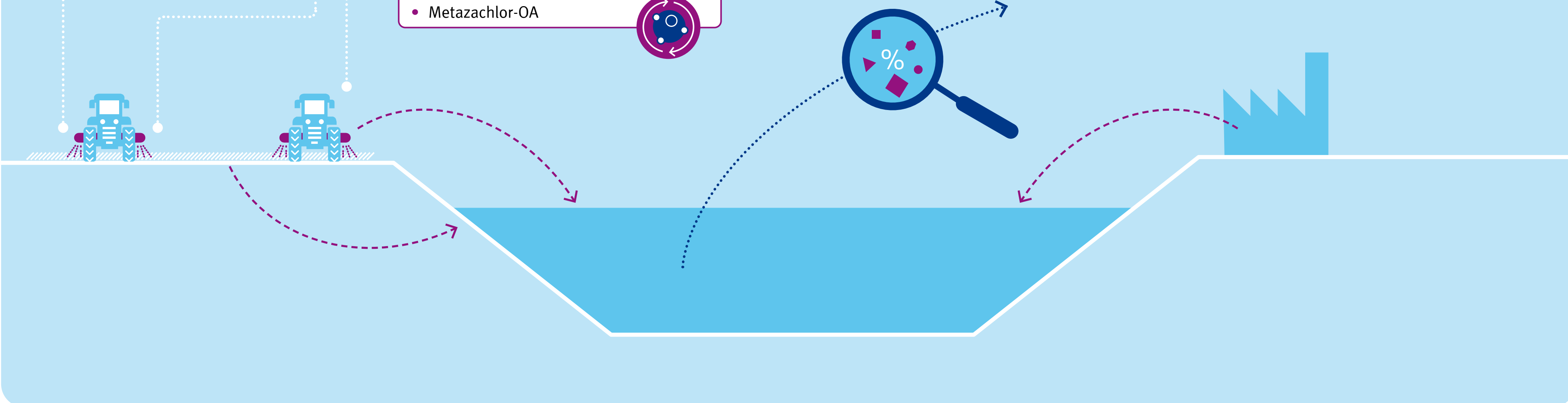
Which pesticides, biocides and their metabolites end up in the Meuse?

Fungicides
- Fluopyram
- Propamocarb
- Cyprodinil

Herbicides
- Dimethylarsenic acid (DMAA)
- Dicamba
- (s-)Metolachloor
- Flufenacet
- Glyfosate
- Dimethenamid(-P)
- Prosulfocarb

Insecticides
- Flonicamid

Metabolites
- Desfenylchloridazon
- Aminomethylphosphonic acid (AMPA)
- Metazachlor-ESA
- Metazachlor-OA



Pesticides and their metabolites

Parameter	CASRN	ERM-	tv	TAI	NAM	LUI	EYS	ROO	STV	HEE	HEU	BRA	BSM	HAR	n/	N	%
Pesticides, biocides and metabolites															211	1746	12%
Desphenyl-chloridazon	6339-19-1	0,1	µg/l	0,12	0,29	0,29		0,35		0,33	0,35	0,27	0,35	0,19	88	113	77,8%
Dimethylsulfamic acid (DMAA)	75-60-5	0,1	µg/l				0,16								4	13	30,7%
Fluopyram	658066-35-4	0,1	µg/l								0,07	0,21			7	31	22,5%
Propamocarb	24579-73-5	0,1	µg/l		<0,02	0,34		0,89		0,54	0,07	0,02	0,09	<0,05	81	433	18,7%
Flonicamid	158062-67-0	0,1	µg/l								0,02	0,16			4	31	12,9%
Aminomethylphosphonic acid (AMPA)	1066-51-9	1	µg/l	0,82	0,72	1,00	<0,5	1,40	1,52	1,10	1,37	0,82	0,94	0,40	14	134	10,4%
Dicamba	1918-00-9	0,1	µg/l					<0,1		0,27	0,01	<0,01	0,90	<0,1	2	60	3,3%
Cyprodinil	121552-61-2	0,1	µg/l								<0,02	0,23	<0,02		1	31	3,2%
(S)-Metolachlor	87392-12-9	0,1	µg/l								0,10	0,09			1	31	3,2%
Flufenacet	142459-58-3	0,1	µg/l		0,06	0,11									1	38	2,6%
Glyphosate	1071-83-6	0,1	µg/l	0,05	0,13	0,09	<0,1	0,13	0,11	0,06	0,09	0,03	0,07	0,03	3	135	2,2%
Metazachlor-ESA	172960-62-2	0,1	µg/l		0,10	0,11				0,07	0,09	0,07	0,08	0,25	2	99	2,0%
Dimethenamid-P	87674-68-8	0,1	µg/l	0,07	0,04	0,10					0,11	0,04			1	81	1,2%
Metazachlor-OA	1231244-60-2	0,1	µg/l		0,08	0,10				<0,05	0,05	0,04	0,07	0,06	1	99	1%
Prosulfocarb	52888-80-9	0,1	µg/l					0,09		0,10	0,06	0,03	<0,05	<0,05	1	417	0,2%

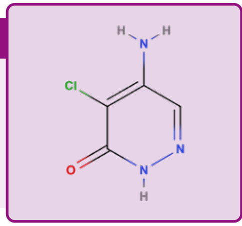
Pesticides and their metabolites

In 2025, 69 parameters breached the ERM target values once or more. A total of 21.7% of cases (15 times) involved pesticides or their metabolites. Of the 1,746 measurements that were taken for these 15 substances, 211 (12.1%) breached the ERM target value (see Table 8).

Table 8 on page 185: Pesticides and their metabolites breaching the ERM target value in 2025 (maximum concentrations, in order of percentage of breaching measurements).

Chloridazon desphenyl (CASRN 6339-19-1)

PMT-score 0,46 (P=0,20 | M=0,80 | T=0,61)



Application: chloridazon desphenyl is a metabolite of chloridazon, a herbicide. Authorisations of pesticides based on the active substance chloridazon have recently been withdrawn in Belgium and the Netherlands. The last authorisations in the Netherlands expired on 31 December 2018, with a use-by date of 30 June 2020. This happened in line with the expiry date of the active substance chloridazon stipulated in Implementing Regulation 2008/41/EC. Chloridazon was present in pesticides with the following names: Agrichem Chloridazon 65% Sp.P. (NL), Agrichem Chloridazon F.W. (NL), Alicep N (NL), Aliproc (NL), Better Df (NL), Better Sc (BE, NL), Better Wp (NL), Bietazol 520 (BE), Booster 520 (BE), Chlordex Sc (BE), Chloridazon Df (NL), Chloridazon Flow 3 (NL), Chloridaz-W.G. (NL), Fiesta (NL), Fiesta New (BE), Imex-Chloridazon Flow 2 (NL), Luxan Chloridazon Df (NL), Luxan Chloridazon Flow (NL), Luxan Chloridazon Spuitkorrel (NL), Pyramin DF (NL), Pyramin FL (NL), Pyramin Sc 520 (BE) and Pyroquin Tdi Sc (BE) (source: Board for the Authorisation of Pesticides and Biocides (Ctgb) and Fytoweb).

Origin: emissions from the use of this substance in agriculture (farmyard run-off, spray drift, etc.).

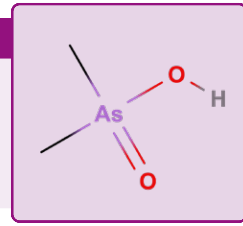
Distribution of pollution: the metabolite chloridazon desphenyl was detected above the ERM target value at Tailfer, Namêche, Liège, Roosteren, Heel, Heusden, Brakel, Bergsche Maas and Haringvliet. The Dutch government considers chloridazon desphenyl to be a pesticide metabolite that is not relevant from a human toxicological viewpoint Since 2011, the Dutch government has applied a standard for human toxicologically non-relevant metabolites of 1 µg/L for the raw material used to produce drinking water Since 2020, a list has been available of human toxicologically non-relevant metabolites of pesticides and their standards.[14] The standard of 1 µg/L was not breached in 2024. In Flanders, chloridazon desphenyl is tested against a precautionary value of 4.5 µg/L.

Notable: chloridazon desphenyl is detected in groundwater in many North European countries.

dimethylarsenic acid (DMAA, CASRN 75-60-5)

No PMT score

CLP



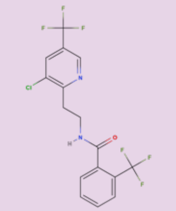
Application: dimethylarsenic acid (DMAA or Cacodylic acid) is one of the components of Agent Blue, a herbicide widely used during the Vietnam War. It is an SVHC (source: RIVM).

Origin: unknown.

Distribution of pollution: DMAA was detected above the ERM target value at Eijsden.

14 *https://www.vmm.be/wetgeving/relevante_en_niet-relevante_metabolieten_tw.pdf.*

Fluopyram (CASRN 658066-35-4)



PMT-score 0,44 (P=0,99 | M=0,26 | T=0,33)

CLP

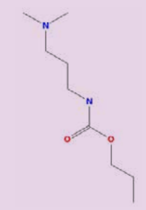
Application: in the Netherlands and Belgium, fluopyram has been authorised as a fungicide (to combat mould) in multiple pesticides and a nematicide (to combat roundworms including nematodes) in all kinds of arable crops, vegetables, fruit crops and floriculture crops (source: HWL factsheet). In Belgium and the Netherlands, these pesticides are sold under the brand names Ascra Xpro (BE, NL), Bixazor Extra (BE), Caligula (BE), Exteris Stressgard (BE, NL), Inter Blast (BE), Inter Lunar (BE), Keynote Xpro (BE), Luna Care (BE, NL), Luna Experience (BE, NL), Luna Privilege (BE, NL), Luna Sensation (BE, NL), Luna Smart (BE), Moona Duo (BE), Propulse (BE, NL), Propyram 250 Se (BE), Recital (BE), Silvron Xpro (BE, NL), Veldig Xpro (BE), Velum Prime (BE, NL), Verango (NL), VSM Care (BE), Vsm Fluostrobine (BE) and Yearling (BE) (source: Ctgb and Fytoweb).

Origin: monitoring data shows that fluopyram was mainly detected at high concentrations in the polder water at the Brakel pumping station. Direct application in agriculture, fruit growing and floriculture is probably the main source of fluopyram in the polder water and, indirectly, in the surface water (source: HWL factsheet).

Distribution of pollution: just as in 2022, 2023 and 2024, fluopyram was only found above the ERM target value at Brakel. This points to a local source.

Notable: since 15 November 2024, RIVM has classified fluopyram as an SVHC because it belongs to the PFAS group. Trifluoroacetic acid is one of the metabolites of fluopyram.

Propamocarb (CASRN 24579-73-5)



PMT-score 0,54 (P=0,36 | M=0,61 | T=0,74)

Drinking water-relevant

CLP

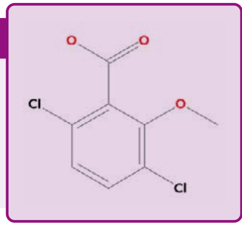
Application: propamocarb is a fungicide that is used, in agriculture, in the cultivation of various vegetables, types of lettuce, tomatoes, potatoes and house plants, to combat false mildew, phytophthora and pythium. In Belgium and the Netherlands, pesticide compositions based on the active substance propamocarb are and were authorised with names like Budget Propamocarb-Fosetyl (NL), Matix (NL), Previcur Energy (BE, NL), Profo Energy (BE) and Wopro Energy (NL). Pesticide compositions based on the active substance propamocarb hydrochloride (CASRN 25606-41-1) were also authorised, with names like Agrichem Propamocarb (NL), Alonso (BE), Axidor (BE, NL), Boreso Flex (BE), Budget Propamocarb 722 (NL), Consento (NL), Curomil 450 Sc (BE), Diprospero (BE, NL), Edipro (BE, NL), Phytocur N (NL), Imex Propamocarb (NL), Infinito (BE, NL), Matix (BE), Obscur (BE), Omix (BE), Omix Duo (BE), Omix Duo Sc (BE), Parimco PROPAMOCARB (NL), Potagold 687.5 Sc (BE), Previcur N (NL), Promess (NL), Proplant (BE, NL), Proxanil (BE, NL), Proxanil Garden (BE), Proxidor (NL), Raport (BE, NL), Rival (BE, NL), Rival Duo (BE), Simpro (BE), Sporax (BE, NL), Tattoo C (NL) and VSM Finito (BE) (source: Ctgb and Fytoweb).

Origin: emissions from the use of this substance in agriculture (farmyard run-off, spray drift, etc.).

Distribution of pollution: propamocarb breached the ERM target value at Liège, Eijsden, Roosteren, Heel and Bergsche Maas. The presence of propamocarb in the Meuse led to abstraction stops in 2025 (see Subsections A2 and C1, amongst others). The incidents in question were not the result of agricultural use but an illegal discharge by a company in Wallonia. Between 30 July and mid-November, WML performed 89 measurements of the parameter propamocarb at the RWS monitoring point in Eijsden (see Figure 2 in Subsection A2):

- The concentration was above the reporting limit 52 times;
- The legal standard for drinking water was breached 39 times (0.1 µg/L);
- The highest values measured were 3 µg/L on 1 August and 4 µg/L on 25 September.

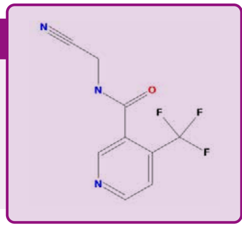
Dicamba (CASRN 1918-00-9)



PMT-score 0,49 (P=0,48 | M=0,60 | T=0,42)

Application: dicamba is a herbicide and plant growth regulator. It is used in agriculture, in the cultivation of maize and other cereal crops, for keeping fallow land and grasslands weed-free and on lawns and grass fields. Pesticides containing dicamba were authorised in the Netherlands in 2024 with the names Arrat, Banvel 4S, CASPER, COMPO Gazonmeststof Plus Onkruidbestrijder, DICASH, DICOPHAR SL, Diniro, Jepolinex Pro, Kalimba (480 SL), Pokon Onkruid Weg!, Rosan, Roundup Gazon Onkruidvrij and Spandis. Previously, a total of 58 pesticides had been authorised with dicamba as the active substance (source: Ctgb). In Belgium, pesticides containing dicamba as the active substance are authorised with names like Banvel, Callisto Plus, Caluma Plus, Dicavel Sl, Diniro, Kamba 480 Sl, Landscaper Pro Weed Control + Fertilizer, Lumestra Plus, Spandis, Dicash, Dicotex, Callam, Casper, Clabod, Frisk, Interproba, Piorun and Rosan (source: Fytoweb.be).
Origin: emissions from the use of this substance in agriculture (farmyard run-off, drift, etc.).
Distribution of pollution: dicamba breached the ERM target value once, in measurements at both Heel and Bergsche Maas.

Flonicamid (CASRN 158062-67-0)



PMT-score 0,54 (P=0,83 | M=0,58 | T=0,33)

CLP

Application: flonicamid is authorised in the Netherlands for use as an insecticide and belongs to the pyridine carboxamides. It is permitted in the cultivation of various vegetables, fruits and flower bulbs. Flonicamid is or was the active substance in the pesticides Afinto (BE, NL), Alakazam 500 Wg (BE), Apn Flonicamid 500 (NL), Flonicastar (BE), Flonigold 500 (BE), Hinode (BE, NL), Inter Peki (NL), Inter Peki Wg (NL), Shoori (NL), Teppeki (BE, NL), Teppeki WG (NL) and VSM Flonicamid 50 Wg (NL) (source: Ctgb and Fytoweb).
Origin: emissions from the use of this substance in agriculture (farmyard run-off, spray drift, etc.).
Distribution of pollution: flonicamid was only detected above the ERM target value at Brakel. This points to a local source.
Notable: since 15 November 2024, RIVM has classified flonicamid as an SVHC because it belongs to the PFAS group. Trifluoroacetic acid is one of its metabolites.

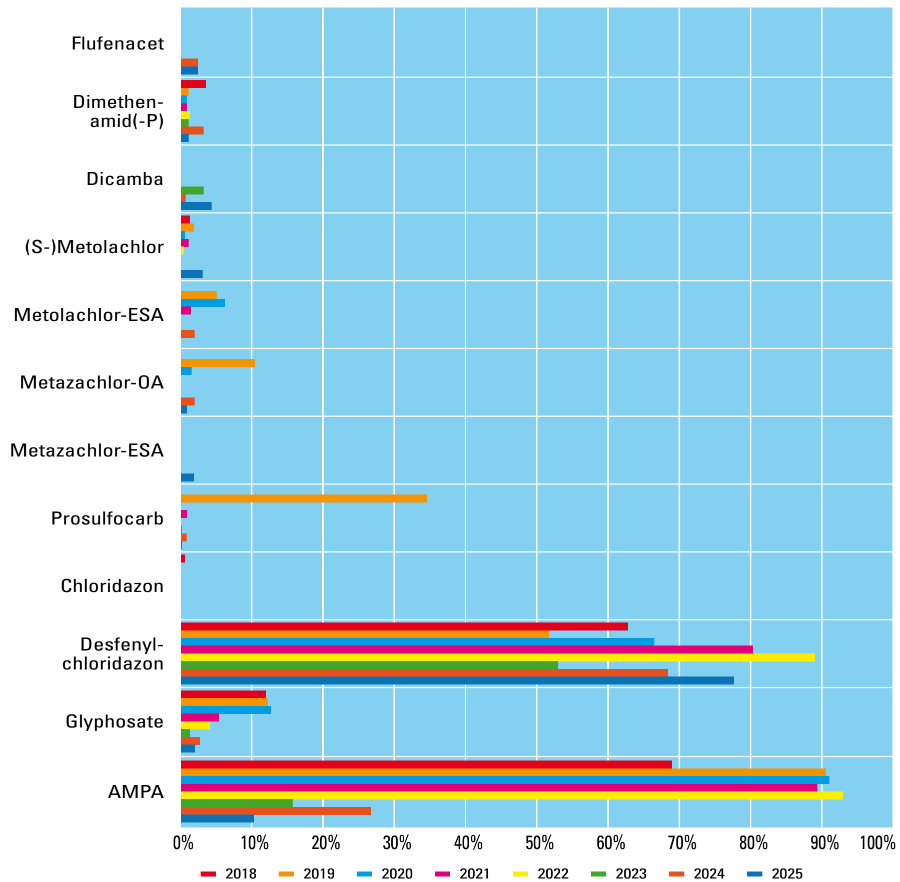
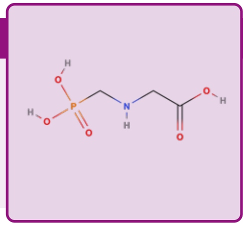


Figure 6: Percentage of ERM target value breaches by weedkillers and their metabolites.

Glyphosate (CASRN 1071-83-6)



PMT-score 0,25 (P=0,05 | M=0,96 | T=0,34)

Drinking water-relevant

CLP

Application: glyphosate is a weedkiller (herbicide).

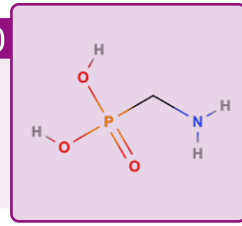
Origin: although the majority of sales of this product result in its use in agriculture, we know from past practical studies and monitoring programmes that emissions of glyphosate into the Meuse mainly originate from sources outside agriculture, such as site management and, in particular, application to surfacing. This was confirmed by calculations of emission loads that were conducted in 2010 for the Netherlands part of the Meuse river basin: 1.5% of the load originates from agricultural use and 98.5% via storm sewers, overflows and effluents from RWZIs. Ctgb has imposed increasing restrictions on the use of pesticides containing glyphosate over the years. For example:

- When applied on land that it is temporarily being left fallow, ditch banks should not be sprayed;
- To protect drinking water sources, the application of this pesticide is not allowed on closed and semi-open hard surfaces in the Meuse river basin. These are the following areas in the Netherlands: the provinces of Limburg and North Brabant (except the municipalities of Woensdrecht and Bergen op Zoom) and the municipalities of Maasdriel, West Maas en Waal, Druten, Wijchen, Beuningen, Heumen and Nijmegen, west of the Meuse-Waal canal.

Distribution of pollution: glyphosate breached the ERM target value at the monitoring points at Namêche, Roosteren and Stevensweert (and equalled the target value at Bergsche Maas).

Notable: in 1994, the drinking water companies demonstrated the presence of glyphosate in the Netherlands part of the Meuse for the first time and, from 1996, the ERM target value was breached every year. The average concentration of glyphosate in the Meuse rose to above 0.1 µg/L in 2002-2005 in particular. The ERM target value has not been breached at Tailfer for years, which means that very little glyphosate from France ends up in the Meuse. When prioritising substances that are drinking water relevant, glyphosate dropped from first to 19th place (2024). In 2018, WML and Evides were granted an exemption that permitted them to continue to use surface water containing glyphosate at Heel and Keizersveer (Gat van de Kerksloot) for the production of drinking water.

Aminomethylphosphonic acid (AMPA, CASRN 1066-51-9)



PMT-score 0,30 (P=0,10 | M=0,84 | T=0,33)

Drinking water-relevant

Application: aminomethylphosphonic acid (AMPA) is a metabolite of glyphosate or phosphonates like ATMP.

Origin: the majority of the AMPA load increase between Eijsden and Keizersveer was explained in a 2010 monitoring programme by the use of glyphosate as a herbicide and mainly outside agriculture. The same monitoring programme in 2010 discovered a major source of AMPA that did not have its source in the use of glyphosate. High concentrations of AMPA were measured in the Ur tributary, which flows into the Grensmaas at Stein. The AMPA in the water of the Ur tributary is a degradation product of ATMP (aminotrismethylenephosphonic acid) that is added to cooling water on the nearby Chemelot chemistry industrial estate. Calculations show that this was responsible for 34% of the AMPA load increase between Eijsden and Keizersveer in 2010. These emissions have since significantly reduced as a result of stricter permit requirements.

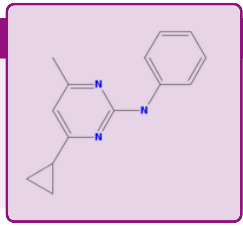
Distribution of pollution: AMPA was detected above the ERM target value at all the monitoring points where it was measured, with the exception of Eijsden, where the reporting limit is higher than the ERM target value.

Notable: the Dutch government considers AMPA a human toxicologically non-relevant metabolite of a pesticide. Since 2011, the Dutch government has applied a standard for human toxicologically non-relevant metabolites of 1 µg/L for the raw material used to produce drinking water (Dutch Drinking Water

Regulation). Since 2020, a list has been available of metabolites of human toxicologically non-relevant metabolites of pesticides and their standards.[15] The standard of 1 µg/L, which has also been the ERM target value since 2025, was breached at Roosteren, Stevensweert and Heusden (and equalled at Liège, where this Dutch standard does not apply). The breach percentage was 10.45% in 2025, significantly lower than in previous years, when they were still being tested against an ERM target value of 0.1 µg/L. If the measurement values in 2025 are tested against 0.1 µg/L, 91.2% would breach this value.

Cyprodinil (CASRN 121552-61-2)

PMT **PMT-score 0,32 (P=0,39 | M=0,26 | T=0,33)**



Application: cyprodinil is the active ingredient in fungicides used in the cultivation of fruit and various vegetables (like pulses, lettuce and endive), herbs and nursery and floriculture crops, amongst other things. In the Netherlands, pesticides containing cyprodinil as the active ingredient have been authorised under names like CHORUS 50 WG, Serenva, Switch and Palladium; in Belgium, under names like CHORUS, SERENVA, SHIFT, SOCIETY, SPEECH and SWITCH.
Origin: emissions from the use of this substance in agriculture (farmyard run-off, drift, etc.).
Distribution of pollution: cyprodinil was only detected above the ERM target value at Brakel. This points to a local source.

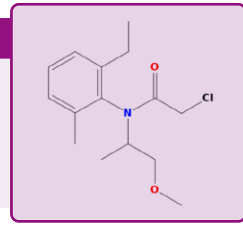
15 https://rvszoeksysteem.rivm.nl/Stoffen.

Metolachlor (CASRN 51218-45-2)

PMT **PMT-score 0,58 (P=0,60 | M=0,43 | T=0,74)**

DWR **Drinking water-relevant**

CLP

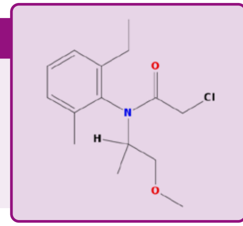


S-metolachlor (CASRN 87392-12-9)

PMT **PMT-score 0,58 (P=0,60 | M=0,43 | T=0,74)**

DWR **Drinking water-relevant**

CLP

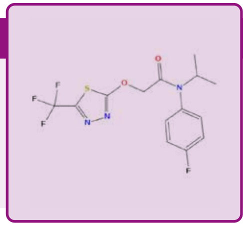


Application: in both Belgium and the Netherlands, S-metolachlor (CASRN 87392-12-9) was approved as a herbicide in the cultivation of various fruit and vegetables. Implementing Regulation (EU) 2024/20 of 23 December 2023 stipulates that the approval of the active substance S-metolachlor will not be renewed and that Member States must have withdrawn all authorisations of pesticides containing this active substance by 23 April 2024. This active ingredient was present in pesticides with the following names: Agan Metolachloor 960 (NL), Camix (BE, NL), Codal (BE), Cropguard S-Metolachloor (NL), Deluge Extra (BE), Dual 720 Ec (NL), Dual Gold (BE), Dual Gold 960 Ec (NL), Efica 960 Ec (BE, NL), Eternity (BE), Gardo Gold (BE, NL), Gardoprim (BE), Gardoprim Plus 500 Sc (NL), Jobber Plus 50 Wp (NL), Lecar (BE), Luxan Metolachloor (NL), Metallica (BE), Metolachloor 960 E.C. (NL), Metolagan 720 (NL), Primagram Gold (BE), S-Metolachlor 960 (BE) and Zeanett 500 Ec (NL) (source: Ctgb and Fytoweb).
Origin: emissions from the use of this substance in agriculture (farmyard run-off, spray drift, etc.). The laboratory analysis methods of the drinking water companies present metolachlor as the racemic mixture of the R- and S-isomers.[16] Measurement results of both S-metolachlor and metolachlor can be considered representative of S-metolachlor, as the racemic mixture of metolachlor has been banned in the EU since 30 November 2002 (Regulation

16 The designations R- and S- are abbreviations of the Latin words rectus (right) and sinister (left).

No. 2002/2076/EC). The active substance S-metolachlor[17] was placed on Annex I to Directive 91/414/EEC by virtue of Directive 2005/5/EC with effect from 1 October 2005 and subsequently approved in accordance with Regulation (EC) No. 1107/2009 by Implementing Regulation (EU) No 540/2011.
Distribution of pollution: (S-)metolachlor was detected once at the ERM target value at Heusden.

Flufenacet (CASRN 142459-58-3)



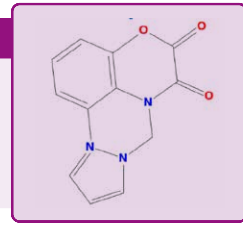
PMT-score 0,50 (P=0,96 | M=0,32 | T=0,42)

CLP

Application: flufenacet is one of the active ingredients in herbicides authorised in Belgium with the following brand names: Andes, Arnold, Artist, Aspect T, Atta-Diflucan, Battle, Carpatus, Cevino 500 Sc, Dalupe, Fence, Fluent 500 Sc, Fluent 500 Sc, Flupicos 340 Sc, Giddo, Glosset Sc, Gofor, Graniprop 600 Sc, Herold Sc, Inter Retil Sc, Liberator, Loukoum 600 Sc, Malibu, Mertil, Naceto, Navigate, Nucleus, Pontos, Promess, Quirinus, Reliance, Seibold, Sirionova and Sunfire (source: fytoweb.be). In the Netherlands, Arnold, Fence, Glosset Sc, Gofor, Herold, Malibu, Mateno Forte, Pontos, Reliance and Sirionova have been authorised for use as well (source: Ctgb.nl).
Origin: emissions during/after its use in agriculture (farmyard run-off, spray drift, etc.).
Distribution of pollution: just as in 2024, flufenacet was detected once above the ERM target value in Liège. According to the OECD definition, flufenacet is a PFAS and trifluoroacetic acid is one of its degradation products. Since 15 November 2024, RIVM has classified flufanacet as an SVHC in the Netherlands because it belongs to the PFAS group.

17 *The mixture of 80-100% S-metolachlor and 0-20% R-metolachlor.*

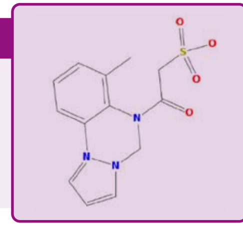
Metazachlor-OA (CASRN 1231244-60-2)



PMT-score 0,36 (P=0,18| M=0,73| T=0,33) [13]

Drinking water-relevant

Metazachlor-ESA (CASRN 172960-62-2)

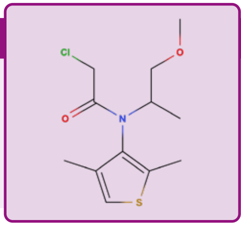


PMT-score 0,41 (P=0,36| M=0,55| T=0,33) [13]

Drinking water-relevant

Application: both metazachlor-OA (also metazachlor-C metabolite or metazachloric acid) and metazachlor-ESA (also metazachlor-S metabolite or metazachlor sulfonic acid) are metabolites of metazachlor.
Origin: emissions from the use of metazachloric acid in agriculture (farmyard run-off, spray drift, etc.). In the Netherlands, the parent substance metazachlor has been authorised as a herbicide in the pesticides Butisan S, Imex-Metazachlor-500, Springbok and Sultan 500 SC (source: Ctgb.nl). In Belgium, authorisations based on metazachlor have been granted for the pesticides BUTISAN GOLD, BUTISAN PLUS, BUTISAN S, FUEGO, METAROCK, RAPSAN 500 SC, RAPSAN TDI, RAPSAN TURBO, SPRINGBOK, SULTAN 500 SC, SULTAN TOP and TORSO.
Distribution of pollution: metazachlor-ESA was detected above the ERM target value at the Liège monitoring point (and equalled the ERM target value at Namêche), while measurements of metazachlor OA equalled the ERM target value at Liège once. The Dutch government considers these metabolites human toxicologically non-relevant. Since 2011, the Dutch government has applied a standard for metabolites that are human toxicologically non-relevant of 1 µg/L for the raw material used to produce drinking water (Dutch Drinking Water Regulation 2011). A list of metabolites of human toxicologically non-relevant pesticides and their standards has been available since April 2020.28 The value of 1 µg/L was not breached anywhere.

Dimethenamid(-P) (CASRN 87674-68-8)



PMT-score 0,56 (P=0,58| M=0,50| T=0,61)

CLP

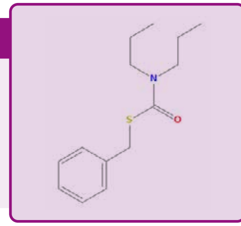
Application: dimethenamid(-P) is a herbicide (weedkiller). Based on Implementing Regulation (EU) 2019/1137, dimethenamid-P will remain on the list of approved active substances until 31 August 2034. In Belgium and the Netherlands, the following pesticides have been authorised based on dimethenamide-P (CASRN 163515-14-8): Agrologic Cleansoil (NL), Akris (BE, NL), Arundo (BE), Butisan Duo 400 Ec (BE), Butisan Gold (BE), Cropguard Metadimemix (NL), Frontier Elite (BE), Frontier Optima (NL), Grometa (BE), Spectrum (NL), Springbok (BE, NL), Tanaris (BE, NL), Terbudime 530 (BE), Wing P (NL) and Wopro Bodem Schoon (NL) (source: Ctgb and Fytoweb). These pesticides may be used on many arable crops (vegetables, fruit etc.) and in floriculture in both countries. In the Netherlands, Frontier Optima may also be used on field verges and on land that is temporarily being left fallow.

Origin: emissions from the use of this substance in agriculture (farmyard run-off, spray drift, etc.).

Distribution of pollution: dimethenamid was detected above the ERM target value at Heusden and one measurement at Liège breached the ERM target value.

Notable: the laboratory analysis methods of the drinking water companies usually show dimethenamid as a mix of stereo-isomers; the S-isomer dimethenamid-P is reported just once.

Prosulfocarb (CASRN 52888-80-9)



PMT-score 0,35 (P=0,26| M=0,28| T=0,61)

Drinking water-relevant

CLP

Application: prosulfocarb is the active ingredient in weedkillers (herbicides). Prosulfocarb-based products are no longer authorised in the Netherlands. In the past, the herbicide Boxer with prosulfocarb as the active ingredient was authorised for winter wheat and barley. In Belgium, prosulfocarb-based herbicides are authorised under brand names like ADELFO, DEFI, FIDOX, FIDOX EC, JURA, ROXY 800 EC, ROXY EC and SPOW (source: Fytoweb.be).

Origin: emissions from the use of this substance in agriculture (farmyard run-off, spray drift, etc.).

Distribution of pollution: prosulfocarb equalled the ERM target value at Heel.

Notable: in 2021, drinking water companies along the Meuse were confronted with high levels of the pesticide prosulfocarb, originating in Wallonia. This was not the first time; there had also been an incident involving the same substance in 2019. The source of the pollutant was identified eventually: Solirem, a company in Wandre that cleans and reconditions cans and barrels. The company was also found to have cleaned drums containing residues of pesticides, even though it had not been issued with a permit to do this. SPW, the public authority comparable to RWS that issues permits to Walloon companies, took legal action against the company and it was ultimately fined.

Annex 2

Abstraction stops and restrictions due to water pollution

There were no abstraction stops or restrictions at Tailfer (statement from Vivaqua).

Abstraction point: Water-Link, Broechem (Albert Canal)						
Nr.	**Start**	**End**	**Duration [d]**	**Duration [d]**	**Type of restriction**	**Cause**
1	Mo 10-02-25 07.00	Th 13-02-25 22.00	3.63	87.00	Water manager report	Visible pollutant (e.g. oil)
2	Tu 17-06-25 14.45	We 18-06-25 07.42	0.71	16.95	Water manager report	Visible contamination (such as oil)
3	Su 22-06-25 13.26	Mo 23-06-25 08.05	0.78	18.65	Report, other authority	Visible pollutant (e.g. oil)
			5.11	**122.60**	**Subtotal**	

Abstraction point: Water-Link, Lier (Nete Canal)						
Nr.	**Start**	**End**	**Duration [d]**	**Duration [d]**	**Type of restriction**	**Cause**
4	Tu 25-03-25 16.10	Tu 25-03-25 19.25	0.14	3.25	Own observation	Visible pollutant (e.g. oil)
5	Fr 28-03-25 02.30	Fr 28-03-25 08.23	0.25	5.88	Failure	Chlorophyll-a [µg/L]
6	Th 03-04-25 04.15	Th 03-04-25 10.32	0.26	6.28	Failure	Chlorophyll-a [µg/L]
7	Th 29-05-25 09.45	Th 29-05-25 10.30	0.03	0.75	Own measurement	Turbidity [FTE]
8	Tu 12-08-25 23.08	We 13-08-25 08.30	0.39	9.37	Own measurement	Online measurements above the limits
			1.06	**25.53**	**Subtotal**	

Abstraction point: WML, Heel (Lateral canal)						
Nr.	**Start**	**End**	**Duration [d]**	**Duration [d]**	**Type of restriction**	**Cause**
9	Su 05-01-25 00.00	Mo 13-01-25 00.00	8.00	192.00	Own measurement	Biomonitoring alarm (daphnia)
10	We 15-01-25 00.00	Mo 20-01-25 00.00	5.00	120.00	Water manager report	Cal A1 (1,2-dichloroethane above alarm value)
11	We 22-01-25 00.00	Sa 01-02-25 00.00	10.00	240.00	Own measurement	Biomonitoring alarm (mussels)
12	Tu 04-02-25 00.00	We 05-02-25 00.00	1.00	24.00	Own measurement	Biomonitoring alarm (mussels)
13	Su 16-02-25 00.00	Mo 17-02-25 00.00	1.00	24.00	Own measurement	Biomonitoring alarm (daphnia)
14	Th 03-04-25 00.00	Fr 04-04-25 00.00	1.00	24.00	Own measurement	Cal A6 (acetone above alarm value)
15	Mo 07-04-25 00.00	Mo 07-04-25 00.00	0.00	0.00	Own measurement	Biomonitoring alarm (daphnia)
16	Fr 25-04-25 00.00	Fr 25-04-25 00.00	0.00	0.00	Own measurement	Biomonitoring alarm (mussels)
17	Su 27-04-25 00.00	Mo 28-04-25 00.00	1.00	24.00	Own measurement	Biomonitoring alarm (mussels)
18	Sa 24-05-25 00.00	Mo 26-05-25 00.00	2.00	48.00	Own measurement	Biomonitoring alarm (mussels)
19	Tu 10-06-25 00.00	We 11-06-25 00.00	1.00	24.00	Own measurement	Sucralose above signal value
20	We 25-06-25 00.00	Th 26-06-25 00.00	1.00	24.00	Own measurement	Biomonitoring alarm (mussels)
21	Su 29-06-25 00.00	Mo 30-06-25 00.00	1.00	24.00	Own measurement	Biomonitoring alarm (daphnia)
22	Mo 07-07-25 00.00	Mo 07-07-25 00.00	0.00	0.00	Own measurement	Biomonitoring alarm (mussels)
23	We 09-07-25 00.00	Mo 14-07-25 00.00	5.00	120.00	Own measurement	Unknown component GCAqua-048
24	Su 20-07-25 00.00	Mo 21-07-25 00.00	1.00	24.00	Own measurement	Biomonitoring alarm (daphnia)
25	We 30-07-25 00.00	Th 31-07-25 00.00	1.00	24.00	Own measurement	Di-isopropyl ether above alarm value
26	Fr 01-08-25 00.00	Mo 04-08-25 00.00	3.00	72.00	Own measurement	1,2,3-benzotriazole above alarm value
27	Mo 04-08-25 00.00	Su 31-08-25 00.00	27.00	648.00	Own measurement	Di-isopropyl ether above alarm value
28	Mo 01-09-25 00.00	Th 04-09-25 00.00	3.00	72.00	Own measurement	1,2,3-benzotriazole above alarm value
29	Fr 12-09-25 00.00	Mo 22-09-25 00.00	10.00	240.00	Own measurement	Screening
30	Tu 23-09-25 00.00	Mo 06-10-25 00.00	13.00	312.00	Own measurement	Propamocarb above alarm value

Continuation Abstraction point: WML, Heel (Lateral canal)						
Nr.	**Start**	**End**	**Duration [d]**	**Duration [d]**	**Type of restriction**	**Cause**
31	Fr 10-10-25 00.00	Mo 13-10-25 00.00	3.00	72.00	Own measurement	Propamocarb above alarm value
32	We 22-10-25 00.00	Mo 27-10-25 00.00	5.00	120.00	Own measurement	Cal A12 (di-isopropyl ether and GCAqua-123 above alarm value)/Biomonitoring alarm (mussels)
33	Mo 27-10-25 00.00	We 29-10-25 00.00	2.00	48.00	Own measurement	Screening
34	Sa 01-11-25 00.00	Su 02-11-25 00.00	1.00	24.00	Own measurement	Screening
35	Tu 04-11-25 00.00	Th 06-11-25 00.00	2.00	48.00	Own measurement	Propamocarb above alarm value
36	Sa 08-11-25 00.00	Mo 10-11-25 00.00	2.00	48.00	Own measurement	Biomonitoring alarm (mussels)
37	Tu 11-11-25 00.00	We 12-11-25 00.00	1.00	24.00	Own measurement	Screening
38	Mo 24-11-25 00.00	Tu 25-11-25 00.00	1.00	24.00	Own measurement	Propamocarb above alarm value
39	We 26-11-25 00.00	Su 30-11-25 00.00	4.00	96.00	Own measurement	Biomonitoring alarm (daphnia)
40	Mo 01-12-25 00.00	Mo 01-12-25 00.00	0.00	0.00	Own measurement	Cal A16 (acetone and dichloromethane above alarm value)
41	We 10-12-25 00.00	Fr 12-12-25 00.00	2.00	48.00	Own measurement	Screening
42	Sa 20-12-25 00.00	Mo 22-12-25 00.00	2.00	48.00	Own measurement	Propamocarb above alarm value
			120.00	**2880.00**	**Subtotal**	

Abstraction point: Dunea, Brakel (Afgedamde Maas)						
Nr.	**Start**	**End**	**Duration [d]**	**Duration [d]**	**Type of restriction**	**Cause**
43	Sa 06-09-25 00:00	Tu 30-09-25 00:00	24	576	Report, other authority	Preventive abstraction stop, propamocarb

Abstraction point: Evides Waterbedrijf, Bergsche Maas (Bergsche Maas)						
Nr.	**Start**	**End**	**Duration [d]**	**Duration [d]**	**Type of restriction**	**Cause**
44	Th 09-01-25 17.00	We 22-01-25 14.30	12.90	309.50	Own measurement	Increased turbidity
45	We 29-01-25 07.30	We 05-02-25 11.00	7.15	171.50	Own measurement	Increased turbidity
46	Th 04-09-25 14.00	Tu 09-09-25 16.00	5.08	122.00	Report, other authority	Preventive abstraction stop, propamocarb
47	We 15-10-25 12.30	Th 16-10-25 15.30	1.13	27.00	Own observation	Propamocarb above alarm value
48	Fr 31-10-25 13.30	Mo 03-11-25 13.00	2.98	71.50	Own observation	Propamocarb above alarm value
49	Th 27-11-25 15.00	Th 04-12-25 13.00	6.92	166.00	Report, other authority	Failure of Land van Cuijk RWZI
			36.15	**867.50**	**Subtotal**	

Abstraction point: Evides Waterbedrijf, Haringvliet (Haringvliet)						
Nr.	**Start**	**End**	**Duration [d]**	**Duration [d]**	**Type of restriction**	**Cause**
50	Su 12-01-25 16.00	Su 12-01-25 22.00	0.25	6.00	Own measurement	Increased turbidity
51	Mo 13-01-25 00.30	Mo 13-01-25 07.30	0.29	7.00	Own measurement	Increased turbidity
52	Mo 13-01-25 23.30	Tu 14-01-25 07.30	0.33	8.00	Own measurement	Increased turbidity
53	We 15-01-25 00.00	We 15-01-25 07.00	0.29	7.00	Own measurement	Increased turbidity
54	We 15-01-25 15.00	Fr 17-01-25 09.30	1.77	42.50	Own measurement	Increased turbidity
55	Fr 17-01-25 16.30	Su 19-01-25 19.00	2.10	50.50	Own measurement	Increased turbidity
56	Mo 20-01-25 14.30	Tu 21-01-25 07.30	0.71	17.00	Own measurement	Increased turbidity
			5.75	**138.00**	**Subtotal**	
			192,07	**4609.63**	**Total**	

Annex 3

Target values in the European River Memorandum (ERM)

(maximum values, unless stated otherwise)

	Unit	Target value
General parameters		
Oxygen content	mg/L	>8
Electrical conductivity	mS/m	70
Acidity	pH	7-9
Temperature	°C	25
Chloride	mg/L	100
Sulphate	mg/L	100
Nitrate	mg/L	25
Fluoride	mg/L	1.0
Ammonium	mg/L	0.3
Organic group parameters	**Unit**	**Target value**
Total Organic Carbon (TOC) ***	mg/L	4
Dissolved Organic Carbon (DOC) ***	mg/L	3
Adsorbable organic halogen compounds (AOX)	µg/L	25
Adsorbable organic sulfur compounds	µg/L	80
Anthropogenic substances foreign to nature with effects on biological systems	**Unit**	**Target value**
Pesticides and their degradation products, by substance	µg/L	0.1*
Endocrine active substances, by substance	µg/L	0.1*
Medicines (incl. antibiotics), by substance	µg/L	0.1*
Biocides by substance	µg/L	0.1*
Other organic halogen compounds, by substance	µg/L	0.1*
Evaluated substances without biological effect	**Unit**	**Target value**
Substances that are difficult to degrade microbiologically, by substance	µg/L	1.0
Non-evaluated substances		
(substances that possibly penetrate** into the drinking water, or substances that form uncharacterised degradation and transformation products), by substance	µg/L	0.1
Health and hygiene/microbiological quality		
The health and hygiene/microbiological quality of the surface water must be improved to such an extent that excellent swimming water quality is permanently guaranteed, as stipulated in EU Directive 2006/7/EC.		

*Unless a lower target value applies as a result of advancing toxicological insight. For genotoxic substances, for example.
** *Substances that cannot be removed via natural methods for the purification of drinking water, or not sufficiently.*
*** *Unless higher values apply due to geogenic relationships.*

For the following substances, tested against the ERM target value of 1 µg/L, where testing was previously done against 0.1 µg/L:

Substance name	CASRN	ERM-tv		i-DWR	
1,3,5-trimethylbenzene	108-67-8	1	µg/L	70	µg/L
1,4-dioxane	123-91-1	1	µg/L	38	µg/L
10,11-cisdiol carbamazepine	35079-97-1	1	µg/L	10.5	µg/L
10,11-dihydro-10,11-dihydroxycarbamazepine	58955-93-4	1	µg/L	50	µg/L
1-propanesulfonic acid, 2-methyl-2-[(1-oxo-2-propen-1-yl)amino]-, homopolymer	27119-07-09	1	µg/L	11	mg/L
2,5-furandicarboxylic acid	3238-40-2	1	µg/L	1,1	µg/L
2-Acrylamido-2-methyl-1-propanesulfonic acid sodium salt	5165-97-9	1	µg/L	11	mg/L
2-methoxypropanol	1589-47-5	1	µg/L	10.5	µg/L
2-methyl-2-propanol	75-65-0	1	µg/L	1.5	mg/L
4-methoxy-N-(3-N,N-dimethylaminopropyl)naphta	276878-97-8	1	µg/L	5.5	mg/L
4-methyl-1H-benzotriazole	29878-31-7	1	µg/L	350	µg/L
acesulfame K	55589-62-3	1	µg/L	3,2	µg/L
diatrizoic acid (amidotrizoic acid)	117-96-4	1	µg/L	250	mg/L
aminomethylphosphonic acid (AMPA)	1066-51-9	1	µg/L	3.5	mg/L
azithromycin	83905-01-05	1	µg/L	49.7	µg/L
1,2,3-benzotriazole	95-14-7	1	µg/L	700	µg/L
bromoacetic acid	79-08-3	1	µg/L	164.5	µg/L
butanone	78-93-3	1	µg/L	1.3	mg/L
butoxypolypropylene glycol	9003-13-8	1	µg/L	1,4	µg/L
caffeine	58-08-2	1	µg/L	1,5	µg/L
carbamazepine	298-46-4	1	µg/L	50	µg/L
chlorate-ion	14866-68-3	1	µg/L	21	µg/L
cis-4,4-diaminostilbene-2,2-disulfonate disodium salt	7336-20-1	1	µg/L	7	mg/L
cis-4,4-diaminostilbene-2,2-disulfonic acid	81-11-8	1	µg/L	7	mg/L
clarithromycin	81103-11-9	1	µg/L	49.7	µg/L
copolymer of maleic acid and acrylic acid		1	µg/L	22	mg/L
cyclamate	100-88-9	1	µg/L	2,5	µg/L
diethylenetriaminepentaacetic acid (DTPA)	67-43-6	1	µg/L	700	µg/L
ethylene glycol dimethyl ether (diglyme)	111-96-6	1	µg/L	440	µg/L
diisopropyl ether (DIPE)	108-20-3	1	µg/L	1,4	µg/L
ethylenediaminetetraacetic acid (EDTA)	60-00-4	1	µg/L	600	µg/L
ethyl lactate	97-64-3	1	µg/L	500	µg/L
ethyl-tert-butyl ether (ETBE)	637-92-3	1	µg/L	7	mg/L
gabapentin	60142-96-3	1	µg/L	100	µg/L
guanylurea	141-83-3	1	µg/L	22.5	µg/L
hexa(methoxymethyl)melamine (HMMM)	68002-20-0	1	µg/L	10.5	µg/L
hexamethylenetetramine	100-97-0	1	µg/L	500	µg/L
iohexol	66108-95-0	1	µg/L	375	mg/L

Continuation

Substance name	CASRN	ERM-tv		i-DWR	
iomeprol	78649-41-9	1	µg/L	1	mg/L
iopamidol	60166-93-0	1	µg/L	415	mg/L
ioxitalamic acid	28179-44-4	1	µg/L	500	mg/L
metformin	657-24-9	1	µg/L	196	µg/L
Methyl-tert-butyl ether (MTBE)	1634-04-04	1	µg/L	9,42	µg/L
sodium carboxymethyl inuline	430439-54-6	1	µg/L	12	mg/L
naphthalene-1,3,5-trisulfonic acid	6654-64-4	1	µg/L	0.7	mg/L
naphthalene-1,3,6-trisulfonate trisodium salt	5182-30-9	1	µg/L	0.7	mg/L
naphthalene-1,3,6-trisulfonic acid	86-66-8	1	µg/L	0.7	mg/L
naphthalene-1,3,6-trisulfonate sodium salt	19437-42-4	1	µg/L	0.7	mg/L
naphthalene-1,5-disulfonate disodium salt	1655-29-4	1	µg/L	0.7	mg/L
naphthalene-1,5-disulfonic acid	81-04-9	1	µg/L	0.7	mg/L
naphthalene-1,7-disulfonic acid	5724-16-3	1	µg/L	0.7	mg/L
naphthalene-2,7-disulfonic acid	92-41-1	1	µg/L	0.7	mg/L
naproxen	22204-53-1	1	µg/L	37.8	µg/L
sodium carboxymethyl starch	9063-38-1	1	µg/L	58	mg/L
N-formyl-4-aminoantipyrine (FAA)	1672-58-8	1	µg/L	10.5	µg/L
nitriloacetic acid	139-13-9	1	µg/L	400	µg/L
polyacrylic acid	9003-04-07	1	µg/L	4.4	mg/L
polymaleic acid	26099-09-02	1	µg/L	4.4	mg/L
polysorbate 60	9005-67-8	1	µg/L	175	mg/L
polyvinyl alcohol	9002-89-5	1	µg/L	350	mg/L
polyvinyl alcohol (1)	25213-24-5	1	µg/L	350	mg/L
saccharine	81-07-2	1	µg/L	1,3	µg/L
sotalol	3930-20-9	1	µg/L	80	µg/L
sucralose	56038-13-2	1	µg/L	5	µg/L
sulfamic acid	5329-14-6	1	µg/L	1.4	mg/L
tetraethylene glycol dimethyl ether (tetraglyme)	143-24-8	1	µg/L	440	µg/L
tetrahydrofuran	109-99-9	1	µg/L	6.3	mg/L
toluene	108-88-3	1	µg/L	260	µg/L
tolyltriazole	29385-43-1	1	µg/L	350	µg/L
TRC233 sodium salt	77019-71-7	1	µg/L	4.4	mg/L
TRC233 polymer	40623-75-4	1	µg/L	4.4	mg/L
Tributyl phosphate (TBP)	126-73-8	1	µg/L	350	µg/L*
trichloromethane	67-66-3	1	µg/L	25	µg/L
triethyl phosphate	78-40-0	1	µg/L	1,4	µg/L
triphenylphosphine oxide	791-28-6	1	µg/L	35	µg/L
triglyme	112-49-2	1	µg/L	440	µg/L
triisobutyl phosphate (TIBP)	126-71-6	1	µg/L	350	µg/L*

CASRN = CAS registry number, ERM-tv = ERM target value, i-DRW = indicative drinking water target,
** sum of tributyl phosphate and triisobutyl phosphate*

In addition to/in deviation from the above, the following target values are applied, in this report, for Meuse water from which drinking water is prepared:

- Sum of PFAS: 4.4 ng of PFOA equivalents/L (= indicative drinking water target);
- NDMA: 12 ng/L (based on the Dutch Drinking Water Decree);
- Bromate: 0.05 µg/L (= indicative drinking water guideline value);
- Bromide: 70 µg/L;
- Dibromoacetic acid: 10.4 ng/L (= indicative drinking water guideline value);
- Lithium: 7.7 µg/L (= indicative drinking water target value).

The target values for bioassays in this report are the effect-based trigger (EBT) values for human health in Been et al., 2021:

- ER-CALUX 17ß-estradiol (E2): 0.25 ng E2-eq/L (0.083);
- Anti-AR CALUX Flutamide (Flut): 4800 ng Flut-eq/L (270);
- AR-CALUX Dihydrotestosteron (DHT): 4.5 ng DHT-eq/L (0.51);
- PR-CALUX Progesterone (P4): 15.5 ng P4-eq/L (0.22);
- GR-CALUX Dexamethasone (DEX): 47.9 ng DEX-eq/L (1.7);
- PAH-CALUX Benzo[a]pyrene (BaP): 24.4 ng BaP-eq/L (19).

Annex 4

List of abbreviations

AAA	N-acetyl-4-aminoantipyrine
AMPA	Aminomethylphosphonic acid
BPA	Bisphenol-A
br2-msa	Dibromomethane sulfonic acid
CALUX	Chemical Activated LUciferase gene eXpression
CAS(RN)	Chemical Abstracts Service (Registry Number)
cl2-msa	Dichloromethanesulfonic acid
Ctgb	Board for the Authorisation of Plant Protection Products and Biocides
DBA	Dibromoacetic acid
DBP	Dibutyl phthalate
DCA	Dichloroacetic acid
DDD	Defined Daily Dose
DIPE	Di-isopropyl ether
DOC	Dissolved Organic Carbon
DMAA	Dimethylarsenic acid (cacodylic acid)
DTPA	Diethylenetriaminepentaacetic acid or pentetic acid
EDC	Endocrine Disrupting Chemicals
EDTA	Ethylenediaminetetraacetic acid
ERM	European River Memorandum
f3-msa	Trifluoromethanesulfonic acid
HAAs	Haloacetic acids
HAZ	Halogenated acetic acids
HFCs	Hydrofluorocarbons
HHCB	1,3,4,6,7,8-hexahydro-4,6,6,7,8,8-hexamethylcyclopenta-γ-2-ben-zopyran (galaxolide)
IAZI	Integrated waste water treatment plant
i-DRW	Indicative drinking water guide value
ILT	Human Environment and Transport Inspectorate
IMC	International Meuse Commission
KMI	Royal Meteorological Institute of Belgium
KNMI	Royal Netherlands Meteorological Institute
WFD	Water Framework Directive
NTA	Nitrilotriacetic acid
OECD	Organization for Economic Cooperation and Development
PEQs	PFOA equivalents
PFAS	Per- and polyfluoroalkyl substances
PFOA	Perfluorooctanoic acid
PMT	Persistent, Mobile, Toxic
PRTR	Pollutant Release Transfer Register
pSVHC	Potential Substance of Very High Concern
RIVM	National Institute of Public Health and the Environment
RIWA	Association of River Water Companies
RPF	Relative Potency Factor
RWZI	Waste water treatment plant
SMWK	Clean Meuse Water Chain
SPW	Service Public de Wallonie
SVHC	Substance of Very High Concern
TBP	Tributyl phosphate
TCA	Trichloroacetic acid
TFA	Trifluoroacetic acid
TfOH	Trifluoromethanesulfonic acid
TOC	Total Organic Carbon
VMM	Flemish Environment Agency
vPvM	Very Persistent, very Mobile
LSE	Licensing, Supervision, and Enforcement
WAOS	Working Group for Tackling Emerging Substances
WAS	Meuse and Scheldt Warning and Alarm System
WMO	World Meteorological Organization
ZeroPM	Zero Pollution of Persistent, Mobile Substances, an EU project (https://zeropm.eu/)
zPzM	Very Persistent, very Mobile
SVHC	Substance of Very High Concern

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