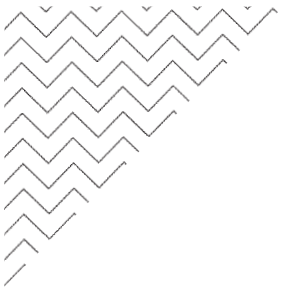
Flanders
State of the Art

Executive summary in English of the third interim report on the PFAS contamination "The spread and risks of PFAS in Flanders"

By PFAS commissioner Prof. Dr. Karl Vrancken

https://www.vlaanderen.be/en/pfas-in-flanders



COLOFON

Government of Flanders
karl.vrancken@vlaanderen.be
https://www.vlaanderen.be/pfas-vervuiling/
pfas@vlaanderen.be
Photos : Shutterstock, VMM

D/2022/3241/245

INTRODUCTION

The PFAS assignment has been ongoing since June 2021. In September 2021 an initial interim report, by the commissioner for coordinating the approach to the PFAS problem was produced, followed by a second interim report in April 2022.

The Government of Flanders[1] prolonged the assignment of the PFAS commissioner until 31 December 2022 with a slight adjustment of the content. On request of the Government of Flanders, another mid-term review is being provided.

The third status report, written in Dutch, covers the following topics:

- Chapter 1: Status of research, compiled in the same way as the overview of research and technical studies, included in the second interim report. This research report covers the period April – June 2022 and also looks ahead;
- Chapter 2: Activity report for the period April – June 2022;
- Chapter 3: Conclusion, outlook and further planning.

This English translation provides a summary of the research outcomes (Chapter 1). In Chapter 2, the commissioner formulates his conclusions and looks ahead to the further approach of substances of very high concern (SVHC) in Flanders.

This third interim report was drawn up on the basis of an exchange of expertise between various Flemish and federal administrations and Flemish research institutions, within the substantive expert group. The entire report came about through mutual coordination, each within their own sphere of competence. However, this does not mean that these texts express the opinion of the entire organisations to which the experts belong.

[1] Notice to the Government of Flanders: FRI 2022 MED.0182/1TER

1 RESEARCH INTO THE SPREAD AND RISKS OF PFAS

1.1 INTRODUCTION

Since the start of the PFAS assignment in June 2021, it has been clear that measurements and studies are an essential part of addressing the PFAS problem. Research is carried out across Flanders in various disciplines (water, air, soil, food, blood, etc.), at 'hotspots', and suspected and non-suspected locations. By gathering all the information, we intend to obtain a better understanding of the full extent of the pollution, the risk of exposure and the health risk. The results of previous research, progressive insights, the recommendations of the parliamentary PFAS Committee of Inquiry etc. provide several starting points for further data collection, interpretation and dissemination.

This research report brings together results from measurement campaigns and technical studies conducted in the period April 2022 – June 2022. The results are presented with a short analysis, providing data, figures and information, which should be used together with previous results to gain more insights into the PFAS problem. These insights are gathered from an expert group, which is composed of representatives from administrations of Flanders and the Belgian federal state, the research community and local authorities (VVSG). First there is a short description of each item followed by the actual research or study. We intentionally bring together studies from different environmental disciplines as this is the only way we can get a complete picture of the PFAS pollution. This might seem obvious, but nevertheless it is still an innovative approach. Too often research is conducted out of a specific specialism i.e., an expertise in one domain (water, waste, etc.) and there is no looking beyond one's own remit. In our work tackling PFAS, we deliberately divert from this silo approach, and we exchange research results between different areas of expertise. This is the only way we can work towards a solution addressing pollution and reducing the health risks.

The first report of the PFAS commissioner outlines the knowledge derived from literature and initial exploratory studies. It also establishes agreements for analytical methods and the naming of components in the PFAS family in order for research results to be comparable. In addition, a database has been created to manage and interpret the information obtained. In the second report, the research focuses on the main exposure routes: intake through food, drinking water and dust. In addition, a broad inventory campaign is mapping out the risk zones associated with firefighting activities in Flanders. The blood testing in Zwijndrecht shows that residents in the vicinity of 3M have highly elevated blood values for several PFAS components and that there is a link between those blood levels and eating eggs from backyard chickens.

In this report, research is more focussed on the general spread of PFAS and how it leads to exposure: in groundwater and surface water as sources for drinking water, in air through suspended matter and deposition and in products, for example drinking straws. This provides us with a broader picture of the presence and spread of PFAS in the environment in Flanders. Meanwhile, the creation of an inventory of firefighting sites continues and we are seeing that in 4 out of 5 of those sites, soil and/or groundwater contamination is indeed detected.

Based on these studies it is becoming increasingly clear that PFAS are present in many places in Flanders and that almost everyone is exposed to it. Therefore, the next important question remains as to how PFAS spread and how great the risk of exposure is for humans and the ecosystem. Several ongoing research projects are trying to find answers to these questions, which we present below. For research results, full reports and summaries, most of them in Dutch language, we refer to the third report and the PFAS website. The knowledge drawn from all these studies is intended to build a stronger regulatory framework. The temporary action framework, proposed in the second report, was based on the state of knowledge in March 2022, being fully aware that at that time many questions were still unanswered. Over the next six months more clarity should arise regarding these questions, enabling us to arrive at a firmly substantiated and renewed framework of standards.

1.2 STATE OF KNOWLEDGE BASED ON THE STUDIES

PFAS distribution and risks.

- PFAS are found everywhere, even in non-suspected areas: in groundwater, food, suspended matter, and deposition, however not in every sample and not at levels that pose a risk. Due to their persistence and mobility, these man-made molecules have spread widely. Risks only exist if the presence also leads to exposure above the health limit. The PFAS molecules that are frequently detected are: PFBS and PFBA (short mobile chains), PFOS, PFOA (long chains, persistent, no longer produced), PFHxA, PFPeA, and PFNA (substitutes for PFOS, PFOA with similar or medium-chain length).

- In 14% of European teenagers, exposure to PFAS has led to values above the strictest (EFSA-proposed) health limit (6.9 ng/l). The highest values have been measured in Northern and Western Europe. Results of mixture risk assessments in Europe confirm that there is a health risk at the current PFAS exposure concentrations in Europe.

- Several research projects are still exploring the relationship between exposure, elevated blood values and potential health effects in human biomonitoring (HBM) campaigns. In addition to the PFAS@Home project, a study of 19 young people in the area around 3M will start in the summer of 2022. The 5th Flanders HBM project 2022–2027 will run long-term and will enable further evidence to be gathered on the impact of PFAS exposure in Flanders.

PFAS concentrations

- Drinking water in Flanders complies with the standard of the EU Drinking Water Directive which will become more stringent in due time. Drinking water suppliers will have to step up to comply, as this future standard is not yet being met everywhere. Drinking water will be the first compartment where the achievement of an EFSA-based target value is legally required, in this case with a five-year transition period.

- PFAS in airborne particles near 3M contain measurable concentrations of (primarily) PFOS and PFOA, but this does not lead to the benchmarks being exceeded. PFBS and PFBA are mainly found in deposition but there is no reference value available.

- On indoor exposure the information is still very limited. We expect PFAS to also be found in indoor air in contaminated areas. Therefore, a study on indoor dust is currently being conducted in Willebroek. In the PFAS@Home project, different routes for indoor exposure are being examined. In addition, there is a project underway, in which a broad group of pollutants will be analysed, using dust samples from homes, sports clubs and offices, all located in the area surrounding 3M. By the end of 2022, all of these results should provide a clear picture of exposure to PFAS in the home.

- In addition to the research on food products already communicated in the "From Knowledge to Action" report, further research by University of Antwerp on food around the 3M hotspot demonstrates:
    - The total average PFAS concentrations in home-grown foods decreased in the following order: eggs > walnuts > vegetables > fruits. Concentrations in eggs were on average five times higher than in plant-based foods and exceeded the FASFC (Federal Agency for the Safety of the Food Chain) action limit in several samples. This means that these eggs are not allowed to be placed on the market.
    - In eggs and soil, concentrations clearly decreased with increase in distance from 3M. However, this trend was partially or completely absent for plant-based foods. No correlation was found between soil concentrations in vegetable gardens and concentrations in vegetables.
    - Both VITO and University of Antwerp are conducting further research into the relation between soil contamination and food grown or cultivated on it.

- The Federal Agency for the Safety of the Food Chain (FASFC) is conducting further research on PFAS in food, and this includes a campaign in Wallonia. Sciensano is also examining food products on behalf of the FPS Public Health. They are analysing products throughout the food chain and the results of these studies are expected by mid-2023.

Research needs

- The temporary action framework of the report "From Knowledge to Action" has already updated and strengthened the assessment values in Flanders. In order to develop the standards framework further, we are faced with several knowledge gaps: leaching, mixture toxicity and human toxicological risk assessment. Filling these gaps will lead to a more accurate statement about the risks of the different mixtures of PFAS, that are constantly being identified. A clearer delineation of best available techniques for water and air treatment is required. Research into all these aspects is still ongoing.

2 COURSE OF ACTION AND OUTLOOK

2.1 ADDRESSING THE PFAS PROBLEM

PFAS are everywhere. This is becoming increasingly clear from the various studies discussed in this report. Measurements are always taken at very low levels (down to less than one particle per billion particles, i.e. one µg/l or µg/kg) and these products are so persistent and mobile that they are found everywhere. This is the case both at sites where we expect their presence (firefighting sites, manufacturing sites), and in non-suspected zones (chicken eggs or suspended matter far from an industrial source). The persistence and spread of chemicals is increasingly being seen as a risk in itself, regardless of any effects there might be on nature or on health. PFAS are a broad family of components and the best known are PFOS and PFOA because of their health effects. Their production and use have been banned and discontinued for many years. They were replaced by other components, smaller molecules with similar properties that are more mobile in water and accumulate less in the body. Several substances in the PFAS family have shown to be linked to health effects such as hormone imbalance, reduced birth weight and reduced immune response. These health effects were confirmed in a recent large-scale European study, HBM4EU (Human Biomonitoring for Europe). It is therefore important to further develop knowledge on the risks and spread of PFAS. Even if production were to stop today, PFAS would still persist in humans and in the environment for a long period of time. By better understanding how these substances spread and when they pose a risk to people and nature, an approach can be developed that minimises the ultimate health effects.

When we look at PFAS concentrations in the **blood of citizens in Europe**, there is a noticeable effect of the PFOS and PFOA phase-out (concentrations in humans are decreasing). However, the short chain products (substitutes such as PFBS, PFBA) have greater mobility and these are now discovered in many places and usually in aqueous environments (groundwater, rain, etc.). At the same time, we need to remember that the health risks only occur with long-term, repeated exposure. Therefore, the objective is to find **long-term solutions**. The PFAS problem must be addressed at the source through a planned cessation of production and use (phase-out), while at the same time tackling pollution of soil, water, air, and materials. Long-term goals need to be set by focussing on removing these products from the environment and achieving very low concentration requirements.

However, PFAS are only 1 category of the **18 priority substances for human toxicity,** identified by the HBM4EU programme. Each of these categories contains substances that give rise to health effects as a result of exposure. In addition, there is ongoing research into **mixture toxicity**, determining whether the co-occurrence of the components increases their risks and in what way. All these substances must therefore be considered when drawing up an environmental and health policy. A policy, that devotes all its resources to one category is bound to be overtaken by adverse effects of another substance. Since the list of priority substances and substances of very high concern is so long, collaboration with other (European) countries to build knowledge and develop policy is imperative.

On the list of substances of very high concern or priority substances, PFAS take a special position as they **combine many risk factors**: persistence, bioaccumulation and mobility. As a result, PFAS pose a long-term

threat to our water resources and soil. Based on this approach, it is useful that we are developing a great deal of expertise on PFAS in Flanders, but that we also share it through European projects such as PARC (*European Partnership for the Assessment of Risks from Chemicals*), launched in May 2022. At the same time, we need to continue to recognise the broader spectrum of pollutants, with toxic effects both to humans and the ecosystem, in policy choices and the day-to-day operation of government. Environmental and health policy is forced to **prioritise** the use of expertise and resources. In doing so, it can draw upon **scientific understanding** of the spread and risk. The role of science is to identify risks, to which policy can respond by setting priorities.

In addition to the large number of PFAS components and substances of concern, the **nature of pollution** also poses new challenges. Environmental policy since the 1970s has been built around addressing point sources. Factories caused environmental pollution through chimneys and discharge points. This was tackled by imposing permit conditions on operators, with regard to discharge and production processes used. This approach to point sources and industrial plants forms the basis of environmental policy on (industrial) emissions. This policy has been very successful in tackling the most severe environmental pollution up to a level where households and traffic join the top of the list of major polluters. PFAS show that we are now dealing much more with **diffuse pollution**. Pollution occurs in many places and in all compartments (water, soil, air, materials) and is caused not only by industrial activities but also, for example, by fire departments, the use of household products, etc. This diffuse pollution cannot be combated by merely tackling point sources.

PFAS and other diffuse pollution require a systemic approach. An approach at different points in the **chain of production, consumption and waste disposal**. If we fail to achieve this, we jeopardise the goals in other policy areas such as climate, waste and circular economy. An approach focusing on only one domain leads to transferring the problem to the next domain and to other types of emissions. For example, physicochemical cleaning of contaminated soil moves the PFAS into the wastewater of the soil washing plant, which is cleaned using activated carbon. Very strict discharge standards require the use of large amounts of activated carbon (and therefore a high level of material consumption), which is regenerated or burned, resulting in the production of CO_2 or other greenhouse gases. The alternative is to send this combustible waste to landfill but that goes against the European waste hierarchy, which was introduced for environmental reasons. PFAS leaching from landfilled waste returns the components to the aqueous phase, from which they are removed in the landfill's water treatment plant, using activated carbon.

An **integrated environmental policy** takes these cycles into account and develops an approach throughout the chain. Moreover, there is a need for (scope for) **innovation** to break through the problem cycles. A risk-based approach evaluates from a **combined environmental and health perspective**, what risk is permitted and how the risk and the load can be limited with the greatest efficiency. The spread of the pollution and exposure to the (vulnerable) population and nature are considered. This may also include an economic consideration: "How do we capture the largest PFAS load per euro spent?" The ongoing research projects highlighted in this report, including two BAT studies, should help us to untangle this systemic knot.

2.2 THE PFAS ASSIGNMENT

2.2.1 Recommendations of the Parliamentary Committee of Inquiry on PFAS

The PFAS assignment started in mid-July 2021. Shortly thereafter, the PFAS Parliamentary Committee of Inquiry was set up. This Committee released its report[2] on 28 March 2021, at about the same time as the second interim report, "From Knowledge to Action".

The report by this investigative committee cannot be considered separate from the operation of the PFAS commissioner, who started his assignment before the Committee of Inquiry was created. It includes a multitude of recommendations, focusing on improving **interactions** within government and improving **coordination** of approaches to new types of pollution. Focussing on interaction within the government, between policy areas, across levels of government, and internationally, is essential. European policy is indispensable for success. The Committee of Inquiry makes several recommendations on this objective.

The Committee of Inquiry is not just emphasizing the need for cooperation between administrations. Interaction between the administration and the political level is given its fair share of attention. It is up to the administration to develop criteria as a basis for prioritising its tasks. The Government of Flanders validates these criteria. As discussed above, research insights need to have an initiating role in this. The **interaction outside the traditional ranks of government** also receives attention. The government is involving all relevant actors such as residents. Two central elements in the onward approach are the PFAS Action Plan and the Environment and Health Knowledge Hub.

Several recommendations revolve around more transparent interaction with companies and greater responsibility/liability for them. The importance of integrating the environmental and health aspects into the structures and through the instruments (e.g., licensing), cannot be dismissed.

2.2.2 Approach and preliminary results of the PFAS assignment

The appointment of the PFAS commissioner in mid-June 2021 resulted in **a deepening of scientific knowledge and improved exchange of information among authorities,** both within Flanders and with the Belgian federal level. By setting up specific communication tools (PFAS website, PFAS mailbox and PFAS explorer), information is being shared with citizens in a transparent way. A **rapid response** was needed to address the most pressing challenges: completing the standards framework, dealing with 3M's production site in Zwijndrecht, the impact of the Oosterweel works, mapping PFAS risk sites and officially adjusting discharge standards for PFAS in permits. Partly prompted by the PFAS assignment, the closeness of cooperation between the experts involved from all regional and federal administrations and interaction with researchers has increased.

Under the impetus of the **substantive expert group**, specific results have been achieved in the areas of research, communication and policy, through improved cooperation and exchange of data. The strengths of that approach need to be translated into a renewed approach for the governance around substances of very high concern within the Flemish administration, beyond PFAS. The recommendations of the PFAS

[2] Flemish Parliament, 2022, Report on behalf of the PFAS-PFOS Committee of Inquiry, 844 (2021-2022) No. 36

Parliamentary Committee of Inquiry on the PFAS Action Plan and the Environment and Health Knowledge Hub will be taken into account when setting up that ***governance* structure**.

Significant steps have been taken within the operations of the PFAS commissioner in a short period of time. Based on the data available in Flanders and from different countries, international frameworks and knowledge platforms, a realistic proposal has been developed to minimise exposure in Flanders and the further spread of PFAS pollution as much as possible. The **temporary action framework**, which was developed in the second interim report, contains proposals for new assessment values for soil, earth moving, soil improvement, groundwater, drinking water, wastewater, drainage water, surface water, bathing and recreation water and air. These assessment values were proposed, based on the available knowledge, with the option to revise them if new insights emerge from research. Since the action framework was submitted as a communication to the Government of Flanders, it constitutes an official document that can be referred to for policy implementation in e.g., enforcement and licensing. The proposed testing values for soil remediation (soil and groundwater) were adopted by OVAM (Public Waste Agency of Flanders) in the guidelines for soil remediation experts.[3] The provisions of the action framework for the different types of water are implemented by means of specific permit requirements, general provisions on the discharge of hazardous substances and sectoral emission limit values for discharge of PFAS. Regarding drinking water, it is envisaged that the PFAS standards framework of the European Drinking Water Directive will be implemented. The conversion law of decree is submitted to the Government of Flanders for approval. Within the soil and ground works regulation, the 3-3-8 standard is applied for free use of excavated soil. Site-specific risk assessment is applied to evaluate soil use from construction sites. An exchange initiative with Dutch experts on approaches to risk assessment and knowledge of leaching will be set up in August 2022.

On 6 July 2022 the Flemish authorities entered into a **remediation agreement** with 3M, in which the company is held responsible for all costs related to the pollution caused, including remediation and derived harm to the environment, economy and health. The PFAS commissioner will assist the Flemish authorities with **technical and scientific** advice in developing the measures provided for in the agreement. In addition, he will help **facilitate** the balanced consideration of various stakeholders' interests in the development of the specific arrangements. An intensive stakeholder consultation is under way to develop a supported solution for the remediation of the industrial zone, the construction site and the surrounding residential areas.

The work method of the PFAS commissioner has led to the creation of a **powerful learning network** with a formal mandate and a highly flexible work approach, focused on interaction and exchange and responding to changing demands. This has resulted in strong knowledge building, which has been written up in three interim reports. An important constant in this operation is the strong link between research and policy on the one hand, and the smooth interaction between the bodies in Flanders and the federal bodies and the scientific institutions.

[3] OVAM, 2022, Richtlijn PFAS-onderzoek [Guideline on PFAS investigation], *via* https://ovam.vlaanderen.be/documents/177281/789862/Richtlijn_PFAS_onderzoek_vanaf_19042022.pdf/36b80ba3-793a-d547-0dd4-08eb85faf8ef, accessed 02/07/2022

At the request of the Government of Flanders, three objectives have now been formulated for the completion of the PFAS assignment:

- the commissioner shall assist the Flemish Region in the preparation of an updated **PFAS action plan**, vision, strategy and associated KPIs by December 2022.
- the commissioner shall provide the Government of Flanders with an **activity report,** summarising the activities and results for the period July-December 2022 in December 2022;
- the commissioner shall submit a research **report** to the Government of Flanders in December 2022, containing the results of completed studies and policy recommendations derived from them.

During the last 6 months of the PFAS assignment, the new initiatives must be transformed into a long-term systematic approach that can prevent a recurrence of the PFAS crisis. In the meantime, action must be taken, both locally and at the level of the Flemish Region, to shape long-term solutions that will reduce the risks and spread of PFAS in Flanders wherever possible.

Prof. Dr. Karl Vrancken
Commissioner for the Government of Flanders in tackling the PFAS contamination
24 August 2022


De VMM meet hier PFAS
VLAAMSE
MILIEUMAATSCHAPPIJ

Albert II laan 20/8
1000 Brussels
https://www.vlaanderen.be/en/pfas-in-flanders