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Agence Régionale de Santé
Auvergne-Rhône-Alpes

Direction générale de la santé

PFAS analysis campaigns in eggs from domestic hen houses in south of Lyon (France), 2022-2023

Conference **'PFAS in soil – forever pollution, forever concern?'**

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Introduction : national context

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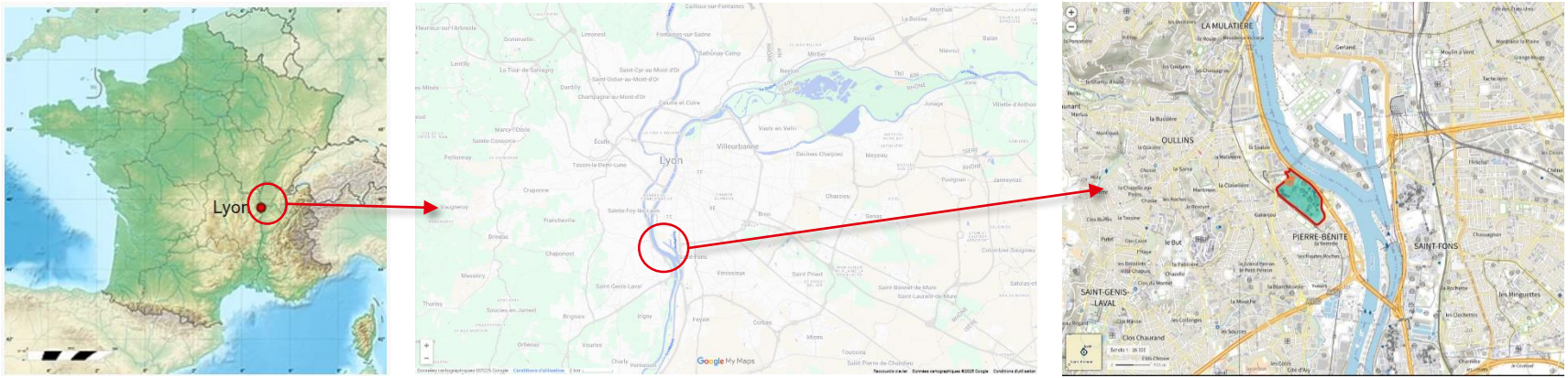
- The **Directorate General for Health (DGS)** is one of the central administrative departments of the **Ministry of Health**, it has 4 main objectives :
  - to **preserve** and **improve** the **state of health** of citizens;
  - to **protect** the population from **health risks**;
  - to guarantee **quality, safety and equal access** to the **healthcare system**;
  - to **mobilise** and **coordinate** partners (relies on the network **of regional health agencies**)
- Regarding the **PFAS issue** :
  - Mainly to guarantee the **safety of drinking water** on a national scale
  - also concerned with the other **health impacts of PFAS**, linked to exposure in different environments: soil, air, food, etc.
- Since April 2024 : **interministerial plan for PFAS** in force in France

Introduction : regional context

Managing PFAS issues in Auvergne Rhône -Alpes

- The Auvergne Rhône-Alpes **regional health agency (ARS)**: one of the most involved in the management of PFAS in France, with **several hot spots** in its territory
- **The south of the Lyon conurbation** is concerned, with an **industrial platform** located in the town of Pierre Bénite, which has been the source of historical **major discharges of PFAS** into the Rhône river, the soil and the atmosphere



Introduction : local context


Pollution autour de Pierre-Bénite : vers un « scandale sanitaire » ?

A PFAS « hotspot »

- PFAS pollution in this sector has been **widely reported in the media** since May 2022
- The situation was **brought before the courts**, following **complaints** lodged by neighbourhood associations and the local authority
- Government departments have set up **extensive environmental monitoring**, with analyses of **surface and ground waters**, **air**, **soil**, **sediments**, **plants**, **fish flesh** and **agricultural production**: all these compartments had been affected, in addition to the **contamination of some of the drinking water catchments** in the area
- It has been suggested to measure **PFAS levels in eggs** produced in the area.
- The ARS is responsible for **monitoring the quality of drinking water** and the **impact of exposure** to other media on the health of the population

Introduction : what about PFAS in self-produced food?

Who monitor private wells & the food produced in home gardens ?

- There is **no 'health police'**: everyone can produce and eat 'what they want'...
- However, the ARS is responsible for **health safety** and may issue **recommendations** based on the potential impact or the regulations governing commercial foodstuffs
- The first egg measurement campaigns were carried out by another administration (population protection dept), who targeted **commercial poultry farms** and included a few private hen houses. The ARS then specifically targeted **domestic hen houses**
- **Vegetables** from private gardens and **water from private wells** were also diagnosed as part of the environmental monitoring process

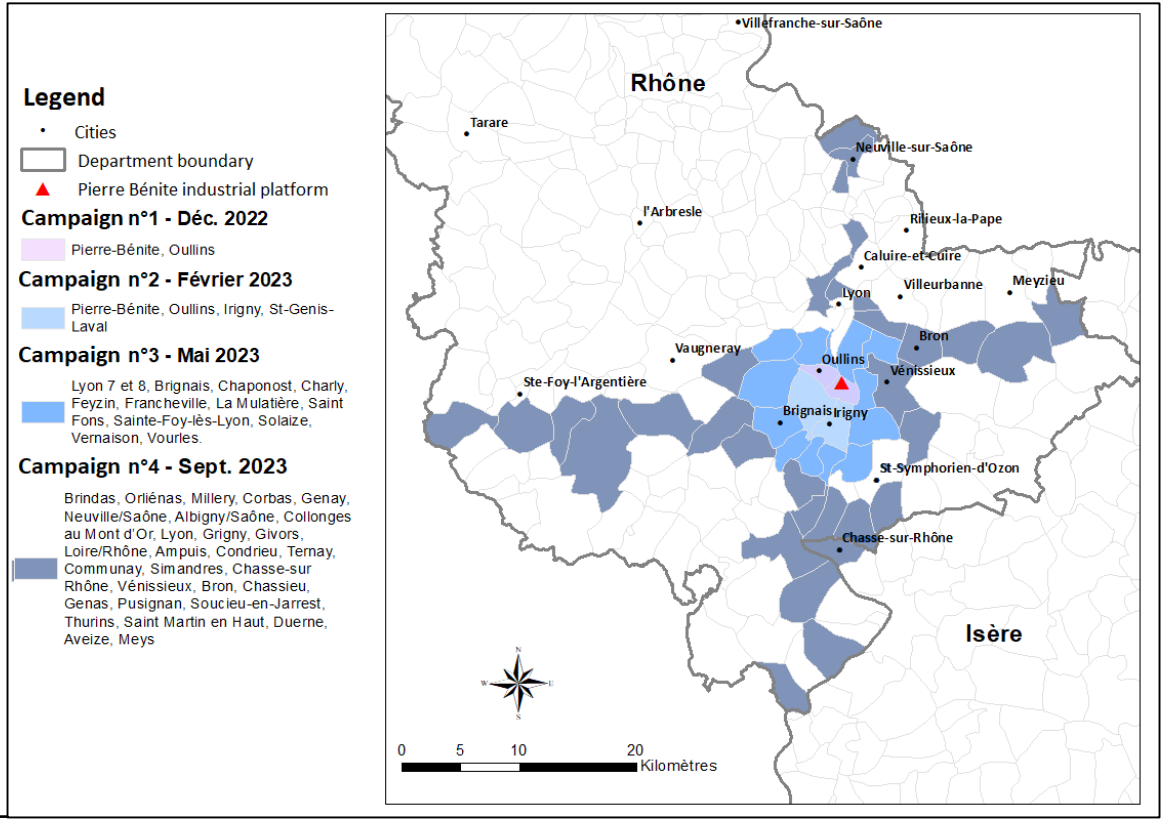
→ **The aim of this monitoring was to determine whether specific measures needed to be taken in this area, concerning self-produced food and water**

Methodology : sampling

4 sampling campaigns :

- carried out between **Dec. 2022** and **Sept. 2023**
- Gradual geographical expansion around the site:
  - first in **concentric circles** around the main source
  - then in north-south and east-west **transects**

→ **47 municipalities** included



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Methodology : data acquisition

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Setting up a database :

The eggs were **collected by the town halls** from private individuals, **registered** and **prepared** for analysis by the ARS.

Characteristics of the poultry house obtained from a **survey questionnaire** :

- **Hen house :** distance from industrial platform, construction material, nature of outdoor run (planted or not), surface area, modifications/inputs
- **Chickens :** number of birds, age, laying period, number of eggs/week, type of feed, feed distribution, feed trough material, source of drinking water

→ **167 hen houses** investigated, of which 91% had completed questionnaires

Results of assays of **26 PFAS** by the national reference laboratory (LABERCA), including **4 PFAS** regulated by the EU in foodstuffs: **PFNA**, **PFOA**, **PFOS** and **PFHxS**.

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Results of all analysis campaigns

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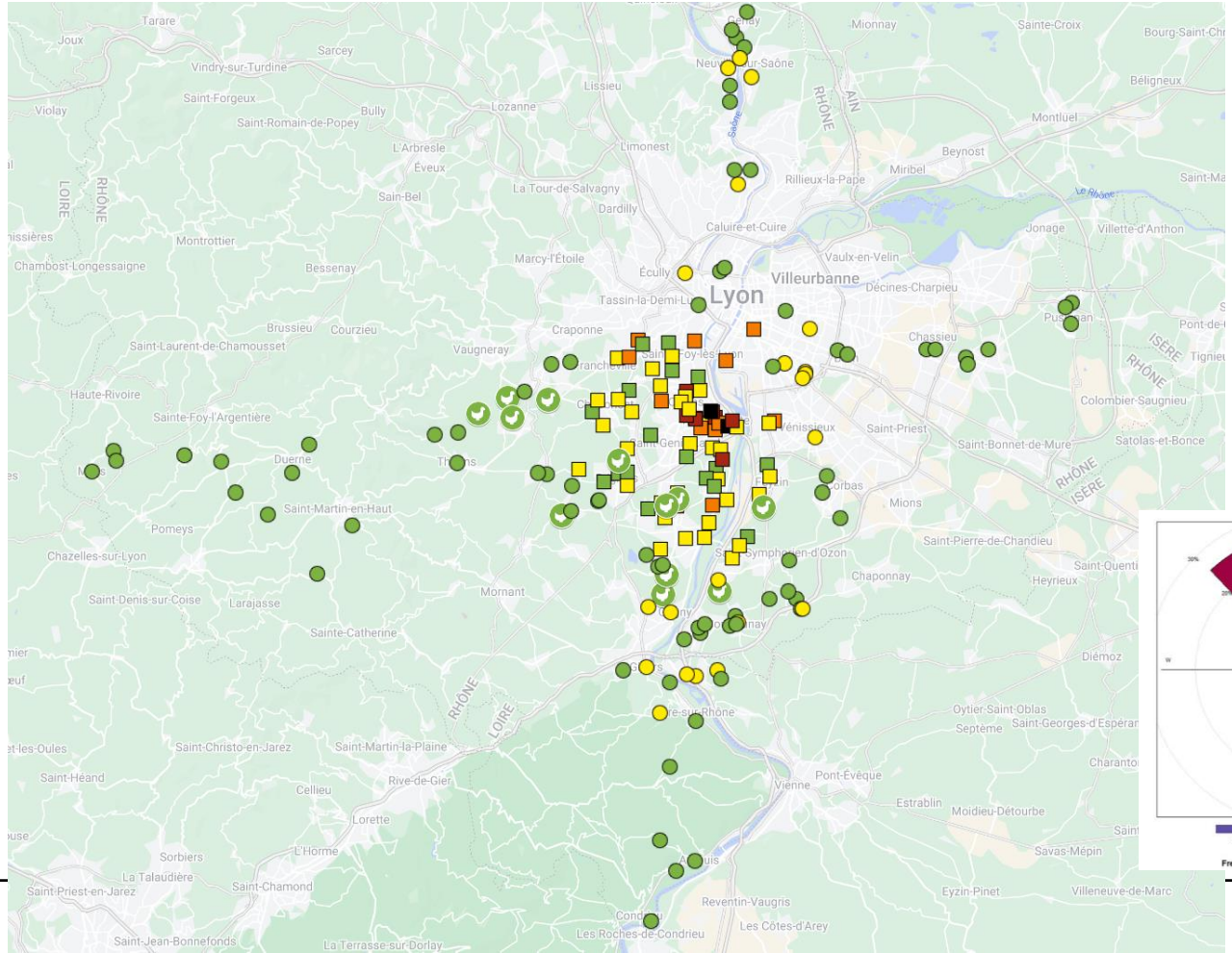
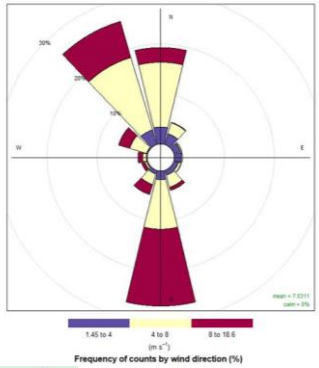


Concentration in µg/kg - sum of the 4 PFAS (PFOA, PFOS, PFNA, PFHxS)

- <1,7
- >1.7<5
- >5<10
- >10<20
- >20

- 3 initial analysis campaigns
- 4th analysis campaign
- Professional farms

Local wind rose (2016 – 2024)



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Results : key findings

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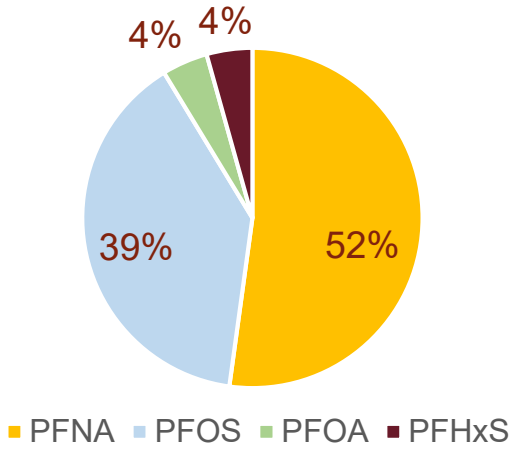
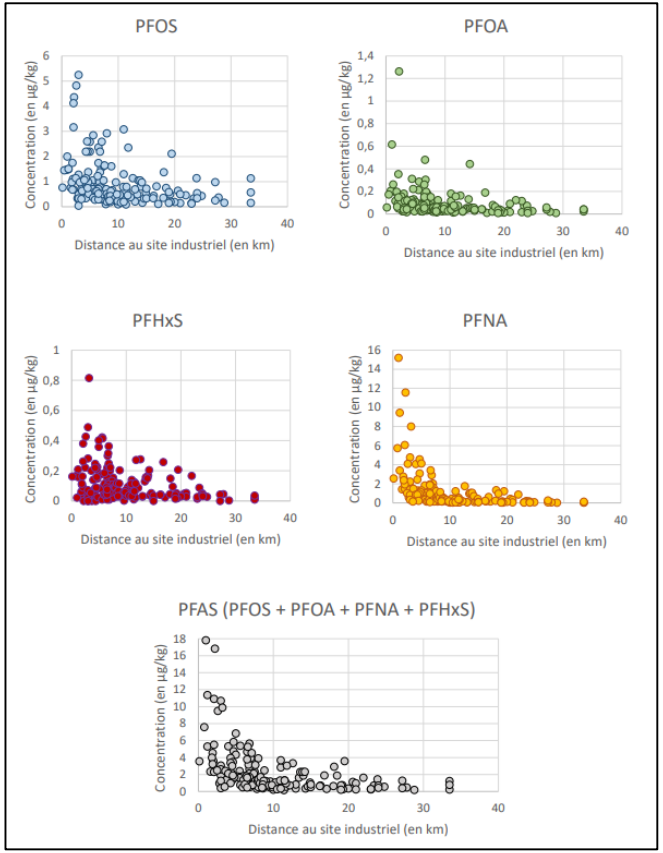
- **Very high levels** measured (up to 40x regulatory threshold) during the first two campaigns in the municipalities located **near the industrial platform**
- Majority of **non-compliant samples located within a 5 km radius** of the industrial site
- None of the **professional poultry farms** analysed showed any non-compliance
- PFAS concentration **decreases with distance**, more markedly along the east-west axis :
  - **Prevailing winds** along a north-south axis
  - **Urban density** and concentration of **activities** along the Rhône valley
  - possible presence of **other sources** of emissions?
- Beyond immediate proximity, geographically close samples shows very different PFAS concentrations → **other factors** may have an influence
- Concentrations above threshold also found in **remote uninfluenced environments**

Results : description of PFAS concentrations

- **Decrease in the concentration** of each of the 4 PFASs as **distance increases**
- Of the four regulated PFAS, **PFNA** and **PFOS** account for the largest share





Results : discussion

Statistical analysis of questionnaires confirmed influence of (only) two factors :

- **Geographical gradient** (distance/site : main determinant on egg contamination levels)
- **Nature of the outdoor run**: bare soil seems to be more conducive to egg contamination than grassed runs (with less influence on the results)

➢ **Hypothesis :**
(to be consolidated)

Industrial atmospheric emissions deposition (on the ground) → Ingestion of soil by hens (geophagy) → Impregnation of meat and eggs

This hypothesis, is consistent with scientific literature and other data in this area :

- Results of soil analysis
- Known results of atmospheric industrial emissions local modelling
- Compliant results in professional farms (geophagy reduced by practices)

Limits : reduced sampling, repeatability of analyses…

Management actions : exposure mitigation

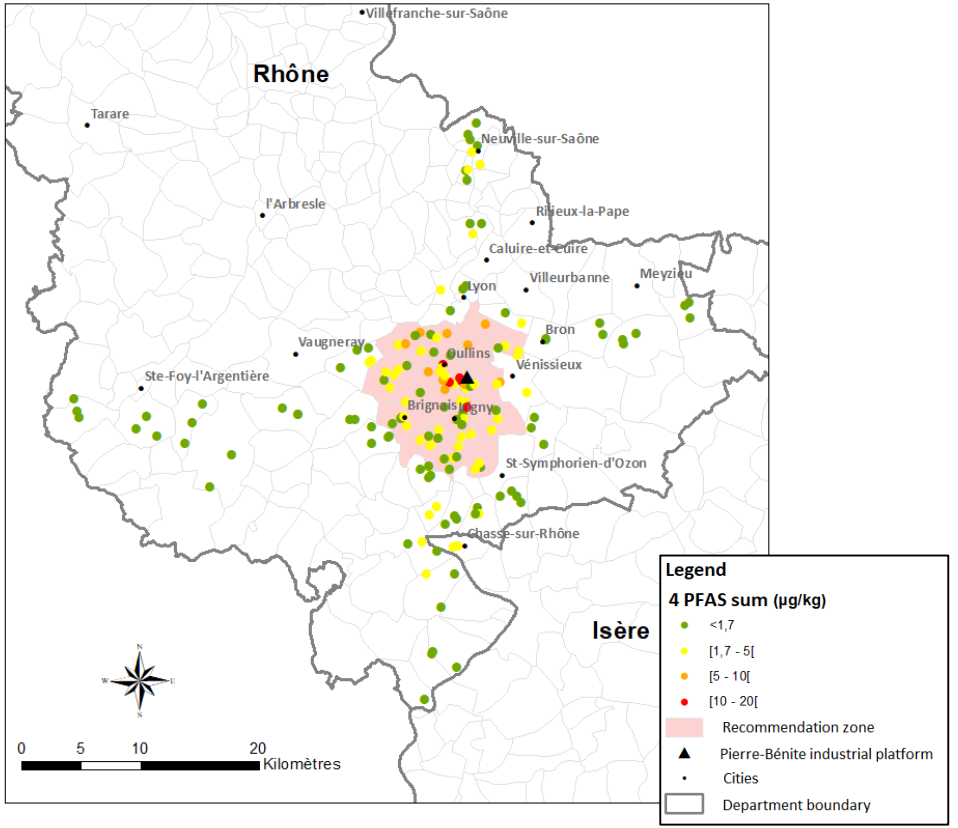
Quick action was taken :

With **initial results** (no wait for all analysis):

- a **recommendation not to consume eggs** (and poultry flesh) from private hen houses was issued, concerning **16 cities** around the industrial platform
- Subsequent campaigns **confirmed the recommendation** and **the area concerned**

General recommendations for hen houses

- **Limit geophagy** (soil ingestion) : trough feeding, grassed or paved course, sufficient space per hen...
- **Adapted and diversified feed**



Conclusions and prospects

- **Eggs from domestic hen houses** appear to be a relevant i**ndicator of soil pollution** by PFAS, but also a potential **major route of exposure** in the “hotspot” type areas
- It is worth recalling the **good practices** concerning **self-produced foodstuffs** (see national guide), but in order to reduce people's exposure, **specific recommendations or restrictions** should be formulated in the **most contaminated areas**
- Concentrations in excess of thresholds were found in **remote locations**, reinforcing the finding that **PFAS are ubiquitous in soils**.

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Thank you for your attention!

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