

From Lubrizol to Canada – Development of a Global Strategy for PFAS

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In September 2019, an industrial fire occurred in the Lubrizol facilities near Rouen in France. This warehouse was storing more than 9000 tons of diverse chemicals, mainly motor oils. In addition, firefighters used more than 40 000 m³ of Aqueous Film Forming Foam (AFFF) to extinguish the fire and 30 000 m³ were released directly in the Seine River. This incident led to a major ecological crisis and VALGO was mandated by the French administration to store the extinguishing waters, and to reduce the environmental impact of the incident. AFFF are known to be a major source of Per and Poly Fluoro Alkyl Substances (PFAS), however, this was not a concern for the French institutional agency.

To address the lack of knowledge, VALGO started several research and development studies:

- Effectiveness of oxidation and flocculation treatments (*finished*)
- Distribution study (*finished*)
- Assessment of the impact on human health (*finished*)
- Risk study (*In progress*)
- Effectiveness of an innovative biological treatment (*In progress*)
- Treatment pilot study (*In progress*)

This presentation will draw a rough outline of the evolution of the strategy of VALGO to deal with PFAS, from the emergency risk containment methods in Lubrizol France to a treatment field study to be carried in Canada in the months to come; with a focus on the distribution study which was the largest sampling campaigns aiming PFAS on the Seine River (at study completion date).

This distribution study assessed the distribution of PFAS after a massive but isolated industrial fire on surface waters, groundwaters, sediments, semi-aquatic plants, plankton, and fishes. This study showed a global contamination of the studied matrices at varying concentrations, but especially by various unsuspected compounds, potentially linked to degradation pathways that have not been described during the Reach recording. Groundwater and fish appear to be particularly affected, with concentrations in some aquifers exceeding 170 ng. L⁻¹, which can constitute a significant path of exposure leading to a significant risk to public health.

This study shows that the PFAS contamination is not linked to the use of fire-fighting foams alone. It rather seems that this contamination is linked to the massive industrialization and urbanization of the banks of the Seine. However, the repeated use of AFFF (fire fighter training area or industrial wastes) seems to have a significant impact on environmental remediation. Furthermore, this study was a cornerstone of the evolution of the strategy of VALGO, leading to an increased attention to public health, and a new focus on contaminated water treatment.

Hugo Carronnier

Hugo Carronnier is a project manager working with VALGO, an international company based in France offering global strategies for environmental remediation of former industrial sites, and now established in seven countries including Canada (VALGO Canada Inc.). His missions at VALGO is focused on the PFAS study, at every stage of the perfluoroalkyl issue, studying the environmental contamination, as well as the human exposure, the impact on health, or the environmental remediation strategies, from lab work to technical scale study. He previously worked on technical scale projects with Landcare Research on the remediation of former and active mine sites (Waiuta, Bellvue, and Stockton, the largest active open pit mine of Oceania) located on the west coast of the southern island of New Zealand.

After a double degree education in pharmacy (Pharm D) and in human and environmental toxicology (MSc) he received his Pharmacy Doctorate, *summa cum laude* in 2021, for the thesis: Distribution and Impact study of per and poly fluoroalkyl substances in the Seine valley, after an industrial incident. This work is nominated for the national thesis award: GATOX 2022, which reward the best Pharm-D thesis specialized in toxicology.