



TREATING WATER
WITHOUT THE ADDITION
OF CHEMICALS



ORANO OPTS FOR FILTRATION BY ZEOLITES:

a natural, economical, sustainable and innovative process that can be used to treat certain types of water from former mining sites

Orano manages nearly all old uranium mining sites in France (235 of 248 in total), whether operated by the group or not, for almost 60 years. Preparing their second life after operation is an area of expertise which mobilizes numerous disciplines, and that of water treatment in particular.

In order to improve, where necessary, the radiological quality of water originating from former mining sites, the group is committed to research and development focused on innovative processes. One of these is filtration over zeolites: a natural, sustainable and innovative process, which means it is possible to avoid the use of chemical reagents.

Water management is one of the most important challenges involved in the remediation of former mining sites, and of their mining closure phase. Depending on the radiological and/or chemical characteristics of this water, it may need to be treated.

Today, there are 18 water treatment stations in operation in France, treating nearly 8 million m³ of water per year.

Zeolite, a real mineral sponge

Natural zeolite is a solid which acts as a magnet, capable of retaining cations (positively charged ions), such as heavy metals or certain radioactive elements, such as radium. It comes in the form of coarse sand. It is a real, very porous sponge with an excellent absorption capacity. Natural zeolites come from quarries mined specifically for this material with its exceptional properties.

Whether for cleanup, removal of pollution, filtration or purification, the filtration capacity of zeolites is used in many industries, and

in particular in the treatment of water from the drilling of oil wells. The technology has the advantage of allowing for the treatment of water without the addition of chemicals, and a making it possible to achieve a very considerable reduction in the quantities of sludges produced when using a conventional physical-chemical treatment.

Orano uses the treatment of water by filtration over zeolites when the configuration of the site and the geological situation allow. Everything depends on the initial quality of the water and of the flow rate. For example, water laden with too much iron will clog the zeolites too quickly, and a flow rate which is too high will not allow the water to spend sufficient time passing through the zeolites pool. Prior tests, conducted in the laboratory then by means of a semi-industrial pilot, are necessary to check efficiency before implementation. Once saturated, these zeolites are stored on site and replaced by new ones.

To date, two sites have been equipped with this method of treatment by filtration over zeolites: one in the Loire region, at Bois Noirs Limouzat, and the second in the Haute-Vienne region, at Silord, near Razès.

Why choose this filtration process?

The treatment of water from former mining sites by filtration over zeolites is a technology which has proved its worth. Why? Here are the three main reasons:

- **Reduced costs of treatment:** Choosing a process that is easy to install and operate makes it possible to significantly reduce the bill for the treatment of mining pit water.
- **Efficiency of capture:** Once the mining site is operating under optimal conditions, this technique proves to be ultra-efficient at guaranteeing the capture of particles. For example, at the Bois Noirs site, the yield is estimated to be 99 %!
- **Reduction of environmental impacts:** Thanks to zeolites, treatment stations use natural crystals without the addition of chemical reagents (sodium hydroxide, barium chloride, etc.). This virtuous process strongly reduces the environmental impact.

Expertise within Orano Mining, and the fruit of teamwork

The development of this process for use with water from uranium mining sites is a world premiere!

It is the fruit of close collaboration between Mining Closure France, responsible for former mining sites in France, and the Center for Innovation in Extractive Metallurgy (Centre d'Innovation en Métallurgie Extractive – CIME).

The CIME develops processes for the treatment of wastewater taking environmental quality standards into account, from the laboratory phase through to the semi-industrial pilot and the industrialization of the water treatment solution.

Spotlight on: Treatment by filtration over zeolites in figures (2020)



2 mining sites concerned



Tests underway or planned on 3 former mining sites



225,000 m³ of water treated by this process in 2020

ZOOM