

Waste-free mining

MINE FOR BUSINESS

CALLIO

PYHÄJÄRVI, FINLAND

2022

PROJECT OBJECTIVES

The treatment of the Pyhäsalmi mine dewatering ensures that the environmental permit conditions are met after the end of underground mining operations. Callio Pyhäjärvi, in close cooperation with Teollisuuden Vesi Oy - Industrial Water Ltd, has explored alternative solutions for current water treatment based on lime neutralization (BAT). Several water treatment technologies and new solutions for the utilization of valuable substances and compounds have been tested in laboratory-scale experiments. Our objective in water treatment is a continuous waste-free water treatment process in which the waste materials generated are recycled for industrial use, resulting in almost pure water. Piloting will clarify the need for purification, the efficiency of the methods and the necessary process design verified on a smaller scale before the industrial-scale investment. Innovations generated in connection with development work can be commercialized to markets.

WHY?

- There is not enough above-ground space for the disposal of reject fractions or waste after the end of mining operations.
- The precipitation of gypsum increases the need for service and maintenance, especially in pipelines, pumps and heat exchangers.
- The annual cost of current lime neutralization and precipitation handling can be as high as € 600,000 per year.
- Circulation of waste-products and water fractions can eliminate the amount of sludge / waste disposed in the area.
- Recycled substances and compounds can generate economic benefits and create new value chains.
- A continuous waste-free water purification process is a strong demonstration of a commitment to minimizing the impact on the environment - global interest is very wide.

HOW?

- Develop a concept for a long-term water treatment.
- The waste-free remotely controlled continuous water treatment process will be piloted at the Pyhäsalmi mine.
- Preliminary LOI agreements will be implemented between actors and companies in the various value chains for the long-term utilization of purified waste-products.
- Preliminary implementation and investment plans for an industrial-scale solution / investment project are modelled.

PILOT EXPERIMENTS?

- Verification of precipitation methods / pH adjustments.
- Effectiveness of ion exchange / various resins are verified.
- Testing of membrane systems and concentration techniques.
- Techno-economic reviews and modelling are carried out.
- Input data for a full-scale water treatment process / project.



NEW OPPORTUNITIES

- In the future, critical raw materials must be recovered and recycled for industrial use.
- When raw materials and compounds are recovered in sufficient purity, they are a commodity.
- Globally, it is of great importance: the first mining water treatment processes without waste/tailings ponds.
- The innovations generated in connection with the development work can be commercialized for utilization in other locations in Finland and abroad.

