DEMINE | Decreasing the Impact of Abandoned Mines

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LIFE DEMINE

Decreasing the Impact of Abandoned Mines

Abandoned mines: an environmental time bomb

Mining activities cause serious environmental damage to **freshwater ecosystems** through the discharge of **polluted effluents**, which may contain high concentrations of **heavy metals** or **salts**, depending on the type of mine. This environmental problem is especially critical for **abandoned mines**, because there is no company in charge of treating these mining effluents, leaving a legacy of **local and global pollution**.

The LIFE DEMINE project: an innovative solution

The **LIFE DEMINE** project aims to demonstrate and disseminate the technical and economic feasibility of **decreasing** the overall **environmental impact caused by mining effluents from abandoned mines** in water bodies.

This will be done by adopting an **innovative and versatile treatment process** that will combine existing and widely known technologies based on **membrane processes (nano-filtration) and electrocoagulation**. The LIFE DEMINE project will obtain a **non-polluting final effluent** to be discharged in water bodies with the minimal environmental impact, in accordance with the European Water Framework Directive (2000/60/EC).

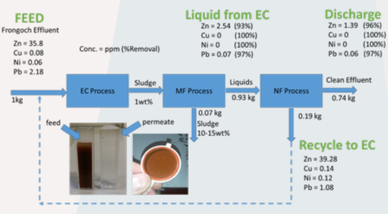
The role of Swansea University in the LIFE DEMINE project

The role of Swansea University was to optimise the METP treatment plant to ensure that the maximum recovery of metals could be made. In this way, we ensure that the watercourse undergoes the most efficient treatment process and is as clean as possible to discharge. Thus, overall metal removal is the key driver when optimising the process.

The process consists of two major technologies, namely electrocoagulation and membranes. The electrocoagulation unit precipitates out the pollutant metals by injecting an electric current into the water. This creates hydroxyl ions (OH-) by splitting water and these ions then react with the metals (Me) to create a metal hydroxide salt (MeOH). The nature of the heavy metal pollutants is such that the hydroxide salt is insoluble and precipitates out of solution, which we can then harvest by filtration. The membranes work two fold, firstly they can concentrate the metal pollutants and secondly they can capture the precipitated hydroxide salts. In both cases the metals can then be removed from the watercourse, either by direct removal of the hydroxide salt or by concentrating and sending to the electrocoagulation unit.

In the case of the Frongoch mine, the combined METP treatment plant was optimised at bench scale and has enabled us to remove 96% of zinc pollution and 97% of Lead pollution.

Picture 1: The optimised mass balance and process developed at the bench-scale.



Picture 2: Bench-top Electrocoagulation unit

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