

# Minerals recovery from CSIR acid mine drainage treatment plant and their possible uses

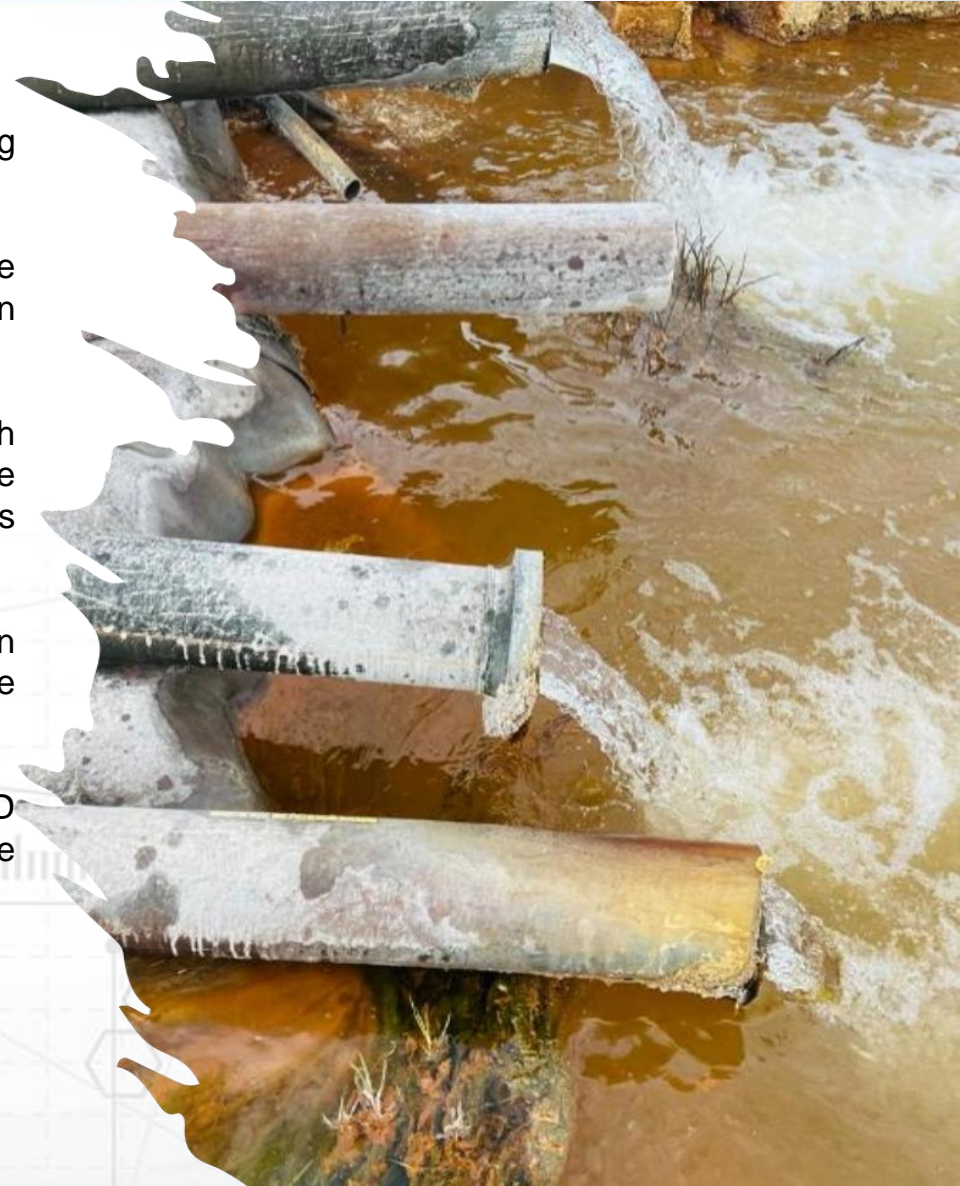
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# Background

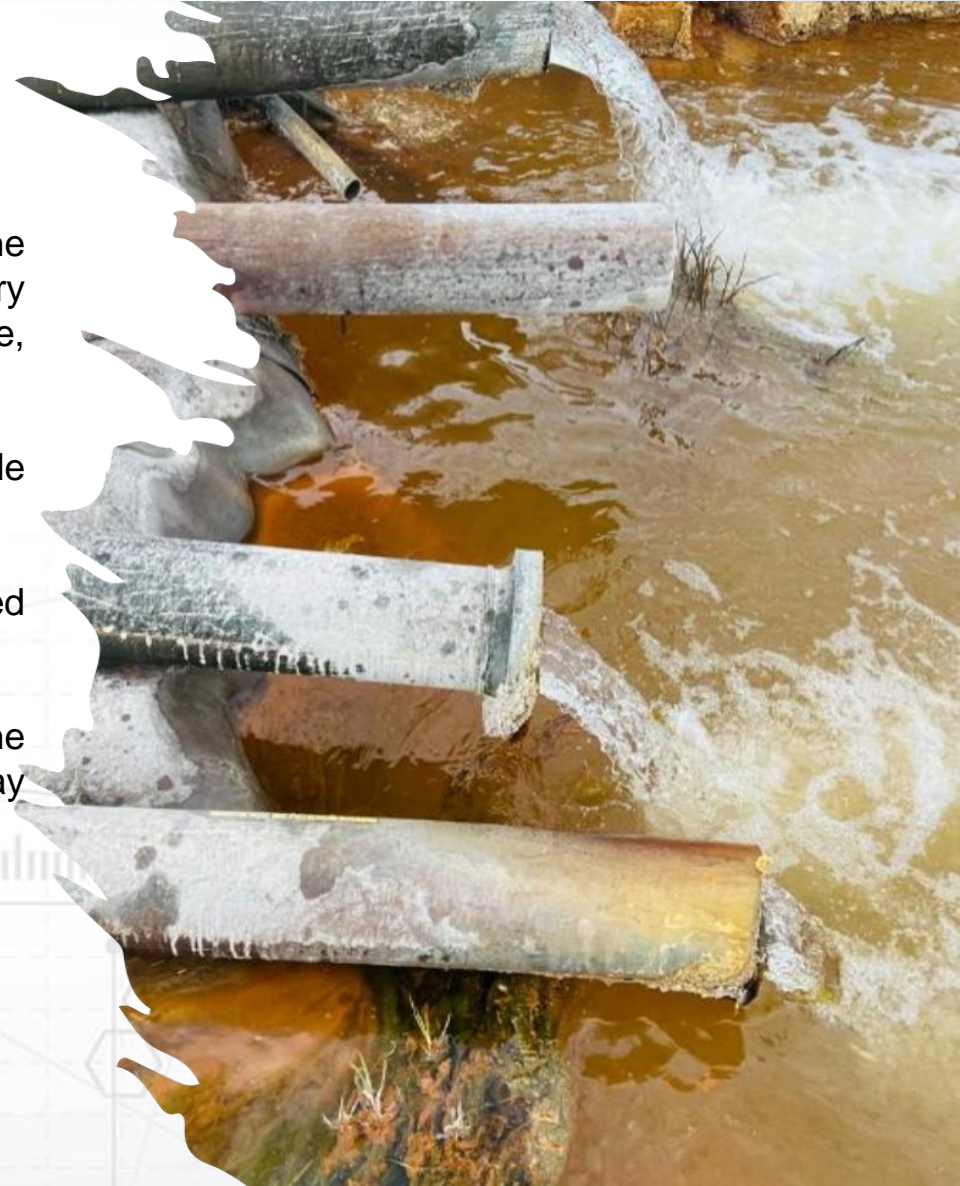
- ❑ Persistent by-product of present and past mining activity.
- ❑ Both current and inactive or abandoned miners face AMD challenges in underground tunnels, shafts, open pits, waste rock piles, and mill tailings.
- ❑ When oxygen and water comes into contact with exposed mine rock surfaces containing sulphide minerals, a toxic wastewater stream called AMD is generated.
- ❑ This process occurs naturally, however, mining can promote AMD generation simply through increasing the quantity of sulphides exposed.
- ❑ Naturally occurring bacteria can accelerate AMD production by assisting in the breakdown of sulphide minerals.





# Background

- ❑ The purpose of this work was to explore the mechanisms and efficacy of the selective recovery of high-concentration goethite, hematite, magnetite, gypsum, and limestone from raw AMD.
- ❑ Using magnesite, soda ash and lime at a pilot-scale process
- ❑ As well as determine the feasibility of the recovered minerals for larger-scale applications.
- ❑ This technology has advanced significantly and the concept has been demonstrated on a 20 kL/day plant.

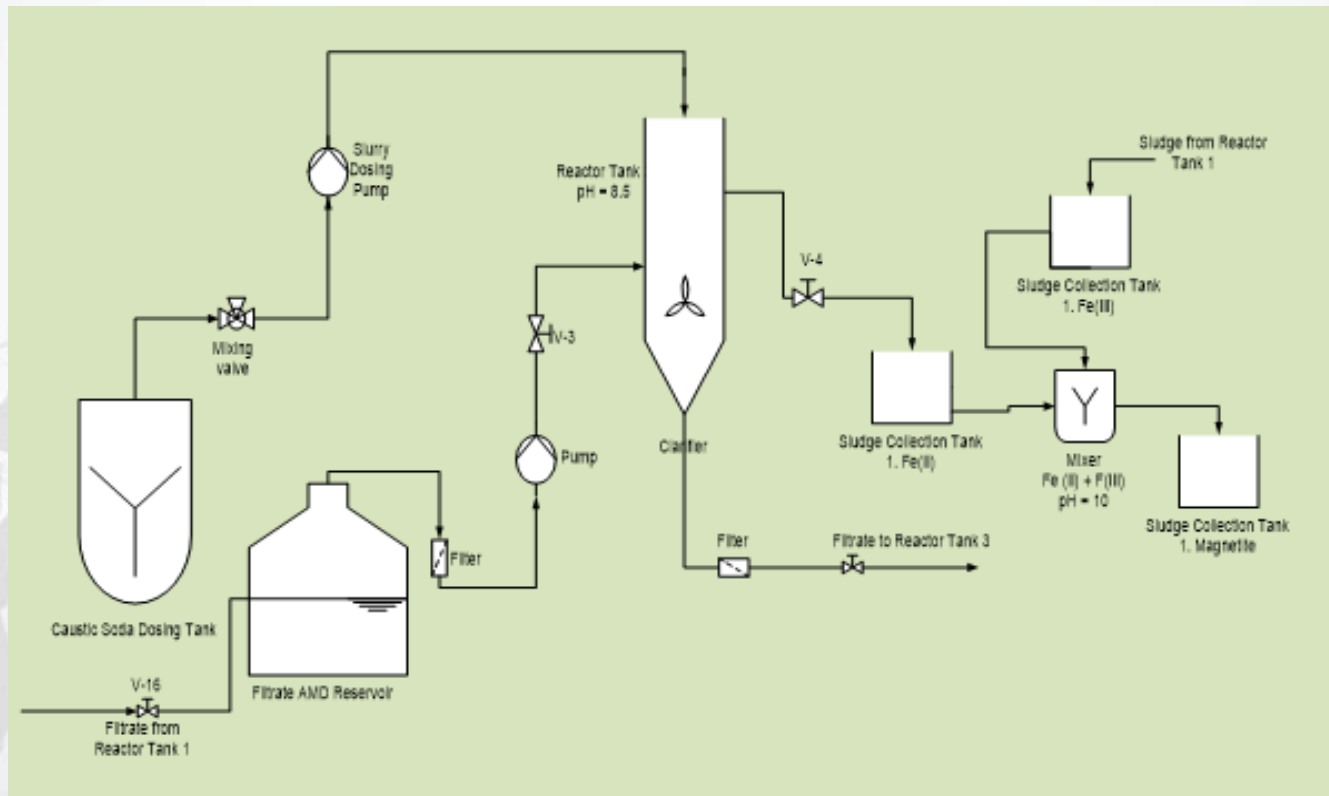




# Experimental Plan

## Recovery of Resources from AMD

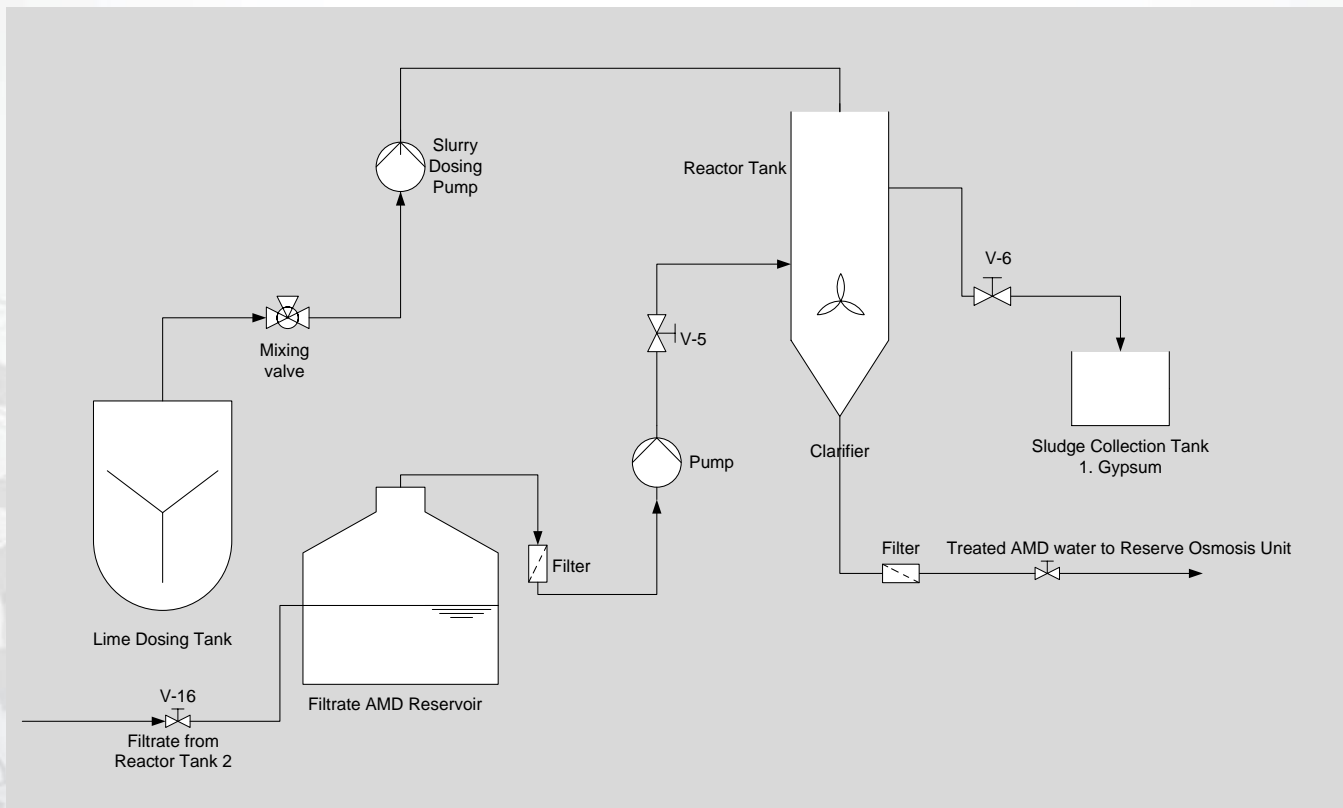
### Magnetite Recovery



# Experimental Plan

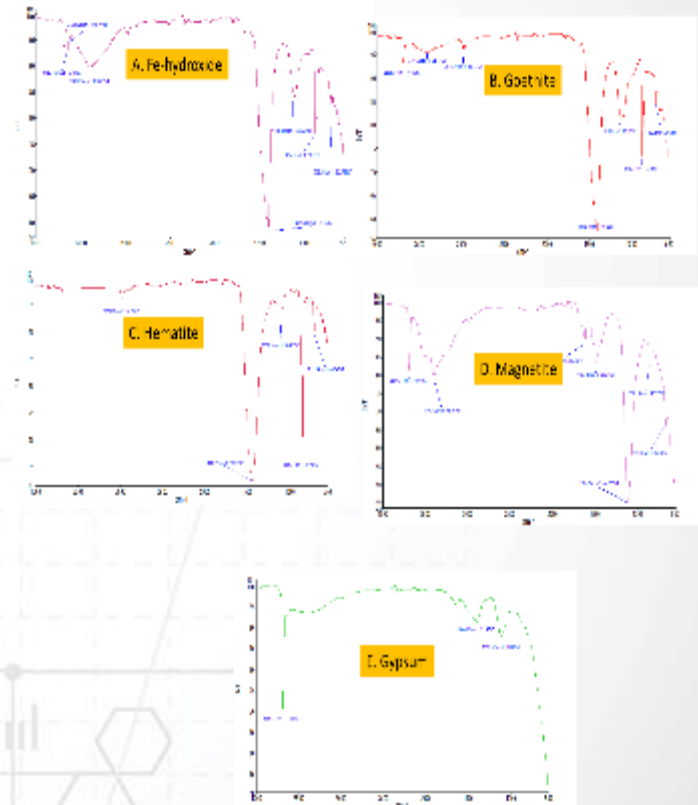
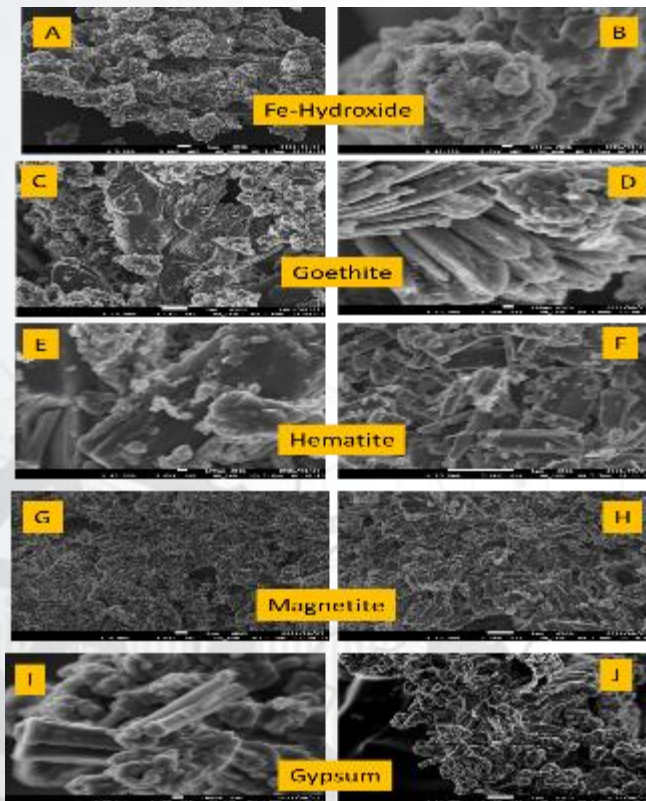
## Recovery of Resources from AMD

### Gypsum Recovery



# Outcome Summary

## Recovery of Resources from AMD

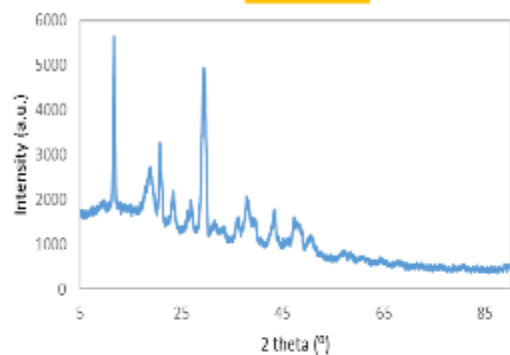




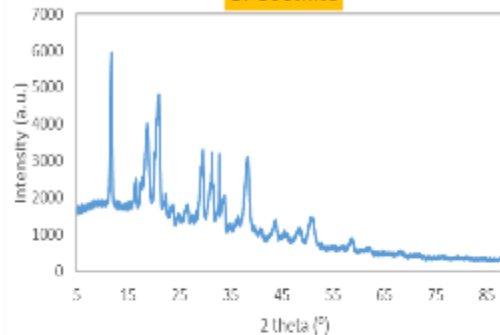
# Outcome Summary

## Recovery of Resources from AMD

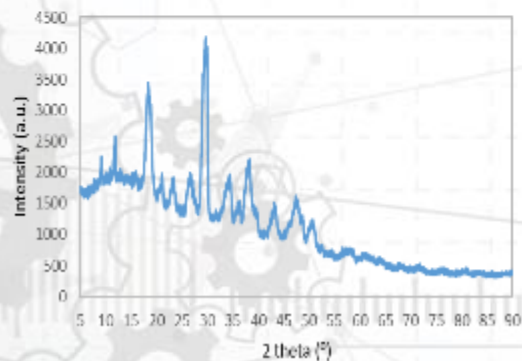
A. Hematite



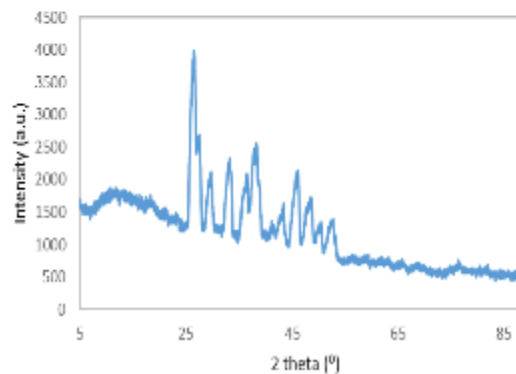
B. Goethite



C. Gypsum



D. Magnetite





# Outcome Summary

## Recovery of Resources from AMD

- ❑ The recovered minerals as confirmed by p-XRD and FTIR were of high purity with at least 90%.
- ❑ These valuable minerals have commercial value for various industrial application.
- ❑ However, the overall viability must be evaluated on the basis of the minerals economic value (market price) over the minerals significance such as risk and market consumptions size, the concentration of minerals in the AMD source and efficiency of the recovery process.
- ❑ The findings have demonstrated the potential of valorizing harmful pollutants like the AMD which contribute positively towards fostering the developed CSIR MASRO process towards commercialization.

# In conclusion

- ❑ The selective precipitation and recovery of goethite, hematite, magnetite, and gypsum was studied at full pilot plant in this work.
- ❑ This study successfully proved that viable minerals can be recovered from the CSIR 20 kL/day AMD plant.
- ❑ These valuable minerals have commercial value for various industrial applications.
- ❑ However, the overall viability of the minerals recovery from the CSIR AMD must be evaluated on the basis of the minerals economic value (market price) over the minerals significance such as risk and market consumption size, the concentration of minerals in the AMD source and efficiency of the recovery process.
- ❑ The findings have demonstrated the potential of valorizing harmful pollutants like the AMD which contribute positively towards fostering the developed CSIR AMD process towards commercialization.



**THE END!**