

Metal Processing Application

Case Study - Reclamation of Acid Rinse Waters Phelps Dodge Copper Rod Mill, USA

Existing Neutralisation and Precipitation System

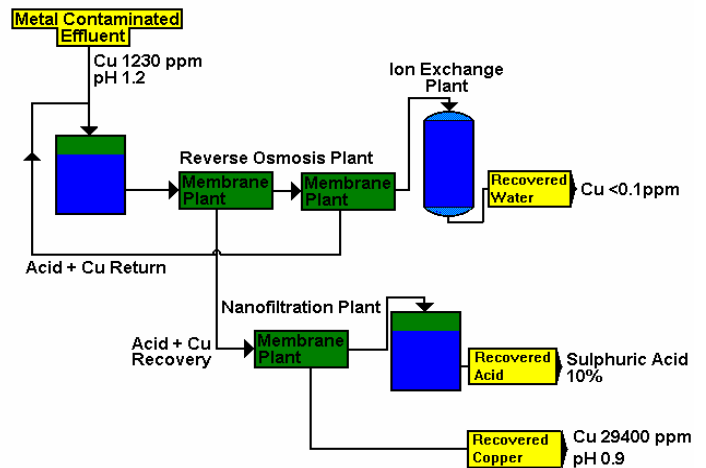
The existing system comprised a conventional precipitation system and had the following shortfalls:

- Requirement for constant monitoring of the precipitation plant
- Poor treated effluent quality (1500ppm TDS plus 2-3 ppm Cu)
- High operating costs associated with chemical dosing and off site sludge disposal

Upgraded Membrane System

The system was upgraded by the installation of a two stage Reverse Osmosis / Nanofiltration membrane plant designed to optimise recovery of both residual copper and spent acid rinse waters. The upgraded system offered the following advantages:

- Rapid investment pay-back
 - 99% Copper recovery.
 - 95% Acid rinse water recovery
- Reduced off-site sludge disposal costs
- Improved treated effluent quality to ion exchange plant
- Reduced environmental liability



Cost Benefit of Upgraded Phelps Acid Recovery Plant	
	Upgraded System
Through-put	110,000 gal/day
Capital Cost	\$1,100,000
Copper Sulphate Recovery	\$917/day
Sodium Hydroxide Savings	\$647/day
Polymer dosing savings	\$88/day
Total Annual Savings (based on 340 days/year)	\$561,680
Payback Period	2 years

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Benefit Summary

Competitive Edge of Membrane Plants versus Conventional Precipitation Plants	
Membrane Advantage	Justification
Low Capital Cost	Smaller Ion Exchange Plant Low civil engineering investment requirement Low earth working investment requirement
Rapid Investment Pay back	Reduced raw material usage Reduced effluent disposal costs Reduced towns water / natural water intake requirement Reduced loading on Ion Exchange Plant
Reduce, Recycle & Re-use	Reduced sludge generation Recycle of residual metals Recycle of spent acid Re-use of high quality treated effluent
Confidence of Environmental Compliance	Robust treatment process that is not affected by temperature, complexing ions, or variations in pH Fixed physical barrier thereby guaranteeing compliance State of the Art Technology (BATNEEC)
Modular System	Discrete process units facilitating incremental upgrading

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