

NOTES - VCL HT Treatment compared with Lime Treatment

Lime reaction notes: Add CaO to H₂SO₄



- Large volumes of gypsum sludge
- Very hard water
- If Fe is present in the wastewater, the iron will armour the lime particles which reduces the neutralisation capacity of the lime reagent
- Liquid – to - solids mixing

VCL technology compared with lime:

SIMPLE SUMMARY

- Typically 200-500 fold element enrichment from the wastewater solution
- One step, broad spectrum remediation technology
removes most major, trace elements, radionuclides
- Simple to implement, low infrastructure/capital requirements
- Typically 10-20% by mass of lime based (gypsum) precipitates
- Easily separable from solution
- Potential cost offset – contained metal values
- Further stabilisation (long-term repository)

DETAILED SUMMARY

Virtual Curtain technology offers superior outcomes to the traditional use of lime-based additives to remediate acidic and contaminated wastewater, with advantages including:

- Typically one-step process with simultaneous removal of anions and cations including **heavy metals, metalloids** and **radionuclides**
- Suited to both in situ and pump and treat operations
- Low infrastructure/capital costs
- Ideal pre-treatment for reverse osmosis
- Low life-cycle costs
- May be applied in low to high pH and fresh to hypersaline waters
- Sludge volumes reduced by up to 90% compared to lime-based precipitated sludges

- Liquid – to – liquid mixing with rapid reaction kinetics (less than one minute to form) with the majority of water available immediately
- Water immediately available from rapid settling, centrifuge or filtering (*VCL settling rate at about 10m per day and up to 90% water available from wastewater source*)
- Gypsum sludge residue from lime requires belt pressing to dewater
- In Fe (iron) rich wastewaters, lime reactivity is greatly reduced and much more lime is required to neutralise acidity
- Water much softer (*much less calcium than with lime*)
- Much higher concentration of contaminants ratio (*ore grade product and far less sludge*)
- Hydrotalcite precipitates encapsulate high concentrations of uranium, rare earth element, copper and other valuable metals (200-500 times enrichment) which can be reprocessed to offset remediation costs
- Hydrotalcites can be further stabilised via calcining to form spinel or silicified to produce a synthetic chlorite analogue for permanent storage for a range of radionuclides liberated during or after cessation of uranium mining
- Less final void space required to dispose of sludge waste product compared with lime
- Less colloidal gypsum.