

A Pilot-Scale Study of DCT Process for Florida Phosphatic Clay

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There are more than 85,000 acres of phosphatic clay ponds and clay-filled mine cuts in the central Florida, with approximately 5,000 acres of additional ponds created each year by on-going phosphate mining and beneficiation. Waste clay disposal represents one of the most challenging problems for the phosphate industry. It takes several years for waste clay slurry to thicken from about 3% to 20% solids by gravity settling.

The present study was conducted to demonstrate the feasibility of Deep Cone Thickening (DCT) process to thicken the phosphatic clay waste to a paste, without filtration, for mine backfilling or surface stacking. A 2 tph Deep ConeTM paste thickener from Dorr-Olive EIMCO was employed at the South Fort Meade mine of Mosaic Phosphates MP Inc., in the central Florida for a pilot scale study to investigate the effects of key operating parameters, including feed rate, sand addition rate, flocculant dosage, bed depth, etc. The pilot scale field testing successfully demonstrated the simultaneous production of an underflow paste product and a clear overflow water stream. Typical overflow water recovery and underflow solids recovery were more than 88% and 98%, respectively with a residence time of as low as 2 hours. The highest clay content and total solids content in the paste were more than 25% and 35%, respectively, with a clay/sand ratio of 2:1.

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