REMOVAL OF COARSE FRACTION FROM PHOSPHATIC CLAYS FOR CLAY SETTLING AREA REDUCTION AND ADDITIONAL PHOSPHATE RECOVERY

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Ore deposits containing more clays and dolomite, and yielding relatively more concentrate than pebble will be encountered as mining advances into the southern extension of the central Florida phosphate district. The permittable clay settling area (CSA) is very limited. Therefore, the ultimate reserve realization would be limited because of lack of CSA storage capacity. The feasibility of increasing reserve recovery by reducing clay tonnages reporting to CSA and recovery of phosphates from the clay stream were investigated. A potential process has been identified that would increase the realized reserve by separating the coarser fractions ("Microfines") of the conventional waste clay stream and removing it, thus freeing up additional CSA storage capacity. The separated Microfines stream, being fine sand and silt, would be disposed with the conventional flotation tailings to mine cuts. In addition, this Microfine fraction has BPL value and can be processed with proven flotation techniques.

In this study, twenty two (22) holes from a southern deposit were selected, drilled and washed to generate -100 micron (conventional Florida phosphatic clays size) samples. The clay slurry from each hole were collected in a 2,000 gallon storage tank, then subjected to two stages sizing using a Krebs 4” gMax cyclone. The settling and consolidation rates of the overflows and the raw clays were determined to determine the potential storage volume reduction.

The feasibility of recovery of phosphate from the coarse fraction materials reported to the 2nd stage cyclone underflow with different flotation processes was explored.

The results showed:
1. Removal of +40 micron fraction from the -100 micron conventional clays could increase storage capacity by about 18.5%.
2. The coarse fraction recovered from the -100 micron clays contained about 12 BPL and 6.5 MgO. After desliming at 400 mesh, the resulting microfine flotation feed contained about 12 BPL and 3.5 MgO.
3. The most promising flotation process was found to be the modified Crago process which produced 62 BPL and 0.8 MgO final concentrate with about 73% BPL recovery and 97% MgO rejection.