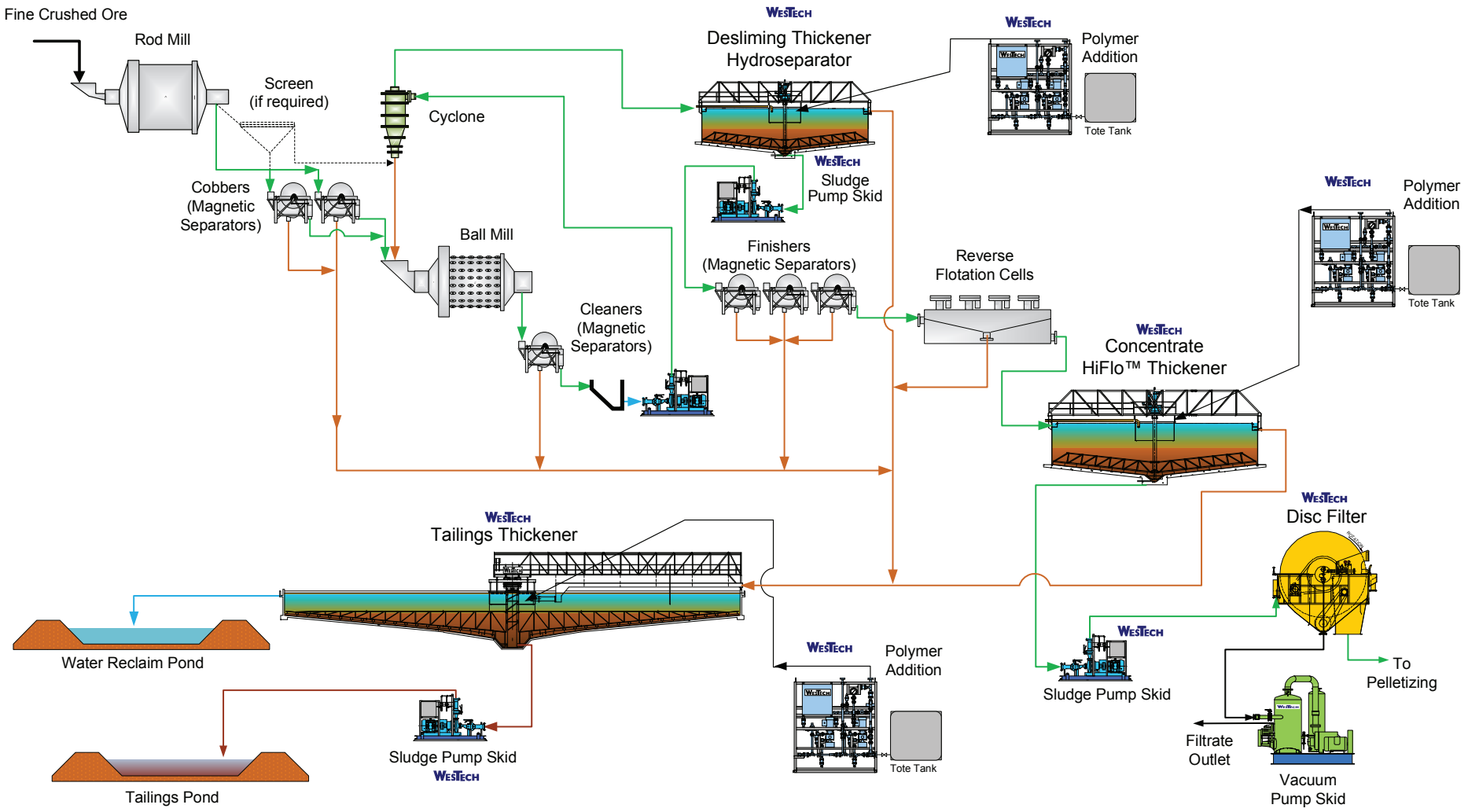

Iron Ore – Magnetite Beneficiation

WESTECH

DWN: **RCS** DATE:

The WesTech ***TitanTraction™ Thickener*** is specifically designed for large flow rates and high tonnages where center drive units become uneconomical. The TitanTraction™ Thickener is a column-supported unit with the rake arm driven by a tractor mounted on the rim of the thickener tank. WesTech employs unrivaled state-of-the art technology to address the complexity of these super-sized thickeners. Designs are verified by integrating the results from computational fluids analysis, finite element analysis, and mechanical event simulation. TitanTraction™ thickeners are indicated when diameters exceed 100 meters, flow rates exceed 20,000 cubic meters per hour, and exceptionally high torques are required.

Iron Ore Concentration Process

Magnetite is mined in large chunks and is crushed into small particles by a series of crushers. After primary crushing with jaw crushers and secondary crushing with gyratory crushers and tertiary crushing with cone or high pressure grinding rolls (HPGR), the ore is screened on vibrating screens to size the particles. The portion of this process which is still too large is sent to a rod mill.

Magnetic Separators

From the rod mill the material proceeds to the cobber magnetic separators. Any non-magnetic material which has been released by the rod mill is separated and sent to the tailings thickener. Magnetite iron ore particles are separated by the magnetite separator from the gangue (waste material) minerals in the cobber magnetic separators. This material flows to the ball mill for further size reduction.

Material from the ball mill flows to the cleaner magnetic separators. Again non-magnetic material which has been released by the size reduction process is sent to the tailings thickener. The magnetic component is pumped to hydrocyclones for sizing.

The finer material in the hydrocyclone overflow is sent to the desliming hydroseparator, while the course material in the hydrocyclone underflow is returned to the ball mill for regrinding. Polymer is added to the desliming hydroseparator to aid in the settling and thickening of the solids.

The desliming prepares the ore for flotation, discarding the ultrafine particles. The underflow from the desliming thickener is sent to a series of finisher magnetic separators to further purify the solution. The overflow from this thickener reports to the tailings thickener.

Reverse Flotation Cells

The separated magnetic material from the finisher separators is sent to reverse flotation cells for further separation. The flotation phases employ conventional large-size mechanical cells, in addition to flotation columns. This process uses starch (depressant) and amine (quartz collector) as reagents to promote the separation of the contaminant mineral (quartz) from the iron-bearing mineral.

The floated material from the flotation process is also sent to the tailings thickener. The underflow from the flotation process is sent to the concentrate thickener.

In the concentrate thickener, the purified slurry is thickened prior to being pumped to a disc filter. Again the addition of polymer aids in the separation and thickening process. The disc filter uses vacuum to dewater the magnetite iron ore concentrate and discharges a relatively dry cake which is sent for pelletizing. This process allows ore of very low magnetite content to be processed into a high quality product.

Tailings

The various reject streams are sent to a tailings thickener. In this unit the solids are allowed to settle and are then pumped to a tailings pond for further settling and water decapitation. The overflow from the tailings thickener is sent to the water reclaim pond and then recycled back into the process.