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CIP, vat leaching, or gravity?

Choose the route the ore supports. This sheet is general information, not a plant design.

Five things to take away

1 Free the gold first: crush and grind so particles can be sorted or dissolved.

2 Gravity first if tests show liberated, fairly coarse gold — and no mercury.

3 Vats soak a batch; CIP is a continuous stirred line that collects gold on carbon.

4 Cyanide works, and it is hazardous. Approvals, detox and tailings are part of the plant.

5 A 200 TPD CIP plant at Umoja is a proposal, not current capacity.

Three routes

Gravity

Density sorts free gold. Best on liberated, coarser particles. Tails may still hold fine or locked gold.

Vat leaching

A batch of ore or tailings in lined vats. Solution percolates over days. Needs permeability.

CIP

Fine slurry is stirred with cyanide, then carbon captures dissolved gold. Continuous, higher complexity.

A practical sequence

1. Test first (assay, mineralogy, gravity, leach).
2. Take gravity gold if the tests support it.
3. If tails still pay and the bed is permeable, a vat may fit.
4. If tests and throughput support a continuous agitated leach, consider CIP or CIL.
5. Refractory ore needs specialist advice — a standard vat or CIP will not fix it alone.

Worked example (illustrative numbers only)

Teaching arithmetic only — not Kitete or Umoja data.

Assume 50 t/day at 2 g/t = 100 g of gold in the day's feed.

If 40% is gravity-recoverable = 40 g; 60 g remains in tails.

If a leach then recovered 90% of that remainder (only if tests say the gold is free-milling) = 54 g.
Combined 94 g of 100 g. Skip gravity and you still need a leach for the fine gold; stop at gravity and you leave 60 g behind.

Read the full explainer: afriglobalresources.com/insights/cip-vs-vat-leaching-tanzania/

Sources (full links in the article): SGS process mineralogy of gold ores; SAIMM CIP design paper (Stange, 1999); US EPA gold beneficiation volume; planetGOLD gravity guides; International Cyanide Management Code; Minamata Convention (Tanzania). Site facts: afriglobalresources.com/projects

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