TWO-STAGE LEACHING OF MINE TAILINGS – RECOVERING IRON AND SULPHUR TOGETHER WITH VALUABLE BASE METALS?

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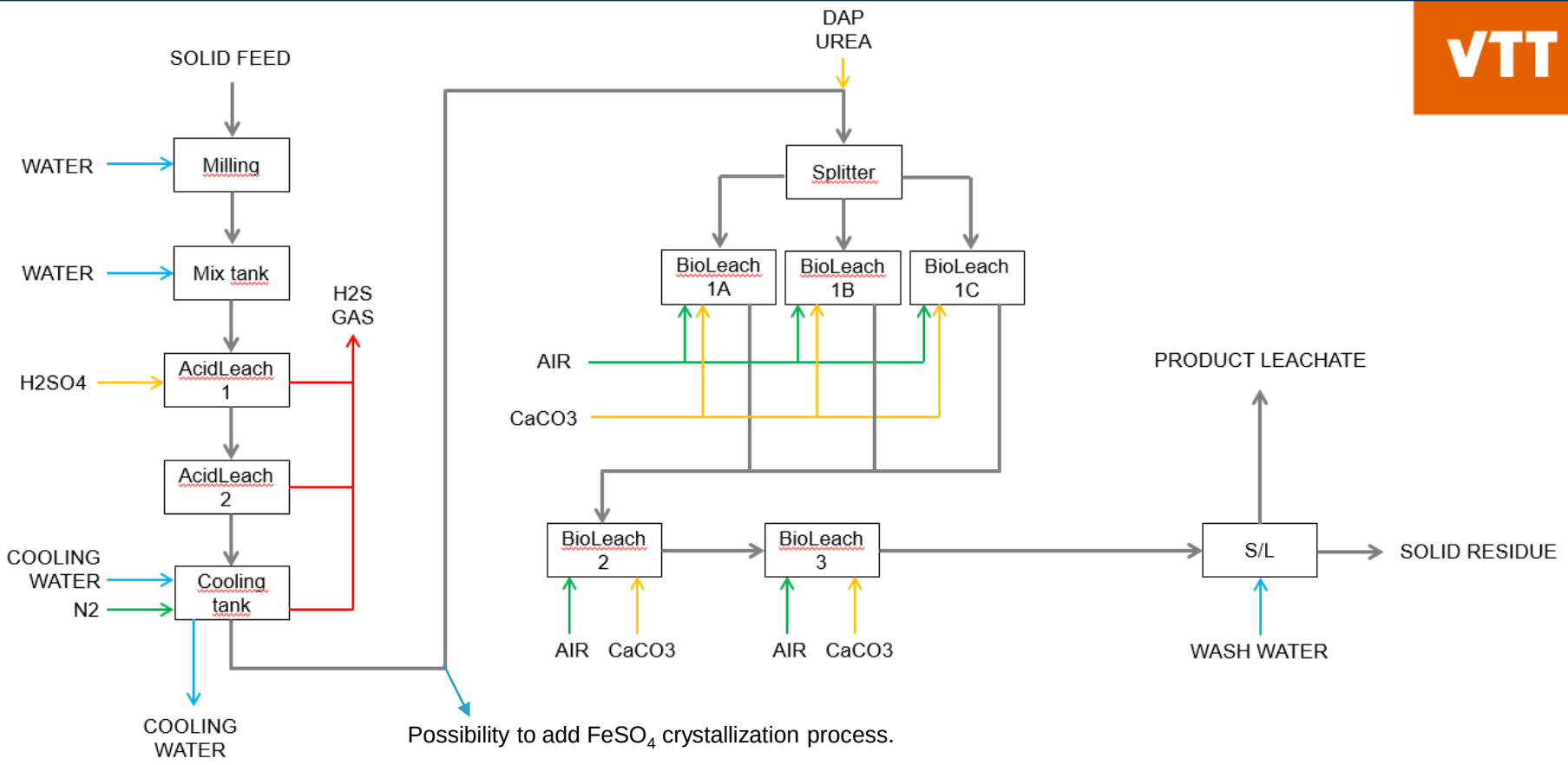
The challenge

- Mine site wastes, such as tailings, contain still valuable metals.
- Content of valuable metals in tailings may increase in future due to more complex ore mineralogy.
  - Importance of developing new processes for both valuable metals but also for other chemical products.
- This presentation addresses the treatment of high sulphur tailings, containing:
  - Pyrite, hosting cobalt that cannot be recovered by conventional processes.
  - Pyrrhotite, hosting no valuable metals and is therefore a waste in conventional processes.

Our approach

- For high sulphur tailings, the tank bioleaching is a technically viable method.
  - However, economic challenges may be present.
- Our approach is to conduct a selective leaching for pyrrhotite removal before tank bioleaching. This may lead to the following benefits:
  - Decreased bioleaching reactor capacity?
  - Decreased oxidation capacity in bioleaching?
  - Possibility to convert pyrrhotite to H_2S gas, and further to sellable sulphur products?
  - Possibility to convert pyrrhotite to $FeSO_4$ product?

Two-stage leaching layout



Results

- Selective pyrrhotite pre-leaching was successful.
  - Rapid process; <2 hours at 90 °C.
  - Complete pyrrhotite dissolution to form H_2S gas and $FeSO_4$ containing leachate.
  - $FeSO_4$ leachate had only minor impurities (Ca, Mg Zn, Ni, Si).
- Following tank bioleaching was successful.
  - Cobalt leaching yield >80 %.
  - Less tank bioleaching capacity needed – seems that one bioleaching reactor can be removed, compared to the direct bioleaching.

THANK YOU – QUESTIONS?

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