Water Consumption at the Proposed Copper Flat Mine

Conventional Tailings Storage Facility
Riotinto mine, Spain

Filtered Tailings Storage Facility
Sigma Lithium mine, Brazil

Presentation to New Mexico Mining and Minerals Division and
New Mexico Environment Department

June 25, 2026

MALACH CONSULTING

Today's Presenter

Prof. Emerman's 60th birthday party at Standing Rock Indian Reservation

Prof. Steven H. Emerman

- M.A., Geophysics, Princeton University
- Ph.D., Geophysics, Cornell University
- Professor of Geology for 31 years
- Over 70 peer-reviewed publications in mining, hydrology and geophysics
- Co-Author of Safety First: Guidelines for Responsible Mine Tailings Management
- Owner of Malach Consulting, specializing in environmental impacts of mining

MALACH CONSULTING

Prof. Emerman has evaluated proposed and existing mining projects in North America, South America, Europe, Africa, Asia, and Oceania. He has testified on issues of mining and water before the US House Subcommittee on Indigenous Peoples of the United States, the European Parliament, the United Nations Permanent Forum on Indigenous Issues, and the United Nations Environment Assembly.

Prof. Emerman is the former Chair of the Body of Knowledge Subcommittee of the U.S. Society on Dams.

Prof. Emerman testifying before the U.S. Congress on March 12, 2020.

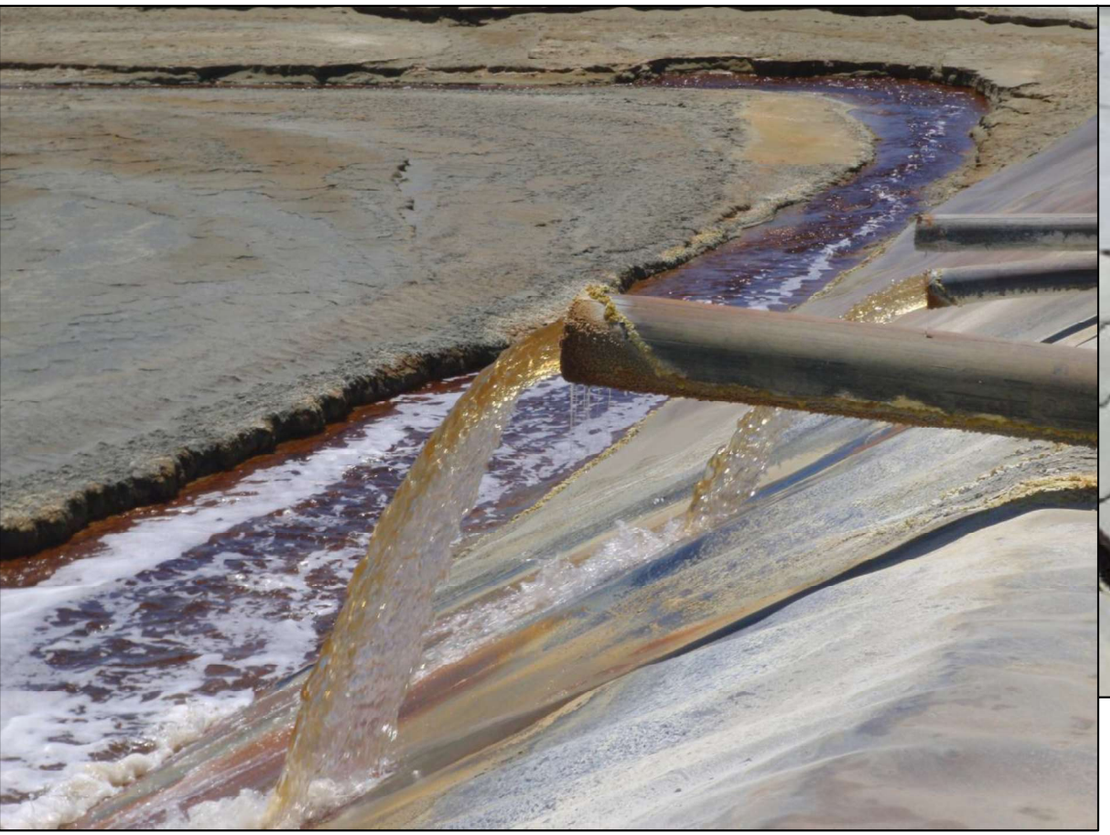
Proposals for Copper Flat Mine

- The project will process 29,600 US tons of copper ore per day.
- The project with conventional tailings technology is anticipated to consume 6100 acre-feet of water per year.
- The project with filtered tailings technology is anticipated to consume 1050 acre-feet of water per year (equivalent to reduction of 82.8%).

Questions

1) Can a reduction in water consumption of 80% be achieved by changing the proposal from conventional tailings technology to filtered tailings technology?
2) Is the anticipated water consumption using filtered tailings technology realistic and consistent with industry standards?

Filtered Tailings have much Lower Water Contents than Conventional Tailings

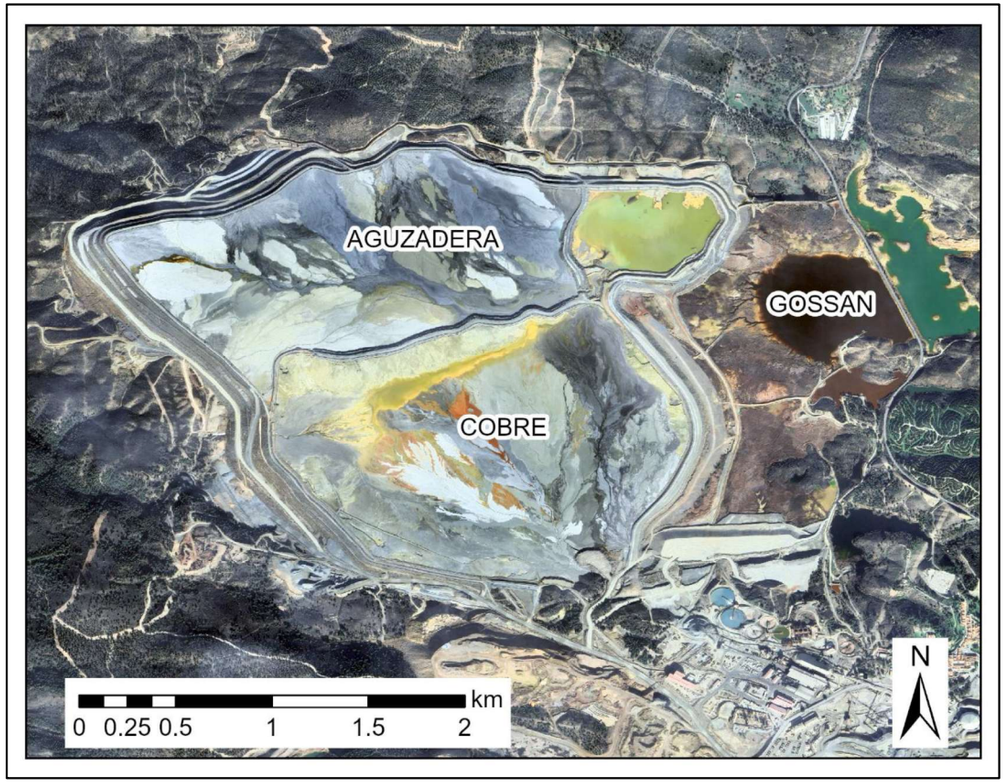


Conventional Tailings:
Typical Water Content = 150 – 400%

Filtered Tailings:
Typical Water Content = 17%

$$\text{Water Content} = \frac{\text{Mass of Water}}{\text{Mass of Solids}}$$

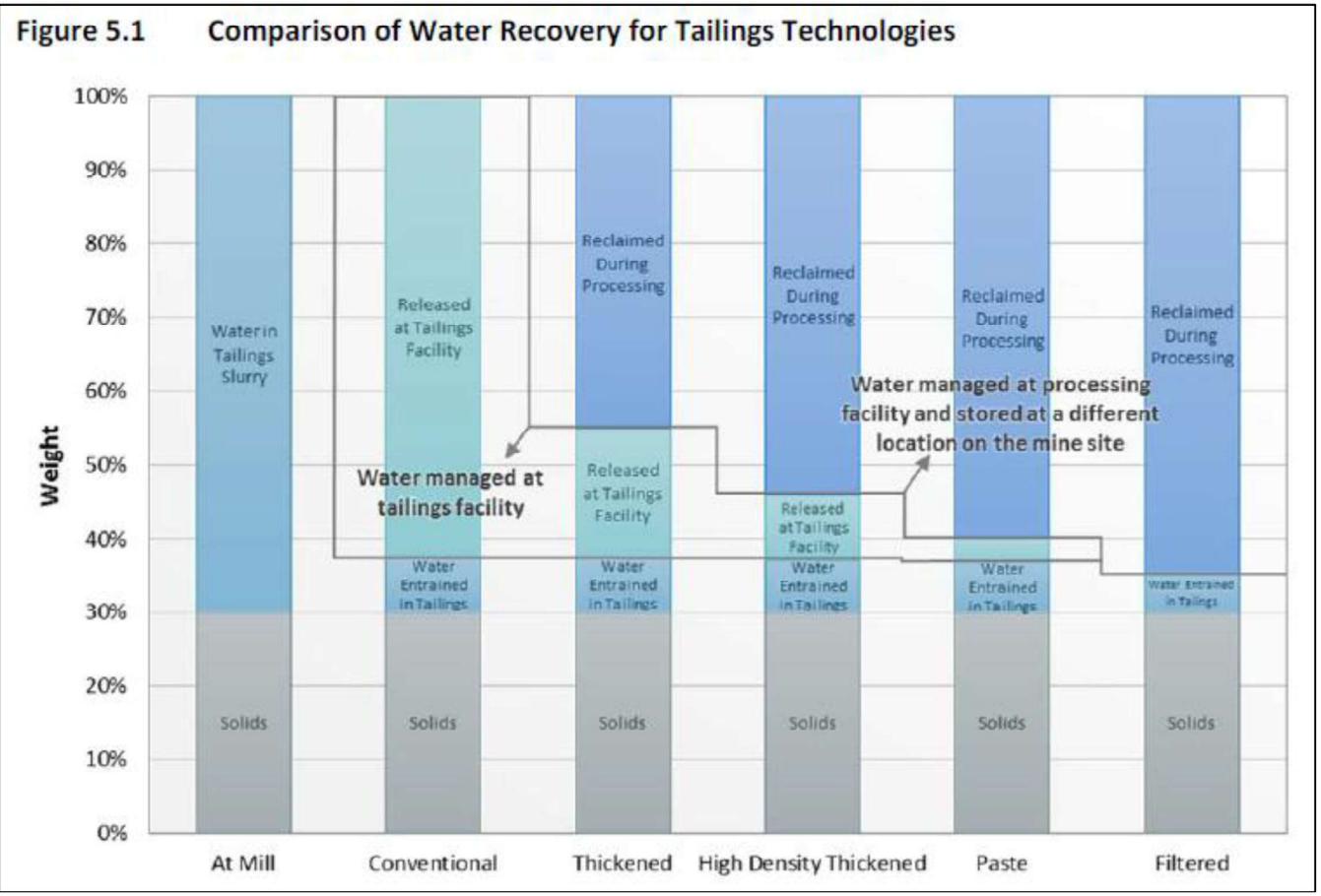
Water from the Tailings Pond is Pumped back into the Mining Operation



At the Riotinto mine, water from the Auguzadera and Cobre tailings ponds is pumped into the Gossam reservoir.

Water Savings from Filtered Tailings Technology

Reduction in Water Consumption = 26%



30 tons of solid tailings

Conventional Tailings: 7 tons of water entrained within tailings, 63 tons of water reclaimed from tailings pond

Filtered Tailings: 5 tons of water entrained within tailings, 65 tons of water reclaimed during processing

Water can be Lost by Evaporation from the Tailings Pond

Spiller and Dunne (2017): “The amount of evaporation of water from the TSF may range from about 5% to more than 60% of the total water lost at a TSF.”

On that basis, compared to a conventional TSF that undergoes evaporation under the most unfavorable conditions (high temperature, high solar radiation, low relative humidity, high wind speed, lack of any technologies for reducing evaporation), the water savings by transitioning to filtered tailings could be as high as 71%.

Tailings pond at Highland Valley Copper mine, British Columbia

Industry Standard: Filtered Tailings Technology cannot Achieve more than a 60% Reduction in Water Consumption

- The preceding analysis refers only to the TSF. Water that is incorporated into the final product and water that is evaporated through dust control throughout the rest of the mining operation will be the same regardless as to how the tailings are managed.
- Tailings ponds can also be a source of water through collection of precipitation and surface runoff.
- In arid or semi-arid climates, the prevention of dust generation from filtered tailings stacks is an additional source of water consumption.
- Under many circumstances, filter presses cannot achieve the target water content for filtered tailings, so that the tailings must be air-dried in the field to achieve the target water content for maximum compaction. This water is lost to evaporation and is not returned to the mining operation.

Minimum Water Consumption = 2500 acre-feet per year

1050 acre-feet of water per year + ore production of 29,600 US tons per day → water intensity of 0.13 cubic meters of water per metric ton of ore

This water intensity is unrealistic for the following reasons:

- A typical target water content for filtered tailings is 15%.
- Targets are not always achieved. Tailings that do not achieve the target water content must be air-dried in the field resulting in additional water loss.
- No water loss is allocated to incorporation into the copper concentrate or to evaporation anywhere else on the mining operation (such as dust control on haul roads).

Summary

- Maximum water savings achieved through conversion to filtered tailings technology = 60%
- Minimum water consumption by Copper Flat mine = 2500 acre-feet per year

Thanks for listening!
I will take questions now or e-mail to SHEmerman@gmail.com.

MALACH CONSULTING