

Tailings Water Treatment

Noor Hassan, Kathy Zhan, Nyahoth Bipean
Schulich School of Engineering

ACKNOWLEDGMENTS

Throughout this project, we were able to design a water treatment plant to treat 2000 cubic meters per hour of Suncor's Composite Tailings (CT) Water, thanks to the support of Dr. Ardy Sadighian and Dr. Hossein Hejazi.

PROBLEM STATEMENT

- Alberta's oil sands have the 4th largest oil reserve in the world [1]
- Suncor's production rate of \$800K barrels of bitumen/day creates the urgency for a solution to treat tailings water
- Deposits are expected to reach maximum capacity by 2025
- Projected: 10% production loss for Suncor without a water treatment solution

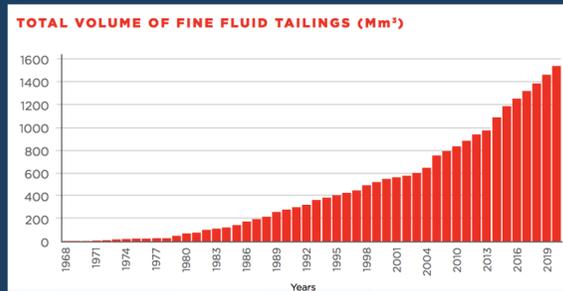


Figure 1: Volume of Fluid Tailings from 1968 to 2019 [2]

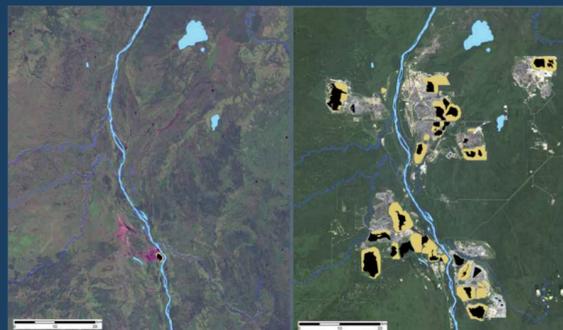
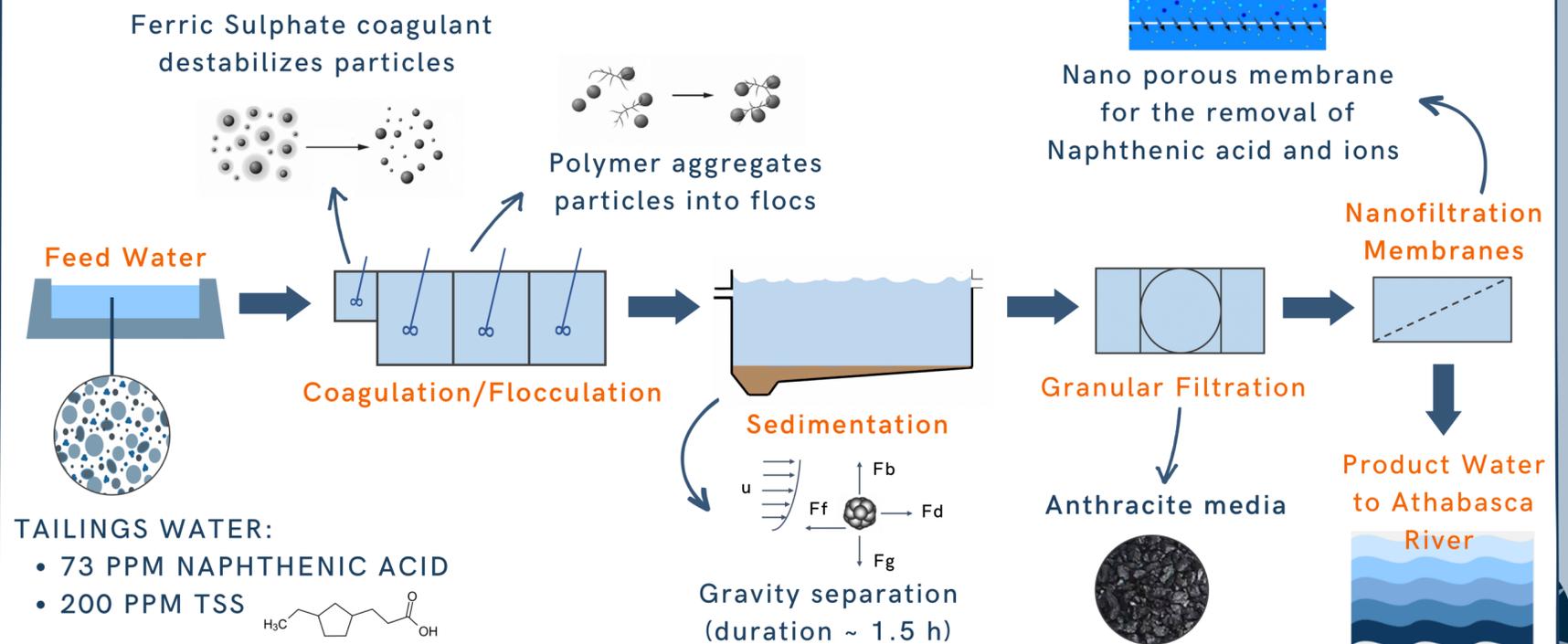


Figure 2: Growth of Tailings from 1975 to 2020 [3]

PROCESS DESIGN



OUR PURPOSE

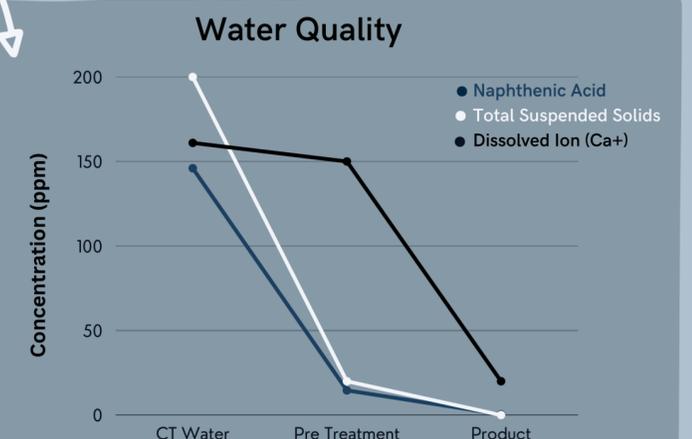
- Treat 2000 cubic meters/hour of Suncor's tailings water to a quality that aligns with Alberta's Surface Water Quality Guidelines
- Release water into the Athabasca River in accordance with federal regulations (in 2025) to replenish Alberta's mining water resources

CONCLUSION

- The increase in fluid tailings requires effective treatment to sustain mining operations in Northern Alberta
- Our design process treats 2000 cubic meters per hour of Suncor's Composite Tailings
- Results show up to ~ 95% removal of TSS, 90% Naphthenic Acid and 70% product water recovery
- Future efforts to achieve a higher water recovery and contaminant removal

RESULTS

- Pre-treatment (coagulation/flocculation, sedimentation, and filtration) of the tailings water - removes up to 95% TSS and 90% Naphthenic Acid
- 70% water recovery in product from feed water
- More water to be recovered from wastewater sludge streams
- Sludge sent to a sludge facility for adequate disposal and treatment



REFERENCES

- [1] Oil sands facts and statistics. <https://www.alberta.ca/oil-sands-facts-and-statistics.aspx> (accessed Mar 24, 2023).
- [2] One trillion litres of toxic waste and growing: Alberta's tailings ponds. <https://environmentaldefence.ca/wp-content/uploads/2017/06/EDC-and-NRDC-One-trillion-litres-of-toxic-waste-and-growing-Albertas-tailings-ponds-June-2017.pdf> (accessed Mar 25, 2023).
- [3] 50 years - Environmental Defence Canada. https://environmentaldefence.ca/wp-content/uploads/2022/05/TailingsPondsReport_edcv2_web.pdf (accessed Mar 25, 2023).
- [4] Tailings management. <https://www.suncor.com/en-ca/sustainability/environment/tailings-management> (accessed Mar 24, 2023).