Remine Water

Solar powered water reuse and resource recovery in mining

Water reuse and resource recovery in mining industry

LIFE REMINE WATER: https://www.reminewater.eu/

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#RemineWater

reminewater.eu

LIFE+ programme

Duration: October 2018-October 2023

Total Budget: 1.8 M€

Partners:

CETAQUA WATER TECHNOLOGY CENTRE

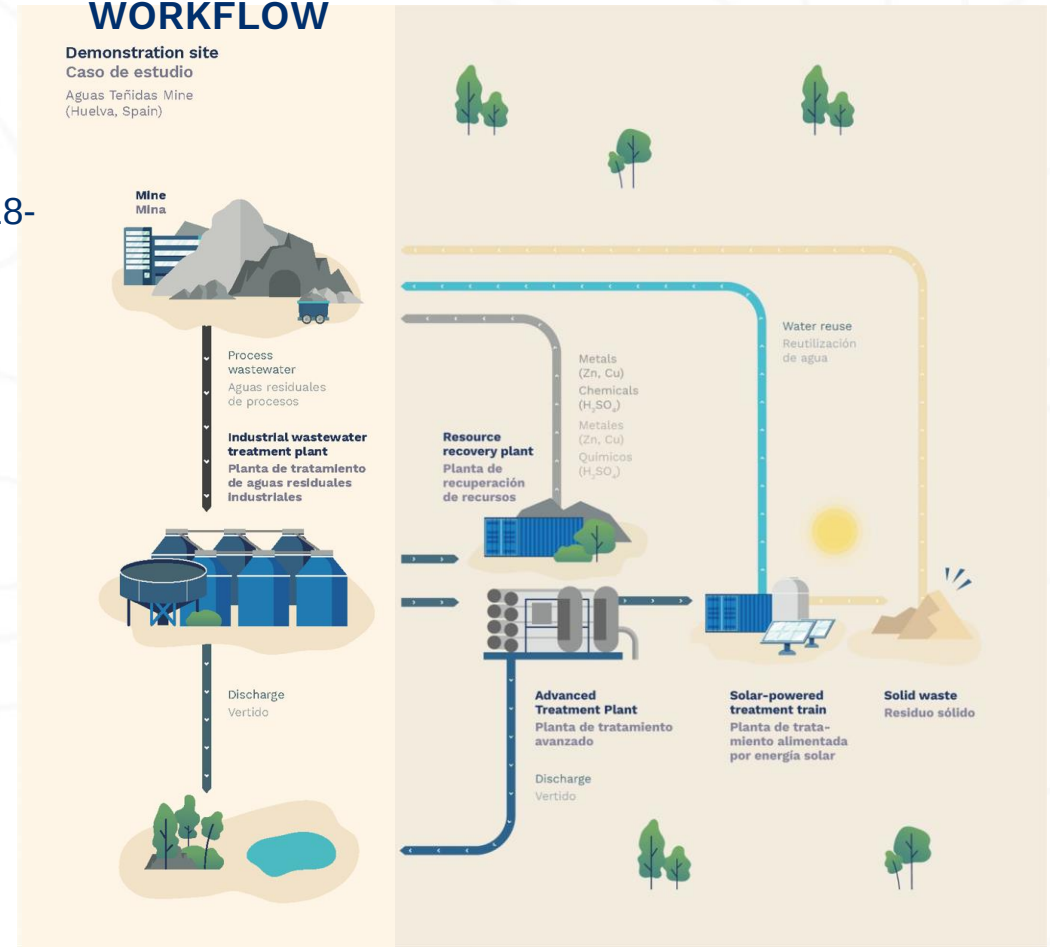
Sandfire matsa

Łukasiewicz Instytut Metali Nieżelaznych

newHeat solar heat generation for industrial applications

CONVENTIONAL WORKFLOW

REMINE WATER



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Context

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MATSA WWTP

CONVENTIONAL WORKFLOW

pH= 2-3
[SO_4^{2-}]= 3500-4000 ppm
[Ca2+]= 500-800 ppm
COD = 150-400 ppm
[Cu^{2+}]= 2 ppm
[Zn^{2+}]= 50-60 ppm

$FeCl_2$ H_2O_2 Flocculant Lime

FENTON PROCESS
Thiosalts oxidation + Sulphates precipitation (Gypsum)

pH= 9.5
[SO_4^{2-}]= 2500-3000 ppm
[Ca2+]= 500-800 ppm
COD = 50-100 ppm
[Cu^{2+}]= <1 ppm
[Zn^{2+}]= <1 ppm

Lime AlNa

SULPHATES PRECIPITATION
(Gypsum and Ettringite)

pH= 7-8
[SO_4^{2-}]= 1500-2000 ppm
[Ca2+]= 400-700 ppm
COD = 50-100 ppm
[Cu^{2+}]= <1 ppm
[[Zn^{2+}]= <1 ppm

Buffer Pond

SO_4^{2-} = 1900 ppm
Future limit: 900 ppm

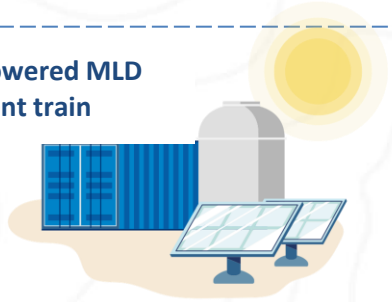
REMINE WATER

Mining dumps

Landfill leachates

Resource recovery plant

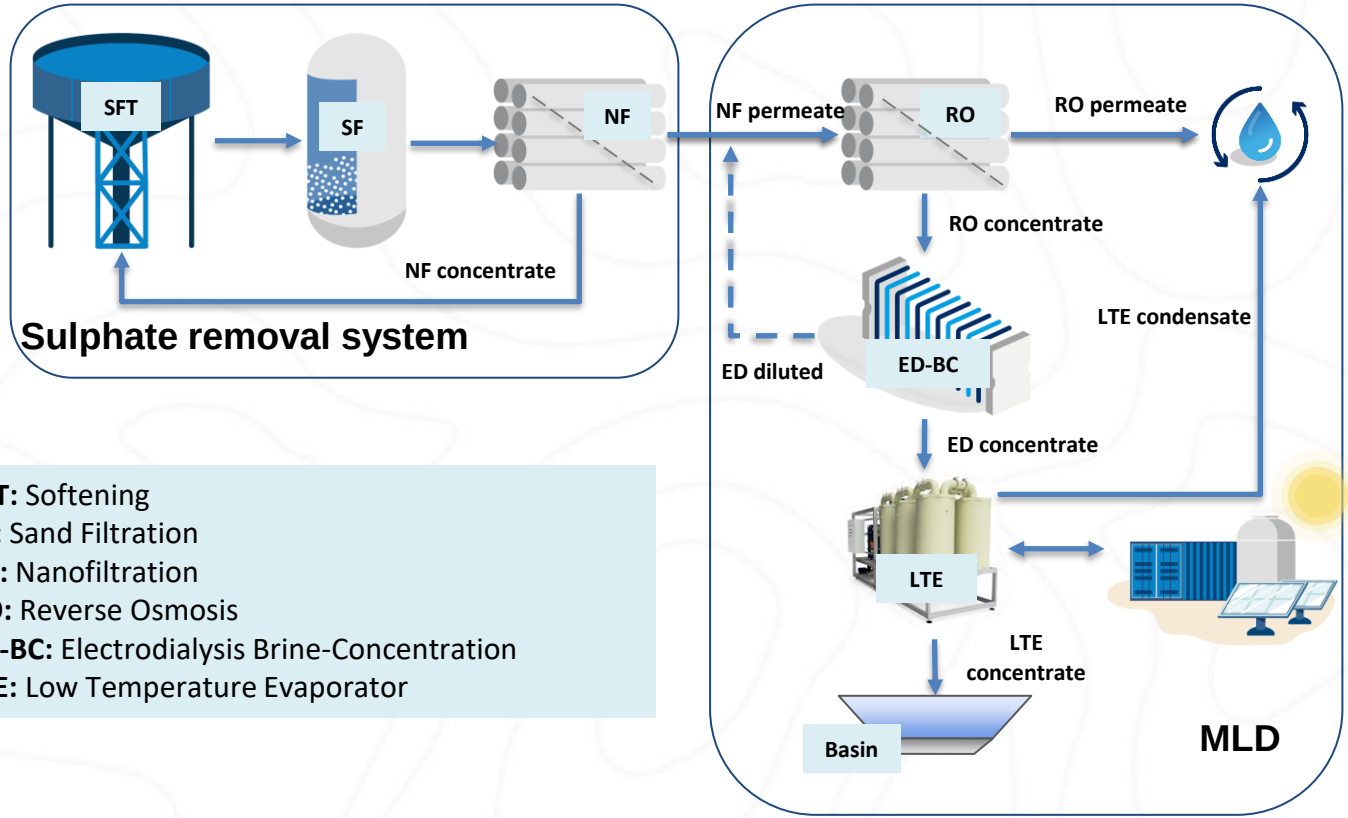
Solar powered MLD treatment train




Virtual tour: https://www.cetaqua.com/wp-content/uploads/LIFE_RemineWater/video.html

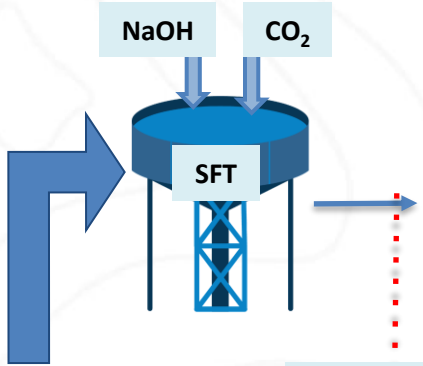

TK-9019

Water Reclamation Plant (Sulphate Removal & MLD)



SFT: Softening
SF: Sand Filtration
NF: Nanofiltration
RO: Reverse Osmosis
ED-BC: Electrodialysis Brine-Concentration
LTE: Low Temperature Evaporator

Water Reclamation Plant (Sulphate Removal & MLD)



Outlet FENTON PROCESS

pH	9.5 ± 0.6
TDS (g/L)	3 ± 0.5
Ca (mg/L)	800 ± 200
Mg (mg/L)	60 ± 30
SO_4^{2-} (mg/L)	3200 ± 600
Na (mg/L)	500 ± 100
Cl (mg/L)	500 ± 100

Water Reclamation Plant (Sulphate Removal & MLD)

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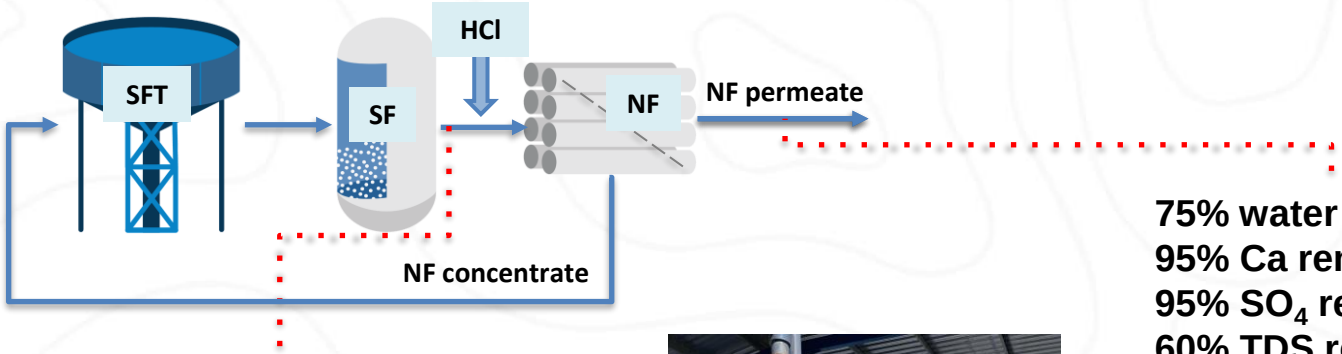
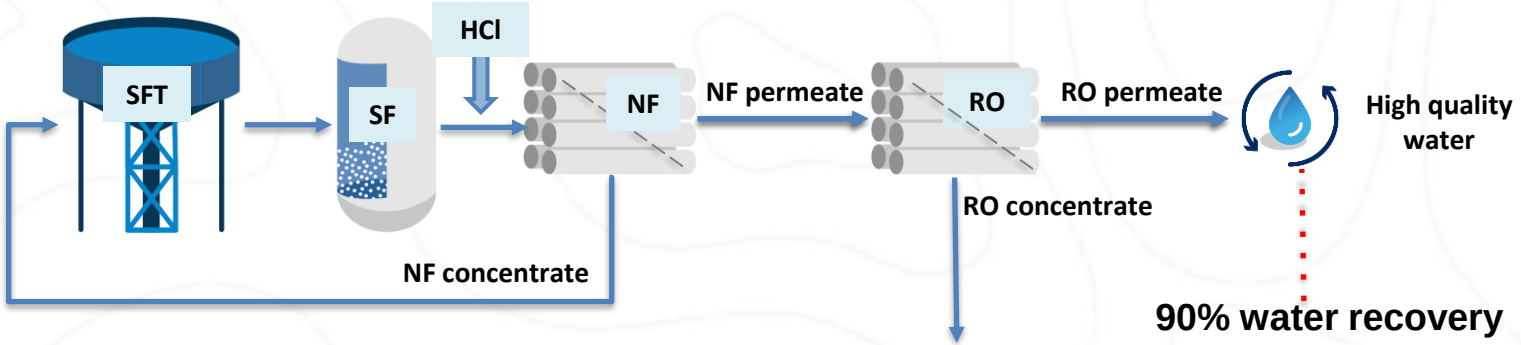


75% water recovery
95% Ca removal
95% SO_4 removal
60% TDS removal

pH	6.5 ± 0.7
TDS (g/L)	3.7 ± 0.4
Ca (mg/L)	300 ± 200
Mg (mg/L)	15 ± 8
SO_4^{2-} (mg/L)	3000 ± 1000
Na (mg/L)	1200 ± 1000
Cl (mg/L)	800 ± 500

pH	7.1 ± 0.8
TDS (g/L)	1.5 ± 0.5
Ca (mg/L)	30 ± 20
Mg (mg/L)	4 ± 3
SO_4^{2-} (mg/L)	30 ± 30
Na (mg/L)	500 ± 100
Cl (mg/L)	1100 ± 300

Water Reclamation Plant (Sulphate Removal & MLD)



TDS (g/L)	4.3 ± 0.4
Na (mg/L)	1200 ± 200
Cl (mg/L)	1800 ± 700

90% water recovery
97% TDS removal
96% Na removal
98% Cl removal

pH	6.3 ± 0.3
TDS (g/L)	0.04 ± 0.04
Na (mg/L)	18 ± 8
Cl (mg/L)	20 ± 10

Water Reclamation Plant (Sulphate Removal & MLD)

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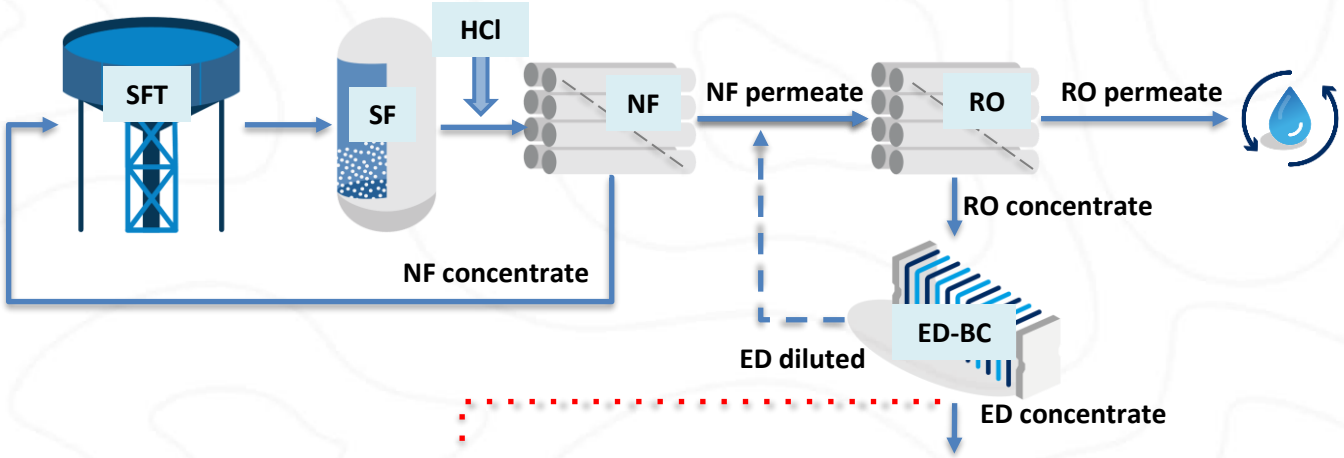

Salt concentration factor: 2

TDS (g/L)	10 ± 1
Na (mg/L)	3600 ± 700
Cl (mg/L)	5000 ± 1000

Water Reclamation Plant (Sulphate Removal & MLD)

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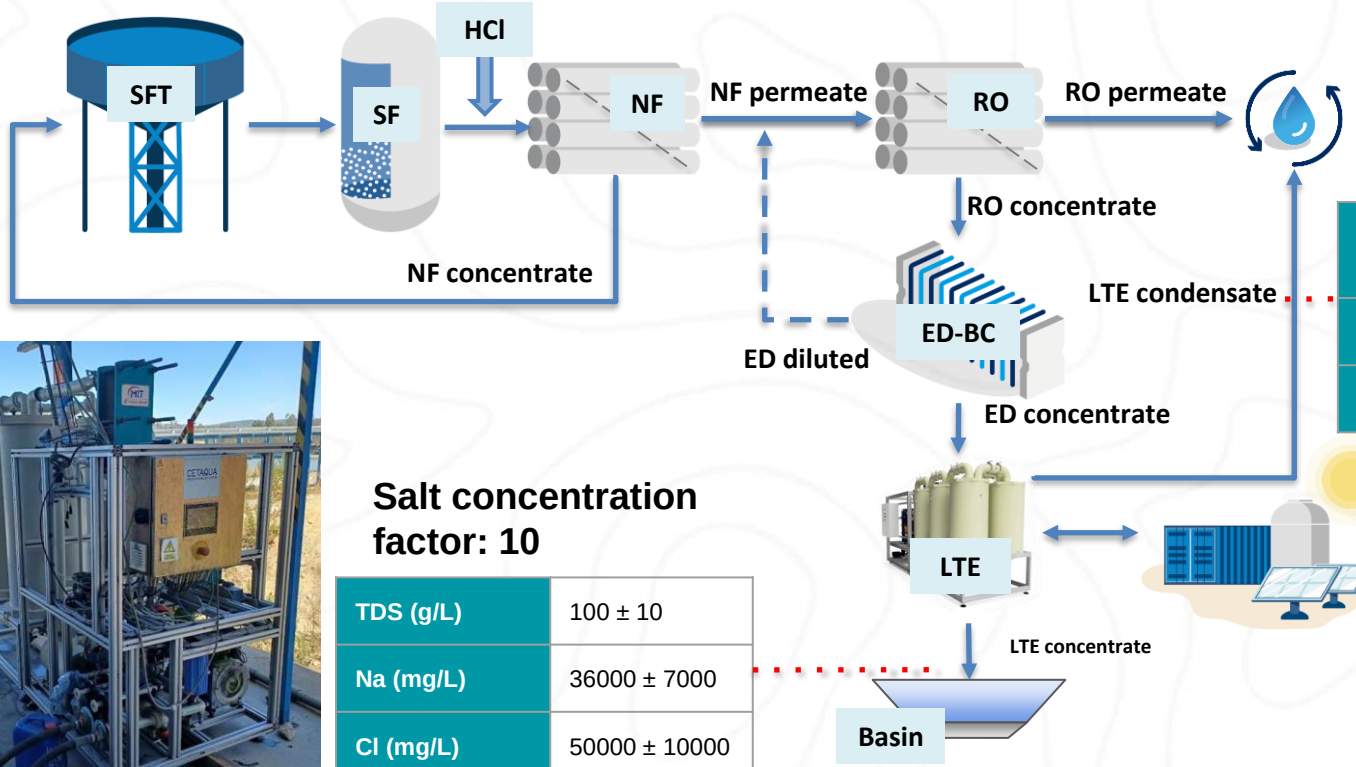

Salt concentration factor: 10

TDS (g/L)	100 ± 10
Na (mg/L)	36000 ± 7000
Cl (mg/L)	50000 ± 10000

TDS (g/L)	0.015 ± 0.001
Na (mg/L)	7 ± 2
Cl (mg/L)	9 ± 2

Resource recovery treatment train

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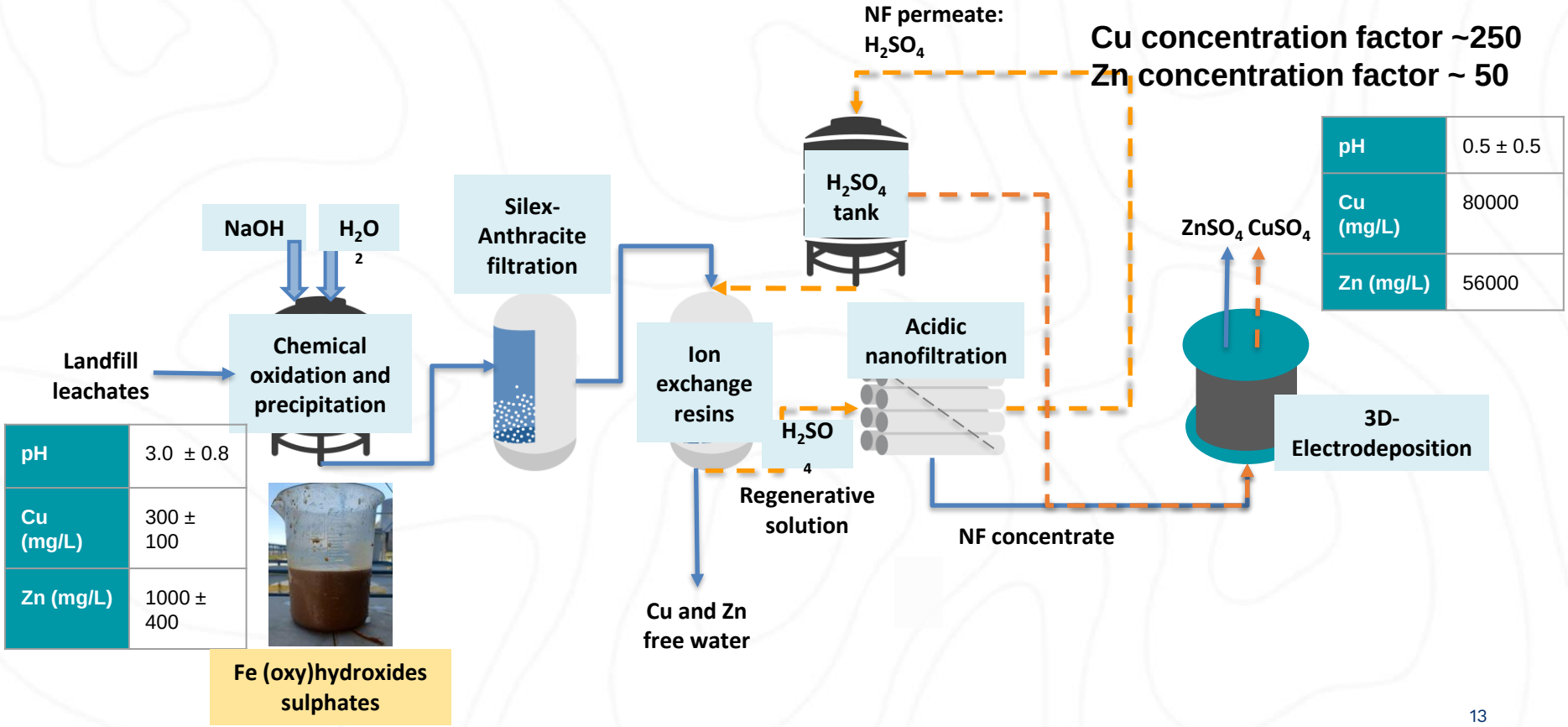

pH	3.0 ± 0.8
Cu (mg/L)	300 ± 100
Zn (mg/L)	1000 ± 400

pH	0.5 ± 0.5
Cu (mg/L)	80000
Zn (mg/L)	56000

CONCLUSIONS

Development of **two innovation treatment trains** that allow to :

- **Reduce the freshwater consumption by 50%** compared to the current water treatment scheme in the mine
- **Recovery of 95% of water from reverse osmosis concentrates** through the implementation of minimum liquid discharge technologies
- **Brine concentration** from ~5 g/L TDS in the reverse osmosis up to 100 g/L in the evaporation concentrate
- **Metal concentration** from 300 mg/L Cu and 1000 mg/L Zn in the resource recovery treatment train up to 80000 mg/L Cu and 56000 mg/L Zn.

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Thank you!