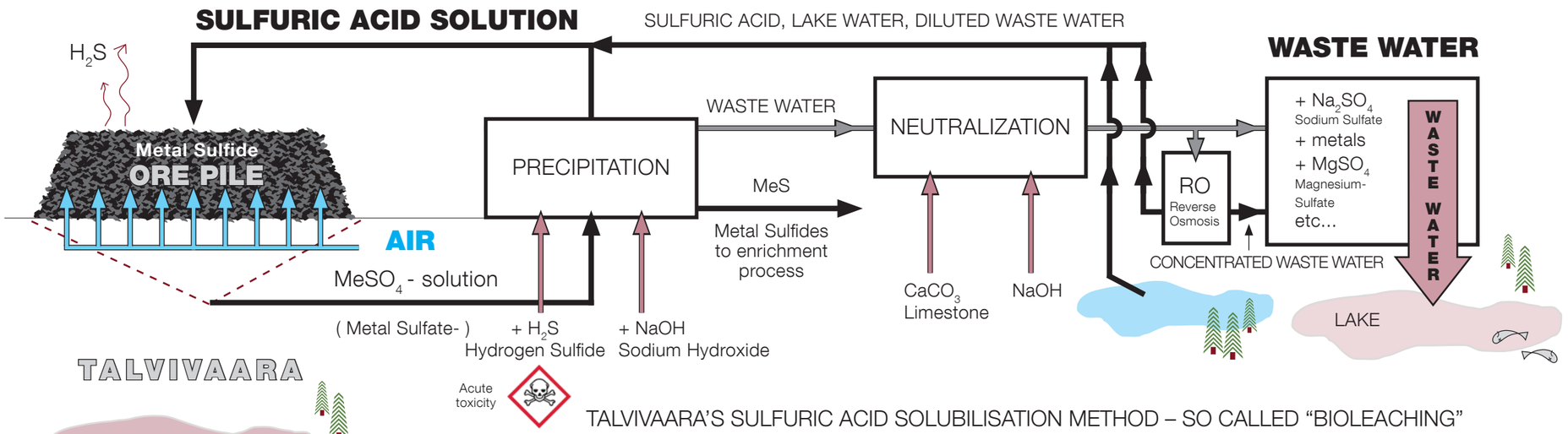
Comparison of Mining Technologies

Hannu L. Suominen, Ph.D.
20.03.2015

"BIOLEACHING" METHOD

150 m³ Na_2SO_4 - solution / 1 tn NiS = 10 000 tn NiS => 1 500 000 m³ of waste water



TALVIVAARA'S SULFURIC ACID SOLUBILISATION METHOD – SO CALLED "BIOLEACHING"

Black schist ore of Talvivaara contains < 0,2 % of NiS, CuS, CoS, ZnS, but plenty of Iron, Manganese, Aluminum, Magnesium and ca. 15 % of coal.
Main products are Nickel Sulfide (NiS, 10 000 tn/y) and Zinc Sulfide (ZnS, 20 000 tn/y) in 2014.
The method produces 150 m³ of waste water per every ton of Nickel (Ni), which contains mostly Sodium Sulfate (Na_2SO_4) but also other impurities.
All information is from public sources.

CAPEX AND OPEX

Investment approx.....2 Milliard €

Operating expenses include:

The use of many chemicals

The necessity to clean the process water/ Cleaning expenses

Only a few commodities for sale

Poor performance of the process

PRODUCTION EXPENCE

75 000 €/ton of Nickel

Stock Price of Nickel in 2015

14 500 €/ton of Nickel

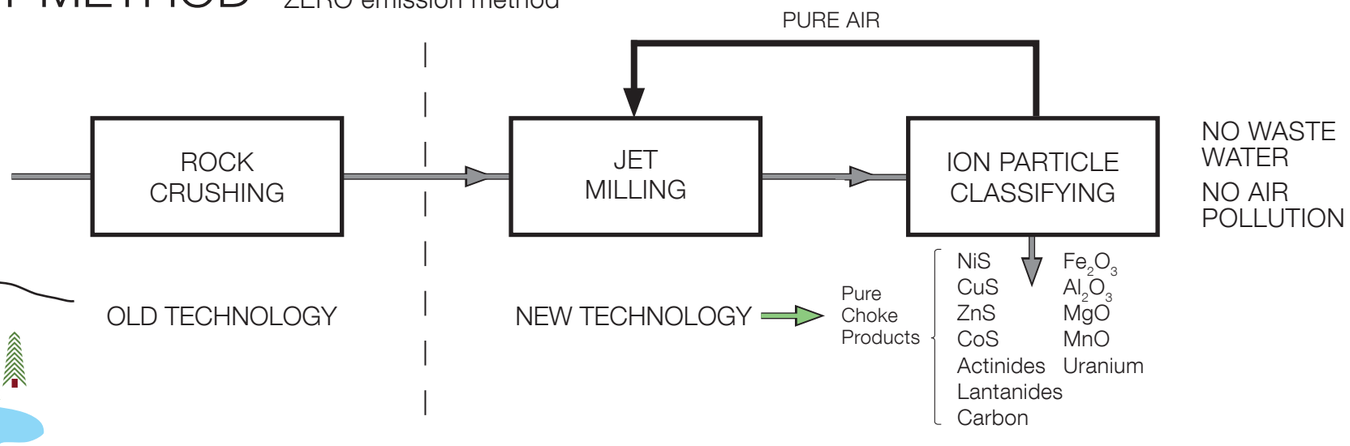
LABOR FORCE

400 workers/10 000 ton of Nickel

DRY ENRICHMENT METHOD

ZERO emission method

Tri Hannu L. Suominen 26.2.2015



- Dry Enrichment Method does not use water at all, nor Sulfuric Acid
- THE PROCESS DOES NOT PRODUCE WASTE WATER
- The method does not emit anything to the air, no particles, no gas

CAPEX AND OPEX

Investment approx … 1 Milliard €

Operating expenses are low, due to:

After investment the only consumable is electricity

Several commodity products for sale

Does not generate waste products and therefore no extra expenses

PRODUCTION EXPENCE

10 000 €/ton of Nickel

Price of Nickel in 2015
14 500 €/ ton of Nickel

LABOR FORCE

About 500 workers/ 50 000 ton of Nickel
Plus other products