**What are tailings?** Tailings are the fine-grained residues of ore processing, which are typically deposited in a Tailings Storage Facilities (TSF). Sedimentary-style processes deposit the tailings material in sub-horizontal, internally graded layers.

**What is the problem?** Each TSF has a complex internal structure, where the minerals comprising the tailings are heterogeneously concentrated, both laterally and vertically. Primary depositional structures may be overprinted by chemical reactions and metal mobilisation. The difficulty lies in how to sample the tailings materials in a way that allows the characterisation of both the horizontal and vertical variability, and the building of geospatial models.

**Why are geospatial models needed?** Tailings can contain significant amounts of recoverable valuable metals which were not recovered by original processing techniques or were previously not of economic interest. Additionally, sulphidic tailings may produce Acid and Metalliferous Drainage (AMD). Accurate and reproducible geospatial models are required for assessment of the economic potential of reprocessing tailings, as well as the AMD generation potential.

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**SULTAN European Training Network for the Remediation and Reprocessing of Sulphidic Mining Waste Sites**

This study is part of the SULTAN ETN. The work is ongoing, and due to the current situation there are not many new results to publish. Instead, the SULTAN project will be presented – see the next slide for the project poster.

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Towards future management of sulfidic mine waste residues

The SULTAN project is performing an innovative approach to reprocess mine waste and recover valuable materials through sustainable methodologies – Working on different approaches linked to geology, geometallurgy, mineral processing, valorization and remediation, thus helping to close the circular loop.

**What?**

- **Base Metals**: Cu, Zn, Pb
- **Critical Elements**: In, Se, Ge, Ga
- **Mineral Residues**: SiO₂, Al₂O₃, Fe₂O₃

**Where?**

- **11.4 Mt of tailings**
- **1.6 Mt of tailings**
- **45 Mt of tailings/year**
- **6.8 Mt of waste rock/year**

**How?**

**WP 1 – Geological mapping and characterization**
- Sampling
- Geology
- Sampling
- Geosampling
- Geo statistics
- Geo modelling

**WP 2 – Sustainable mining chemicals and metal extraction/recovery**
- Froth flotation
- Metal extraction
- Metal recovery
- Beneficiation

**WP 3 – Mineral residues valorization**
- Refuse
- Froth flotation
- Microwave leaching
- Saltwater leaching
- Bioleaching
- Ion flotation

**WP 4 – Environmental assessment**
- Life cycle assessment (conventional and valorization scenarios)
- Environmental and health impact assessment (solid phase and chemical characterization)

**SULTAN in numbers**

- **15** Early Stage Researchers (ESRs)
- **8** Beneficiaries
- **7** Partner Organizations
- **8** Network-Wide Events
- **5** Tailings and mine site visits

First ETN with more female ESRs than male ESRs – Women in science initiative

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Beneficiaries:

- Green Cements
- Ceramics
- Minerals
- Inorganic polymers

Partners:

- Outotec
- GTK
- Sociedad Minera Alpuyeca
- Bouygues
- CSM

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