UMWELTLEISTUNGEN

TECHNOLOGICAL VALUE ADDED TO MINERAL PROSPECTION, MINING, AND PROCESSING

CRITICAL RAW MATERIALS TECHNOLOGY METALS

EXPLORE
DESIGN
CONSTRUCT

UMWELT- UND INGENIEURTECHNIK GMBH DRESDEN (UIT) BELONGS TO GENERAL ATOMICS EUROPE GRUPPE AND IS PART OF THE GLOBAL NETWORK OF GENERAL ATOMICS (GA)

GA and affiliated companies operate on five continents.

The global network comprises over 15,000 employees.

The global network occupies more than 3 million square feet of engineering, laboratory and manufacturing facilities.

GA affiliates include among other General Atomics Europe based in Saxony and Brandenburg, Heathgate Resources Pty Ltd (South Australia), GA Uranium Resources Group, Diazyme Laboratories Inc. and GA Honeywell Uranium Conversion Partnership.

General Atomics is a diversified technologies company.

GLOBAL PROGRESS THROUGH TECHNOLOGY

GENERAL ATOMICS

GENERAL ATOMICS EUROPE

UMWELTLEISTUNGEN

UIT is integrated in GA's business activities for resource prospection, exploration, mining and metallurgical processing in the context of securing the supply of critical materials for high technologies.

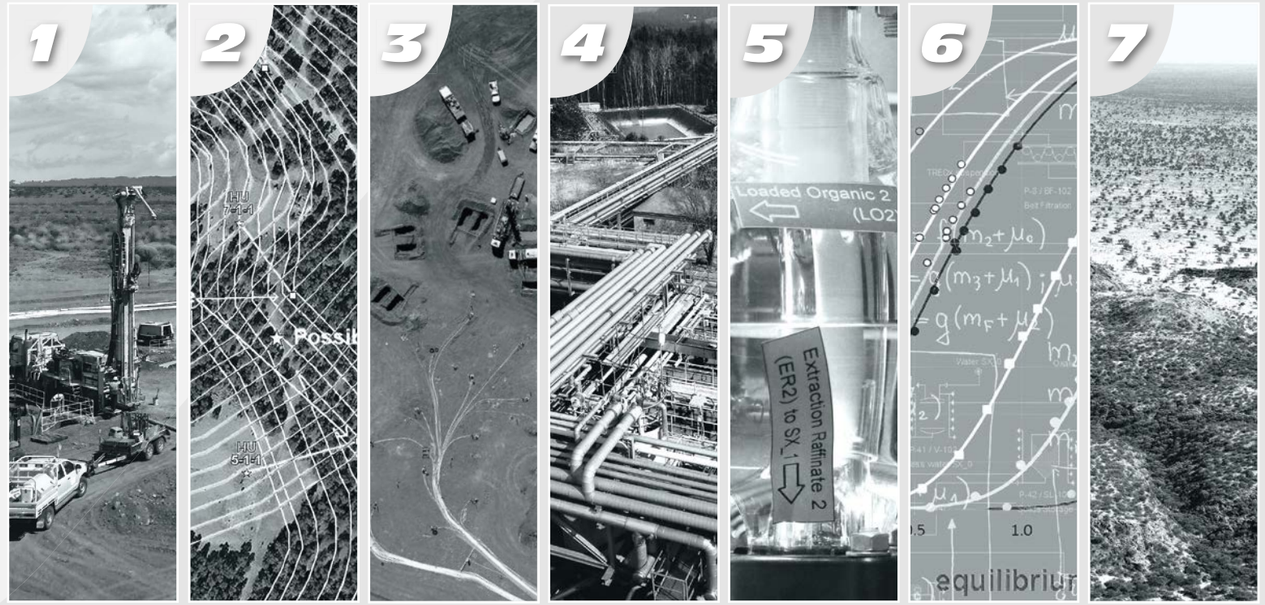
CONSULTING AND ENGINEERING INDUSTRIAL R&D CENTER FOR EXPLORATION, MINING AND PROCESSING TECHNOLOGIES

FACILITIES PRODUCTS

1. Mineral processing and hydrometallurgical test/piloting center (including NORM removal)
2. Radiological laboratory for geophysical logging tools
3. Radiometric process monitoring and control
4. OreLog – innovative borehole logging of ore deposits/grade control

SERVICES

1. Exploration – geophysics – economic geology
2. Feasibility studies towards engineering
3. Expertise in unconventional mining methods including in-situ recovery (ISR)
4. Mineral processing / NORM separation (removal of natural radioactivity) – process design
5. Metal separation / refining – from test work to engineering
6. Metallurgical process simulation / modeling, in particular, IX, IEX, RIP, SX, …
7. Environmentally compliant mining and remediation



EXPLORATION
GEOPHYSICS
ECONOMIC GEOLOGY

UIT can provide expert advice, project audit, and staff mentoring at any stage of the exploration and evaluation cycle from project generation through to mine development. Given our depth of experience, we can supply a complete exploration management service including planning, supervision, implementation, management and reporting.

We have worked with all types of companies, from junior expertise through to international majors, and our depth of knowledge and experience enables us to tailor genuinely value-adding solutions for each client's needs, whether first-pass drilling or brownfields exploration at an operating mine. Our consultants are industry leaders and can provide unique insights on the best ways to advance your project or to assess opportunities for project acquisition.

ADVANCED GEOPHYSICAL METHODS

3D DEPOSIT AND HYDROLOGICAL MODELING

ECONOMIC GEOLOGY

Deposit evaluation by:

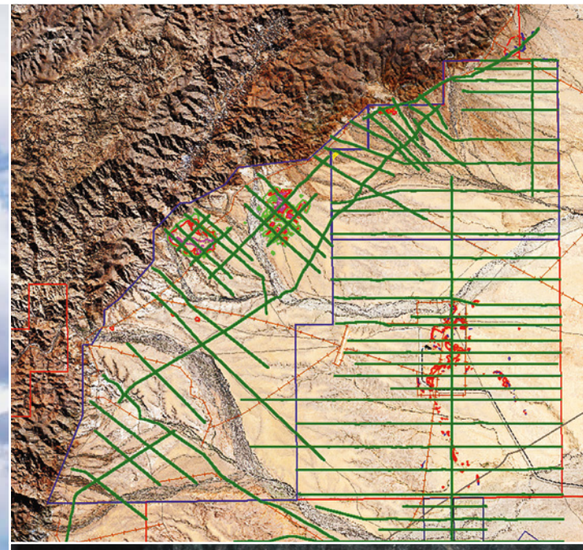
- Mapping and field investigations
- Drill program planning and supervision
- Exploration strategy and project management
- Geometallurgy

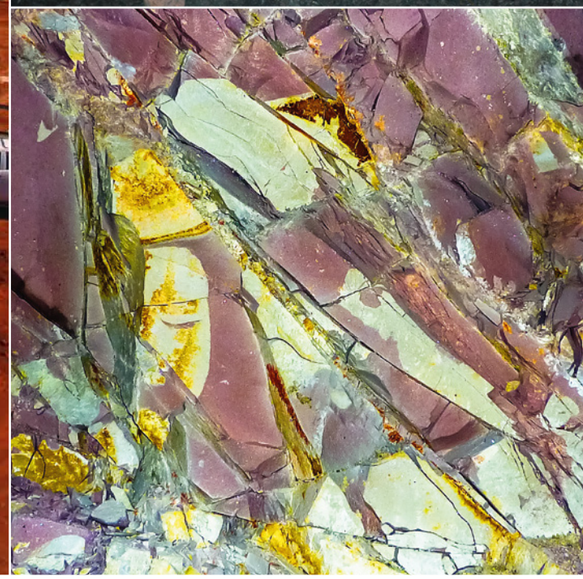
Geological documentation and evaluation of

- Drill cores
  (petrography, stratigraphy, ore minerals, tectonic structures)
- Underground exposures (mines, caves)
- Surface exposures
  (e.g. open-pit mines, quarries, excavations)
- Field exposures (field mapping)
- Tailings

Sample Characterization

- Geochemistry (traditional and non-destructive methods)
- Mineralogy by optical microscopy, XRD, Raman, SEM, MLA
- Petrophysical parameters such as density, porosity, permeability, pore size distribution, etc.
- Particle size distribution

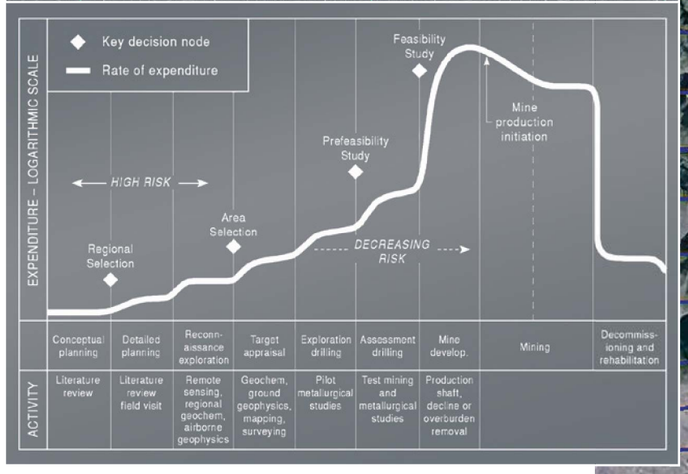




FEASIBILITY STUDIES TOWARDS ENGINEERING

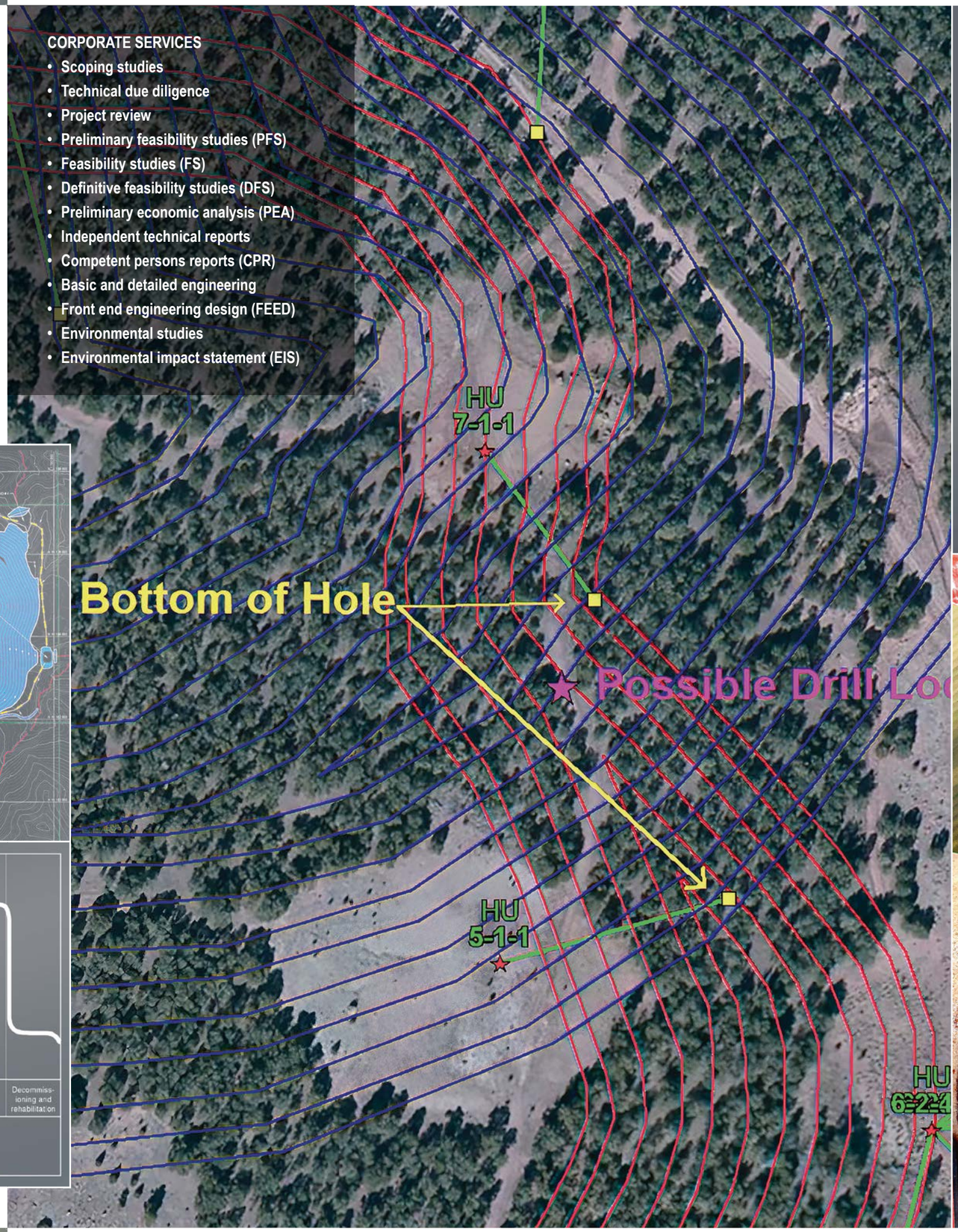
The mining industry has been characterized by failed mining investments. This can be due to bad luck, optimistic evaluations and/or unidentified fatal flaws.

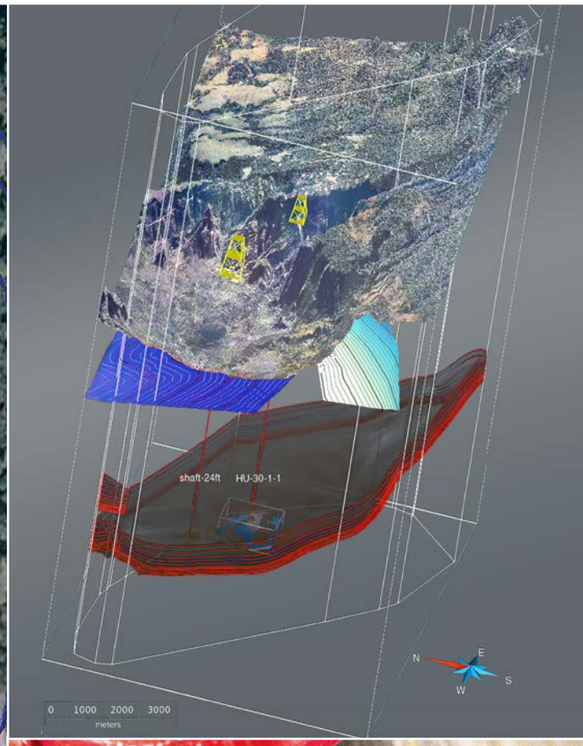
Some of these issues can be addressed through quality reviews by experienced technical aspects and embedding best practice processes within your organization. UIT experts and consultants are trained to understand your situation and advise you in supporting, your investment decisions. We have geologists, mining engineers, metallurgists and process engineers to cover the technical spectrum.



CORPORATE SERVICES

- Scoping studies
- Technical due diligence
- Project review
- Preliminary feasibility studies (PFS)
- Feasibility studies (FS)
- Definitive feasibility studies (DFS)
- Preliminary economic analysis (PEA)
- Independent technical reports
- Competent persons reports (CPR)
- Basic and detailed engineering
- Front end engineering design (FEED)
- Environmental studies
- Environmental impact statement (EIS)





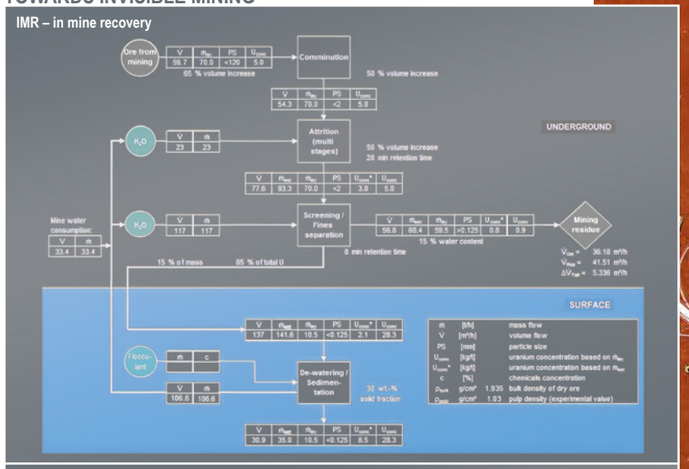
EXPERTISE IN UNCONVENTIONAL MINING METHODS INCLUDING IN-SITU RECOVERY 'ISR'

Unconventional mining methods including ISR are considered as environmentally friendly, highly innovative and economically sustainable game-changing mining methods without waste/tailings dams (no earthworks or strip ratio) and less CAPEX than conventional operations.

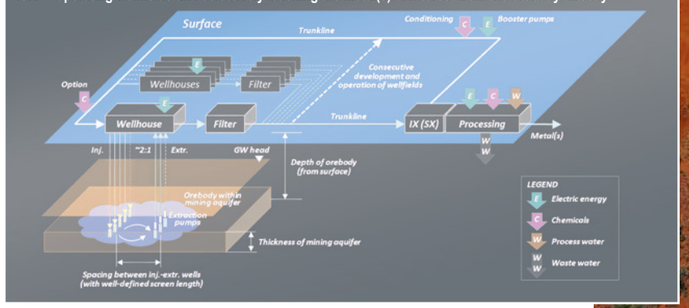
UIT's references document numerous innovative solutions to optimize operational conditions of unconventional mining methods (such as ISR, IMR, etc.) and increase recovery. Based on our experience with ISR design and implementation, we have developed an approach that focuses on maximizing the extractable ore while appropriately reducing (if not eliminating) post-closure effluent flows and associated water management risks and treatment costs. In-situ recovery, previously known as in-situ leaching (ISL), is formerly known is a very attractive alternative to conventional mining methods. In particular, recent advances in hard rock ISR using innovative permeability enhancement methods besides fracking allow the application of in-situ mining to many more deposit types and commodities.

TOWARDS INVISIBLE MINING

IMR – in mine recovery

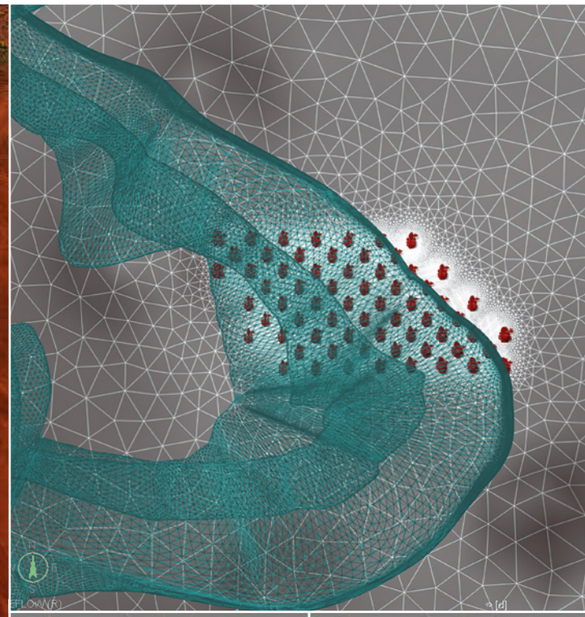


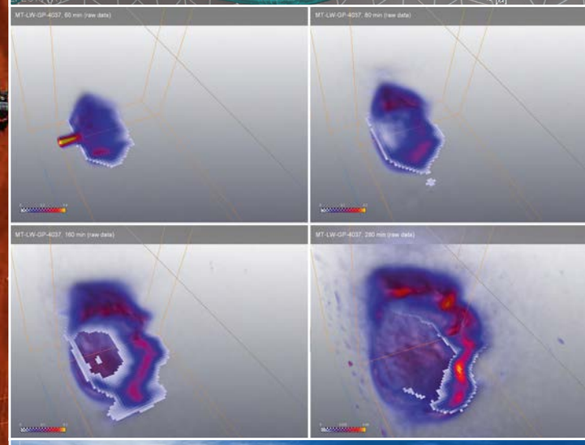
ISR — operating wellfields and selectively leaching the metal(s) of interest from the orebody directly



ISR – MINING without MINEWORKS:

- **ISR – a technology developed in the 1960s, mainly applied to uranium production from sedimentary deposits (meanwhile the predominant U recovery technology worldwide)**
- **ISR — an attractive recovery technology with significant advantages over conventional mining (underground, open pit) including:**
  - **Low to moderate costs for mine development → Profitable on lower grade deposits**
  - **Lower environmental impacts → Reduced solid waste (no waste rock, no tailings)**
  - **Reduced period of project development and start-up**
  - **Lower CAPEX/OPEX (energy, labour, equipment, restoration, CAPEX partially distributed over project lifetime)**
- **ISR — in addition to uranium, industrially applied (at least pilot-tested) for:**
  - **Some key industrial metals (Cu, Zn, Ni) and others (Au, V, Mo, …)**
  - **Several technology metals including Re, Se, Sc, Y, REE**



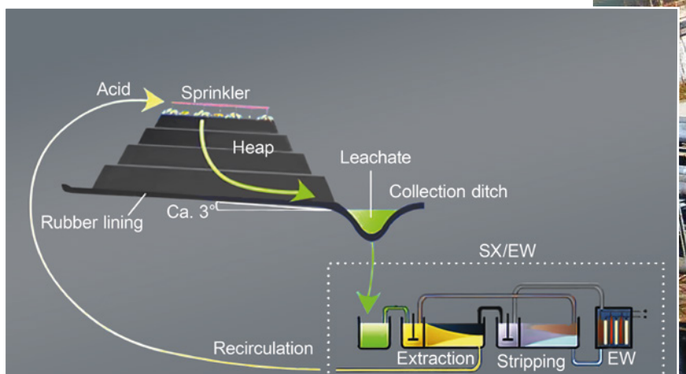


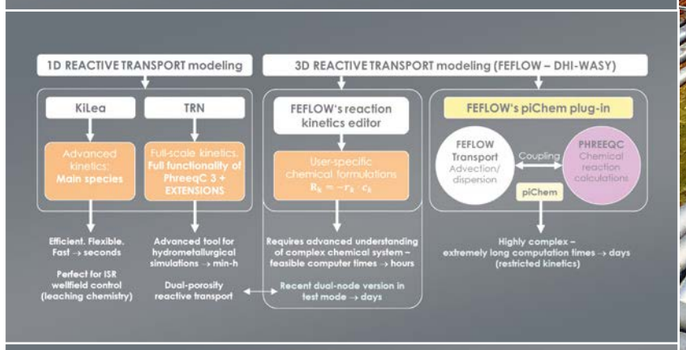
Mineral processing / norm separation (removal of natural radioactivity) – process design

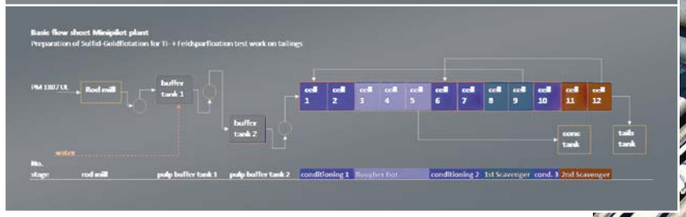
During project development metallurgical testwork is required to optimize process routes and guide equipment selection. UIT provides a full range of testwork related services from sample selection to reporting and preparation of process relevant parameters.

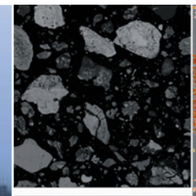
In terms of metallurgical experience, our processing team has in-depth and applied metallurgical knowledge encompassing mineral processing testwork, (hydro-)metallurgical testwork, NORM separation, plant design and engineering, as well as plant optimization.

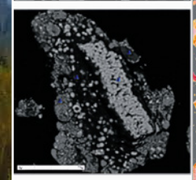
- Sample selection and characterization incl. NORM
- Geometallurgical testwork interpretation
- Testwork design, management, interpretation, reporting and presentation
- Hydrometallurgical process development
- Minerals processing tests and engineering
- Chemical engineering
- Advanced computer simulations to optimize leaching kinetics (3D reactive transport model for percolate/saturated conditions by in-house software KiLea and TRN)
- Analysis and separation of NORM, as well as integration of NORM removal within the flow sheet
- Integral solutions by considering the whole process chain from ore sampling, processing, disposal and final remediation of the mine site by simulating and engineering the entire process from mining to a marketable metal concentrate
- Testing and evaluation of the most efficient and economic extraction method (tank/heap/in-situ leaching) for a specific ore body under the local conditions (geomorphology, infrastructure, climate, legal issues, etc.)

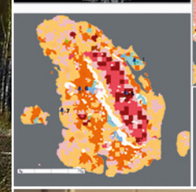


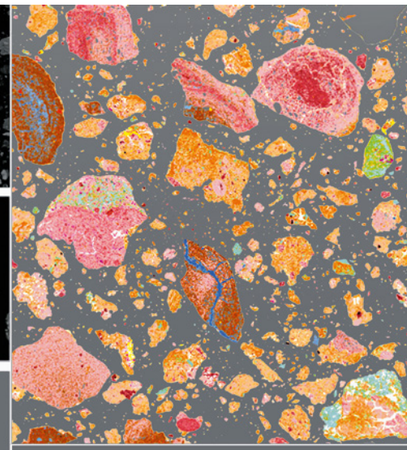


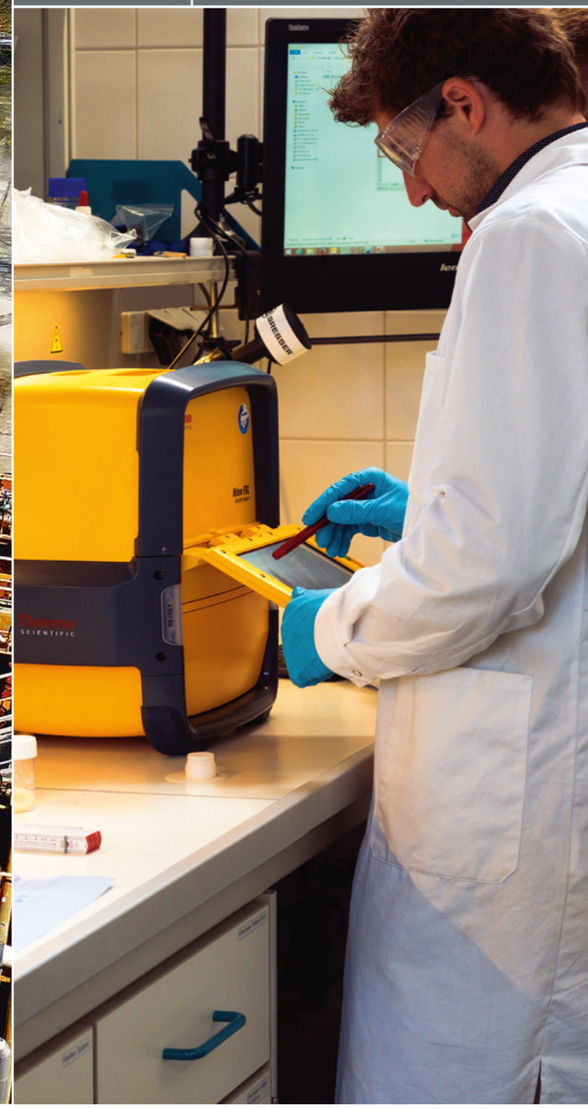












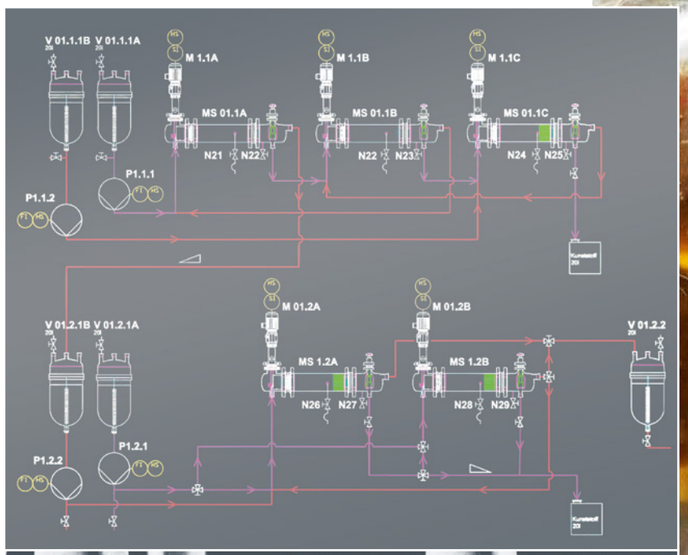
METAL SEPARATION / REFINING – FROM TEST WORK TO ENGINEERING

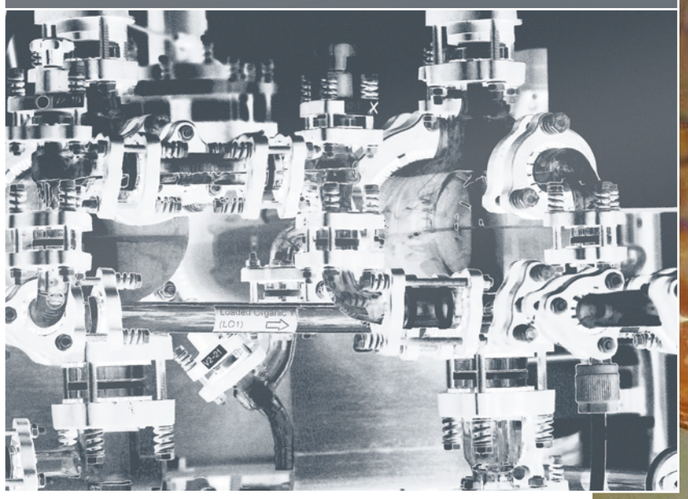
We are experienced in solving hydrometallurgical, geochemical and process engineering challenges.

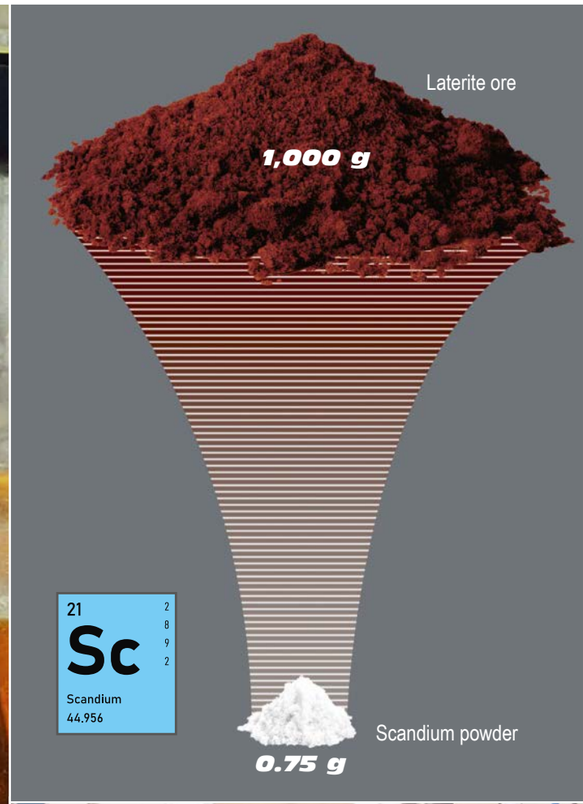
Our experts have designed and successfully applied entire hydrometallurgical processing chains including technologies like IX/RIP, SX, and full-scale downstream processing including separation/refining for conventional ore processing operations as well as in-situ recovery (ISR).

SEPARATION AND REFINING OF CRITICAL RAW MATERIALS BY:

- **Physical beneficiation (crushing, grinding, screening, gravity concentration, floatation)**
- **Chemical beneficiation (heap leach, In-situ recovery, roasting, pressure oxidation, hydrometallurgical leaching and metals recovery, sulphide precipitation, hydrogen reduction, electrowinning, CIP/CIL, RIP/RIL, IX, IEX, SX, carbon elution and regeneration)**
- **Testwork at in-house laboratories and technical centers at lab-, bench-, and pilot-scale**
- **Testwork results are directly transferred to our engineering department for plant design and engineering**
- **Process simulation accompanies all stages and scales of separation and refining testwork**







METALLURGICAL PROCESS SIMULATION / MODELING, IN PARTICULAR IX, IEX, RIP, SX, …

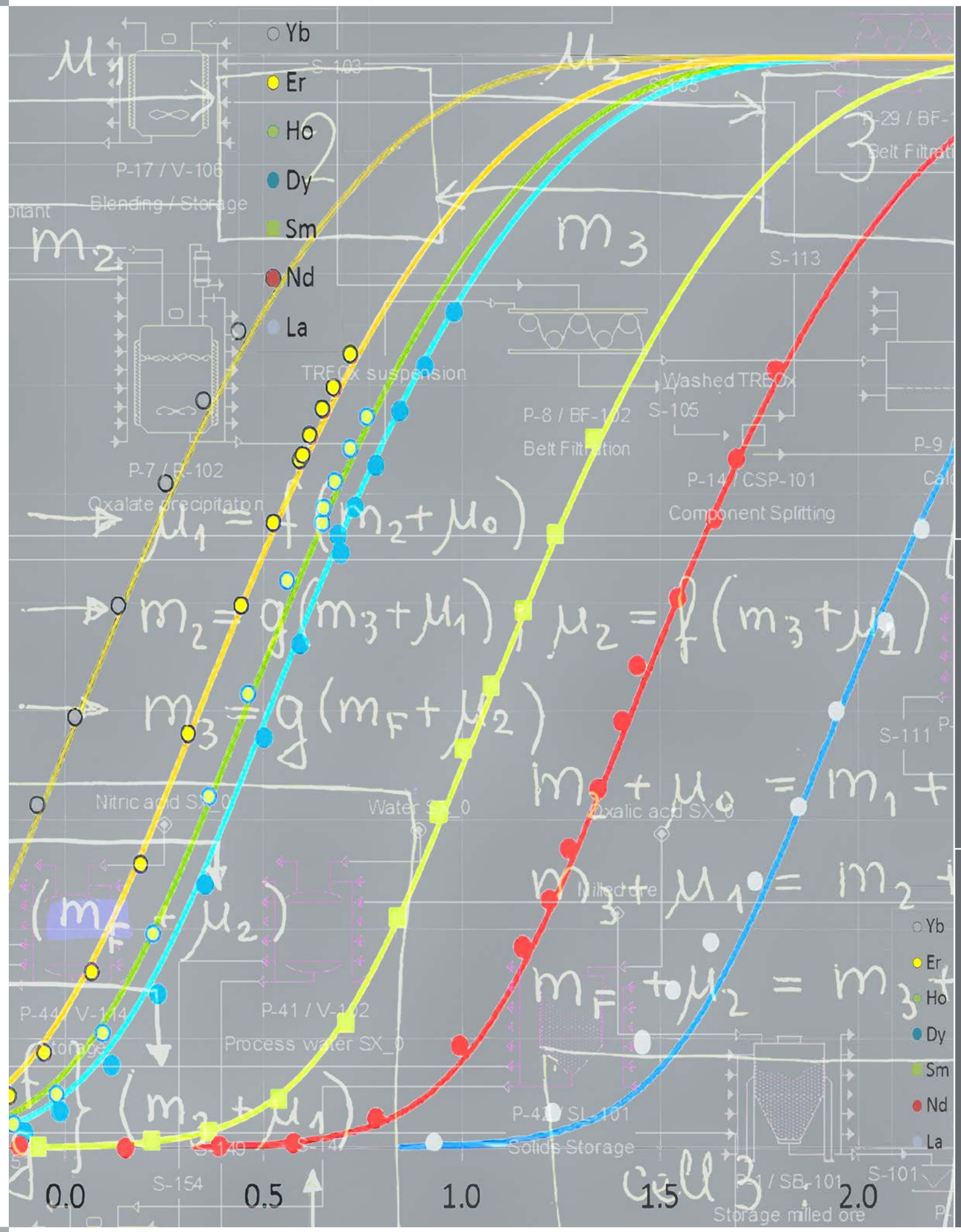
Starting from first principles, (mass conservation, charge balance, mass action) models were developed for ion exchange (IX), ion exchange chromatography (IEX), solvent extraction (SX), and resin-in-pulp (RIP).

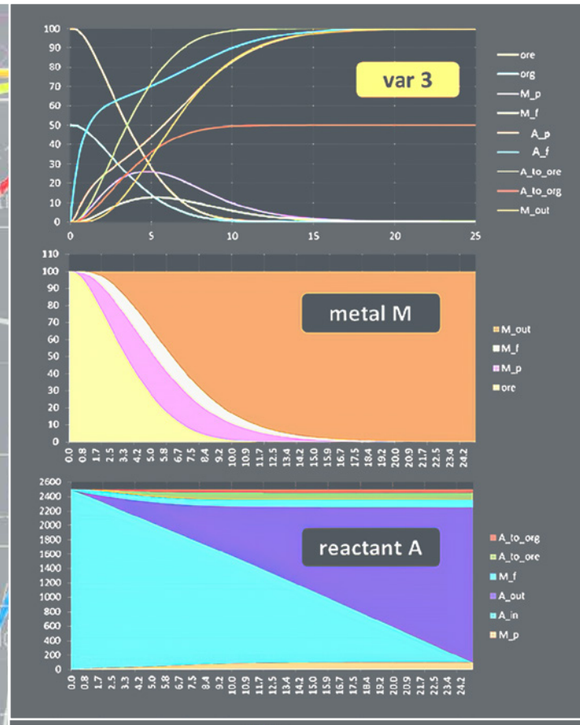
These models (i.e. UIT's in-house software) go beyond traditional approaches. They are flexible enough to simulate and optimize a variety of process-specific tasks. The software was tested in pilot projects and industrial applications (the first started already in the nineties). Good software is not built, it is grown!

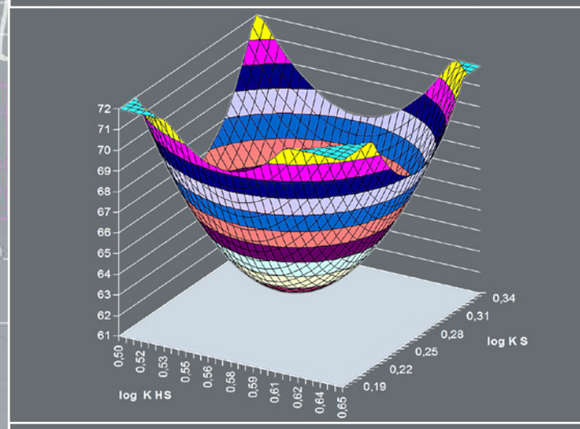
Each task requires its own specific model. The degree of model/software complexity depends on the real-world system to be modeled, the availability of input data, the computational resources available, the skill of the user, and the types of questions to be answered.

- Thermodynamic modeling and process simulation
- Several types of chemical reactors with a wide library of chemical reaction models: instantaneous, equilibrated, kinetic controlled, complex reactions...
- Multi-stage columns implemented for distillation, absorption or stripping
- Multi-stage separators for liquid-liquid extraction
- Multi-stage separators with transfer models - non equilibrium stage (optional)
- Multi-fluids heat exchangers (plate-fin heat exchangers)
- Solid treatment equipment (crystallizer, filters)

- Develop new processes and improve existing ones through modeling and simulation
- Develop process flowsheet models and test ideas prior to lab or pilot stages
- Support and acceleration of lab testwork
- Estimate the environmental footprint of processes for Life Cycle Assessment
- Apply complex process theory in an easy-to-use format
- Apply complex calculations in minutes
- All the tools and databases you need in a single package







ENVIRONMENTALLY COMPLIANT MINING AND REMEDIATION

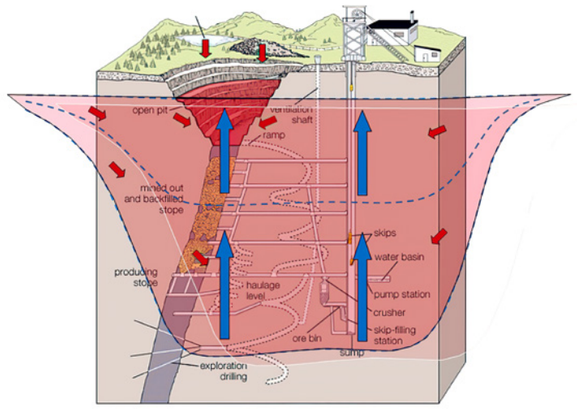
- Mine Closure Planning
- Remediation of Abandoned Mine Sites
- Mine Closure Design and Implementation
- Geochemistry and Water Quality
- Minewater Treatment

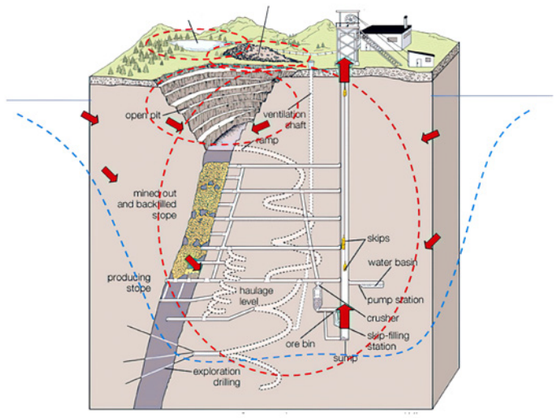
The combination of our internationally recognized experience in many aspects of mining with our knowledge of local requirements makes us the partner of choice for many clients embarking on mine closure projects.

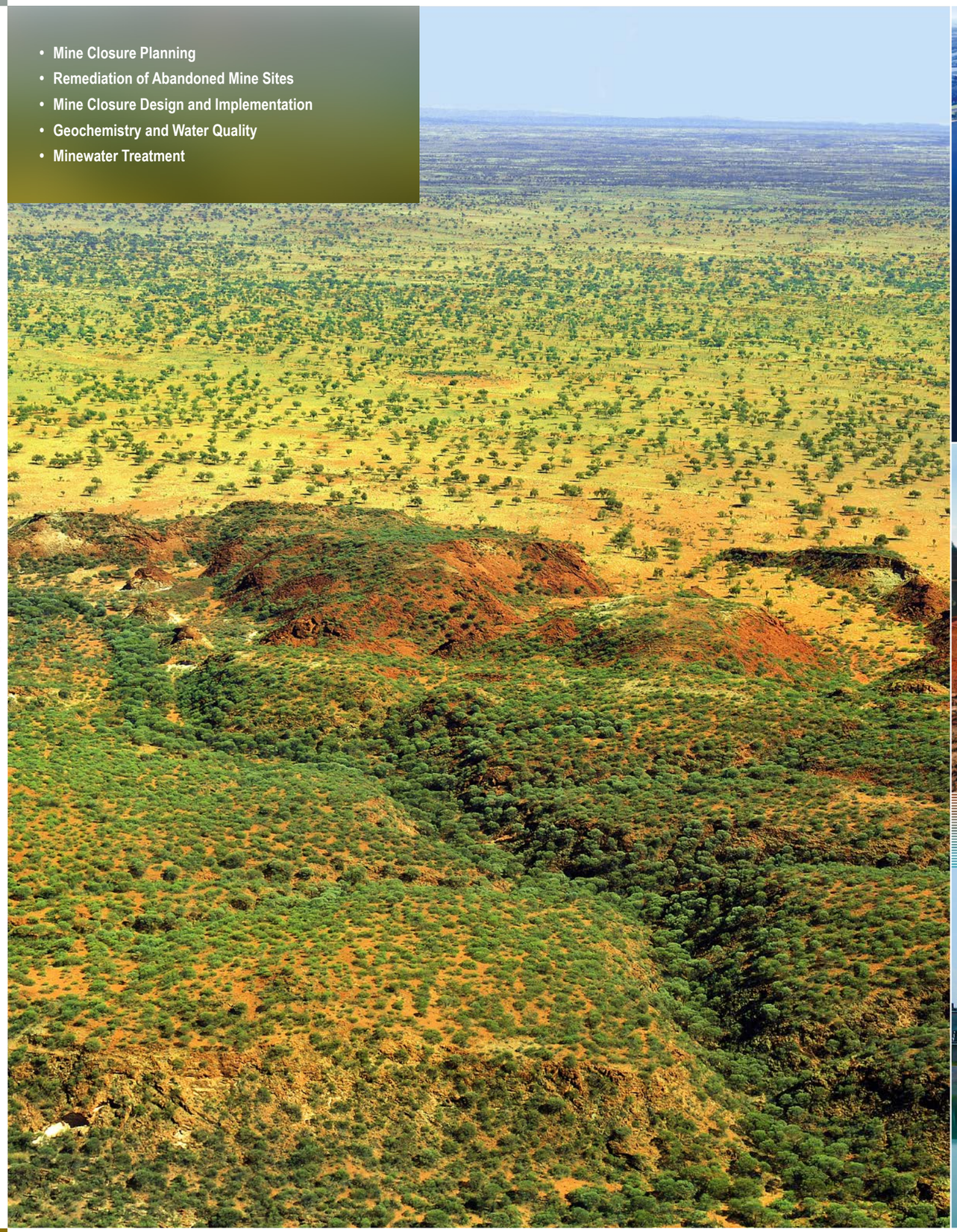
Mine closure planning is necessary at all stages of a mining operation. Current best practice dictates that all mines are to be ‘designed for closure’. Closure plans and related financial securities are also required for permitting.

We develop appropriate mine closure plans to meet project specific needs. Implementation of closure plans begins with engineering studies, testing and monitoring that translate plans into construction drawings and specifications.

Our spectrum of services includes engineering, procurement and construction management as well as the delivery of complete design-build packages.







Mineral processing and hydrometallurgical test / piloting center (including NORM removal)

- Crushing, grinding and sieving
- Sorting (magnetic separation, gravity separation, flotation)
- Solid-liquid separation
- Consulting, process optimization
- Mineral and chemical analyses incl. NORM by ore microscopy, XRF and Raman
- Process design and basic engineering
- Heap leaching
- In-situ recovery

Specialized in the processing of minerals containing technology metals associated with NORM (Naturally Occurring Radioactive Material). Reproducible sample preparation is ensured by crushing, grinding, sieving, homogenization and mechanical beneficiation (gravimetric, magnetic) with the most modern lab instruments in order to facilitate a reliable sample analysis. The geochemistry is determined by XRF and additional analyses such as ICP-MS/AES, SEM or MLA/QEMSCAN. Generally, the facilities of the technical center provide contamination-free and reliable sample preparation; optimized and certified for NORM samples. Industrial (hydro)-metallurgical processing options are investigated from lab- to pilot-scale and are simulated by chemical processing models for up-scaling.

(Dynamic) column leach test facility ((D)CLTF)
The column leach test facility (saturated flow) is designed according to international standards, operating a 3-channel system with either horizontal or vertical flow. Operational parameters corresponding to realistic ISR wellfield conditions (aquifer temperature, pore volume exchange rate) monitored by real-time data logging/control.

- Anaerobic column preparation (N_2)
- 3-channel high-precision peristaltic feed pump
- 3-channel temperature control
- 3 parallel columns (horizontal or vertical)
- In-line measurement of pH, ORP, EC, (I), p
- Injection leachant reservoirs
- Leachate collectors for sampling
- DCLTF allows use of intact and undisturbed drill core samples and various sizes (NQ, HQ, PQ)

Heap/tank leaching
Percolate column leach tests are performed under ambient physical conditions in order to simulate heap leaching. Performance depends on chemical parameters, unsaturated flow conditions and additional parameters (e.g. particle size distribution, homogeneity, porosity). Test results enable up-scaling of an ideal reactive transport model to real-world scenarios.

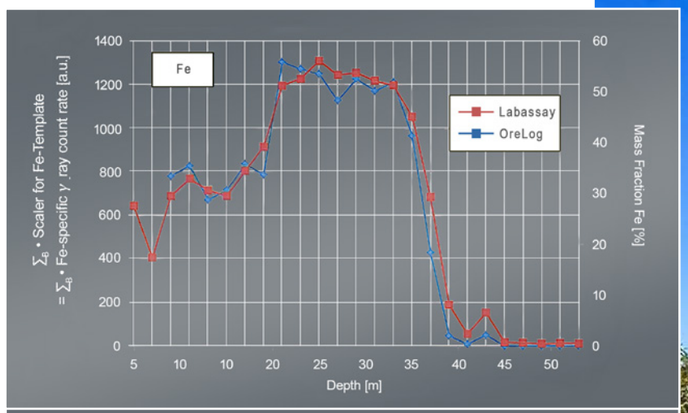
OreLog – INNOVATIVE BOREHOLE LOGGING AND GRADE CONTROL

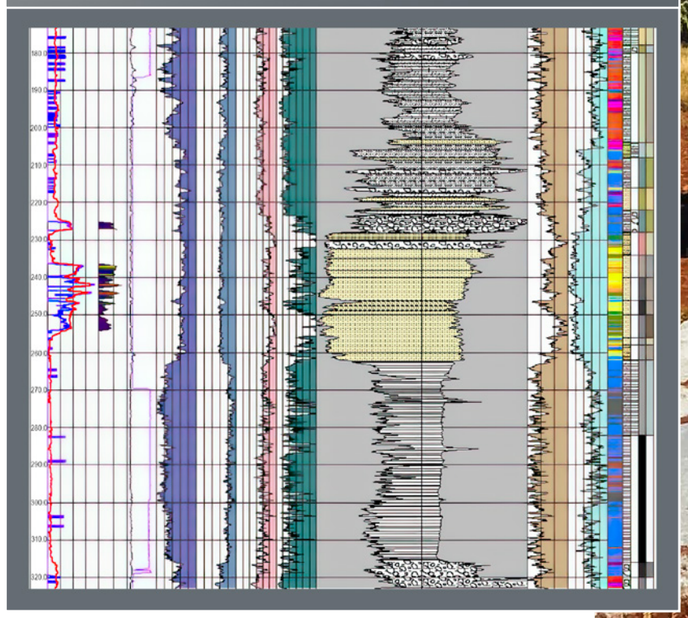
OreLog – an integrative borehole logging tool providing more comprehensive data than any conventional tool, in particular, qualitative and/or quantitative (previous calibration) measurements of desireable and undesireable mineral and ore forming elements along a borehole, such as Al, Si, P, S, Cr, Fe, Ni, Cu, Zn, As, etc. Additionally, it allows the quantification of petrophysical data that is typically gathered from expensive core drilling and mineralogical assays of ore samples.

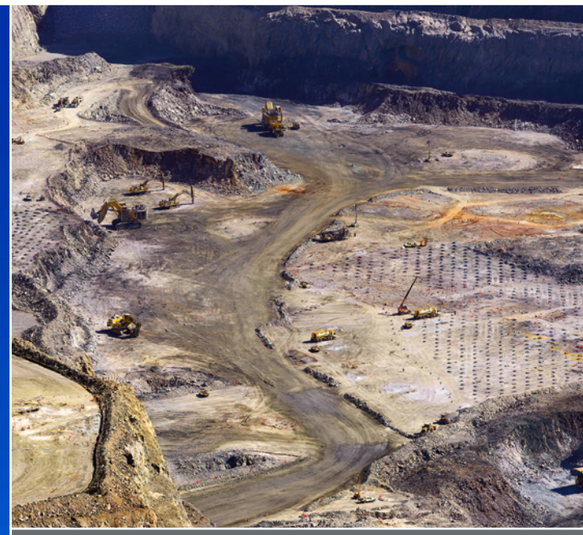
OreLog – fast, reliable and economic characterization of mineral deposits and petro-physical parameters, specifically important for planning In-Situ Recovery of technology metals.

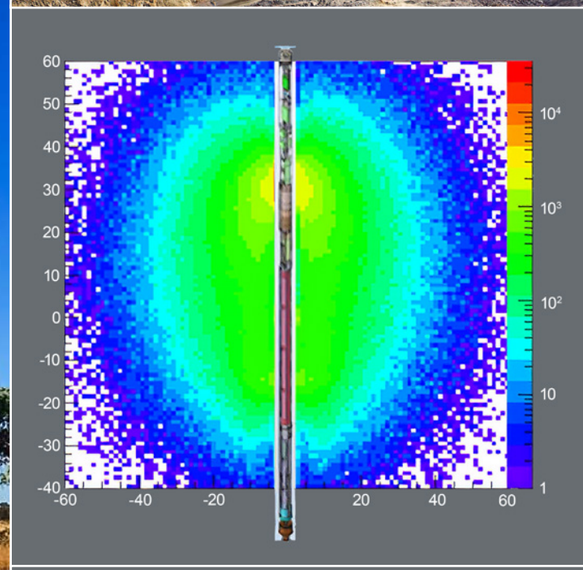
APPLICATIONS AND BENEFITS

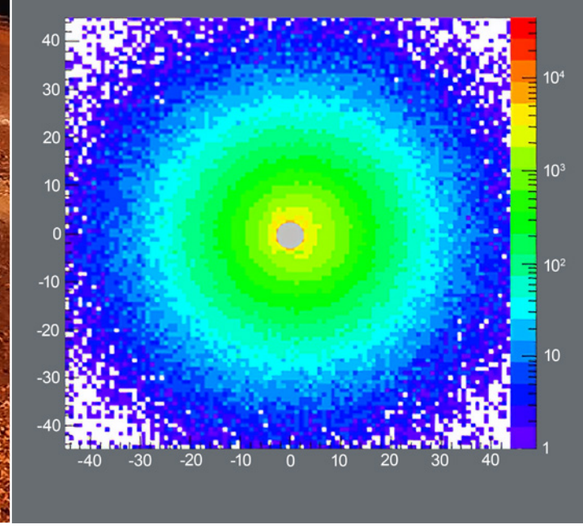
- Improved accuracy/precision of aa, including correction of formation influences, and detailed mineralogy analysis of complex deposits
- Quantitative mineral logging based on high-performance γ-ray spectroscopy for quantifying the abundances of main elements/minerals
- Sophisticated formation evaluation (host rock lithology, geophysical/hydrological data)
- Effective porosity and permeability estimates related to matrix properties
- Logging of borehole geometry (diameter, inclination)









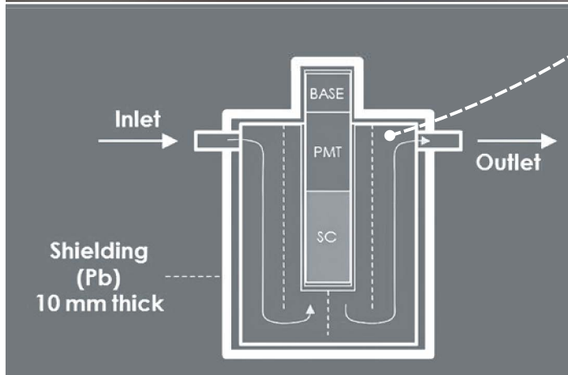


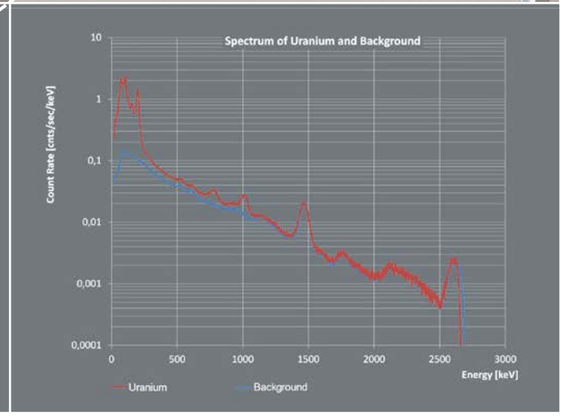
RADIOMETRIC PROCESS MONITORING AND CONTROL

- Measuring range for uranium: 1-100 mg/L to 100 g/L (lower detection limit depends on solution matrix)
- Hydraulic multiplexing system for inlet control (base version for three inlets, upgradable to up to twelve)
- Background suppression by 10 mm Pb shielding (optionally customizeable)
- Remaining background measurement at times for reliable spectral decomposition
- Adjustable flow control to setup effective retention time within the measuring cell
- High-performance spectral analysis resulting in (absolute, calibrated) individual radionuclide concentrations

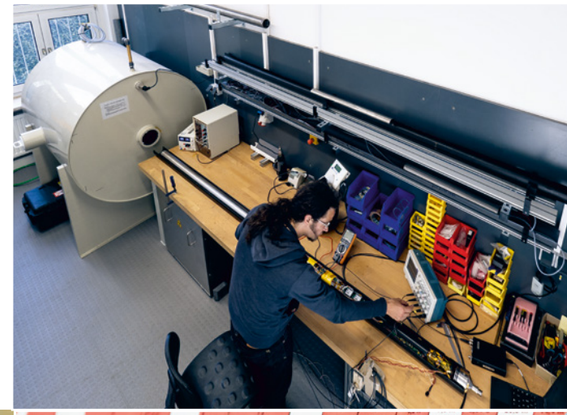
u|con — Real-time process analyser for uranium and other radionuclides

1. For u|con, the U-bearing solution by-passes the main-pipe or main-reservoir into a flow measuring cell. In more detail, the cell is continuously flushed (and renewed) by the solution of interest. The volumetric flow rate through the cell is controlled via a system of pumps, flow indicators and valves coupled to a programmable logic controller (PLC). A flow-guided setup minimizes the hydraulic retention time in the cell.
2. The uranium content of the solution is measured by a γ-ray detector recording the uranium-specific γ-rays. The integrated spectrometer is coupled to an industrial PC (IPC) for spectral analysis (effective peak area and correction for background and interfering γ-rays).
3. To ensure U concentrations are measured with high accuracy, u|con records y-ray spectra under two conditions:
   a. The water-based spectrum, or background spectrum, is first recorded with pure water in the cell
   b. The total spectrum, also called the signal spectrum, is recorded while the uranium solution flows from the main-pipe through the cell





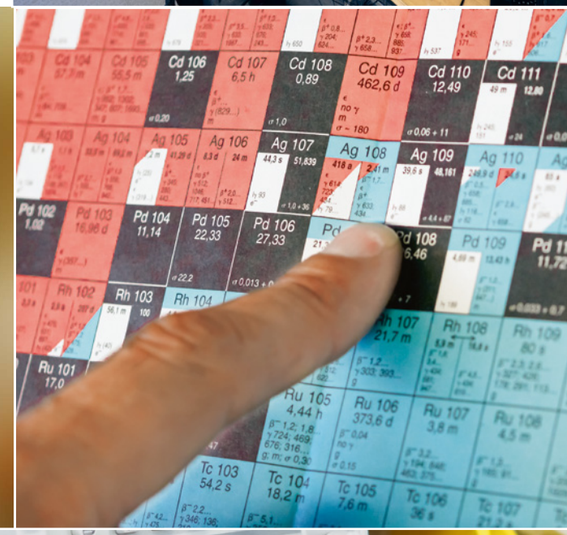
RADIOLOGICAL LABORATORY FOR GEOPHYSICAL LOGGING TOOLS

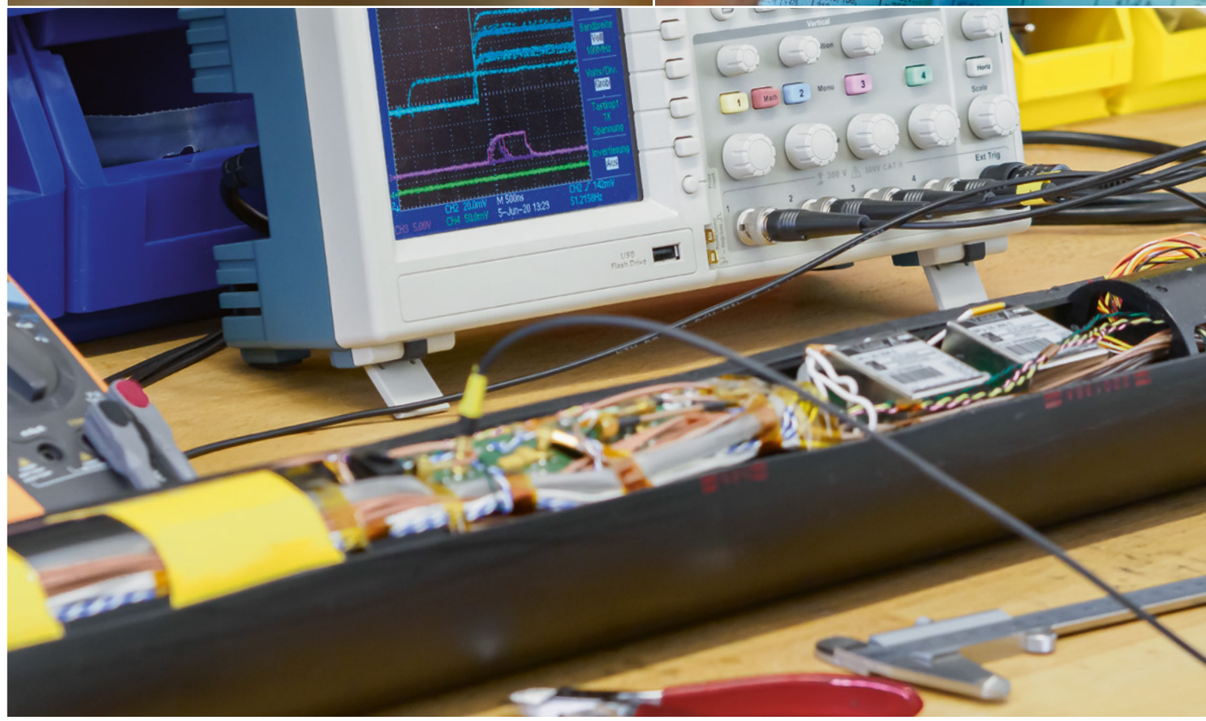


Our radiological laboratory for geophysical logging tools provides latest equipment for the development, manufacture and testing of radiological measuring devices.

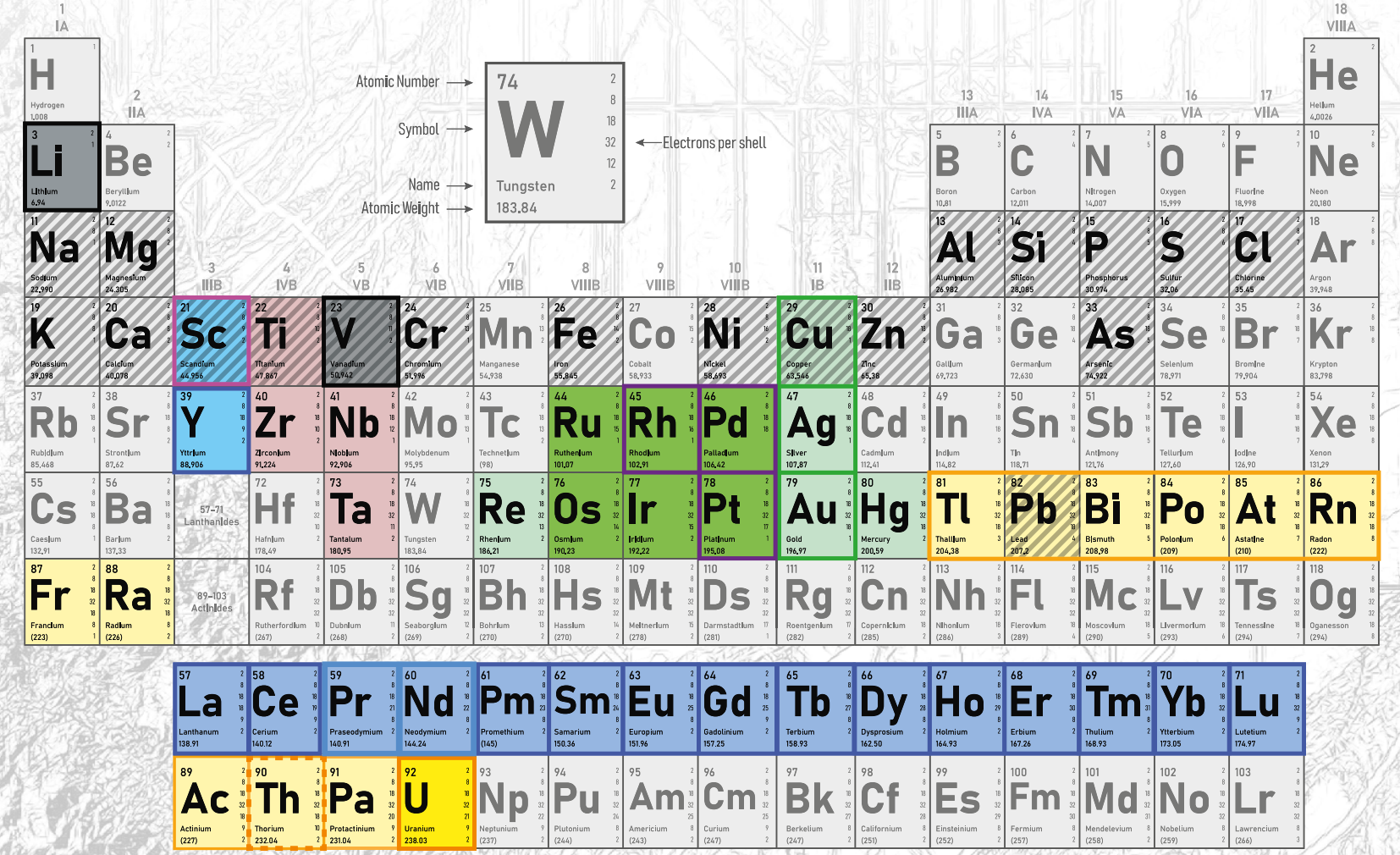
EQUIPMENT

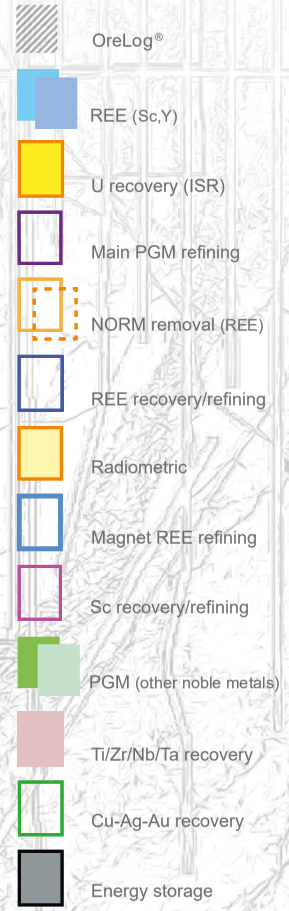
- Workbenches
- Safe for gamma-sources and pulsed n-generators
- Water tank for operation of pulsed neutron generator
- Lead for shielding against gamma-radiation
- Winch with 1000m cable
- Power supplies
- Electronics
- Nuclear instrumentation modules
- Multi-purpose measurement devices
- Radioactive sources:
  - AmBe neutron source in a PVC cube
  - Gamma source calibration set
  - Radiation dosimeter





UIT´s range of services





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UIT Mineral Resources v2