

UNDERGROUND and SURFACE

MINERAL EXPLORATION SERVICES

www.k-utec.com

K-UTEC
MINING SOLUTIONS

WE HELP YOUR EXPLORATION

K-UTEC supports you from the beginning to the end of your exploration campaign, worldwide. You deserve an experienced partner. We have more than 70 years of experience in mining.

The Exploration Game

Mineral exploration is the systematic search for mineral resources following established methods. Exploration typically starts on a „big picture“ scale and subsequently zooms into the most prospective parts of the asset. Early elimination of less prospective areas is key, so that exploration efforts can be focussed on the highgraded zones.

The Beginning

We are with you right from the start. K-UTEC analyzes all existing data and builds a geological 3D model from this. We establish what data are available and what data are missing. Based on these information, we design a tailor-made exploration program for you.



The Exploration Campaign

Exploration in new areas typically starts with large scale geophysical methods covering the entire concession, e.g. airborne techniques, regional seismic and gravity-magnetics to understand the geological structural style. It is often followed by a series of drill holes, retrieving rock samples for laboratory analyis to determine mineral concentration. The data are added to the 3D geological resource model. Finally, resource estimates are provided, according to international standards such as JORC or NI43-101.

A professionally designed and performed exploration campaign reduces the resource risk, helps to convince investors to join and avoids negative surprises late in the project.

K-UTEC is always on your side, from the early idea phase through scoping study, prefeasibility study (PFS) to bankable feasibility study (BFS).

EXPLORING FROM THE SURFACE

Initial exploration typically focusses on cost-effective surface methods to cover as much ground as possible. K-UTEC will help you to select the most effective techniques, optimized to achieve best value for money. **We will design a tailor-made exploration program for you that fits your needs, timing and budget.** Besides planning and data analysis services worldwide, K-UTEC also offers to organize and supervise the field measurements for you. Depending on the geography and task, the measurements are either done by local partner companies, or by ourselves.

View from Above
Exploration in new areas may typically start with satellite images and airborne geophysical measurements such as gravity, magnetics, electromagnetic conductivity and radiometry. K-UTEC works with highly specialised service providers who fly their sensors on aircrafts, helicopters and drones.

Seismic and other exploration surveys
On the ground, seismic, gravity, geoelectrics, Ground Penetration Radar (GPR) and magnetic surveys may be carried out. K-UTEC offers weight-drop, impact source and vibro surface seismic surveys, with imaging down to a depth of about 1,000 m. This is often sufficient for shallow and medium depth mining purposes and is much cheaper than hiring a fleet of vibration trucks. If required, the survey can be performed as hybrid seismics which collects both reflection and refraction data, providing information on both seismic velocities and geological structure at the same time. Results become even more powerful if combined with Vertical-Seismic-Profiling (VSP) in boreholes with imaging down to a depth of about 2,500 m.



TEM to detect subsurface brine
For lithium and potash brine exploration, K-UTEC offers Transient ElectroMagnetic (TEM) measurements which map electrical resistivity of the subsurface. Other surface techniques in our routine portfolio are geoelectrics and georadar.

Health and Safety: Structural integrity of tailings waste heaps
We also support you during production phase. We climb up waste heaps and run geophysical transects over them to image their internal structure and document their structural integrity.

Geohazards and Ground Investigations
K-UTEC also carries out surface geophysical measurements for geohazards and ground investigations, e.g. for wind farms, power lines, railway, roads, power plants and other large-scale infrastructure projects.

UNDERGROUND EXPLORATION

Horizontal exploration wells in underground mines
Operating underground mines regularly need information about the continuation of the ore body. Which are the best directions to expand the mine? Which areas are less prolific and should be avoided? To answer these questions, long horizontal exploration wells of more than 1,000 m are drilled in underground mines. K-UTEC is your partner of choice to geophysically log these horizontal wells and integrate the data into a 3D resource model. We offer borehole radar, borehole seismics, borehole deviation measurements and camera surveys.

Geophysical underground exploration in galleries, drifts and tunnels
Within mines, K-UTEC is available to carry out seismic, ground penetrating radar (GPR) and geoelectrics.





Health and Safety: Roof Radar
Loose rock at the ceilings of mining tunnels are a deadly threat to miners. Fall of Ground (FOG) accounts for a significant part of mining accidents. K-UTEC is highly experienced in roof radar measurements. We can help you to reduce FOG in your mine.

Roof Radar is a geophysical method for the detection of cracks and loose material in the roofs of drifts and workings within a mine. The electromagnetic method can be carried out at a high measuring speed in the roadways either manually or mechanically. Together with a partner, K-UTEC has developed a sophisticated AI-based traffic light system that facilitates the data evaluation and allows even non-geophysicist to carry out the measurements. Speak to us and learn how to boost your mine safety with Roof Radar.



GEOLOGICAL SERVICES

Our geologists are ready to support your exploration effort:

- K-UTEC carries out **geological field mapping** for you. We feel comfortable in remote and not so remote places, collecting rock samples and structural geological information for your asset.
- We **plan borehole drilling campaigns** for you and work with the drilling contractor to make sure everything runs smoothly.
- We do **mud logging** and **core description** for your boreholes.
- Our geologists provide **geological borehole interpretations** based on petrophysical logs and cuttings. We also do **well correlations**, geologically integrating all available holes in the region.
- Taking all available information together, K-UTEC compiles geological **3D models** to map the spatial resource distribution.



INTERDISCIPLINARY AND HIGHLY QUALIFIED

Our interdisciplinary teams are highly qualified and provide evaluations combining geophysics and geology. We help you to define the next exploration steps by recommending follow-up investigations.

CERTIFIED RESOURCE AND RESERVE STATEMENTS

K-UTEC is qualified to provide certified resource and reserve statements according to international standards (e.g. NI 43-101, JORC) that are accepted by the stock markets.

Among our team are several Eurogeologists who are entitled to carry out resource estimates and officially sign the statements. These titles are equivalent to the American "Qualified Person" (QP) and the Australian "Competent Person" (CP). K-UTEC can issue such statements for a wide range of minerals such as lithium, potash and salts.



DUE DILIGENCE

The mineral and resource sector requires large investments. Junior miners typically carry out the initial exploration and establish whether the asset is prospective. If successful, the projects are subsequently offered to investment partners.

K-UTEC makes sure that these deals are technically and financially sound. We carry out due diligence assessments of third-party projects for investors and governmental agencies. Our interdisciplinary team of geophysicists, geologists, process engineers, chemists, environmental experts and economists has significant experience in data room screenings of investment opportunities. We compile red flag analyzes that you can trust. K-UTEC‘s expertise is predominantly in lithium, potash and salt.



SELECTED PROJECT REFERENCES

- Various VSP, hybrid seismic, MASW and geoelectric surveys in Central Europe
- Tomography surveys of mining waste heaps
- Geophysical measurements of long horizontal wells in underground mine in Germany
- Roof radar measurements in underground mines in Europe
- Exploration concept, TEM, core description, and pumping tests for lithium project in South America, Australia and Africa
- Scoping Study, resource assessment, exploration concept for potash project in Ethiopia
- NI 43-101 / JORC compliant reports for projects in Australia and Africa
- Potash resource estimates for German greenfield and brownfield projects
- Various Due Diligences of South American lithium brine projects for international investors
- Due Diligences for potash mining projects worldwide for leading mining companies

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We support your exploration. Contact us today:

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K-UTEC: WHERE INNOVATION MEETS TRADITION

We work worldwide, supported by a network of international partners. Our homebase is in Sondershausen in central Germany, a place with more than 135 years of salt and potash mining history. Our campus (white buildings) is located in direct neighbourhood of the historical Petersenschacht, a shaft that was built in 1910 to enlarge the local potash mine. K-UTEC is a renowned and innovative service provider for the global mining and natural resources industry founded in 1951.



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