

G E O L O G Y A N D
R E S E R V O I R E N G I N E E R I N G



Untergrundspeicher-
und Geotechnologie-
Systeme GmbH

GE O L O G Y A N D R E S E R V O I R E N G I N E E R I N G

Untergrundspeicher- und Geotechnologie-Systeme GmbH (UGS) is a company specialised in underground storage, a technology aimed at the safe, cost-effective and environmentally friendly storage of energy carriers, raw materials and chemical products in deep geological formations. The specific advantage of our highly experienced engineering and service company is that we offer the full range of services, everything necessary to carry out underground storage projects from pre-investigations to the commissioning and operation of turn-key facilities. This includes all geological, engineering, drilling, workover and leaching processes.

The exploration, design, construction and operation of underground storage facilities would be unthinkable without essential engineering services in the field of

GE O L O G Y A N D R E S E R V O I R E N G I N E E R I N G

Our team of specialists in geology and reservoir engineering have a broad range of experience. They may call on extensive geological documentation and records, and they are familiar with the latest geo-scientific software. Assistance to drilling and workover projects of the service division is given by this team from the planning phase to the final documentation. If horizontal drilling is performed, experts of the Geology and Reservoir Engineering Department are responsible for planning the drilling path and for geo-steering the borehole at the site.

The design and dimensioning of the required surface facilities is supported by providing related geological and reservoir data. Special geological engineering services such as geomechanics, seismic, logging, etc. are carried out in co-operation with well known universities, institutes, engineering and service companies as well as with experts from the world-wide active Geostock group.

The specialists of the Geology and Reservoir Engineering Department have also built up experience in the related geotechnical engineering fields of brine disposal, extraction of geothermal energy, depositing, oil and gas production.

S E R V I C E S O F F E R E D B Y T H E G E O L O G Y A N D R E S E R V O I R E N G I N E E R I N G D E P A R T M E N T

- Geological studies for underground storage, brine disposal, ground water production and extraction of geothermal energy
- Programmes for exploration work and drilling of vertical and horizontal wells
- Terms of references for performing geophysical measurements and interpretation of the data obtained
- Preparation of and assistance during execution and evaluation of bore hole tests
- Comprehensive assessment of storage formations including storage and process simulations
- Programmes for hydro- and gas-dynamic explorations
- Monitoring of storage formations during storage operation and storage operation management through all phases of operation
- Assistance in applying for mining rights and licenses as well as in permit procedures (permissions, approvals, operating permits)

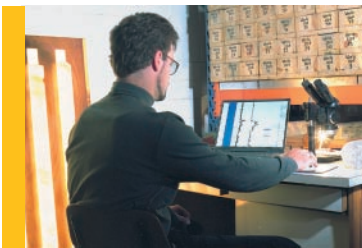




**RANGE OF SERVICES OFFERED BY THE
GEOLOGY AND RESERVOIR
ENGINEERING DEPARTMENT**

Regional Studies

Investigation and assessment of the geological preconditions of a selected area regarding underground storage in salt caverns, aquifer structures or depleted hydrocarbon fields

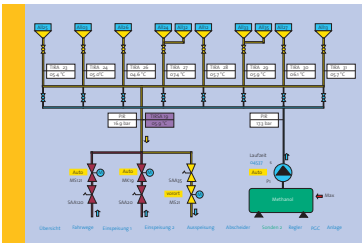


**Site Selection
Studies**

Detailed investigation of the geological conditions for storage of a selected site including a preliminary design of the storage, rough estimation of the investment and operation cost and a first evaluation of the efficiency of the whole project.

**Geological
Investigation
Programme**

The geological investigation programme determines in detail all the exploration necessary to support a decision regarding the underground storage project. These will serve as input data for the design.

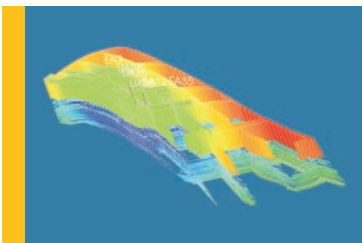


**Geological
Supervision of
Drilling Work**

Geosteering of horizontal drilling, description of cores and cuttings, photography of the cores, sampling, geological documentation, supervision and documentation of well testing.

**Geological
Assessment**

Evaluation of all geological and reservoir investigations related to the selected storage site including adapted model simulations. The geological assessment is essential for the basic design and the dimensioning of the technical facilities as well as for the permitting procedure.



**Geological
and Reservoir
Engineering Assistance**

Geological and reservoir engineering services necessary for the construction and the operation of the storage facilities (geomechanics, monitoring and interpretation of subsurface processes, adaptation of numerical models etc.)

**Programmes for
abandonment**

Geological and reservoir engineering requirements for abandonment and decommissioning of geological structures when it has been decided not to continue using them for underground storage.

SOME OF THE REFERENCES OF THE GEOLOGY AND RESERVOIR ENGINEERING DEPARTMENT

Experience gained over decades and innovative solutions characterise the capability of the Geology and Reservoir Engineering Department. Recent references include:

- Geological preparation, assistance and monitoring of salt cavern construction at the locations Kraak and Rüdersdorf
- Geological assistance and monitoring of the underground storage facility at Ketzin - ranging from the initial steps until the final abandonment of this storage facility
- Geological assistance and supervision during the drilling of horizontal wells into the storage formation at Allmenhausen underground storage
- Geological assistance and monitoring of brine disposal in deep aquifer structures from cavern leaching at the underground storage locations Kraak and Rüdersdorf
- Analysis of the geological structure of the salt dome Kraak
- Conversion of the depleted natural gas field Allmenhausen to an underground gas storage formation
- Exploration and geological assistance and monitoring during construction and operation of the underground storage facilities at Kirchheilingen, Bad Lauchstädt and Buchholz



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