UGS Academy
The core of competence

UGS
A COMPANY OF
GEOSTOCK ENTREPOSE

Training Programme 2023

Untergrundspeicher- und
Geotechnologie-Systeme GmbH
Berliner Chaussee 2
15749 Mittenwalde (Germany)
Telephone +49 33764 820
Fax +49 33764 82-280
info@ugsnet.de
www.ugsnet.de

Head of the training program

Dr Amer ABDEL HAQ
Authorized Officer/
Business Development Manager

The head of the training program, Dr Amer Abdel Haq, is available to give you detailed advice by phone at +49 33764 82151 or by email at abdel-haq@ugsnet.de.

Overview

The storage industry is currently undergoing radical change. New technologies, safety systems and optimisation methods are now being deployed to meet the demands of the energy market today. A sound knowledge of new market rules and technologies are fundamental for the successful implementation of any current and planned projects. This is where responsible technicians and managing engineers need broad and extensive knowledge about the general idea of underground storage. This demands a deep understanding of the interaction between numerous areas. It begins with the construction of a storage facility and extends across several construction phases to the final operation of the facility.

Our four-stage program provides a deep understanding of the technologies involved in the underground storage of hydrocarbon products. The focus of this program is on the most important fundamentals for the acquisition, planning, regulation and long-term supervision of underground storage facilities. This training program is a combination of the many years of specialist experience at UGS GmbH with state-of-the-art science and the latest technologies, recognised and deployed in underground storage. The training program consists of four *main areas*:

- Subsurface Engineering,
- Surface Engineering,
- Drilling/Workover,
- Operation Management.

The main areas have been divided into several training units (**Sub, Sur, DW** and **OM**). This enables various training units from the main areas to be individually selected and adapted to participants' professional requirements. Participants themselves can determine both the duration and time intervals between the selected training units, in agreement with the head of the training program, through targeted allocation and adaptation of the training contents to the length of the training units. On request by participants, the training program can be modified and offered as an *in-house program*.

Target group

As the training units are combined and selected by the participants themselves, the target group extends across all technical and (often) commercial areas of the storage industry. Technicians and project engineers with less than two years' professional experience could particularly profit from the training program.

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Dr Amer Abdel Haq

Contents

Subsurface Engineering

- Geology
- Drilling technology
- Testing
- Rock mechanics
- Leaching caverns
- Completions of cavern wells
- Completion of pore storage wells
- First gas fill
- Snubbing work
- Well integrity and technical assessments of wells
- Safekeeping and connection plans
- Norms, guidelines and standards
- Legal fundamentals

Surface Engineering

- Basics of process engineering for the arrangement of surface facilities
- Types of production and basic functions of surface facilities
- Operation principle of the main equipment for injection
- Operation principle of the main equipment for withdrawal
- Piping technology
- Metering technology
- First gas fill flooding equipment
- ATEX basics (explosion protection)
- Availability of facility components, safety considerations
- Approval procedures in mining law

Drilling and Workover

- Plant engineering
- Drilling technology
- Drilling/Workover

Operation Management

- The operation management contract
  - Enquiry
  - Offer
  - Forms of contract
  - The operation management contract
  - Regulatory framework
  - The BBergG German mining law
  - Organisational responsibility
  - The German BetrSichV ordinance on industrial safety and health
- Process plants
  - Life stages
  - Knowledge transfer
  - Machinery labelling
  - Block flow diagram
  - Process flow diagram
  - P&I flow diagram
- Process management
  - Visualisation in the control system
  - Functionality
  - Levels of observation
  - Measured and count values
  - Operating level
  - Operation interventions
  - Interlocks
- Maintenance
  - Maintenance terms
  - Preparation
  - Execution
  - Re-commissioning
- Information and communication
  - Information (verbal)
  - Training unit
  - Specifics
  - Court-proof documentation
  - Plant documentation
  - Cyclical documentation
  - Events-based documentation
  - SDS
- Occupational Health and Safety
  - Occupational safety
  - Health protection
  - Environmental protection
  - Hazard assessments
- Gas operation
  - Process management responsibility
  - General framework
  - Specifics of injection
  - Specifics of withdrawal
  - Handling of Storage Data System
  - Repetition of maintenance terms
  - Maintenance actions
  - Repetition in preparation of maintenance measures
  - Typical maintenance actions in the field
  - Managing the SDS
  - General
  - Availabilities
  - Nominations
  - Matching
  - Allocation
  - Accounts

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Subsurface Engineering

The training program modules cover the entire spectrum of subsurface technology used in the investigation and commercial exploitation of the deep underground. They include geology, drilling technology, leaching technology, completion, test processes, casing inspections, technical assessments as well as the dismantling and plug and abandonment of wells and underground storage facilities. We demonstrate the expertise and capability of our company on the basis of our own innovations from the areas of completion, running in of welded tubes and technical measurements.

The knowledge and experience that we share are focussed on underground storage, but they can be deployed equally well on the investigation and exploitation of storage deposits and/or the extraction of geothermal energy. The key subjects for the training program are listed below.

- Geology: basics, storage structures, exploration, ...
- Drilling technology: drilling planning, drilling tools, well control operations, ...
- Leaching technology: cavern leaching, first gas fill, water and brine management, ...
- Completion: completion design, packers, subsurface safety equipment, ...
- Test processes: tightness tests, pneumatic tests, ...
- Well integrity: casing inspections, technical assessments, ...
- Removal: concepts for re-use, care of underground storage caverns, plug and abandonment of wells, ...

Berliner Chaussee 2 • 15749 Mittenwalde • Telephone +49 33764 82 0 • Fax +49 33764 82 280 • info@ugsnet.de • www.ugsnet.de

Subsurface Engineering

No.	Training unit	Training contents	Duration (45 minute units)
1/Sub	**Geology**	General principles for underground storage: geological principles; salt structures – types, formation and structural aspects; depleted reservoirs; aquifers	**2**
2/Sub	**Drilling technology**	Introduction to drilling equipment; planning principles; cavern well principles; geothermal well principles; drilling into reservoirs	**2**
3/Sub	**Testing**	Planning principles; in-situ stress tests/pressure resilience tests; tightness (mechanical integrity) tests; function tests	**2**
4/Sub	**Rock mechanics**	Principles of rock mechanics investigations for underground storage facilities; determination of relevant parameters for cavern design; cavern assessments – integrity monitoring	**2**
5/Sub	**Leaching caverns**	Planning principles; location and dimensions; leaching principles; leaching process and simulation; water and brine management; day-to-day business and supervision	**2**
6/Sub	**Completions of cavern wells**	Planning principles; subsurface equipment; completion of salt caverns; completion of gas storage caverns; completion of oil storage caverns; completion of caverns for storing other liquids	**2**
7/Sub	**Completion of pore storage wells**	Planning principles; subsurface equipment; completion of pore storage wells; observation wells; injection wells	**2**
8/Sub	**First gas fill**	Planning principles; technical equipment; day-to-day business and supervision; start and end phases	**1**
9/Sub	**Snubbing work**	Snubbing unit; pulling out of draining string; installation of subsurface safety valve (SSSV); volume measurement of the cavern; integrity checks	**1**
10/Sub	**Well integrity and technical assessments of wells**	Planning principles; measurement processes; casing inspections; integrity assessments; functionality verification	**2**
11/Sub	**Safekeeping and connecting plans**	Planning principles; options for re-use; decommissioning; shutting off systems and closure technologies; carrying out safekeeping of wells; carrying out safekeeping of caverns	**2**
12/Sub	**Norms, guidelines and standards**	API guidelines; BVEG guidelines; DIN regulations; the Lower Saxony BVOT ordinance	**1**
13/Sub	**Legal fundamentals**	Laws and official regulations; HSE; approvals procedures; special operation plan; supervisor	**1**

Surface Engineering

Technical equipment for the transport, compression and treatment of gases in connection with their storage is outlined in the surface engineering subject area.

Alongside the procedural, thermodynamic and hydraulic principles of the media deployed, the production directions of a natural gas storage facility are explained as well as the operating principle of the main equipment.

The pressure- and temperature-dependent design of pipelines and valves in the plant construction, the explosion protection on storage facilities (ATEX principles) and the recording of injected and withdrawn quantities will be explained in in more detail.

The subject area of the storage development include the plant engineering principles of the first gas injection and the flooding of caverns.

The approval processes in German mining law, safety and risk aspects as well as the availability of equipment and plant components are discussed in connection with the management construction, the extension, or decommissioning and operation of storage facilities

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Surface Engineering

No.	Training unit	Training contents	Duration (45 minute units)
1/Sur	**Basics of process engineering for the design of surface facilities**	Thermodynamic principles; pressure and temperature behaviour; hydraulic considerations; performance diagrams; limiting criteria; humidity/water content; hydrate accumulation/inhibition; modes of cavern operation (e.g. pool operation); surface plant (injection/withdrawal)	**2**
2/Sur	**Types of production and basic functions of surface facilities**	Injection; withdrawal; transport pipelines; technical gas connection to the storage facility	**2**
3/Sur	**Operating principles of the main equipment for injection**	Flow metering; filters; compressor units	**2**
4/Sur	**Operating principles of the main equipment for withdrawal**	Separators; pre-heaters; pressure and quantity regulation; gas dehydration (separate module possible)	**2**
5/Sur	**Piping technology**	Piping classes; valves; materials	**2**
6/Sur	**Measurement technology**	Structure, measurement principles; current variants; custody requirements	**1**
7/Sur	**First gas fill flooding equipment**	Plant engineering elements; operating principles, development and re-use	**1**
8/Sur	**ATEX basics (explosion protection)**	Explosion protection on storage facilities; elements and classifications	**1**
9/Sur	**Availability of facility components, safety considerations**	State of the art; safety report; safety integrity level design; availabilities	**1**
10/Sur	**Approval procedures in German mining law**	State of the art; framework, central and special operation plans; special procedures such as planning permission/planning approval; with/without public participation	**1**

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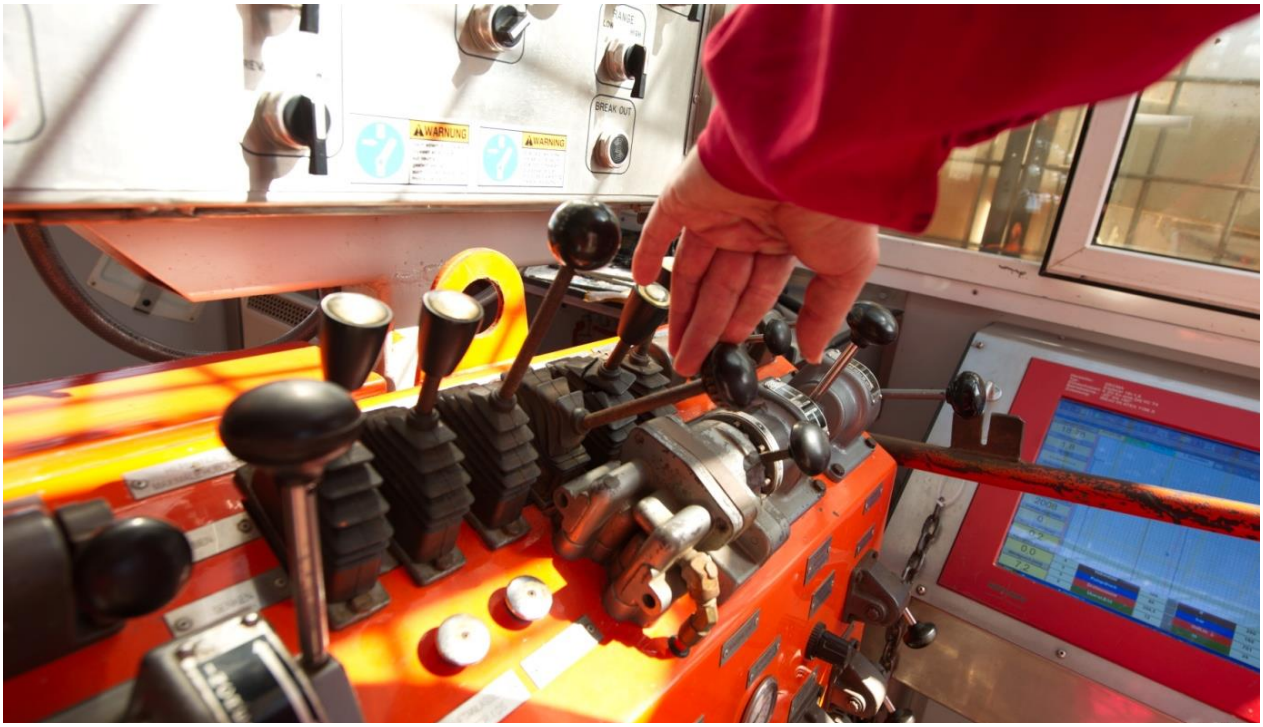
Drilling/Workover



The Drilling Services department operates a total of seven drilling and workover rigs for carrying out its standard contractor services and has gained considerable experience from over 50 years of activity in the drilling and workover field.

Beyond that, the service catalogue extends through borehole measurements, screw services as well as the planning and implementation of test and investigation work from simple sample taking at depth for liquids and gases, right through to complex tasks such as the realisation and assessment of gas tightness tests and compressive strength investigations.

Above all, the Drilling/Workover module is set out in a practical way and is especially intended for people who are interested in supporting their theoretical knowledge with practical experience. Alongside the basic introductory training unit in drilling technology, the plant engineering module particularly focuses on mechanical and electrical plant components that are introduced and explained on the company premises. The practical deployment of the equipment can be seen during an on-site visit. Among other things, this provides an insight into the coordination of the whole project and the actual application of the drilling drig.

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Drilling/Workover

No.	Training unit	Training contents	Duration (45 minute units)
1/DW	**Plant engineering**	Mechanical plant components; electric plant components; hydraulic plant components; presentation of selected equipment; demonstration of individual devices	**4**
2/DW	**Drilling technology**	Principles of drilling technology; mud technology; directional drilling technology; case examples	**2**
3/DW	**Drilling/Workover**	Location visit at a site of the UGS GmbH	**1 day**

Operation Management

With our modular service approach regarding operation management, maintenance and dispatching, the operation management department provides an efficient, reliable and safe solution for the operation of all process facilities related to underground storage. Customers can select from individual options and combinations right through to complete operation management.

Whether it is a matter of systems for brining, first gas filling systems or complete storage facilities, the Operations Management department has trained and experienced personnel available to operate systems precisely according to technological specifications, around the clock, even in remote operation, and to document them in a court-proof manner using our specially developed storage documentation system (SDS).

The insights we have gained in these technical and commercially decisive processes in the storage business also enable us to discuss and consolidate selected subjects with interested specialist colleagues within our training programs.

From the very beginning, our knowledge of the longest phase in the lifecycle of a process plant, the operation phase, covers a broad spectrum, is constantly increasing and also opens up a wide range of options for improvements. By providing comprehensive services on different plants – from the commissioning phase of the plant right through to its removal – it has been possible to acquire knowledge in a particularly intensive and extensive way, make comparisons and our own observations.

You can benefit from our expertise in seminars, in group work or by talking through practical case examples, and individually generate the greatest possible value for yourself.

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Operation Management

No.	Training unit	Training contents	Duration (45 minute units)
1/OM	**The operation management contract**		
1.1/OM	Enquiry	Pre-qualification; submission deadline; technical/commercial enquiry/offer conditions	**1**
1.2/OM	Offer	Technical part; commercial part	**1**
1.3/OM	Contractual form	Contract for work; contract for services; legal terms (negligence, duty of care, ...)	**1**
1.4/OM	The operation management contract	Obligation to perform; liability and warranty conditions in operation management contracts; insurance policies	**2**
1.5/OM	Regulatory framework	Laws; regulations; employers liability insurance association regulations	**1**
1.6/OM	The German mining law (BBergG)	Operation plan procedures; responsible persons; the German general federal mining act (ABBergV)	**1**
1.7/OM	Organisational responsibility	Responsibility for selection; responsibility for instruction; responsibility for implementation; responsibility for control	**2**
1.8/OM	The German operation safety regulation (BetrSichV)	Definition of facilities that require monitoring	**1**
2/OM	**Process plants**		
2.1/OM	Life stages	Planning phase; construction phase: commissioning; operation; reconstruction(s); removal, safekeeping and scrapping	**2**
2.2/OM	Knowledge transfer	People involved in the lifecycle; these people's special know-how; knowledge transfer options and opportunities	**2**
2.3/OM	Machinery labelling	Machinery labelling systems; process signage	**1**
2.4/OM	Block flow diagram	Explaining the scope of the depiction; consolidation of the depiction	**1**
2.5/OM	Process flow diagram	Explaining the scope of the depiction; consolidation of the depiction	**1**
2.6/OM	P&I flow diagram	Explaining the scope of the depiction; consolidation of the depiction	**1**
3/OM	**Process management**		
3.1/OM	Visualisation in the control system	Similarities to/differences from flow sheets; extended scopes of display	**2**
3.2/OM	Functionality	Functional elements; dynamic sampling	**1**
3.3/OM	Observation level	Field and field measurement technology; EMSR rooms; control room/laboratory (analyses)	**1**
3.4/OM	Measured and count values	Measurement precision, measurement area; reading errors; typical measured values; typical count values; static pressure, dynamic pressure	**2**
3.5/OM	Operating level	On site, manually; hand operation level; automatic operation	**1**

Operation Management

No.	Training unit	Training contents	Duration (45 minute units)
3/OM	**Process management**		
3.6/OM	Operation interventions	Start-up and shut-down processes; switch-over of flow paths; optimal modes of operation; emergency shutdown	**2**
3.7/OM	Interlocks	Cause and effect lists; mechanical lock systems	**1**
4/OM	**Maintenance**		
4.1/OM	Maintenance terms	Maintenance; servicing; inspection/auditing; improvement	**2**
4.2/OM	Preparation	Release systems; L(ast)M(inute)R(isk)A(nalysis)	**2**
4.3/OM	Execution	Taking out of operation; shutdown procedure including restrictions; release and draining/residue removal; safety measures against unintended restarting and/orreconnection; typical examples ofservicing and maintenance measures	**2**
4.4/OM	Re-commissioning	Filling and pressurisation processes through bypasses; mechanical locks; follow-up checks/tightness tests after pressurisation with earlier system openings	**2**
5/OM	**Information and communication**		
5.1/OM	Information (verbal)	Duty of disclosure; technological information	**1**
5.3/OM	Specifics	Communication in emergencies; contact with the regulatory authority; incidents and inconsistencies	**2**
5.4/OM	Legally watertight documentation	Explanation of the term ‘watertight’; fulfilment of contract; dual control; signature regulations	**2**
5.5/OM	Plant documentation	Constructor documentation (as built, changes); operation documentation (operating schedule book, HSD, mine plan, cyclical and event-driven)	**2**
5.6/OM	Cyclical documentation	Reports; shift book (chronology, details); inspection records	**2**
5.7/OM	Events-based documentation	Error message; damage report; error message list from the control system; trend graphs; defect notifications	**2**
5.8/OM	SDS	Working with the system; cyclical case example; event-driven case example	**1**
6/OM	**Occupational safety and health protection**		
6.1/OM	Occupational safety	Personal protection equipment; general dangers; tasks of the safety officer; occupational safety signage	**2**
6.2/OM	Health protection	German mining regulations for occupational health protection/PMU; noise (addition of levels); comparative volumes	**2**
6.3/OM	Environmental protection	The German Water Resources Act; hazardous substances; waste materials / disposal channels	**2**
6.4/OM	Hazard assessments	Reference to the German operation safety regulation (BetrSichV (§ 3)); case-related to process management (operation and observation); case-related to maintenance; difference from last-minute risk analysis	**2**

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Operation Management

No.	Training unit	Training contents	Duration (45 minute units)
7/OM	**Gas operation**		
7.1/OM	Process management responsibility	Selecting, instructing, executing, checking; job description, work order, implementation of mining authority laws and regulations (§58 BBergG); differentiation of the areas of responsibility; breakdown operation (in accordance with the German breakdown regulations)	**2**
7.2/OM	General framework	Compliance with the plant parameters; compliance with the daily running schedule; compliance with other (quality) parameters; depressurisation to atmospheric pressure; switching on and off of caverns	**2**
7.3/OM	Specifics of injection	First gas fill; starting and shutting down processes	**2**
7.4/OM	Specifics of withdrawal	Prevention/removal of hydrate formation; starting and shutting down processes	**2**
7.5/OM	Managing the SDS	diverse modules	**1**
7.6/OM	Repetition of maintenance terms	Maintenance; servicing; inspection/auditing; improvement	**2**
7.7/OM	Maintenance responsibility	Selecting, instructing, implementing, checking; job description, work order, implementation of mining authority laws and regulations (§58 BBergG)	**2**
7.8/OM	Repetition in preparation of maintenance actions	Release systems, especially release of gas; L(ast)M(inute)R(isk)A(nalysis)	**2**
7.9/OM	Typical maintenance actions in the field	Release and draining/residue removal; filling and pressurisation processes through bypasses; follow-up checks/tightness tests after system openings; gas-tight closures (development of double block and bleed system, operation and observation, ...)	**2**
7.10/OM	Handling of storage data system	Realisation of duty of documentation; operating sequence/workflow with various modules	**1**
7.11/OM	General	European frameworks, terminology; day-to-day business procedure; dispatcher job description; instructions; storage data system module; manual procedures (xml files)	**2**
7.12/OM	Availabilities	General; remit; technical and commercial availability	**2**
7.13/OM	Nominations	Nominations of memory users, zero nominations	**2**
7.14/OM	Matching	Daily running schedule	**2**
7.15/OM	Allocation	Daily bookkeeping	**1**
7.16/OM	Accounts	Storage user accounts; transport system operator accounts; storage accounts	**2**

Prices 2023

Are you interested in modules of our training program?

Choose the modules you are interested in and contact us.
On our homepage www.ugsnet.de you find the link of the UGS-Academy under the heading „Our Services“ including training program. Please write an e-mail at info@ugsnet.de with the subject „UGS-Academy“.

For our education services at the UGS Academy in Mittenwalde we charge:

• Day rate for up to 4 participants *(The day rate includes 8 units (U) at 45 min.)*	2.200 €
Charge for any further participant	210 €
The day rate includes training material, refreshments and snacks during breaks and lunch.	
• Success monitoring	95,00 €/participant
• Half day rate for up to 4 participants *(The half day rate includes 4 units (U) at 45 min.)*	1.100 €
Charge for any further participant	105 €
The half day rate includes training material, refreshments and snacks during breaks and lunch.	

To ensure an adequate quality the maximum number of participants is limited to 12. The specified prices are net values. Invoicing shall be made in addition to the statutory value-added tax applicable at the time of invoicing.

Do you have special requests for a training please contact us. We will find the perfect solution for you.


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