

Deep Geological Repositories in Sedimentary Environments

Held : 24th – 28th September, Peine, Germany
Course Outline

This five-day course concerns all of the key aspects of geological disposal of radioactive wastes in sedimentary environments, including evaporites. It covers the scientific and technical background of the hydrogeology and hydrochemistry of sedimentary environments, the engineering properties of clays and evaporites, the design of repositories and site characterization in sedimentary formations. Safety assessment is also covered in detail, through a series of six case studies in different sedimentary and evaporite environments.

A particular feature of this course is an in-depth look at the practical aspects of managing both a planned and an operating repository – the Konrad and the Morsleben facilities. Field visits will be made to the surface and underground works at both sites and there will be detailed lectures on site characterization, safety assessment and the issues involved in closing a repository at the end of its operational life.

The course is ideal for those involved in any component of a national waste programme that is considering repository development in sedimentary formations.

Course Organiser

The course is organised by the ITC-School in collaboration with, and supported by, the IAEA (International Atomic Energy Agency) within its network on Training and Demonstration of Waste Disposal Technologies in Underground Research Facilities (<http://www-tc.iaea.org/tcweb/default.asp>).

The local host organisation is DBE Technology in whose offices in Peine the course will be held and who will guide the field visits (<http://www.dbetec.de/en/about-dbe-tec/the-company/>).

Teaching

The course will be held in an informal, workshop atmosphere and participants will be encouraged to interact and question at all times. Each course topic will be taught by highly qualified and internationally recognised specialists from a range of organisations active in the field of radioactive waste disposal. They will provide the most up to date and comprehensive information and discussions. Course materials will be provided for each topic. The course language is English and course materials are printed in English.

Participants from IAEA Technical Co-operation Project

Participants from the countries within the IAEA training scheme "Training in Radioactive Waste Disposal Technologies in Underground Research Facilities", of which this course is a part, (i.e. Argentina, Armenia, Brazil, Bulgaria, Chile, the Peoples Republic of China, Croatia, the Czech Republic, India, Lithuania, Kazakstan, Mexico, Pakistan, Philippines, Republic of Korea, Romania, Republic of South Africa, Romania, Russian Federation, Slovakia, Slovenia, Ukraine) should contact the responsible officers at the Agency as below.

Mr. Mykola Kurylchuk Department of Technical Co-operation, ext. 26368 e-mail M.Kurylchuk@iaea.org

Malcolm Gray, Technical Officer, Department of Nuclear Energy, Division of Waste Management and the Fuel Cycle, IAEA for details: Tel. ++ 43 1 2600 21535; e-mail: M.N.Gray@iaea.org

Course Programme

Monday 24th September

0830 - 0900

Introductions

ITC

DBE Technology IAEA

0900 - 0930

Participants introduce themselves

All

0930 - 1015

Why sediments?

- Geological disposal and the isolation potential of sediments – an introduction to the course

Neil Chapman ITC

1015 - 1045

COFFEE

1045 - 1230

Hydrogeological and hydrochemical properties of sediments

- groundwater flow and chemistry in sedimentary sequences (including salt dome cover formations)
- argillaceous rocks: formation-scale and small-scale hydraulic and geochemical properties affecting waste and engineered barrier performance and radionuclide migration
- flow and chemistry response to climate change: palaeo-flow properties of sediments and palaeohydrogeology

Adrian Bath

Intellisci UK

1200 - 1300

LUNCH

1300 - 1400

Engineering properties of clay and marl formations

- constitutive properties of clays
- stress-strain behaviour and excavation support implications
- thermal behaviour

Michael Jobmann

DBE Technology

1400 - 1500

Engineering properties of salt and anhydrite formations

- creep and plasticity; stress-strain behaviour
- behaviour of intergranular/bound water and formation gases
- thermal behaviour

Nina Müller-Hoeppe DBE Technology

1500 - 1530

COFFEE

1530 - 1700

Repository design and operational considerations in clays and salt formations

- EBS systems for clay and salt formations for HLW/SF and ILW
- tunnel/cavern excavation and support
- converting existing underground facilities (e.g. mines) to repositories
- operational factors
- backfill materials and options

Enrique Biurrun DBE Technology

Tuesday 25th September

0830 - 1300

Visit to the Morsleben repository

- history and characteristics of the repository
- tour of the repository

Wilhelm Hund

BfS, Germany

1300 - 1400

Lunch (at Morsleben) and return to Peine

1400 - 1430

Visit to DBE Technology underground waste handling equipment store in Peine (excavation and waste transport and emplacement machinery)

DBE Technology

1430 - 1500

Site characterisation work around Morsleben: techniques and results

Wilhelm Hund BfS

1500 - 1530

Geotechnical safety assessment of the Morsleben site

Monika Kreienmeyer

DBE Technology

1530 - 1600

COFFEE

1600 - 1700

Backfilling and sealing of salt repositories: technical and safety aspects

Nina Müller-Hoeppe DBE Technology

Wednesday 26th September

0800 - 1230

Field visit to Konrad LILW repository development site

- history of the repository programme
- tour of the underground facilities

Wolf Koch

BfS, Germany

1230 - 1330

Lunch (at Konrad) and return to Peine

1330 - 1415

Geology of the Konrad area: surface-based and underground geological site characterisation programme (techniques and results)

TBA

DBE Technology

1415 - 1530

General approaches and techniques to site investigations in mixed sediment sequences: international experience

Tim McEwen

Independent Consultant, UK

1530 - 1600

COFFEE

1600 - 1715

The history, development and status of geological disposal in Germany

Klaus Kühn

Professor Emeritus University of Clausthal

Thursday 27th September

Repository Safety Concepts and Safety Assessment Case Studies

0830 - 0930

1. The Callovo-Oxfordian clay, France

Sylvie Voinis ANDRA, France

0930 - 1030

2. The Opalinus clay, Switzerland

Paul Smith

SAM, UK

1030 - 1100

COFFEE

1030 - 1130

3. Mesozoic sediments of Konrad, Germany

Peter Brennecke

BfS, Germany

1130 - 1230

4. Generic salt dome repository

Jürgen Krone

DBE Technology

1230 - 1330

LUNCH

1330 - 1430

5. Morsleben salt dome repository, Germany

Wilhelm Hund

BfS, Germany

1430 - 1530

6. Limestone-marl: Richard repository, Czech Republic

Bernt Haverkamp

DBE Technology and TBA, RAWRA

1530 - 1600

COFFEE

1600 - 1700

Natural analogues in clays and salt

Russell Alexander

ITC

Friday 28th September

0900 - 1000

Underground experimental programmes at Asse, Germany

Walter Steininger

PTE-FZK

Germany

1000 - 1100

Long-Term monitoring of deep geological repositories: experience from international URLs in salt, clay and hard rock

Michael Jobmann

DBE Technology

1100 - 1130

COFFEE

1130 - 1200

Wrap up and close

ITC

DBE Technology

1200 - 1300

Lunch

1300

Depart for afternoon and evening visit to Berlin

Course participants wishing to participate in the visit will transfer to an hotel in Berlin for Friday night and should arrange to depart from Berlin on Saturday 29th September