



# School of Geological Disposal

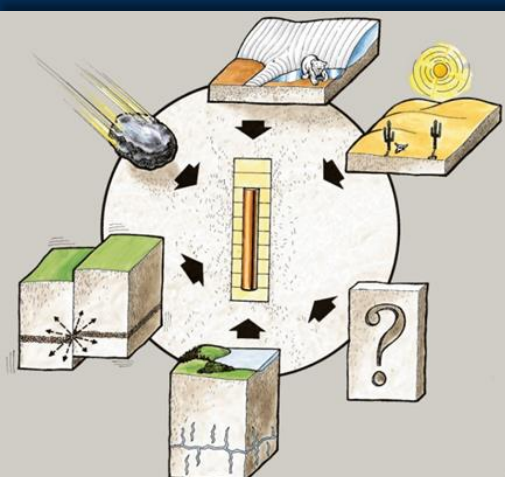
## Siting and site investigations of a geological repository for nuclear waste

### Östhammar, Sweden

1 – 5 June, 2020

SKB International and SKB are delighted to once again offer a training course covering important issues governing a national nuclear waste disposal programme.

Based on the experiences gained by SKB during the past 40 years the course will present the planning and execution of a successful programme. The starting point being a strategic and graded approach from both a technical and societal perspective starting with national studies, base requirements, safety functions, conceptual design via feasibility studies and site investigations, updated requirements, safety assessment and repository design to site selection including the licensing process.



Full course details and a registration form are available at SKB web site: [www.skb.se/SGD2020](http://www.skb.se/SGD2020)

Further information contact: [erik.thurner@skb.se](mailto:erik.thurner@skb.se)



## Full Registration and Schedule

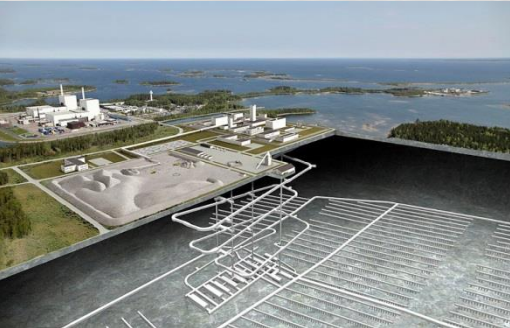
In the following package you will find the updated final schedule, detailed programme description and information about recommended accommodation, transport and invoice details and registration form.

The course is given by senior experts from SKB, many with world renowned reputation in their field, and will cover the relevant topics regarding siting and site investigations. The course programme will launch from the strategy of a siting process and the fundamentals needed for a site selection of a geological repository for nuclear waste or spent nuclear fuel. We will present SKB's experiences and knowledge based on the stepwise siting process, transparency in the programme and communication with stakeholders and share experiences gained from successes as well from failures. The lectures and discussions will provide extensive, profound information coupled to cutting edge applications when applicable. We aim to transfer theoretical knowledge and practical experience to the course participants efficiently and effectively all in an informal and inclusive atmosphere encouraging open discussions and networking.

Attendants will obtain course material (English), information material about SKB, and general information about Östhammar such as map, tourist information, etc. during the welcome reception to further enhance the positive experience of the course.

SKB International AB





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## Siting and site investigations of a geological repository for nuclear waste

Östhammar, Sweden  
June 1 - 5, 2020

**When:** 1 – 5 June 2020  
**Time:** One full workweek, 08:00-17:30  
**Location:** SKB's office in Östhammar, accommodation in Öregrund  
**Price:** €4000, including lunches & local transport, one dinner  
**Registration:** Full registration form to be submitted by latest **20 March 2020**

### Important information:

#### Registration:

- Full registration must be submitted by latest 2020-03-20.
- Registration form is attached to this information packages or can be downloaded from the web site: [www.skb.se/sgd2020](http://www.skb.se/sgd2020)
- A brief presentation of the participant is requested, will be used to adapt the presentations.
- Limited number of participants is 30 and first registered – first served.

#### Accommodation:

- SKB International propose participants to stay at the Strandhotel located in Öregrund. The price is 1050 SEK/night and includes breakfast.
  - ✓ Participants make their reservation in the registration form.
  - ✓ Dinners at Strandhotel needs to be booked in advance. The cost is SEK230/dinner. The booking is made in the full registration form.
- Other accommodations are available in Öregrund but the participants have to make their own hotel reservation.
  - ✓ Transports will be arranged from/to Strandhotel.
  - ✓ Please inform secretariat if you stay at another hotel.

#### Transportation:

- All local transportations between Strandhotel in Öregrund and SKB facilities, Monday through Friday are arranged.
- Transportation both ways between Arlanda airport and Strandhotel on Sunday 31 May and on Friday 5 June after ending the course are arranged.
- Further travel information is found on the last page and in the registration form.

#### Payment:

- Invoice will be sent to each participants affiliation after final registration.
  - ✓ Non-refundable registration fee of €4000, shall be paid within 30 days.
  - ✓ Additional cost for hotel, dinners and transportation shall be paid within 30 days.

*Final decision to execute the course will be done at the end of March. The decision will be based on the number of registered participants and the current restrictions connected to the Coronavirus disease outbreak.*

#### Special feature:

- Presentations by NWMO on the Canadian siting process including ongoing site investigations

#### Study visits to:

- Forsmark site
  - ✓ Overview
  - ✓ Drill sites
  - ✓ Monitoring
  - ✓ Water chemistry laboratory
- Final Repository for Short-lived Radioactive Waste, SFR
- Demonstration of site investigations equipment





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## Siting and site investigations of a geological repository for nuclear waste

### Östhammar, Sweden

1 – 5 June, 2020

## Schedule

Time	Day 1 - 1 June	Day 2 - 2 June	Day 3 - 3 June	Day 4 - 4 June	Day 5 - 5 June
<b>08:00 - 10:00</b>	<b>Introduction</b> Participants presentation & expectations	<b>Day 1 recap</b>  <b>Overview Site investigations</b>	<b>Day 2 recap</b>  <b>Site Investigations</b>	<b>Site visit -</b> Demonstration of site investigation methods  <b>Day 3 recap</b>	<b>Day 4 recap</b>  <b>Canadian site investigations – current status and future plans</b>
<b>30 min</b>	BREAK	BREAK	BREAK	BREAK	BREAK
<b>10:30 – 12:00</b>	<b>Siting a Nuclear Waste Repository in different geological environments</b>	<b>The Geological Barriers</b>	<b>Investigations of the surface and the near surface system</b>	<b>Site selection</b>	<b>Panel session</b>
<b>1h.</b>	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
<b>13:00 – 15:00</b>	<b>Overview of the Siting process</b>	<b>Site visits</b> Forsmark site SFR	<b>Monitoring</b>  <b>Participant workshop</b>	<b>Communication with stakeholders</b> Compensations	<b>SKB - status and future plans</b>  <b>Summary and course evaluation</b>
<b>30 min</b>	BREAK	BREAK	BREAK	BREAK	BREAK
<b>15:30 – 17:30</b>	<b>Continue siting process</b>  <b>Overview of the Canadian programme</b>	<b>Continue the Geological barriers</b>	<b>Developing a Site Descriptive Model (SDM)</b>	<b>View from the Municipality in Östhammar</b>  <b>Participant workshop</b>	<b>Examination and certificate of completion of the School of Geological Disposal.</b>  <b>Course ends at 16.30</b>
<b>Evening activities</b>	Sunday 31 May Welcome Reception	Dinner hosted by SKB International			



# School of Geological Disposal

## Siting and site investigations of a geological repository for nuclear waste

Östhammar, Sweden  
1 – 5 June, 2020

### Detailed programme description

#### Sunday evening, 31 May:

- A school representative will be available in the reception at the **Strandhotel in Öregrund** from 17:00.
- Registration package including local information, list of participants, name tags, and a full course documentation will be distributed to all participants.
- **Welcome Reception** between 19:00-20:00 at the **Strandhotel in Öregrund** hosted by SKB International, including snacks and drinks.

#### Monday, 1 June:

- Bus transfer to SKB's office in Östhammar depart the **Strandhotel in Öregrund** main entrance at 07:30.

#### Monday Technical Programme:

- ✓ **Introduction and Background to the course.** This section includes a presentation of the waste management company SKB, responsibilities, working procedures and financing. It includes a presentation of geological disposal concepts and its relation to waste forms/waste acceptance. We also expect a short presentation by each of the participants on their background and expectations from the course (max. 1 min).
  - ✓ **Siting a Nuclear Waste Repository in different geological environments.** This section presents disposal options which are tailored for different geological media (crystalline rock, clay formations and salt). The focus is to present the similarities and differences which are due to the geological properties of the different media. A brief description of the KBS-3 concept is given. Regulation, IAEA and national requirements will also be discussed.
  - ✓ **Overview of a siting process of a geological repository for nuclear fuel.** This section presents a historical view of the Swedish roadmap of the siting process. Starting from an international overview and how SKB developed the strategy and the stepwise approach to find suitable sites in Sweden. The licensing process and the communications with different stakeholders will be discussed.
  - ✓ **Overview of the Canadian programme** will be presented by the NWMO. This section gives a historical view of the Canadian programme covering the nuclear industry, regulators, implementers and the development and implementation of Adaptive Phased Management for the safe, long-term management of used nuclear fuel.
- Bus transfer to Strandhotel in Öregrund at 17:30.



# School of Geological Disposal

## Siting and site investigations of a geological repository for nuclear waste

Östhammar, Sweden  
1 – 5 June, 2020

### Detailed programme description

#### Tuesday, 2 June:

- Bus transfer to SKB's office at Forsmark site depart the **Strandhotel in Öregrund** main entrance at 07:30. Registration and identification control – **Bring Passport!**

#### Tuesday Technical Programme:

- ✓ **An overview of SKB's site investigations.** This section starts with the goal and stages of the Swedish site investigation programme and includes what was to be determined and why. The quality assurance and quality control including databases and datahandling was an important part of the work. The management and the organisation of the two site investigations in Laxemar and Forsmark and the differences between them will be presented.
  - ✓ **The Geological Barrier.** This section starts with a presentation of the safety functions and criteria expected for the geological barrier. In contrast to the engineered barriers this barrier cannot be manufactured and therefore its properties must be assessed carefully. In addition to the solid (rock) material the properties and aspects of the groundwater flow, chemical composition and potential to transport of dissolved species is highlighted. The geological barrier will provide the long-term stable conditions needed for the engineered barriers to function properly.
  - ✓ **Two visits in the Forsmark area:**
    - A visit to SKB's Final Repository for Short-lived Radioactive Waste, SFR. SFR has been in operation since 1986 and is now planned to be expanded to handle decommissioned waste. Registration and identification control – **Bring Passport!**
    - A visit to the Forsmark site, where the repository for nuclear spent fuel is planned to be constructed.
- Bus transfer to Strandhotel in Öregrund at 17:30.

#### Tuesday evening, 2 June:

- SKB International invites all participants and lecturers to the **Course Dinner!**
  - ✓ Time: 19:00
  - ✓ Location: To be decided, either walking distance from Strandhotel or transportation will be arranged.





# School of Geological Disposal

## Siting and site investigations of a geological repository for nuclear waste

Östhammar, Sweden  
1 – 5 June, 2020

### Detailed programme description

#### Wednesday, 3 June:

- Bus transfer to SKB's office in Östhammar depart the **Strandhotel in Öregrund** main entrance at 07:30.

#### Wednesday Technical Programme:

- ✓ **Site investigations.** This section presents the different investigations methods SKB used during our site investigations, both at surface and in boreholes.
  - ✓ **Investigation of the surface and the near surface system.** This section covers the surface system concept and the general site characterisation strategy and the end user needs during the siting process and investigation programmes. The stepwise investigations and iterations with the overall programme was important. The presentation includes the site descriptive modelling of the surface system and linkage to the bedrock system and the resulting site understanding (surface system).
  - ✓ **Monitoring.** This section describes the monitoring programme established at the start of the site investigations for both the Laxemar and the Forsmarks sites and up until today. It includes monitoring of the geology, hydrogeology, and the surface and near surface systems.
  - ✓ **Participants workshop.** Discussion in groups about the lectures held during the first part of course covering overview of the siting process, site investigations and monitoring. The groups compile questions to be raised at the panel session on the last day.
  - ✓ **Developing a Site Descriptive Model (SDM).** The SDM is developed as a result of careful investigation of the bedrock at sites potentially suitable for the construction of a nuclear waste repository. SDM work is a systematic assessment of all data and information useful for describing the properties and function of the host rock. Even though the modelling starts with disciplinary assessment of data, geology, hydrogeology, hydrogeochemistry the very core of SDM is the total integration of all data. In a fractured crystalline rock the existence of fractures and the network of fractures have an important impact on the outcome of flow and transport of dissolved species. Therefore the development of Discrete Fracture Network Models (DFN) is one of the most important components in preparation for the safety assessment.
- Bus transfer to Strandhotel in Öregrund at 17:30.



# School of Geological Disposal

## Siting and site investigations of a geological repository for nuclear waste

Östhammar, Sweden  
1 – 5 June, 2020

### Detailed programme description

#### Thursday, June 4<sup>th</sup>:

- Bus transfer to SKB's office in Östhammar depart the **Strandhotel in Öregrund** main entrance at 07:30.

#### Thursday Technical Programme:

- ✓ Demonstration of site investigation methods. A visit to the Forsmarks site and a drill site where some of the investigation methods used during SKB's site investigation will be demonstrated. Registration and identification control – **Bring Passport!**
  - ✓ **Site selection.** The selection of the repository site (Forsmark) was based on the outcome of the investigations, which proved the bedrock properties of Forsmark to be superior in comparison to the other investigated site (Laxemar). Thereby the actual selection of Forsmark was a simple task, but it required an intensive amount of investigations and modelling (SDM) before the choice could be made. The procedure to do the site selection is presented.
  - ✓ **Communication with stakeholders.** Within the organisations in charge of the SKB's Site Investigations was also the responsibility to handle the acceptance by the local politicians, neighbours and other stakeholders. Information and study visits to the SKB facilities was arranged weekly during the site investigation stage. The importance of confidence building and public acceptance issues are discussed and experiences from the Swedish programme. The work and good/bad experiences on how to reach out to different stakeholders will be presented.
  - ✓ **View from the Municipality in Östhammar.** The mayor of Östhammar will present the view from the Municipality and the public in SKB's siting process.
  - ✓ **Participants workshop.** Discussion in groups about the lectures held during the second part of course covering Site Descriptive Modelling, Site selection and communication with stakeholders. The groups compile questions to be raised at the panel session on the last day.
- Bus transfer to Strandhotel in Öregrund at 17:30.



# School of Geological Disposal

## Siting and site investigations of a geological repository for nuclear waste

Östhammar, Sweden

June 1 - 5, 2020

### Detailed programme description

#### Friday, June 5<sup>th</sup>:

- Bus transfer to SKB's office in Östhammar depart the **Strandhotel in Öregrund** main entrance at 07:30.

#### Friday Technical Programme:

- ✓ **Canadian site investigations – current status and future plans** will be presented by the NWMO. This section presents the status of the Canadian site selection process including a summary of surface and subsurface studies, municipal and indigenous engagement and plans for selecting a single site.
- ✓ **Panel session.** The key lecturers will answer questions and comments based on contribution from participants, individually and/or from the two participants workshops.
- ✓ **SKB status and plans.** This section gives a more overall presentation on ongoing and planned work within SKB and includes the remaining steps in the licensing process for both the final repository for spent nuclear fuel and the extension of the final repository for short lived radioactive waste.
- ✓ **Summary and course evaluation.** Summing up of the course and an evaluation of the course. This includes an oral examination and certificate of completion of the School of Geological Disposal 2020.
- ✓ The School will end no later than 16:30, and a transfer bus from SKB's office in Östhammar to Stockholm Arlanda Airport will be arranged, see information on the last page and in the full registration form.





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Östhammar, Sweden

June 1 - 5, 2020

### Key lecturers

To accomplish a best possible course SKB International has involved key persons from the Swedish siting process and site investigations with wide and long experience. Some of these persons are as follows:

- *Claes Thegerström*, SKB's former CEO during the site investigations and manager of the feasibility studies
- *Johan Andersson*, key role in interaction between site investigations and SDM and also in the site selection
- *Peter Wikberg*, manager of the site investigations in Laxemar
- *Raymond Munier*, research manager Geology
- *Tobias Lindborg*, task leader of surface system SDM and managing biosphere safety assessment projects
- *Jacob Spangenberg*, Major of the municipality in Östhammar

We are also very pleased to be able to include two lecturers from the NWMO, responsible for the Canadian high-level waste management programme. They are:

- *Maria Sánchez-Rico Castejón*, Manager of site investigations
- *Martin Sykes*, Geoscientist and technical lead for borehole drilling

### Information how to get to and from Öregrund

Unfortunately the options to travel to Öregrund are somewhat limited.

Therefore SKB International will arrange for one transfer in each direction between Stockholm Arlanda Airport and Öregrund, see below.

#### Sunday May 31<sup>st</sup>, 2020

- Bus transfer at 16.00 from Stockholm Arlanda Airport (Terminal 5) to Strandhotel in Öregrund. The bus transportation takes about 1,5 hour. The cost is €50.

#### Friday June 5<sup>th</sup>, 2020

- Bus transfer at 16.45 from SKB's office in Östhammar after ending the course to Stockholm Arlanda Airport (Terminal 5). The bus transportation takes about 1,5 hour. The cost is €50.

**Please fill in the registration form about transportation, costs will be added to the invoice.**

#### Other options to get to/from Öregrund (individual booking):

- Taxi, 45-60min. Cost about €190.
- Bus 801 from Stockholm Arlanda (Terminal 2 or 3) or Commuter train (SL-pendel) from Arlanda C to Uppsala Central station and then Bus 811 to Öregrund. About 2,5 hours and the cost about €25 (SEK250). Find more information at <https://www.ul.se/en>