

NEWSLETTER

Special Edition: 10-year Anniversary
Issue #9, November 2019



Editorial News

Radioactive waste management and geological disposal is a challenging and complex societal task from every perspective: technical, political or ethical. It is widely accepted that this topic needs to be handled by the current generation and shall not be postponed to future generations. Even more because the last stage in the project cycle of nuclear energy bears a significant cost.

The Implementing Geological Disposal of Radioactive Waste Technology Platform (IGD-TP) was established in 2009 to initiate and perform joint activities in Europe to facilitate the stepwise implementation of safe, deep geological disposal of spent fuel, high-level waste and other long-lived radioactive waste. Previously established by the European Commission (EC), it is now led and funded by an Executive Group (EG) comprising representatives from 12 European Waste Management Organisations (WMOs) and organisations responsible for implementation-related RD&D programmes.

The aim of the IGD-TP is to coordinate RD&D work to help ensure the realisation of our vision to have the first geological disposal facilities (GDF) for spent fuel, high-level waste and other long-lived radioactive waste in operation by 2025 (<https://igdtp.eu/>).

The scientific and technical knowledge base that has been acquired for over 40 years of collaborative international research is considerable and is now sufficient and appropriately robust to facilitate progression towards licensing and construction of GDFs in Europe. However, it is important that this knowledge is maintained, enhanced and shared between WMOs throughout the stepwise development, operation and eventual closure of facilities. Today we would like to celebrate the 10th Anniversary of the IGD-TP by highlighting some of the achievements throughout the years of work and take a quick peek to the next decade that we are entering now. We thank all organisations and people supported the initiative and guaranteed its success over the years.

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What has been achieved?



Major progress has been made in achieving the vision formulated in 2009. As a geological repository for high-level waste is being constructed in Finland and construction licence applications are either in preparation or being assessed in France and Sweden, the vision of the IGD-TP, namely

'to have the first geological disposal facilities (GDF) for spent fuel, high-level waste and other long-lived radioactive waste in operation by 2025' is materialising.

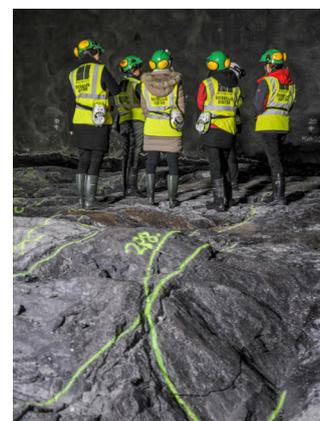
In addition, progress has also been made right across the spectrum of waste management programmes. While early stage programmes have published policies in support of the geological disposal facility as a preferred solution, other 'mid stage' programmes have developed and documented credible underpinning research programmes. This in line with the EURATOM spent fuel and radioactive waste directive that has been in force since 2011. Based on the IGD-TP's 2011 Strategic Research Agenda (SRA), the WMO's research needs have helped define and direct numerous EURATOM calls and projects such as PEBS, CAST, MODERN, BELBAR, LUCOEX, CE-BAMA, JOPRAD, THERAMIN, BEACON, etc., to highlight only a few of them.



Source: Posiva Oy

Much of the extensive underpinning scientific knowledge base has been developed with EURATOM RD&D funding. In June 2019 the European Joint Programme EURAD on Radioactive Waste Management, founded on agreed common objectives and aims to deliver an ambitious, cohesive and coordinated joint programme was launched. EURAD brings together waste management organisations (WMOs), technical support organisations (TSOs) and research entities (REs), and envisions a step change in European collaboration towards safe radioactive waste management (RWM), including disposal, through the development of a robust and sustained science, technology and knowledge management programme. The IGD-TP has acted to coordinate the WMO view in the proposal, along with those bodies representing the TSOs and the REs, and will continue to do so in the future.

The IGD-TP has achieved its main objectives set at this time in 2009, and it is now important to face the new challenges and adapt the strategy accordingly.



... and where to go from here?

On 1-2 October this year the IGD-TP Executive Group, on invitation by Posiva, met in Rauma (Finland) to celebrate the achievements to date and the 10th Anniversary of the founding of the IGD-TP. This was an ideal place as it enabled us to visit the ONKALO® facility and to experience the birth of the first deep geological disposal facility which will start operation soon. The IGD-TP recognises that, thanks to these positive developments and the kick-off of the EURAD joint programme, there is room to focus intensively on the needs of the WMO programmes. In the next years the IGD-TP will develop strongly application-driven joint activities that are linked more closely to decision-making in the individual WMO programmes and have shorter timelines. The IGD-TP objective here is to combine forces around joint interests between WMOs and increase efficiency.

Furthermore the IGD-TP has widened its WMO network to represent all WMOs that are currently in EURAD and acts as the implementer college in EURAD with three representatives in the bureau (currently Andra, SKB and DEKOM (Denmark)). The IGD-TP college will work decisively to realise its own strategic research agenda within EURAD where this is possible timewise and where a consensus can be reached with the other colleges in EURAD.

However, typical WMO RD&D programmes have a much wider scope of activities than the commonly agreed EURAD strategic research agenda can address. The IGD-TP will therefore increasingly move its focus towards developing RD&D initiatives and activities that are unlikely to be integrated into the EURAD scope (two examples are introduced in the next section of this newsletter).

The IGD-TP remit will remain focused on geological disposal, with interest in upstream activities (such as conditioning and treatment), and will also expand to include scope of greater relevance to nations with small programmes, such as, for example, the disposal of sealed sources and deep borehole disposal.



NEW VISION

2040 – Towards industrialisation of radioactive waste disposal in Europe

Safely operate

the first geological disposal facilities in Europe

Optimise & industrialise

planning, construction and disposal operations

Tailor solutions

for disposal of the diverse waste inventories in Europe



In order to meet the challenges of the next phase the IGD-TP EG has updated its vision during the last few months. It was identified that the **new vision** up to 2040 needs to consider the next step towards industrialisation of radioactive waste disposal in Europe. The focus should lie on the safe operation of the first geological disposal facilities in Europe, the required optimisation and the development of individual solutions to meet the requirements of the diverse range of waste inventories we have in the various countries and programmes in Europe. The new vision is now being announced as part of the celebration of the 10th Anniversary. The publication of the updated second version of the IGD-TP strategic research agenda will follow in the first half of 2020.

IGD-TP Projects – What is going on?

Kiruna Natural Analogue (KiNa Project)

The Kiruna International Natural Analogue Project (KiNa) aims at investigating long-term bentonite behaviour under repository relevant conditions. Nagra, SKB, Posiva, NWMO and RWM are joining forces to gain the information needed for their national programmes. NUMO (the Japanese implementor) will probably join at the beginning of the next year.

The expected outcome of this project will be an important addition to the safety case as it will provide evidence from a bentonite body under repository like conditions for several hundred million years. More specifically it will provide the following key information: (i) demonstration of sustainable performance of safety relevant aspects of bentonite such as swelling pressure and low hydraulic conductivity; (ii) a validation of the model for iron and bentonite interaction; (iii) insight in to the evolution of the mechanical properties of smectite aged several hundred million years.

In the north of Sweden, the up to 50 m thick clay alteration zones have been encountered in the Kiruna-type magnetite(-hematite)-apatite deposits, which are hosted in weakly to strongly metamorphosed intermediate to acid volcanic and subvolcanic rocks. Preliminary data indicate that the clay contains a high amount of montmorillonite and that the swelling pressure and hydraulic conductivity is similar to that of commercial bentonites intended for repository use.

The project scope will include:

- sampling and in-situ characterization of the alteration zones,
- physico-chemical and mineralogical analyses of the smectite,
- age determination of the smectite phase,
- swelling pressure and hydraulic conductivity tests of smectite, and
- geochemical modelling of the alteration zone.

The kick-off meeting was held on the 17th September 2019 in Kiruna and hosted by LKAB, Sweden. The meeting was attended by participants from Bedrock Geosciences, LKAB, Nagra, NUMO, NWMO, Posiva, SKB and Technical University of Munich.



Top: Magnetite-smectite occurrence in outcrop in the Kiirunavaara iron ore mine, Sweden

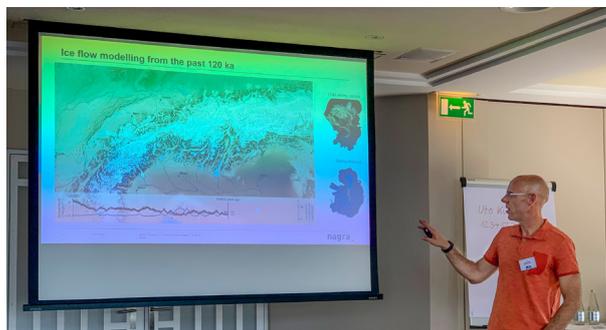
Left: Kiirunavaara iron ore mine (Sweden) visit during the kick-off meeting on the 17th September 2019

IGD-TP Projects – What is going on?

Climate change in the safety case

Nagra successfully hosted a one-day information exchange WMO workshop on views and consistency between research programmes with regard to climate change in June this year.

15 participants from Andra, BGE, KIT/BMWi, Nagra, Posiva, RWM and SKB discussed how to make full use of synergies between WMOs to help ensure that arguments used for the safety case with respect to climate evolution/change coincide between the different WMOs and international best practice.



One outcome of the meeting was the recommendation to create a platform for information exchange and use of synergies to reinforce argumentation on the impact of climate on repository safety through transparent exchange of applied methodologies, uncertainty estimations and results between the participating WMOs. This will take the form of an annual workshop and collaboration on RD&D where possible and deemed useful. A proposal for the continuation of this project was presented at the IGD-TP EG30 meeting with the project title "Climate change in the safety case (CCSC)". The IGD-TP EG was very positive regarding reaching a consensus on the approach to, and modelling of, climate evolution and related climate change impacts in the safety case. A clear link between global climate change projections and downscaling of global climates to a useful regional/local level needs to be established, including the assumptions of impacts of different climates on the biosphere and geosphere in the immediate vicinity of the proposed/planned repository sites.

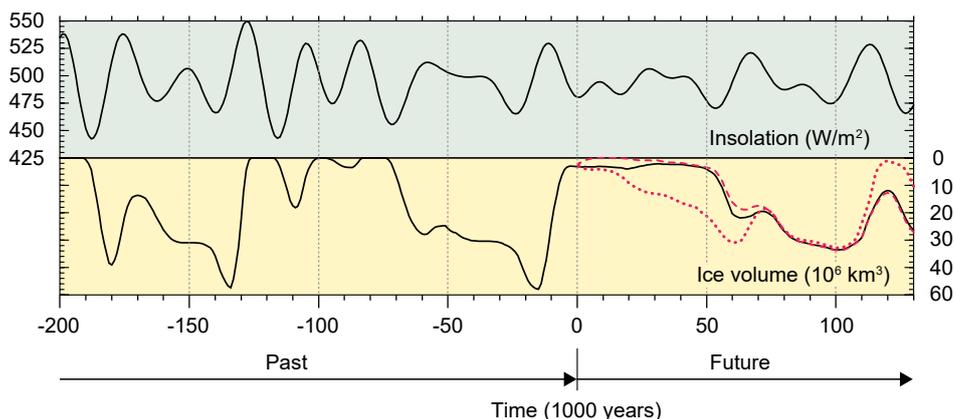
Discussion at the last IGD-TP EG30 meeting noted that identification and definition of reasonable scenarios that have a maximum impact on specific GDFs is a challenge; how each WMO approaches this topic would be beneficial to share and discuss. For example, Nagra's focus is on erosion (i.e. during glaciation) while sea level changes related to climate change is only of marginal interest. This is quite different for other WMOs whose planned/proposed repository sites are e.g. close to the sea shore or have in the past never been covered by extensive ice sheets.



Downscaling climate projections from a global to a regional level using a nested approach (pers. com. Raible)

Two questions/challenges are put to the platform by the IGD-TP EG:

1. how to ensure consistency of the scientific basis when scaling from global to regional predictions, and how resulting differences between different GDFs are communicated to stakeholders; and
2. how to identify and define reasonable scenarios that maximise the impact on repository systems.



After Berger, A., Loutre, M.-F. & Crucifix, M.: The Earth's climate in the next hundred thousand years (100 kyr). Surveys in Geophysics 24, 117–138 (2003)

Secretariat News and Meeting Announcements

New IGD-TP Members

Since our last newsletter we have welcomed one new organisation to the IGD-TP: Deep Isolation Inc. (www.deepisolation.com) is a small start-up in California, USA, and their field of research is in deep geological disposal of radioactive wastes through the use of patented technology that utilises innovations in directional (not vertical) drilling technology for the disposal of spent nuclear fuel and weapons waste.

The IGD-TP now has 137 member organisations from 27 countries active in geological disposal. All our member organisations and their contact points are available at: <https://igdtp.eu/members/>



Upcoming Meetings



THERAMIN Conference 2020

Date: 4-5 February 2020
Location: Manchester, UK



31st Meeting of the IGD-TP Executive Group

Date: 26 February 2020
Location: Madrid, Spain



International Conference on Geological Barrier Systems, Host Rock Characterization and Site Selection

Date: 27-28 February 2020
Location: Hanover, Germany



Waste Management 2020

Date: 8-12 March 2020
Location: Phoenix, USA



Third BEACON Annual Project Meeting

Date: 13-14 May 2020
Location: Liege, Belgium



Clay Conference 2020

Date: 8-11 June 2020
Location: Nancy, France

Website Development

We have continued to develop the activities pages on the IGD-TP website by adding historical and ongoing collaborative research projects. You can now find project summaries, report deliverables and links to further information for 35 projects.

We also announce events and news relevant to geological disposal research on our website. Please contact the IGD-TP Secretariat (secretariat@igdtp.eu) if you would like to highlight something of interest to our community.

