



# IGSC

## Integration Group for the Safety Case

**C**ountries that rely on nuclear energy and materials have an ethical obligation to manage radioactive waste in a safe and environmentally responsible manner. For society to support the sustainable solutions envisaged, disposal concepts must be technologically sound and the safety of these concepts must be convincingly demonstrated.

### Geological disposal and the safety case

Radioactive waste is produced in all phases of the nuclear fuel cycle, from the use of radioactive materials in industry, medicine, defence and research. The most hazardous and long-lived radioactive wastes, such as spent nuclear fuel and high-level waste from fuel reprocessing, must be isolated and contained for hundreds of thousands of years. Disposing of waste in engineered facilities or repositories located deep underground in suitable geological formations is being pursued worldwide as the preferred disposal option. The concept of a **geological disposal facility takes advantage of both the capabilities of local geology and those of engineered materials** to isolate and contain radioactive materials for their required timescales.

For society to agree to such deep geological disposal facilities, they must be shown to protect humans and the environment both in the short and long term. **The safety of a disposal facility is evaluated and documented in a “safety case”** that supports decision making at each stage of facility development. It presents the underlying evidence and methods that allow for increased confidence in the quality of scientific and institutional processes, as well as in the results of analyses.

### The IGSC mission

The Nuclear Energy Agency’s Integration Group for the Safety Case (IGSC) establishes and documents the technical and scientific basis for developing and reviewing safety cases as a platform for dialogue among technical experts and as a tool for decision making. The IGSC addresses various strategic and policy aspects of radioactive waste management as the technical advisory body to the NEA Radioactive Waste

Management Committee (RWMC) for all issues related to repository development.

For more than two decades, the IGSC and its predecessor technical groups have promoted the **exchange of national experience** in evaluating and implementing geological repositories. IGSC activities foster **consensus on best practices** and encourage the **development of innovative, advanced approaches** covering the technical aspects at all stages of repository implementation, including:

- strategies to characterise and evaluate potential disposal sites;
- methods to design and test engineered barrier systems;
- priorities for research and development programmes to improve the understanding of important processes and interactions;
- tools for safety assessments;
- techniques for the effective presentation and communication of the results of safety cases and other factors that provide the basis for increased confidence in the safety of geological disposal facilities.

The IGSC has been instrumental in further developing the “modern safety case”, a concept that originally emerged from NEA work in the 1990s. Co-operation with the International Atomic Energy Agency (IAEA) and the European Commission (EC) has led to the worldwide adoption of this safety case concept.

### IGSC membership and operation

The IGSC comprises **senior technical specialists and managers** from national waste management programmes, regulatory agencies, and research and technical support institutions.

The strength of the IGSC is derived from the diversity of the affiliations, the priorities and the expertise of its members. The preparation of a safety case involves many disciplines including physics, engineering, geology, chemistry, radiological protection and mathematical modelling. IGSC membership is truly international with members emanating from these disciplines representing European, Asian and North American national repository programmes, their regulators and supporting research organisations or the European Commission.

### IGSC members

- **Asia:** Japan, Korea;
- **Europe:** Belgium, Czech Republic, Finland, France, Germany, Hungary, the Netherlands, Poland, Spain, Sweden, Switzerland, United Kingdom;
- **North America:** Canada, United States.

The EC is also an official member and the IAEA participates as an observer.

The IGSC accomplishes its work through a variety of mechanisms including:

- annual **plenary meetings** with in-depth discussions on emerging issues and trends;
- **technical workshops** to explore key topics in detail;
- **studies**, joint projects, and national programme safety case peer reviews that are backed by the expertise of participating organisations, as well as external expertise from scientific and academic communities, when necessary.

The outcomes of IGSC projects are documented in technical reports and information flyers that are available to the public.

The IGSC recognises that implementing waste disposal solutions requires more than just technical competence. Members of society also need to have confidence in the safety of disposal strategies. The IGSC co-ordinates with other NEA committees and working parties on radioactive waste to **integrate multidisciplinary aspects of waste disposal programmes**, from the legal, regulatory and societal aspects. The IGSC co-operates with its counterparts in the EC and the IAEA to ensure consistency in international consensus on scientific and technical issues.

## The safety case: current activities and the IGSC work programme

Through IGSC activities, members are provided with important fora to develop state-of-the-art knowledge and tools that demonstrate safety and enhance confidence in the safety case. Activities of the IGSC can be categorised into four main themes:

- **Design and implementation:** hosting workshops and international joint studies to review and discuss the latest feasible design of repository systems and best available technologies to achieve safety in practice. The IGSC addresses practical challenges in implementing geological repository facilities while maintaining a balance between operational safety and long-term safety considerations.
- **Safety case integration and management:** ensuring the exchange of international knowledge and experience to evaluate the fundamental aspects required for the development of the safety case. Open discussions focus on efficient means and strategies to integrate newly acquired knowledge into safety cases and to communicate technical safety case information concerning the repository system (over different timescales) with various stakeholders so as to enhance confidence. The importance of records and knowledge management, long-term preservation requirements and overall staff management in organisations have been recognised by the IGSC, and activities are ongoing to find a proficient solution.
- **Safety assessment strategies and tools:** regularly reviewing state-of-the-art safety assessment approaches when developing and managing safety cases. Effective strategies and tools [e.g. the use of safety functions or “features, events and processes” (FEP) database] are refined and advanced to improve safety assessment approaches.
- **Scientific basis:** gathering and developing the crucial technical and scientific evidence, knowledge and data necessary for improving the design of geological disposal systems in their potential host formations. Key topics include the stability of the geosphere for the long-term isolation of radioactive waste; the engineered barrier system (EBS) design, including its long-term performance modelling and construction feasibility; and the transport behaviour of radionuclides.



SKB, Curt-Robert Lindqvist

W.E. Falick

ANDRA, 4 Vents