

Celebrating 20 Years of the Integration Group for the Safety Case

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Two decades of Safety Case Development: An IGSC



Introduction



Lucy Bailey

Head of RWM
Research Support
Office

- Fellow of the UK Institute of Physics
- Over 25 years' experience in geological disposal
- Led development of UK generic Disposal System Safety Case
- Expert peer reviewer of international safety cases
- Leading roles in NEA, IAEA and EC projects
- IAEA mission to Chernobyl, Dec 2018
- Over 40 publications covering the safety case and other technical and societal aspects of geological disposal
- Elected Chair of the IGSC in October 2015

Overview

- Introducing the IGSC 20th Anniversary brochure
- A brief history of the IGSC – why we were formed
- Role and mission of the IGSC – what we aim to do
- A 20 year timeline - Key achievements of the IGSC
- Value to national programmes – advancing geological disposal
- Where are we now?
- Where next?

IGSC 20th Anniversary Brochure

- The IGSC celebrated its 20th birthday in 2020
- Keen to mark achievements of IGSC
 - looking back and looking forwards
 - value IGSC brings to national programmes
- Point to future requirements for IGSC
- Published Dec 2020 https://www.oecd-nea.org/jcms/pl_52665
- Contains timeline with links to key IGSC publications
- Dedicated to two key IGSC members who sadly died in our 2020 anniversary year:
 - Jürg Schneider (Nagra, Switzerland)
 - Alan Hooper (RWM, UK)

Brochure Contents

- Evolution of safety case over last 20 years
- IGSC contributions to multiple lines of evidence for a successful safety case
- Key features & activities in safety case development
 - Integration
 - Safety functions
 - Handling uncertainty
 - Scenario development
 - Knowledge management
- Regulatory perspective
- Safety case communication & stakeholder interaction
- Main messages & outlook



Two decades of Safety
Case Development:
An IGSC

20th
anniversary
Brochure



In the beginning....

Performance Assessment Advisory Group (PAAG)

- Numerical approaches
- IPAG sub-group publishes:
*Confidence in the Long-term
Safety of Deep Geological
Repositories, NEA 1999*



Site Evaluation & Design of Experiments (SEDE)

- Qualitative approaches
- Building understanding through
research
- Site evaluation techniques
- Clay Club



IGSC

- Holistic approach to safety case
- Integrating underpinning research,
science, technology & site
understanding with assessments
- Robust safety case as basis for
decision-making in licensing process

IGSC Mission

The IGSC builds and documents the technical and scientific basis for developing and reviewing safety cases as a platform for dialogue amongst technical experts and as a tool for decision making.

IGSC Membership

Senior technical specialists and managers from national waste management programmes, regulatory agencies and research and technical support institutions



MANAGING
RADIOACTIVE WASTE
FOR THE LONG TERM

IGSC
*Integration Group
for the Safety Case*

AN INTERNATIONAL GROUP OF
THE NUCLEAR ENERGY AGENCY (NEA)
A SPECIALISED AGENCY OF
THE ORGANISATION FOR ECONOMIC
CO-OPERATION AND DEVELOPMENT (OECD)



Work of the IGSC

- Senior technical group reporting to RWMC on progress on the basis for developing, reviewing & updating safety cases for geological repositories
- An international platform for dialogue between senior technical representatives of regulatory agencies & implementing organisations
- Safety case as a tool for programme integration, for regulatory decision-making at major project stages, for knowledge transmission & wider communication, for prioritisation of research, site evaluation and repository design
 - IGSC work therefore encompasses all these areas
- IGSC mission delivered via annual plenary meetings, topical sessions, workshops, publications, peer reviews & safety case symposia, for 20 years...

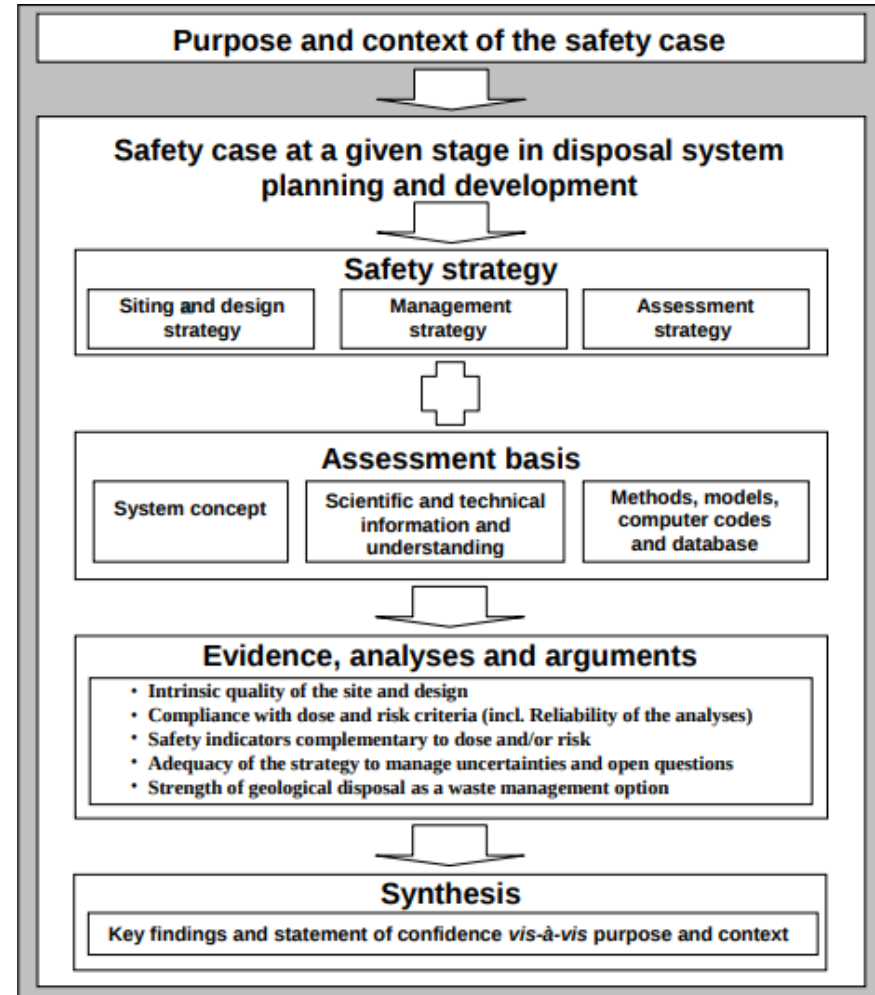
2000 – 2007: *What* is needed in a SC?

	Working groups	Workshops, symposiums and projects	Topical sessions	Publications	Databases
1990	Clay Club Foundation [~]				
1999		Workshop on scenarios [~]		Confidence in the long-term safety [~]	
2000	IGSC Foundation	Workshop on gas generation and migration [~]		IFEP 1.0 [*]	FEP Database 1.0 [*]
2001			The role of the biosphere The safety case	Scenario development methods and practice [*]	
2002		Workshop on handling timescales [*]	Partitioning & transmutation		
2003			Reviews of safety assessments	FEP catalogue for argillaceous media [*]	
2004		Workshop on uncertainty management [*]	Monitoring	Post-closure safety case [*]	
2005			Handing timescales to build confidence		
2006			FEPs in safety case		FEP Database 2.0
2007		1 st Symposium [*]			

Key IGSC achievements 2000-2007

Establishing the safety case

- NEA FEP database established
- GEOTRAP & AMIGO - geoscientific lines of reasoning and integration of geoscientific data in the SC
- Handling timescales
- Scenario development methods
- Engineered Barrier System project
- *Post-closure Safety Case for Geological Repositories: Nature and Purpose*, NEA 2004
- **1st SC Symposium: Safety Cases for Deep Geological Disposal of Radioactive Waste: Where Do We Stand?**, Symposium Proceedings, Paris, France, 23-25 February 2007



2008 – 2013: *How do we deliver safety?*

	Working groups	Workshops, symposiums and projects	Topical sessions	Publications	Databases
2008			Operational safety		
2009		Workshop on cement*	Organisational issues	Considering timescales in post-closure safety*	INTESC outcomes*
2010			Optimisation	Main messages from AMIGO*	EC/NEA EBS project: Synthesis*
2011	Salt Club Foundation		Gas migration		
2012		RF/IGSC workshop on optimisation*	Uncertainties & sensitivity analysis	MeSA*	Indicators*
2013	EGOS Foundation	2 nd Symposium*		Nature and purpose of post-closure safety case*	

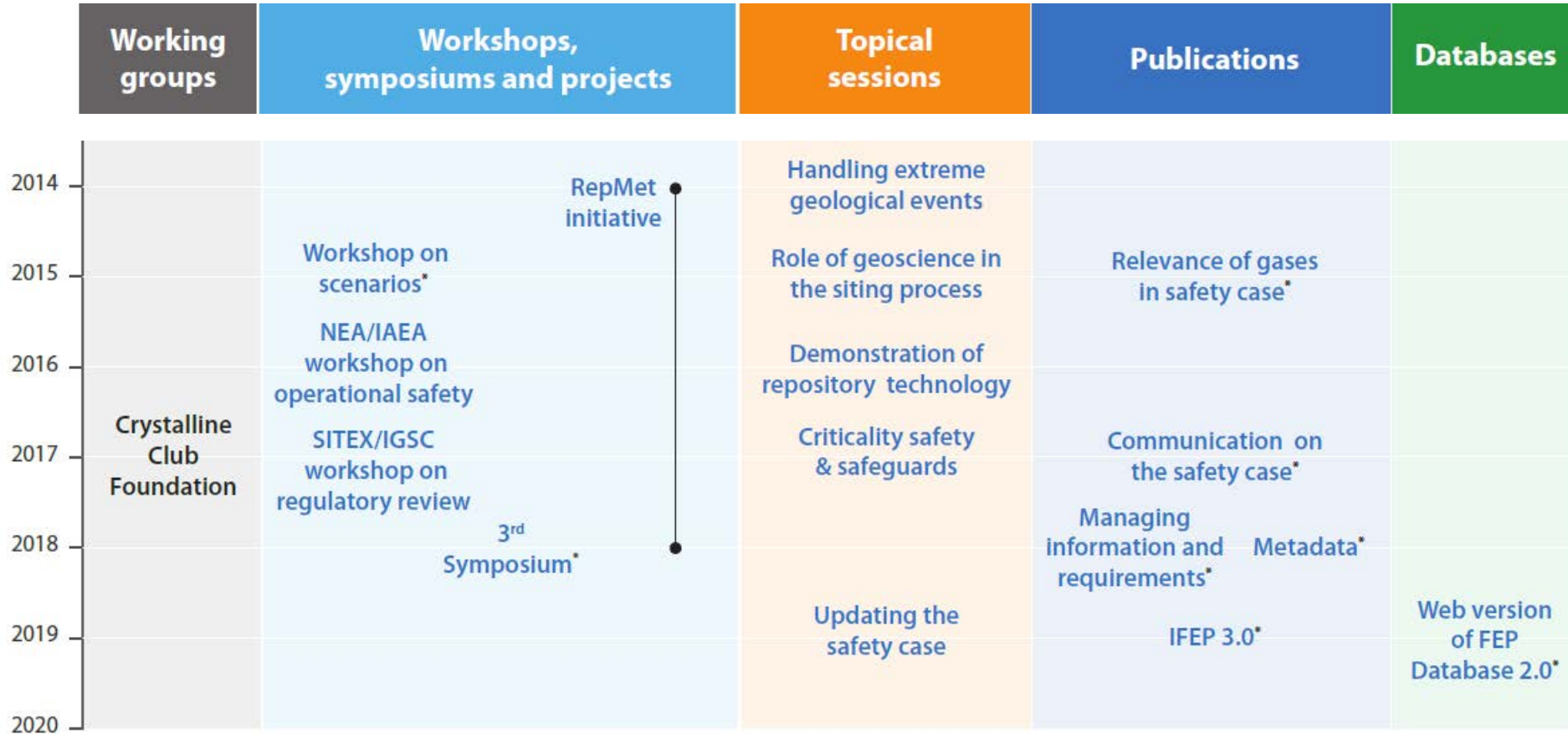
Key IGSC achievements 2008-2013

Delivering the safety case

- MeSA – methods for safety assessment
- Optimisation – *“Once the safety objectives (dose/risk targets and other constraints) have been met, further optimisation should be aimed at moving the project forward as efficiently as possible, and this could largely be reflected as cost optimisation”* IGSC, 2010
- Safety Indicators
- Salt Club and EGOS formed
- Nature & Purpose of Safety Case update
- **2nd SC Symposium: *The Safety Case for Deep Geological Disposal of Radioactive waste: 2013 State of the Art, Symposium Proceedings, Paris, France, 2013***



2014 – 2020: Building confidence in safety



Key IGSC achievements 2014-2020

Communicating the safety case

- Web-based NEA FEP database
- RepMet tools, managing information
- Siting – role of geoscience
- Implementation – demonstration of repository technology
- Crystalline Club formed
- Safety Case Communication – 1st Joint workshop with FSC (Sept 2017) agreed value of IGSC/FSC collaboration, 2nd Joint workshop on SC Communication, October 2019, dedicated session in symposium
- **3rd SC Symposium: *Current Understanding and Future Direction for the Geological Disposal of Radioactive Waste*, Rotterdam, Netherlands October 2018**



Value of IGSC to National Programmes

- Safety case peer review
- International collaboration, open exchange of ideas, building on each other's strengths – internationally benchmarked approaches
- Consensus builds confidence – helps national programmes to move forward

“The IGSC bridges the gaps between repository safety and social acceptance. It’s a forum with diverse perspectives for regulators and implementers to interact and openly discuss both technical and regulatory issues.”

Tom Peake, US Environmental Protection Agency (EPA), United States

Recognition of a unique international body

"The value of the IGSC is to provide an **internationally unique** area in which the safety case of DGRs is continuously discussed in an integrated fashion in order to increase its confidence by taking into account the state-of-the-art scientific and technical knowledge and evolving socio-political conditions. The IGSC is also contributing to foster a **“generalist” for geological disposal** who can overview all important elements of the safety case by transferring its accumulated intellectual legacy/knowledge to the next generations.”

Mr Tetsuo Fujiyama, Nuclear Waste Management Organization of Japan (NUMO), Japan

Review Feedback

“On behalf of SSM and Swedish colleagues I would like to express our sincere appreciation and support of the work of IGSC and the paper commemorating IGSCs’ 20th anniversary. SSM has been an active member of the IGSC since the very beginning. The work of this group has been of the utmost importance for SSM and its predecessors in understanding the technical and scientific aspects of and in regulating the development of a Swedish safety case for spent fuel disposal. The IGSC has provided an excellent forum for the sharing of experiences with colleagues from other organisations representing different countries waste programmes, and in building a long-standing network for dialogue between regulators, implementers and the academia.”

Johan Anderberg, SSM, Sweden

Where are we now?

- IGSC has established the concept of the safety case & adapted it in line with emerging issues from members – clear statement on the nature & purpose of the safety case and the methodology for developing a safety case for geological disposal
- Safety case development established as structured process for integrating science, engineering, safety assessment, quality assurance – using well-defined strategies to build confidence in decision-making
- Important progress in tools & concepts for integration (NEA FEP database, RepMet tools, safety functions, scenarios, handling uncertainty, knowledge management)
- Greater stakeholder involvement during Siting and Licensing stages – current focus on safety case communication and collaboration with Forum for Stakeholder Confidence (FSC)

The future: Where next?

- Communication & FSC collaboration
 - Joint IGSC / FSC workshop, *Building Confidence in the Face of Uncertainty: The Role of the Safety Case*, Switzerland, October 2021
- Operational issues – building confidence in implementation technology – topical session April 2021
- Waste characterisation & disposal strategies
- Regulatory review & Licensing
- Sharing IGSC expertise, collaborating with other NEA groups
 - NEA IGSC / RWMC Workshop, *Developing Safety Cases for Various Radioactive Waste Disposal Facilities - Needs and Challenges of RWMC Organisations*, Romania, June 2021 TBC

Thank you

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[https://www.oecd-
nea.org/jcms/pl_52665](https://www.oecd-nea.org/jcms/pl_52665)



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