



# The IGD-TP Geodisposal 2014: Introduction to the Conference Proceedings

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KATHERINE MORRIS\*, NICK D. BRYAN, NICHOLAS D. M. EVANS AND RAY KOWE

THE 'Implementing Geological Disposal – Technology Platform' (IGD-TP) is composed of European waste-management organizations and has a vision that "by 2025 the first geological disposal facilities for spent fuel, high-level waste and other long-lived radioactive waste will be operating safely in Europe".

The first IGD-TP Geodisposal Conference was held at The University of Manchester, UK from June 24<sup>th</sup> – 26<sup>th</sup> 2014 and provided a new forum for researchers in this area to present their work. The Conference brought together >270 delegates from across 23 countries and an important aspect of the conference was to showcase and publish research relevant to geological disposal of radioactive waste. The conference was also an opportunity for more advanced geological programmes to share >30 years of Research and Development and Demonstration (RD & D) and implementation experience in geological disposal with less advanced programmes.

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Disposal; The Royal Society of Chemistry; The Geological Society, UK; The Mineralogical Society, UK; the National Nuclear Laboratory; the STFC EnvRadNet Network; and the NERC BIGRAD Consortium.

The Conference organising committee comprised: Raymond Kowe, Radioactive Waste Management Ltd., UK; Nic Bilham, Geological Society, UK; Nick Bryan, National Nuclear Laboratory, UK; Gunnar Buckau, Joint Research Centre, Germany; Jacques Delay, ANDRA, France; Daniela Diaconu, Institute for Nuclear Research, Romania; Nick Evans, Loughborough University, UK; Hans Forsström, SKB, Sweden; Erik Kremer, NWMO, Canada; Katherine Morris, The University of Manchester, UK; Kevin Murphy, The Mineralogical Society, UK; Cherry Tweed, Radioactive Waste Management Limited, UK; Ewoud Verhoef, COVRA, The Netherlands; Juhani Vira, POSIVA, Finland; and Claudia Vivalda, Nidia srl, Italy. The scientific committee consisted of: Katherine Morris, The University of Manchester, UK; Nick Bryan, National Nuclear Laboratory, UK; Nick Evans, Loughborough University, UK; Horst Geckeis, Karlsruhe Institute of Technology, Germany; José Luis Fuentes-Cantillana, AITEMIN, Spain; Mats Jonsson, KTH Royal Institute of Technology, Sweden; Wolfgang Kickmaier, MCM International, Switzerland; Rebecca Lunn, University of Strathclyde, UK; André Maes, KU Leuven, Belgium; Caroline Peacock, University of Leeds, UK; Karsten Pedersen, Chalmers University of Technology, Sweden; Richard Shaw, British Geological Survey, UK; and Behnam Taebi, TU

\* E-mail: [katherine.morris@manchester.ac.uk](mailto:katherine.morris@manchester.ac.uk)  
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Delft, Netherlands. Both the organizing committee and the scientific committee would like to thank the sponsors of the Conference. Papers derived from the conference talks and posters are presented in this special issue of *Mineralogical Magazine*. All of the papers underwent independent peer review and the *Mineralogical Magazine* IGD–TP Geodisposal 2014 special issue Guest Editors Katherine Morris, The University of Manchester; Nick Bryan, National Nuclear Laboratory and Nick Evans, Loughborough University would like to express their thanks to all the reviewers that provided detailed comments and feedback on all the papers which were submitted to the special issue.

The conference sessions were organized into thematic sessions which were based around the IGD–TP's Strategic Research Agenda and other research related to geological disposal across Europe. The key topics covered were: radionuclide and gas behaviour; natural systems including biogeochemistry, biosphere and geosphere; monitoring; engineered barriers, wasteforms and criticality; societal aspects; national programmes for geological disposal; safety case; and, disposal concept and technology development. There was also a discussion session on future IGD-TP activities and Horizon 2020-funded projects involving newer member states.

### *Section 1: Radionuclide and Gas Behaviour*

The first section includes papers on: gas-transport results from the EU FORGE project (Bond *et al.*, 2015); behaviour of uranium with the iron oxide magnetite (Marshall *et al.*, 2015); carbon-14 behaviour in alkaline iron-water systems (Wieland and Hummel, 2015); the fate of the radionuclide neptunium-237 in alkaline sediment microcosms (Williamson *et al.*, 2015); retention of chlorine-36 in alkaline cement systems (van Es *et al.*, 2015); bentonite colloid behaviour in ternary systems (Sherriff *et al.*, 2015); gas migration in a high-level waste disposal tunnel (Justinavicius and Poskas, 2015); carbon-14 behaviour in reactor graphite cores (Payne *et al.*, 2015); and a paper on visualization of flow paths in clay minerals (Wiseall *et al.*, 2015).

### *Section 2: Natural Systems Including Biogeochemistry, Biosphere and Geosphere*

The discussion of natural systems includes a diverse range of papers covering: iodine behaviour in model sediment systems (Guido-Garcia *et al.*,

2015); characterization of the mineralogy and redox reactivity of potential GDF host rocks in the UK (Quirke *et al.*, 2015); modelling studies applying pore network models to Opalinus clay (Xiong and Jivkov *et al.*, 2015); the behaviour of pertechnetate in hyperalkaline conditions in the context of recrystallization of kaolinite (Littlewood *et al.*, 2015); the impact of GDF-relevant temperatures on clay systems in the context of high-level waste disposal (Jobmann and Meleshyn, 2015); the impact of humic substances on metal ion behaviour (Bryan *et al.*, 2015); an evaluation of the Herberts Quarry site in the UK as an analogue for intermediate level waste disposal (Moyce *et al.*, 2015); a study examining the inhibition of colloidal formation in intermediate level waste systems (Felipe-Sotelo *et al.*, 2015); microbial degradation of cellulosic materials under conditions relevant to intermediate level waste disposal (Bassil *et al.*, 2015); microbial degradation of isosaccharinic acid under far-field conditions (Kuipers *et al.* 2015); radiation damage studies in natural sheet silicate minerals (Bower *et al.*, 2015); and a representation of biosphere systems in the UK relevant to higher activity waste disposal (Walke *et al.*, 2015).

### *Section 3: Monitoring*

Here, a paper on applying a micro-electro-mechanical system to monitor conditions in a bentonite buffer system is discussed (Yang *et al.*, 2015).

### *Section 4: Engineered barriers, wasteforms and criticality*

Here, papers cover: bentonite buffer erosion in fracture systems (Reid *et al.*, 2015); carbon-14 behaviour in the engineered geological disposal facility system (Douleris *et al.*, 2015); modelling post-closure criticality events associated with spent-fuel disposal (Mason *et al.*, 2015); the European Network of Testing Facilities for the 'Quality Checking of Radioactive Waste Packages' (ENTRAP) programme and its potential interaction with the IGD-TP (Tietze-Jaensch *et al.*, 2015); manufacturing of copper canisters for geological disposal (Hernandez-Selva *et al.*, 2015); dissolution of MAGNOX blend nuclear waste glass (Cassingham *et al.*, 2015); the impact of thermal cycling on bentonite permeability (Zihms and Harrington, 2015); and on the likelihood and consequences of post-closure criticality in a geological disposal facility (Winsley *et al.*, 2015).

### Section 5: Societal Aspects

This session includes contributions on: integrating societal concerns into R&D for geological disposal at a national level (Martell and van Berendoncks, 2015); and a paper on the investigation of attitudes, needs and expectations of a local community where waste disposal is relevant (Constantin *et al.*, 2015).

### Section 6: National programmes for geological disposal

In this section, the conference papers cover: the Lithuanian programme for spent fuel (Poskas *et al.*, 2015); the Implementing Geological Disposal Technology Platform in the context of addressing the needs of new member states (Kowe *et al.*, 2015); and an overview of the less advanced programmes and their requirements (Diaconu *et al.*, 2015).

### Section 7: Safety Case

Here papers are presented on: the safety case for the biosphere in the context of the mature, Finnish safety case (Ikonen, 2015); the influence of anthropogenic CO<sub>2</sub> on post-closure performance assessment (Lord *et al.*, 2015); the design of waste packaging for heat generating wastes (Myers *et al.*, 2015); development of a generic safety case narrative for the UK geological disposal facility (Bailey, 2015); and an integrated approach to disposal of the UK's carbon-14 wastes (Lever and Vines, 2015).

### Section 8: Disposal concept and technology development

In this final section, the papers cover: technology transfer from the space and physics sectors (Direto *et al.*, 2015); and, the state-of-the-art with respect to repository concepts for crystalline rocks (Kronberg *et al.*, 2015).

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## INTRODUCTION

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