

## Report Summary NWAT/NDA/RWMD/2008/002/RS

### Title: Gas generation and migration from a deep geological repository for radioactive waste. A review of Nirex/NDA's work

The Environment Agency's Nuclear Waste Assessment Team (NWAT) commissioned Quintessa to review Nirex/NDA's work relating to gas evolution and migration in the context of disposing of higher activity radioactive waste in a deep geological repository.

Significant quantities of gas (mainly hydrogen, carbon dioxide and methane) will be generated in a deep geological repository. Some of this gas is likely to be radioactive. If gas accumulates in a repository there will be a build up of pressure which has the potential to disturb the engineered structure of the repository and its host rock. If gas is not contained there will be other consequences, particularly on the local ground water flow regime.

The report concludes that Nirex has taken into account most of the processes likely to generate gas and the issues that may affect long-term safety. The report identifies key issues that need to be addressed including the challenge of modelling gas and its effects.

Our recommendations following this review are:

- The NDA RWMD should review and evaluate the significance of Quintessa's findings and recommendations.
- The NDA RWMD should explain the relevance of its current gas research, the questions that are being addressed and present a strategy for future work on gas, explaining what information is required and why.
- Many of the gas transport issues are site-specific. Continued detailed modelling for any particular geologic formation may not be the best use of resources. At this stage the NDA RWMD should identify the key gas transport questions that need to be addressed to support the site selection and characterisation process.
- The NDA RWMD has developed one tool (SMOGG) to model gas generation through the lifecycle of a waste package. The NDA is funding development of similar models for nuclear sites (for example MAGGAS and models adapted specifically for the Low Level Waste Repository near Drigg). We would encourage model inter-comparison studies, but suggest that NDA also considers rationalising the future use and development of such models.
- If un-reprocessed spent Magnox fuel were to be disposed of, its subsequent corrosion could produce significant amounts of gas. The consequences of this option should be investigated.
- We encourage the NDA to integrate the work of its corrosion specialists and gas modellers.

- A general challenge is the extent to which cautious or conservative assumptions influence decisions relating to package and repository design, and disposal concept. Conservative assumptions are used to build confidence that safety targets can be met, however, these same assumptions can compromise design decisions. NDA RWMD should review the role of conservatism in gas pathway safety assessment and highlight areas of tensions with design decisions.

This work will inform our ongoing dialogue with the NDA and scrutiny of its programme.

#### **Full report:**

This is a summary of the following report:

**NWAT Report:** NWAT/NDA/RWMD/2008/002

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This project was carried out by the Environment Agency's Nuclear Waste Assessment Team (NWAT). NWAT provides technical support to the Environment Agency on the management and disposal of radioactive waste in England and Wales, to ensure that wastes are disposed of in the most appropriate manner to protect the public and the wider environment, and to contribute to the UK's aim of sustainable development.

Further copies of this summary, and the full report, are available from:

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