Geophysical Research Abstracts
Vol. 17, EGU2015-14916-2, 2015
EGU General Assembly 2015

The consideration of geological uncertainty in the siting process for a Geological Disposal Facility for radioactive waste

Steve Mathers, Fiona McEvoy, and Richard Shaw
British Geological Survey, Keyworth, Nottingham, NG12 5GG, UK

Any decision about the site of a Geological Disposal Facility at depth for medium to high level radioactive waste is based on a safety case which in turn is based on an understanding of the geological environment which enables, for example, understanding groundwater flows and groundwater chemical composition. Because the information on which geological understanding is based cannot be fully understood, it is important to ensure that:
i. Inferences are made from data in a way that is consistent with the data.
ii. The uncertainty in the inferred information is described, quantitatively where this is appropriate.
Despite these uncertainties decisions can and must be made, and so the implications of the uncertainty need to be understood and quantified. To achieve this it is important to ensure that:

i. An understanding of how error propagates in all models and decision tools.

Information which is collected to support the decision-making process may be used as input into models of various kinds to generate further information. For example, a process model may be used to predict groundwater flows, so uncertainty in the properties which are input to the model (e.g. on rock porosity and structure) will give rise to uncertainty in the model predictions. Understanding how this happens is called the analysis of error propagation. It is important that there is an understanding of how error propagates in all models and decision tools, and therefore knowledge of how much uncertainty remains in the process at any stage. As successive phases of data collection take place the analysis of error propagation shows how the uncertainty in key model outputs is gradually reduced.

ii. The implications of all uncertainties can be traced through the process.

A clear analysis of the decision-making process is necessary so that the implications of all uncertainties can be traced through the process. This means that, when a final decision is made, one can state with a high level of confidence that site conditions, while not known exactly, fall within an acceptable range.