



**MRS 2011 - XXXV International Symposium on Scientific Basis for Nuclear Waste Management - Buenos Aires, Argentina, October 2 - 7, 2011**

**Abstract Submission Form**

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**Please indicate the three main categories of your abstract for easy location in the symposium sessions (1 to 10 of the call for abstract menu. If 10 please add your own category)**

<b>1<sup>st</sup></b>	Geological Disposal (concepts, designs and materials)
<b>2<sup>nd</sup></b>	Modelling (Performance assessment and safety cases)
<b>3<sup>rd</sup></b>	

<b>Preferred Presentation (oral or poster)</b>	oral
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**Preliminary Performance Assessment for Deep Borehole Disposal of High-Level Radioactive Waste**

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Deep boreholes have been proposed for many decades as an option for permanent disposal of high-level radioactive waste and spent nuclear fuel. Disposal concepts are straightforward, and generally call for drilling boreholes to a depth of three to five kilometers into crystalline basement rocks. Waste is placed in the lower portion of the hole, and the upper several kilometers of the hole are sealed to provide effective isolation from the biosphere. The potential for excellent long-term performance has been recognized in many previous studies. This paper reports updated results of what is believed to be the first quantitative analysis of releases from a hypothetical disposal borehole repository using the same performance assessment methodology applied to mined geologic repositories for high-level radioactive waste. Analyses begin with a preliminary consideration of a comprehensive list of potentially relevant features, events, and processes (FEPs) and the identification of those FEPs that appear to be most likely to affect long-term performance in deep boreholes. The release pathway selected for preliminary performance assessment modeling is thermally-driven flow and radionuclide transport upwards from the emplacement zone through the borehole seals or the surrounding annulus of disturbed rock. Estimated radionuclide releases from deep borehole disposal of spent nuclear fuel, and the annual radiation doses to hypothetical future humans associated with those releases, are extremely small, indicating that deep

boreholes may be a viable alternative to mined repositories for disposal of both high-level radioactive waste and spent nuclear fuel.

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High-level radioactive waste disposal, deep borehole disposal, performance assessment for geologic repositories

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