Malaysian Alternative to International Reference Bentonite Buffer in Underground Nuclear Waste Repository

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Abstract. The performance of bentonite as buffer material in underground nuclear waste repository has been extensively being investigated all over the world. Over the years, almost exclusively, naturally occurring Wyoming sodium based bentonite (MX80) was tested as a reference buffer material. Other alternatives such as calcium and mixed based bentonites from all over the world were also examined for this specific application in respective countries. In Malaysia, the potential of naturally occurring bentonites have not clearly documented and may be considered for the application of buffer material in underground nuclear waste repository. In the context of underground radioactive waste storage, bentonite from Sabah volcanic formation, namely Andrassy bentonite was characterized in the laboratory and compared with MX80 and Deponit Ca-N bentonites. The geotechnical properties such as Atterberg limits, particle size distribution, specific gravity, cation exchange capacity, specific surface area and swelling potential were carefully determined. In addition, the water retention characteristics were established using a chilled-mirror dew-point potentiometer. Test results indicated that the Andrassy bentonite may be selected as the key component in the country's future development of deep underground radioactive waste facilities.

Keywords: bentonites, clay, buffer, radioactive waste disposal, suction, chilled-mirror dew-point.

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