

ADSORPTION ISOTHERMS OF CESIUM, STRONTIUM AND
COBALT ON CANDIDATE BUFFER MATERIALS

by

M.D. Lupien

ABSTRACT

Simulation of the transport of contaminants from a disposal site in the Canadian Shield requires knowledge of the adsorption capacity of the various barriers being considered in the Canadian Nuclear Fuel Waste Management program. Clays are promising candidate materials for use as buffer components. The material/radionuclide/solution interactions are quantified here in static mode. The Freundlich adsorption isotherms that apply between 1×10^{-11} mol/L and 1×10^{-4} mol/L have been plotted for cesium, strontium and cobalt while the distribution coefficients (R_d) applicable to these interactions, albeit at low concentrations, have been calculated. Speciation showed that the cations Cs^+ , Sr^{2+} and Co^{2+} are present in ionic form in the saline solutions found in the Canadian Shield. Analysis of the Freundlich plots reveals that the constant k is directly proportional to the ionic strength of the saline solution used, whereas the constant n is inversely proportional. For all three cations studies, the relative adsorption capacity of the different materials is a function of the composition of the saline solution. The results will be used in the SYVAC (System Variability Analysis Code) computer program. They will also be submitted to the International Sorption Information Retrieval System (ISIRS) under the supervision of the Organization for Economic Cooperation and Development/Nuclear Energy Agency' (OECD/NEA).

Service Metallurgie et technologie du nucleaire
Direction Production et Utilisation de l'energie
Institut de recherche d'Hydro-Quebec
Varenes, Quebec JOL 2P0

Work done for

Atomic Energy of Canada Limited
Whiteshell Nuclear Research Establishment
Pinawa, Manitoba ROE 1L0

1987