

**Appendix 5: CHINA (b)****Natural analogue study on backfill materials from ancient Chinese constructions for LILW disposal**

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The objective of this work was to contribute to the demonstration of the long term safety of low-and-intermediate level radioactive waste (LILW) disposal using information from a natural analogue study on ancient Chinese constructions.

The work firstly compared LILW near surface disposal facilities with Chinese ancient tombs in respects of siting, engineering structures, design and construction procedures and indicates that they are both based upon multi-barrier principle. After extensive literature and field survey, three materials were collected from two Chinese ancient tombs and one ancient architectures for further laboratory study.

The three materials were studied in laboratories from the point of view of radioactive waste disposal in near surface facilities to obtain information concerning their basic physical and chemical properties, engineering properties and radionuclide adsorption abilities. The results show that the two materials from the ancient tombs have low permeability and strong adsorption for ^{60}Co and ^{134}Cs . The saturated permeabilities of the two ancient materials are in the order of 10^{-10} m/s and the distribution coefficients for the two radionuclides are all in the order of 10^1 m³/kg.

The conclusion was that the then current LILW disposal option in near-surface would be effective for a long term period of time, and clay materials, as backfill materials for LILW near-surface disposal facilities would very effective in preventing water intrusion and retarding radionuclide release even over a long term of period. Overall the LILW disposal option was considered to be safe in long term.