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Introduction to the Special Issue on Disposal of Radioactive Waste by Means of Clay

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Radioactive wastes will be produced at all stages of the nuclear fuel cycle. Low-level radioactive wastes (LLW, using the IAEA classification scheme) come from various generating sources in this cycle – mainly as by-products obtained in the course of operation of nuclear reactors. Final disposal of LLW will be in secure landfills or in underground repositories at shallow or medium-depth. Some ILW – Intermediate-Level Radioactive Waste – with low content of radionuclides can also be contained in landfills while those with a certain higher level of radioactivity may have to be placed in medium-deep repositories.
Waste containing long-lived radionuclides, and High-Level Waste (HLW), have to be disposed at larger depth. Both represent a problem of considerable concern be setting most planners and operators of nuclear power generating plants. HLW is often synonymous to Spent nuclear fuel, the final disposal of which is the main issue addressed in the Special Issue.

In certain countries utilizing nuclear power, interim storage of high-level radioactive waste has reached a level that requires considerable extension of the storage capacity, underground or in special facilities on or near the ground level, a matter of particular importance if nuclear energy will undergo significant renaissance. This puts a pressure on parliaments and licensing authorities as well as on the scientific society for solving this problem or for working out cost-effective methods of reprocessing the waste for generation of new fuel or, alternatively, for final disposal. The issues are largely political and of public interest but do not seem to urgently engage neither the United Nations and its daughter organization, the International Atomic Agency in Vienna, Austria, nor the European Union, despite their great importance at a time when there is global search for exploitable, cost-effective technology that can replace use of fossil energy. They are not yet found.

Since there is high time for solving acute problems with final disposal of high-level radioactive waste in the form of spent reactor fuel without reprocessing, several attempts are being made in the world in recent time to initiate conferences and R&D projects like those conducted by EPA in the US and in Great Britain for finding ways for safe disposal, like placement in very deep boreholes, and for reuse of

radioactively contaminated ground. An attempt to convey investigators to consider use of clay barriers for isolating solid radioactive waste in crystalline rock is manifested by the present special issue “Disposal of Radioactive Waste” prepared in co-operation with the “Journal of Earth Sciences and Geotechnical Engineering”. It contains a limited number of individual papers, rich in literature references and written by specialists who have shown particular interest in and familiarity with the task.

The purpose has been to create an independent up to-date reference document per year 2019.

Lulea, February 2019