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Safety Management of Wet Storage Facilities of ETRR-1 Research Reactor to Support the Future Decommissioning Phase –Defueling and Spent Fuel Encapsulation Process

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GRAPHICAL ABSTRACT:

The Egyptian first research reactor ETRR-1 is a tank type reactor which was supplied by the former Soviet Union and reached its first criticality in 1961, with a nominal rating power of 2 MW. The reactor was in operation till 2010, from that time it is in extended shutdown state for major maintenance and refurbishment. The core was entirely unloaded and the fuel is transferred to the spent fuel wet storage tanks. This paper deals with some safety aspects of the radioactive waste of ETRR-1 and the related activities which could be done during the extended shutdown period of the reactor. It is assumed that such activities could significantly minimize the time of the planned transition period and reduce the estimated generated waste during the upcoming decommissioning process. Defueling and encapsulation process with its safety issues for the ETRR-1 fuel elements during the current extended shutdown state of reactor are described and presented in this work. Fig. 1 shows the defueling, ion exchange water purification, and encapsulation process. In the defueling process, all the fuel are removed from the reactor core and transferred to the wet storage facilities for cooling and storage until the final disposition path is determined. Ion exchange filter is used to maintain purity of water within the recommended conditions. Some of these fuel elements could be safely canned and encapsulated if needed as shown in Fig. 1. However the present work showed that such activities during the current statuses of the reactor will significantly enhance and optimize the safety of radioactive wet storage facilities and facilitate and speeding up the upcoming decommissioning process when decided.

Fig. 1 Defueling, Ion Exchange and SF Encapsulation Process in ETRR-1

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