

TRANSITION FROM OPERATION TO DECOMMISSIONING OF HWRR IN CHINA

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The paper aims to describe the activities conducted during transition between permanent shutdown and decommissioning of Heavy Water Research Reactor (HWRR) in China.

HWRR is the first nuclear reactor in China. It went first criticality and was put in operation in 1958. It is a tank-type, heavy water cooled and moderated research reactor with 6 neutron beams and 1 thermal column. At the beginning of 1980s, it was modified to improve its performance. After modification, thermal power is increased from 7MW to 10MW, while maximum thermal neutron flux rate is increased from 1.2×10^{14} n/cm².s to 2.6×10^{14} n/cm².s. After 49 years operation, it was permanently shut down at the end of 2007. As a multi-purpose research reactor, HWRR has made great contributions to development of nuclear science and technology in China.

After permanent shutdown, a project was approved and has been implemented. Reactor was defueled and spent fuel assemblies were moved to the storage pool for interim storage. Coolant in primary coolant system and secondary system was drained after reactor defueling. Heavy water was loaded into 200L barrels for storage. Spent fuel transport has been routinely conducted several times as it had been done many times during operation. Most spent fuel assemblies have been transported to the reprocessing plant except those discharged after final shutdown. Operational waste was cleaned up in the main reactor building and auxiliary buildings, including neutron guide tube of CNS and instruments and equipment of neutron beams and thermal column. As a result, the space of reactor hall was recovered for reconfiguration during decommissioning. Water containing K₂CrO₄ in the shielding tanks was drained and treated, so density of Cr⁶⁺ met relevant criteria and it can be drained as normal effluent. Radiological characterization survey of most structures, systems and components was conducted, so the overall radiological information was obtained. Of course, the reactor block is the key point. First of all, original composition of different structures was obtained by sampling and analysis. Then calculation, sampling and measurement were conducted respectively. But unfortunately, most internal components have not been sampled and measured, since accessibility to them is nearly impossible. Supporting systems were modified, e.g. ventilation system, radiation monitoring system and entrance to the reactor hall. In the meantime, international cooperation on HWRR decommissioning was initiated and has been implemented step by step. Two IAEA TC projects have been successfully implemented. Furthermore, staff in different fields participated in many IAEA projects or workshops on decommissioning, such as R2D2P, DESA/FASA, IDN, DACCORD and regional TC project RER3009. As a result, personnel have been well trained.

Based on the activities mentioned above, preliminary HWRR decommissioning plan has been studied and developed. Proposal of HWRR decommissioning has been developed and submitted to the authority for review and approval.

In summary, a number of activities have been conducted during the transition period and HWRR decommissioning is well prepared.

Country or International Organization

CHINA

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