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Decommissioning Strategy For Liquid Low-Level Radioactive Waste Surface Storage Water Reservoir

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The paper discusses long-term radiation and radioecological safety assurance and justification for the Techa Cascade of water reservoirs (TCR) at PA "Mayak"created in 1951-1964 to store large volumes of LRW. Since the late 1990s, TCR operation has been associated with high radiation and radioecological risks due to the large size of the facility (TCR area exceeds 50 km2), the total accumulated activity (over 360 mln m3 of LRW with a total activity of some 5·1015 Bq has been accumulated to date) and strong dependence of precipitation on TCR state.
As the result, the facility established under the first stage of the river Techa remediation program started to pose a threat as only limited solutions providing effective water level control could be implemented.
Unlike other industrial water reservoirs, TCR conservation involving soil cover placement, contaminated water retrieval or treatment is considered to be basically impossible. The estimated total cost of such efforts would have exceeded 200 bln RUB, whereas the estimated maximum damage worth less than 50 bln RUB.
In the early 2000s, a series of urgent measures designed to improve the TCR water balance and hydraulic engineering structures stability was implemented due to the increase in regional water level and a real risk of TCR overflow. Relevant engineering efforts have been carried out in parallel with the development of calculation and monitoring tools necessary for effective management and justification of TCR long-term safety.
By now, high population and environmental risks associated with the TCR state have been significantly reduced.
In the last 5-8 years, a relatively stable water level enabled to implement a large-scale cross-disciplinary R&D program aimed to justify a set of efforts required to achieve the ultimate solution to TCR challenges presented in a form of a strategic master-plan.
The paper presents the main results of this work, in particular those associated with:
 identification of TCR end-state, justification of main strategies aimed at achieving it, as well as long-term work schedule and consolidated road maps with due regard to relevant top-priority tasks and boundary conditions;
 development of calculation tools designed to forecast TCR long-term behaviour based on different engineering solutions and environmental conditions;
 development of treatment technologies and installations for TCR water and LRW discharged into it;
 addressing key regulatory issues.

Country or International Organization

Russian Federation

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