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Concurrent Trends in Indian Fast Reactor Fuel Reprocessing Programme

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The Indian fast reactor program, which began with the construction of the mixed carbide fuelled Fast Breeder Test Reactor (FBTR) at Kalpakkam, has reached a level of maturity with three decades of operating experience and is stepping into the realm of commercial operations with the construction of Prototype Fast Breeder Reactor (PFBR). The necessary technology for closing the fuel cycle, which is vital for the success of the fast reactor program, has been concurrently developed facing the unique challenges posed by the fast reactor fuel. CORAL (COmpact Reprocessing of Advanced fuels in Lead cells), a pilot facility, has been operating successfully since the year 2003, reprocessing the spent fuel discharged from FBTR, with burnup upto 155 GWd/t and very short cooling periods as low as 18 days. This facility has served the purpose of validation of the process as well as the equipments that were developed for fast reactor fuel reprocessing. Operating the facility has given valuable feedback for the Demonstration fast reactor Fuel Reprocessing Plant (DFRP), which will be a regular reprocessing plant for FBTR and also serve as a demonstration for the reprocessing of mixed oxide fuel from PFBR. The CORAL experience was also vital in designing the Fuel Reprocessing Plant (FRP) of Fast Reactor Fuel Cycle Facility (FRFCF), which would be a regular reprocessing plant for spent fuel discharged from PFBR. Considerable experiences gained and feedback obtained in design and operation of the reprocessing facilities provided vital inputs for achieving the required robustness in the fast reactor fuel reprocessing program. With the construction of FRFCF, the Indian fast reactor fuel reprocessing program would step in to the realms of commercial reprocessing. R&D efforts are also concurrently under progress to develop efficient processes and equipments, aqueous processes for reprocessing of the U-Pu-Zr metallic fuel as a fall-back for the pyro-chemical process.

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