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Advanced sodium-cooled fast reactor development regarding GIF safety design criteria

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Design studies on a next generation sodium-cooled fast reactor (SFR) considering the safety design criteria (SDC) developed in the generation IV international forum (GIF) was summarized. To meet SDC including the lessons learned from the TEPCO's Fukushima Dai-ichi nuclear power plants accident, the heat removal function was enhanced to avoid loss of the function even if any internal events exceeding design basis or severe external event happen. Several design options have been investigated and auxiliary core cooling system using air as ultimate heat sink has been selected as an additional cooling system regarding system reliability and diversification. Even though the next generation SFR already adopts seismic isolation system, main component designs have been improved considering revised earthquake conditions. For other external events, design measures for various external events are taken into account. Reactor building design has been improved and important safety components are diversified and located separately improving independency. Those design studies and evaluations on the next generation sodium-cooled reactor have contributed to the development of safety design guidelines (GIF) which is under discussion in the GIF framework.

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