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Spent nuclear fuel storage: concepts and safety issues

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The IRSN (Institut de radioprotection et de sûreté nucléaire), the French technical support organization, was asked by the parliamentary inquiry Committee on the safety and security of nuclear installations to provide a report on the concepts and safety issues regarding storage of spent fuel from nuclear power reactors. Based on its expertise in France and on its knowledge acquired during services performed abroad, IRSN examined the concepts of wet and dry spent fuel storage existing worldwide and in France, as well as the associated safety issues.

In conclusion, IRSN emphasizes that the choice of a type of spent fuel storage must be assessed with regard to the following considerations.

The two types of spent fuel storage, wet or dry, do not completely serve the same needs, as wet storage is essential for spent fuel with high residual heat and dry storage is well suited to highly cooled fuels. In any case, these two types of storage are complementary, but the choice of one or the other largely depends on national choices in terms of spent fuel management (reprocessing or not).

The type of spent fuel (UOX, MOX...) affects the choice of the type of storage, at least for a certain period of time. Thus spent MOX fuels have a higher residual heat and this decreases less rapidly. Their cooling time before being placed in dry storage is thus much longer than for spent UOX fuels.

From the safety point of view, whatever the type of storage, the key parameter is the residual heat of the spent fuel to be stored. In this respect, wet storage, which is generally used for spent fuel with higher residual heat, requires more extensive safety provisions than dry storage where safety relies on passive systems.

IRSN also considers that a particularly important point for the safety of spent fuel management operations is the control of zirconium fuel cladding ageing, which depends on the storage temperature. On this point, wet storage offers guarantees whereas, in dry storage, the ability to directly and easily examine fuel cladding is reduced.

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Country or International Organization

France

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