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SAFETY OPTIONS FOR THE PROJECT OF A FUTURE CENTRALIZED INTERIM WET STORAGE FACILITY FOR SPENT FUEL ASSEMBLIES

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The French nuclear fuel cycle includes in particular the manufacture of uranium-based fuels, the reprocessing of the spent fuels, the fabrication of MOX fuels and of ERU fuels (enriched reprocessed uranium) and the interim storage of spent fuels which are not currently reprocessed (MOX and ERU).

Regarding the used MOX and ERU fuels which are currently not being reprocessed, the strategy consists in keeping them under safe storage conditions while waiting for their future reprocessing and potential use in future generations of reactors, such as fourth-generation reactors (GEN IV).

The quantity of non-reprocessed spent fuel slightly increases every year leading to the need of extended interim storage capacities.

In this regard, the French National Plan for the Management of Radioactive Waste and Materials (PNGMDR 2016-2018) provides that, given the prospect of saturation of spent fuel storage capacities between 2025 and 2035, the french nuclear power plant operator, called the operator in the following text, shall submit to the Minister of Energy by March 31, 2017, its strategy for managing storage capacity of spent fuel from NPP and the timetable associated with the creation of new storage capacities.

In response to this point, the operator submitted the safety option file for a new spent nuclear fuel wet storage facility, so-called the centralized interim storage pool.

As requested by the French nuclear safety authority (ASN), IRSN reviewed these safety options. The IRSN assessment focused on the safety approach at the preliminary design stage and the structuring design choices such as:

- the civil engineering structures, including storage pools (number, dimensions, storage capacity, subdivision) and the building shell,
- the methods of unloading, loading and handling of spent fuel assembly transport casks as well as the methods to store the spent fuel assemblies,
- the consideration of scenarios of loss of “support functions” identified by the operator, in particular the duration of autonomy retained in the event of a prolonged loss of electricity or cooling function.
- more generally, the accident situations to be taken in the design of the installation

Special attention was paid on the one-hundred-year operational lifetime of this facility with regard to the surveillance of spent fuel assemblies, the control of the facility ageing, in particular through maintenance and monitoring, and the inspectability and possible replacement of systems, structures and components important for safety

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Country or International Organization

France

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