

## Safety assessment of the Osiris Research Reactor and final shutdown officering

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The French research reactor “Osiris” is an open-core pool type reactor notably used for the irradiation of enriched uranium targets in order to produce medical isotopes and operated by the French Alternative Energies and Atomic Energy Commission (CEA). Designed in 1965, it was supposed to be definitively shut down by the end of 2015. This assumption has been considered by the French Nuclear Safety Authority (ASN) and the Institute of Radioprotection and Nuclear Safety (IRSN) during the partial safety reassessment carried out by the CEA in 2009: several safety topics either were not evaluated or were evaluated with lower safety requirements.

At the end of 2011, the CEA asked the French Prime Minister for the authorization to keep the reactor operational until 2018. The CEA motivated its request by the potential lack of medical isotopes during the period between the Osiris reactor final shutdown and the Jules Horowitz reactor (RJH) commissioning (the RJH is a new pool type research reactor under construction in Cadarache - France).

In order to assess this demand, the ASN needed to determine whether the Osiris reactor met the current standards, as other perennial reactors. So the ASN asked the IRSN to initiate a safety assessment with the aim of identifying the main modifications that would be necessary to ensure that the reactor is operating with sufficient safety conditions for a significant time.

The paper will present the reactor safety assessment performed by the IRSN in 2013 in order to identify the parts of the reactor’s safety case that are consistent with the standard nuclear engineering practice and to point out the aspects of the safety case that should be reassessed if the operation were continued beyond 2015. In particular, the paper will present the opinion of the IRSN about the approach followed by the CEA to demonstrate the reactor’s safety. Indeed, if the reactor had to be operated longer, a safety demonstration based on operating conditions would have been required. Such an approach actually structures the safety demonstration and enables to better judge the provisions implemented for the different levels of the defense in depth. The paper will also present the assessment of the reactor containment performed by the Institute, which led to the conclusion that the CEA would have to reinforce the static containment integrity in order to continue operating. Indeed, the total radioactivity release in environment due to a BORAX-type accident (namely radioactive Iodine and noble gas release) could be significantly reduced if Osiris building reactor’s gas-tightness were improved. A reinforcement of the containment building would indeed allow a different handling of the post-accidental situation.

The paper will present the way the ASN has officered the final shutdown of the facility considering safety aspects. It will also present the work done by the ASN regarding medical radioisotopes supply in the past years. The paper will finally present the position taken by the ASN in 2014 regarding the request of the CEA to keep the reactor operated after 2015.

### Organization

IRSN

### Country

FRANCE

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