

SUMMARY

At the request of the French Nuclear Safety Authority (ASN), the IAEA convened from 6 to 15 November a team of international experts to review the “Safety Options Dossier” of the Cigéo Project on the disposal of intermediate level long lived and high level radioactive waste in the Callovo-Oxfordian (COX) formations of Meuse/Haute Marne. This strategic dossier sets out the chosen objectives, concepts and principles for ensuring the safety of Cigéo.

The review focused on the strategy of research & development and knowledge acquisition, the approach for defining scenarios for operational and post-closure safety assessment. It also addressed the approach for post Fukushima actions.

The step-wise and iterative process for the Cigéo development has included the publication of several safety and feasibility related dossiers, their regulatory review, interaction with the local stakeholders and public and national public debates. The International Review Team (IRT) considers that the decision to introduce an industrial pilot phase and the preparation of a Safety Options Dossier is commendable. It confirms the responsiveness of Andra to the public consultation and is a good example of taking account of the public’s concerns and proposals in the Cigéo development programme.

Related to the management of the Cigéo project, the IRT acknowledged that the Operations Master Plan is a good project management tool that can play an important role in the communication and consultation of Andra’s planning of future activities with the safety authority, the public and other stakeholders. For enhancing the management and building confidence among regulator and stakeholders the IRT considers that Andra should:

- Specify how new information will be used when proceeding from one stage to the next in the incremental development of the Cigéo project and describe the link between the milestones of the Cigéo development process, the regulatory authorization process and key milestones in Andra’s R&D plan.
- Develop a strategy to ensure that data and information important for operations and post-closure safety can be updated, preserved and understood over the more than one hundred years of expected operation of Cigéo.
- Clarify its updated R&D plan consistent with the development of Cigéo by identifying and prioritising R&D activities; describing the intent of the R&D; and defining the link between the R&D and the stage in the programme.
- Further address in the development of its monitoring plan implemented during the operational phase: the relationship between the monitoring parameter(s) and post-closure safety; the feasibility of the monitoring activities planned to function over the operational period including equipment maintenance or replacement and potential detrimental impact on post-closure safety barrier performance.
- Further strengthen the dialogue with the waste producers and seek possibilities for overall optimization of waste predisposal management and disposal of the waste.

Based on the Safety Options Dossier and the discussions during the review mission, there is reasonable assurance about the robustness of the disposal concept. Noting that in many areas research is on-going both for demonstration of safety or confirmation, the IRT identified a few other areas - gas generation and transport, description of disposal facility components ageing during the operational period, uncertainties related to the re-saturation time of the disposal cells and effects on the degradation of the waste packages, role of microbes and potential for biofilms

during the operational period and implications of undetected faults - where studies should continue to further strengthen confidence in the safety case.

The IRT considers that Andra implements a good overall management process to systematically define and investigate safety scenarios. The IRT appreciates the use of what-if scenarios, as this enables Andra to get a good understanding of the disposal facility system behaviour under extreme conditions and to illustrate the disposal system robustness. However, the IRT is in the opinion that, in order to further demonstrate the robustness of the disposal system, Andra should

- Consider water conducting features within the COX in the frame of what-if calculations in order to further demonstrate robustness of the disposal system.
- Substantiate why there is no need for including any initially defective HLW containers or early failure of HLW containers in the normal evolution scenario.
- Include in its safety case and safety assessment microbial activity at the sleeve/back fill interface supported by research on microbial activity as necessary.

Andra has covered the human intrusion scenarios in depth, assigning them to altered evolution scenarios or to the group of what-if scenarios. Internationally, it is understood that there is no reliable scientific basis for predicting the process or likelihood of inadvertent human intrusion. In accordance with international practice, Andra should treat human intrusion separately from the other scenario groups without any judgement on probability of occurrence.

The IRT considers that Andra's methodology for evaluating operational safety is comprehensive and systematic. With regard to post Fukushima actions Andra has used ASN specifications for the "stress tests" on nuclear installations as a guideline for integrating complementary safety assessments into the design of Cigéo. The IRT is in the opinion that Andra should consider the use of filtration of exhaust air from the underground facility and evaluate the robustness of its design for the removal of high water ingress from tunnels/ramp sections.

The time schedule to prepare Cigéo license application by 2018 is challenging. The Safety Options Dossier is a valuable preliminary step before license application as it provides a basis to evaluate at a strategic level the key aspects relevant for Cigéo development and preparation of the license application. The IRT therefore encourages ASN, IRSN and Andra to use the review of the Dossier as a basis to further precise the expectations for the license application. This is especially important as the planned Cigéo facility is one-of-a-kind.