



Proposed Paper for ICONE-9, Track 6 – Next Generation Systems

Licensing Activities for Advanced Reactors in NNC*

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NNC has been involved in safety and licensing activities for advanced reactors for many years. Most recently NNC has been involved with national regulators or their representatives for the HTR (High Temperature Reactor) reactor and the possible siting of ITER (International Thermonuclear Experimental Reactor) within Europe.

Commonalities between the two activities can be seen, even though one is a fission process and the other based on a completely new technology. Both have the potential to generate power at a very low overall exposure to the public and station staff, but both also need to demonstrate to the regulator the safety of a design which differs from the standard LWR practice. In both concepts passive design features provide a major part of the safety argument, but the detailed assessment and justification of these features in licensing terms still needs to be made. A number of critical safety issues can be identified, which generally apply to any advanced system. These are:

Safety categorisation, codes and standards. This is an important issue in terms of highlighting those systems of greatest importance to safety. It is also linked to the defence in depth concept.

Confinement or containment. An advanced design with low radiological consequences of accidental conditions may not need a containment when considering plant faults. However, external events also need to be considered, and these could influence the design chosen.

ALARA. The ALARA principle is a qualitative principle widely used as a means of continuous safety improvement. In some countries it is a legal requirement that risks must be minimised. As a principle it applies to the design process as well as operational activities.

Safety code modelling and data. A new reactor system may require new codes for the evaluation of evaluation of fault sequences, or require existing codes and data to be used beyond their existing validation.

Occupational Exposure. Occupational exposures for exiting plants are the results of an optimisation process over many generations of plant design. New reactor concepts may be expected to meet these levels immediately with little scope for iteration.

Decommissioning and waste. Decommissioning issues are closely related to waste with the additional aspect of handling large components. A dismantling concept has to be presented as an integral part of the design.

No evacuation, or no emergency plans. Many advanced reactor concepts incorporate a no evacuation, or alternatively propose that no site emergency plans are required beyond a short distance from the plant.

The UK is notable for a flexible licensing regime, which allows a safety case to be built up from first principles, where this is applicable. In addition, experience of licensing gas cooled, water cooled and liquid metal plant, as well as extensive experience outside the UK provides NNC with a unique insight into the different licensing methodologies which can be applied in the licensing process. This paper discusses some possible approaches which could be applied in order to satisfy regulatory demands when addressing the critical issues listed above.



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