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Interface between Safety and Security of Research Reactors

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The operation of a reliable and well utilised research reactor facility is dependent on many factors, and the basis of all the factors are the dual platforms of safety and security. Good design, well planned and executed operations and maintenance, healthy and strong cultures, effective leadership and management, appropriately trained staff and many other factors are all enabled and based on strong and effective safety and security.

The overall objective for nuclear safety and nuclear security is the same, being: protection of people and the environment from the harmful effects of radiation. Safety and security share the common goal of the elimination of risk. The mechanisms for achieving the common objective are different from the perspectives of safety and security. This partly stems from the examination of the risks associated with safety and those from security, which demonstrates that those risks emanate from different sources. Safety is about avoiding, protecting and mitigating accidents, while security is about protecting against, and mitigating, threats. For safety the overriding strategy to combat risk is "defence-in-depth" against accidents which, to be effective, needs to be embedded in design and operations, while the complementary approach for security is "detection, delay and response" to threats.

Understanding the distinctions of these sources of risk can help operators, regulators and users become more effective in their domains so that research reactors can be utilised to their full potential. Being able to delineate the interface between safety and security is an important facet of managing a research reactor facility effectively.

Both nuclear security and nuclear safety have distinctive cultures, which share many common characteristics, have elements which are different, and to be most effective are required to coexist. The paper will examine the elements of the coexisting cultures so that the interface of safety and security can be detailed. Practical examples will also be used from our experience with the OPAL research reactor.

The OPAL research reactor located in Sydney, Australia is operated on behalf of the Australian Government by the Australian Nuclear Science and Technology Organisation (ANSTO). OPAL is one of the world's more modern high powered research reactors, and the process for licencing, and operation considered safety and security matters according to best international practice. The mission for OPAL is multi-purpose in nature, with the main components being scientific and engineering research using neutron beam scattering and imaging techniques and irradiation facilities which are part of the supply chain for various radio-pharmaceuticals, research based radio-isotopes, neutron-transmutation doped silicon, and neutron activation analysis techniques.

In order to firstly obtain, and secondly maintain a license to operate, ANSTO was required to demonstrate the safety and security of the reactor via processes which involved submissions, reviews and approvals by two regulatory bodies –the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the Australian Safeguards and Non-Proliferation Office (ASNO). The interplay between the two regulatory bodies and the operating organisation was an important factor in determining outcomes in the security area for which there was no available international precedent.

Safety and security issues were considered at various levels of detail and depth in the applications for siting, construction, and operation. Once an authority to hot commission was obtained through the issue of the OPAL operating licence, requirements were made through licence conditions for periodic reviews of safety and security. The first periodic reviews for safety and security have now been undertaken and have received the necessary approvals from ARPANSA and ASNO. In March 2015 the OPAL licence conditions were modified to explicitly include development of a program supporting continuous improvement in safety culture, analysis of the interdependencies between safety and security of nuclear and other radioactive materials, and development of an overarching protective security system.

Since the operating licence for OPAL was granted, there have been other significant reviews undertaken in the safety and security areas following specific external and internal events, for example following the Fukushima accident. The experiences from these reviews will also be covered in the final paper and presentation.

Organization

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