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# The Safety Review and Update of the Safety Analysis Report for the OPAL Reactor

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# Outline

- History and background
- Operating Licence Condition 1.2
- The SAR Action List
- Implementation of the SAR update
- Future safety review and SAR activities
  
- Objective is to provide some general guidance and advice on how to prepare or update an SAR based on ANSTO's experience

# Safety Statement

- Safety Statement required from reactor vendors as part of their Tender Submission
- Content was as per IAEA Safety Series No. 35-G1
- Purpose was to
  - Assess the ability of the vendor to prepare an adequate safety case
  - Assess the safety of the proposed reactor design
  - Identify potential licensing/regulatory issues



# PSAR

- INVAP developed the Safety Statement into the Preliminary SAR
- Reflected the basic design of the OPAL reactor
- Formed the basis for the application for the Facility Licence, Construction Authorisation
- Reviewed by
  - Australian regulator ARPANSA
  - IAEA peer review team
  - Public and other stakeholders (eg Greenpeace)

# SAR

- INVAP developed the PSAR into the SAR
- Reflected the detailed design of the OPAL reactor
- Prepared prior to the completion of construction
- Formed the basis for the application for the Facility Licence, Operating Authorisation
- Reviewed by
  - ARPANSA
  - partial IAEA peer review of operational aspects
- Public review of unrestricted version of SAR

# Comments on the PSAR & SAR

- IAEA peer reviewers commented that PSAR and SAR among the best they've seen
- However, problems included
  - Language – original not written in English, style
  - Resources – few staff dedicated to preparation and review of SAR
  - Consistency – multiple authors and reviewers
  - Audience – PSAR particularly tried to satisfy multiple stakeholders
  - Configuration management – significant difficulties in controlling revisions



# Operating Licence Condition 1.2

- Requires *" a periodic safety review that is a detailed re-examination of the safety of the OPAL reactor taking into account operating experience and international best practice in radiation protection and nuclear safety"* that *" must be completed no later than two years after the completion of commissioning ... and must include revision of the SAR to the satisfaction of the CEO of ARPANSA"*

# Approach to Safety Review

- Safety case prepared by INVAP consistent with performance based contract
- However, safety case isn't the way ANSTO would have done it
- Intention is to complete the safety review part of LC1.2 by redoing the safety case from scratch the way ANSTO would have done it
- Use a formal fault schedule approach (eg as done for UK power reactors)



# SAR Action List

- Comprehensive single listing of all changes identified as a result of
  - ARPANSA review and resultant commitments
  - Errors identified through use
  - Commissioning and operational experience
  - Changes and modifications since issue of SAR
- Currently more than 420 actions identified ranging from simple editorial corrections to major technical changes (eg change in moly targets)
- Subject to ongoing review and revision

# Implementation of SAR Update

- Update of SAR will use dedicated technical writers within Reactor Operations configuration management group
- Overall content and structure will remain as per IAEA Safety Series No. 35-G1
- Format and configuration management as per the standard used for all Reactor Operations manuals
- Use of modern word processing and web-based capabilities to improve ease of use

# Benefits of Update Approach

- Dedicated technical writers working as a single team should result in a more consistent and readable SAR
- Configuration management will be via Reactor Operation's existing, proven system
- Technical experts will not be overloaded or distracted from their normal operational functions
- SAR is a Reactor Operations document for internal use, not just a document to be submitted to the Regulator



# Example of Consistency

- Content/format of each section describing a structure, system and component will generally be as follows:
  - Introduction and outline description of structure, system or component.
  - Identification of safety and operational design basis.
  - Identification of safety category, seismic class and quality level.
  - Detailed description of the as-built design of the structure, system or component.
  - Detailed description of the operation of the structure, system or component.
  - Safety evaluation of structure, system or component that demonstrate the system fulfils its safety design basis.

# Review Process

- Internal technical review by relevant experts within ANSTO
- Independent internal review by safety committees
- External technical review by INVAP acting as the Design Authority (ie the original designer)
- Top level management review for fitness for purpose
- International peer review

# Future Activities

- Operating Licence Condition 1.3 requires a safety review and SAR update "*to be conducted at intervals of no more than 10 years*"
- Doing a good job now will make future safety reviews and SAR updates easier
- Use of standard Reactor Operations formats and processes will also facilitate future SAR updates



# Conclusions

- Safety case and SAR development driven by project requirements and need to obtain licences
- Review of safety case to be done by completely re-doing the safety analysis
- SAR Action List prepared to identify what needs to be done
- SAR update intended to result in easily used document that can be readily maintained using existing proven processes

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