

1st Topical Peer Review
Public event – 22nd November 2018
Brussels

Laurent Streibig

PM, Thematic group RPV and Calandria

Reactor Pressure Vessel :

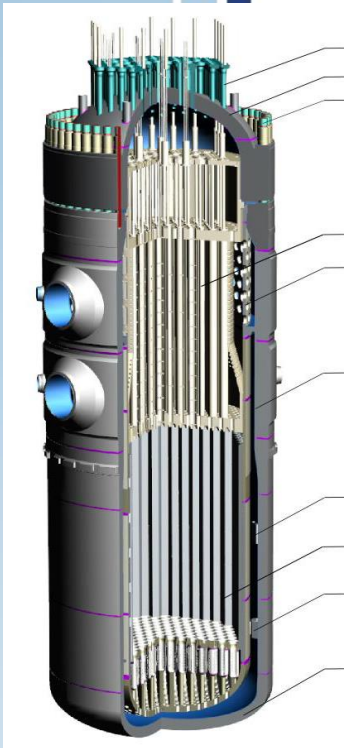
RPV crucial for nuclear safety

- Contain the reactor core
- Under radiation embrittlement
- Has to ensure the containment of coolant
- Failure is not taken into account

The scope of TRP includes:

- All RPV and Calandria,
- Different type of reactor
 - PWR
 - VVER
 - BWR
 - CANDU

Reactor Pressure Vessel :



Reactor Pressure Vessel :

Review Process

- 9 experts during the pre-workshop
- 28 participants from 19 countries during the workshop
- 162 questions by the experts
- 128 preliminary findings identified by the experts
- 27 common findings were identified before the workshop
- 15 findings were discussed during the workshop
- Finally 7 findings after the workshop : 2 good practices, 4 expected level of performance and 1 challenge :
 - Radiation embrittlement
 - Primary water stress corrosion cracking
 - Fatigue
 - In service inspection

Reactor Pressure Vessel :

Findings

▪ Good Practices

- Hydrogen Water Chemistry (HWC) is used in BWRs which may be sensitive to Intergranular Stress Corrosion Cracking
- Shielding in the core of PWRs with relatively high fluence is implemented to preventively reduce neutron flux on the RPV wall

▪ Expected level of performance

- Periodic volumetric inspection is performed for nickel base alloy penetrations which are susceptible to Primary Water Stress Corrosion Cracking for PWRs to detect cracking at as early a stage as possible.
- Comprehensive NDE is performed in the base material of the beltline region in order to detect defects

Reactor Pressure Vessel :

Findings

- **Expected level of performance**
 - Fatigue analyses have to take into account the environmental effect of the coolant
 - For new reactors, suitable and sufficient irradiation specimens and archive materials are provided to support the reactor through its full operational life.

- **Challenge**
 - NDE techniques are continuously developing and improving and it is a challenge for licensees to know the current state of the art in qualified RPV inspection techniques. The RPV inspections could be improved by establishing and maintaining an up to date European catalogue of state of the art new techniques and technologies for NDE

Reactor Pressure Vessel :

Conclusion on RPV and calandria

- RPV one of the most important component, licensees have done a lot of research, codes and standards are documented and monitoring is applied on this component
- Regulations and practices are different from one country to another, but each country implement an ageing management programme
- Findings were identified on the monitoring programmes, preventive actions or fatigue analyses
- Few research reactors have a RPV, corrosion is identified in every AMP
- Calandria and pressure tubes of CANDU are only in one country, the TPR has assessed the AMP in comparison with international standards

Thank you for attention

Questions ???