



IAEA

International Atomic Energy Agency

Atoms for Peace and Development

The SMR Activities in the IAEA and SMR Regulators' Forum



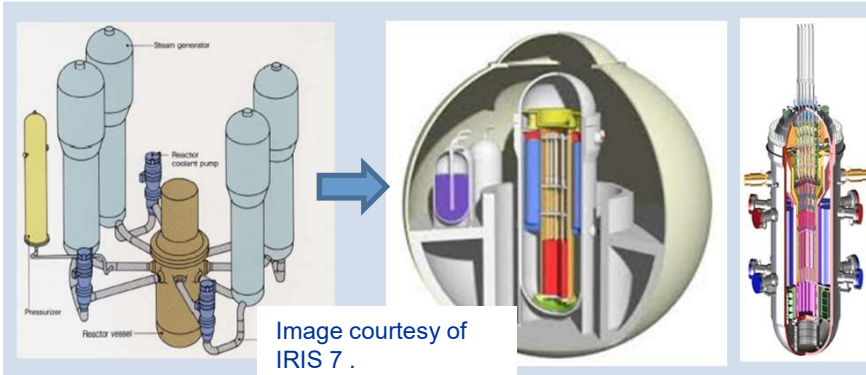
**Workshop on the Security of Small
Modular Reactors
20-21 Nov 2019
Ottawa, Canada**

*Miguel Santini, Regulatory Activities Section,
Division of Nuclear Installation Safety, NS*

SMR: Salient Design Characteristics



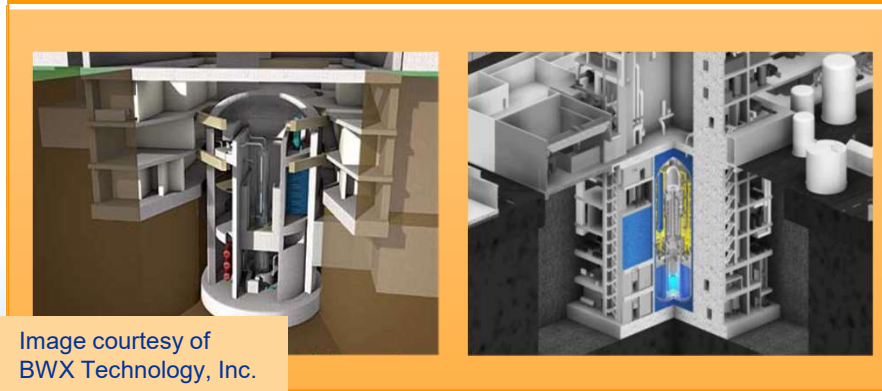
Simplification by Modularization and System Integration



Multi-module Plant Layout Configuration



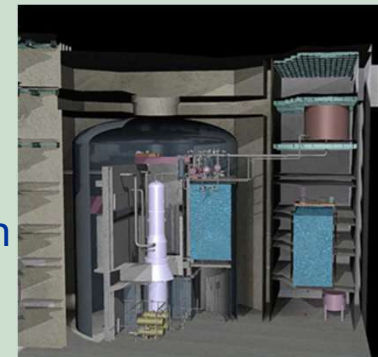
Underground construction for enhanced security and seismic



Enhanced Safety Performance through Passive System

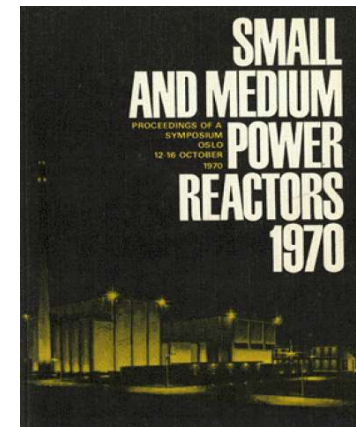
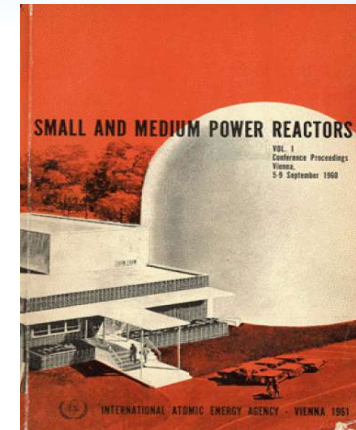
- Enhanced severe accident features
- Passive containment cooling system
- Pressure suppression containment

Image courtesy of BWX Technology, Inc.



SMR Regulatory Challenges

- Large number of innovative designs (first of kind)
- Unproven technology
 - Comprehensive analyses, simulations, and testing needed to close knowledge gaps
 - New design philosophy
 - New materials
 - New safety systems strategies
- Lack of operational experience
- Regulatory processes need to be adapted, as appropriate
 - Rules and Regulation
 - Safety Requirements and Guides



SMR-Related Activities at the IAEA

Nuclear Energy

- International Technical Working Group on SMR
 - Created in 2018, 20 member states
- CRPs relevant to SMRs
- INPRO: 17th INPRO Transportable Nuclear Power Plants (TNPPs) using SMRs

Nuclear Safety and Security:

- SMR Regulators' Forum
- Nuclear Security Assessment consultancy for Small Modular Reactors (2018)
- Applicability of Design Safety Requirements to SMRs
- Applicability of Licensing processes for SMRs

IAEA Position on Standards for SMRs



Nuclear Safety

- No plans to develop additional safety standards specific to SMR/TNPPs
- Useful for SMR/TNPPs but do not focus specific aspects of SMR/TNPPs

Emergency Preparedness and Response

- GSR Part 7 applicable to SMR & TNPPs for docked or stationary operations and during transport
- Development of EPR technical guidance for SMR and TNPPs has been already planned

Nuclear Security (Including Transport Security)

- All types of nuclear facilities are covered by IAEA NSS publications
- No additional guidance for SMR/TNPPs is needed given current understanding of known issues

Transportation Standards for TNPP



Transport Safety – land transport

Within the scope of SSR-6

- Used reactor with fuel unloaded (compliance to be demonstrated)

Outside the scope of SSR-6

- Reactor with fuel loaded, previously tested or operated to criticality

Exempt from SSR-6

- New / unused reactor – no fuel loaded

Transport Safety – sea transport

Within SSR-6 scope (and IMO regulatory framework)

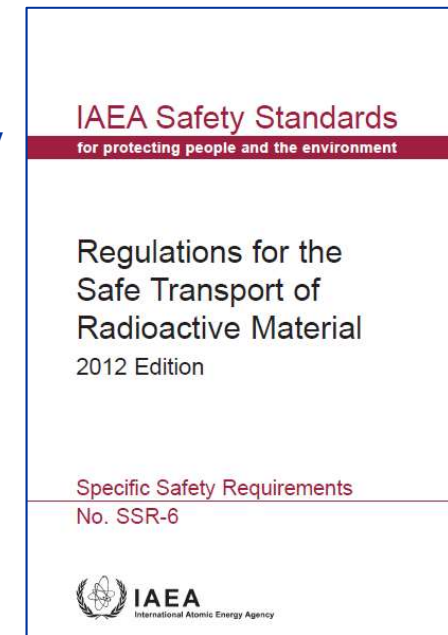
- Used reactor with fuel unloaded (compliance to be demonstrated)

Outside SSR-6 scope (and IMO regulatory framework)

- Used reactor with fuel loaded, previously tested/operated to criticality

Exempt from SSR-6 (and IMO regulatory framework)

- New / unused reactor – no fuel loaded



Members

- Canada
- China
- Finland
- France
- Korea
- Russian Federation
- Saudi Arabia
- United Kingdom
- United States



Observers:
European Commission,
OECD Nuclear Energy Agency
CORDEL



IAEA acts as Scientific Secretary and
promote and facilitate the Forum

Forum's Definition of SMRs

- Nuclear reactors typically <300 MWe or <1000 MWt per reactor
- Designed for commercial use, i.e. power production, desalination, process heat (as opposed to research and test reactors)
- Designed to allow addition of multiple reactors in close proximity to the same infrastructure (modular reactors)
- Use novel designs that have not been widely analysed or licensed by regulators.



Areas of work: Pilot Project (2015/2017)

Task-specific Working Groups

- Graded Approach
- Defence-in-Depth
- Emergency Planning Zone Size

Areas of work: Phase 2 Project (2018/2020)

Task-specific Working Groups

- Licensing Issues
- Design and Safety Analysis
- Manufacturing, Commissioning and Operation

Constraints Set at Origin



- The forum will exclude safeguards issues.
- The forum will not focus on security issues, however:
 1. each working group will note the safety/security interface in their discussions.
 2. Security experts, including representatives from the IAEA Division of Nuclear Security will be invited to attend working group meetings.
 3. This does not preclude the Forum SC to form working groups formed by the Regulators Security Experts in the future – This may allow more specific discussions in case issues are not identified in 1.



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Thank you!



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