

# VR-1 Reactor Operation in 2018

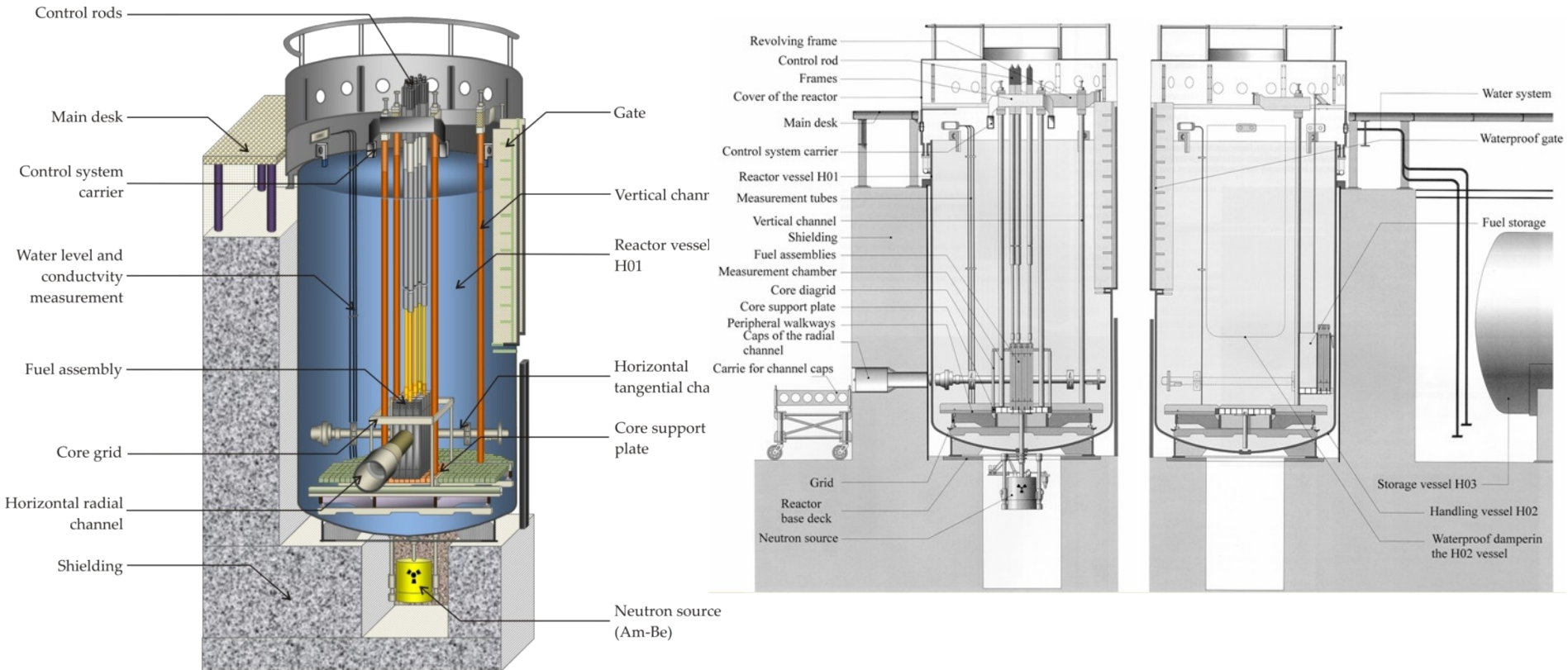
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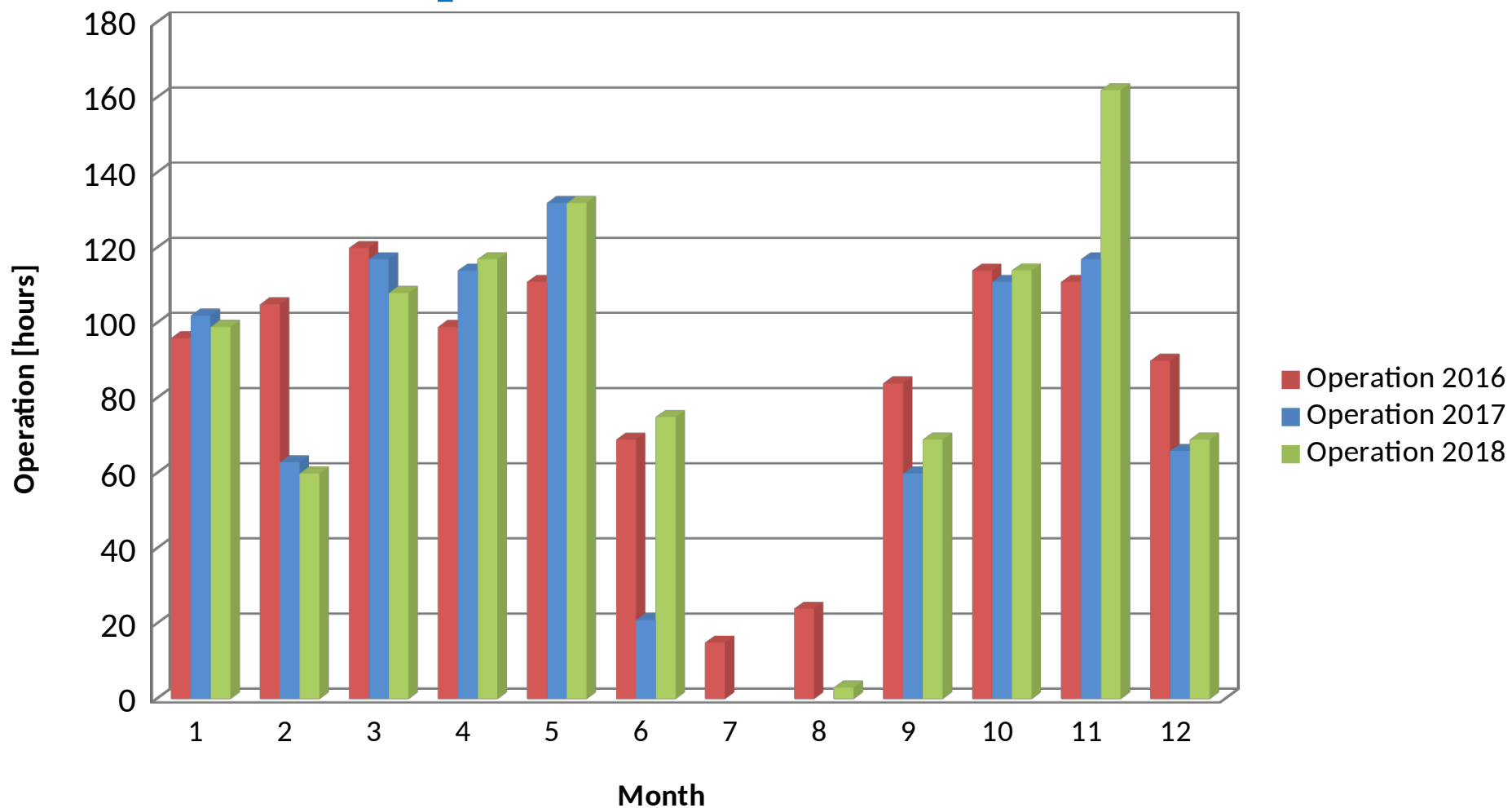
# Reactor VR-1



# VR-1 Reactor in 2018

- Operation
  - 1008 hours (+105 hours) in 336 shifts (+35 shifts)
  - 62% (+5%) education & training; 25% (-2%) research; 13% (-3%) maintenance
- Experimental works
  - New core configuration C14 – critical experiments, MCNP comparison
  - Continuous NAA
  - Measurements of D-D neutron generator parameters
  - Thermal feedback for different types of IRT-4M FAs

# VR-1 Reactor Operation in 2018



# Training Courses at VR-1 Reactor in 2018

- Training courses for 2 (-1) domestic universities
- Courses for foreign universities/entities
  - Slovak University of Technology, Slovakia – 1
  - University of Manchester, UK – 2
  - Defence Academy of the United Kingdom, UK – 2
  - University of Tennessee Knoxville, USA – 1
  - Middlebury Institute of International Studies, USA – 1
  - Aachen University, Germany – 1
- Training courses for NPP personnel
  - NPP Dukovany and Temelín (CZ) – 2
  - NPP Jaslovske Bohunice (SVK) – 2

# VR-1 Reactor Performance Indicators in 2018

	Availability		Unscheduled shutdowns		Adequacy Manpower	Emergency Prepared.	Safety system maintenance		Review	
	A1	A2	B1	B2	F	G	H2	H3	I	J
2016	99%	55%	4	0	13	1 exercise	0 / N/A	N/A	0/0	2
2017	99%	48%	1	0	12	1 exercise	0 / N/A	N/A	0/0	3
2018	99%	54%	1	1	13	1 exercise	0 / N/A	N/A	0/0	6

- A2 = Number of hours in operation/ 1880 hours of Standard reactor capacity Standard reactor capacity = 8 hours a day/5 days a week & 4 weeks holiday in summer & 1 week holiday Christmas & New Year
- D1a = Collective radiation dose to reactor operating staff (mSv) – under the limit of detection; < 0.5 mSv/person
- F = minimal required number of licensed supervisors and operators – 2
- Radioactivity released annually: E1, E2, E4: N/A

# VR-1 Reactor Performance Indicators in 2018

	Safety culture				Safety documentation	Quality assurance	Fuel integrity	Utilization	Events
	K1	K2	K3	K4	L	M	N	O	P1
2016	N/A	1	1	1	0	1	0	-	0
2017	N/A	1	1	1	4	1	0	-	0
2018	N/A	4*	0	1**	0	1	0	14 courses	0

- O = Number of education/training courses
- \* = Nuclear safety, radiation protection, physical protection, emergency preparedness training
- \*\* = Annual medical check for radiation workers

## Accomplished Tasks in 2018

- Finalization of Relicensing process
  - 13 new or updated documents send to regulatory body
  - Final step: safety analysis report - External experts for seismic activities, building qualifications, underground water structures
- Development and implementation of IRL system
  - Original intention – part of IAEA program (2019 Q4)
  - No contract and minimal feedback from IAEA so far
- New operator's desk
- „New“ fuel pins from Finland



## Tasks in Progress (2018) and Future Plans

- Solution to comments and conclusions of extended analyses of reactor building
- Innovation of absorption rods
  - 2019 summer – new design (vessel H02)
  - ? 2020 summer – full set in reactor core ?
- Sub-critical assembly VR-2
  - placed in reactor VR-1 hall
- Long term plans for new FA compatible with IRT-4M type

# Aging management and decommissioning of research reactors

- Aging management
- Required document contains effects of aging, monitoring, acceptance criteria, and measures
- Annual inspection of (e.g. absorption rods, FAs and vessels) based on operational inspection program
- 5-year non-destructive investigation of absorption rods and vessels
- Only the binary output, no extrapolation or forecasts

# Aging management and decommissioning of research reactors

- Decommissioning
- Required documents: plan of decommissioning, and financial cost evaluations
- No new safety incidents compared to current emergency plan
- Extended radiation protection and physical protection is covered by current systems
- Financial cost evaluation is prepared/refreshed every 5 years
- Cooperation with external subjects in pricing



Thank you for your attention!