Nuclear Energy Agency

5 June 2023

NUCLEAR ENERGY AGENCY
NUCLEAR SCIENCE COMMITTEE

Working Party on Scientific Issues and uncertainty analysis of Reactor Systems (WPRS)

Notification of the Workshop of the NSC/WPRS Task Force on Zero Power Reactors - "The demise of zero power reactors: From concern to action"

Proposed Agenda

22-23 June 2023
IRSN, Fontenay-aux-Roses, France

Scheduled meeting times (CEST):

Thursday, 22 June 2023 from 9:30 to 18:00
Friday, 23 June 2023 from 9:00 to 16:00

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Notification of the Workshop of the NSC/WPRS Task Force on Zero Power Reactors - "The demise of zero power reactors: From concern to action"

22-23 June 2023

IRSN Headquarters
31, venue de la Division Leclerc, Fontenay-aux-Roses, France

The 1st Workshop of the NSC/WPRS Task Force on Zero Power Reactors - "The demise of zero power reactors: From concern to action" will be held on 22-23 June 2023 at the IRSN Headquarters at 31, venue de la Division Leclerc, 92260 Fontenay-aux-Roses, France. It will be a hybrid meeting with remote participation possible through Zoom.

Background

In the early decades of nuclear reactor development, many countries built and operated zero-power facilities in which many different critical arrangements of materials were studied. These flexible experimental facilities, which included zero power reactors (ZPRs), criticality-safety assemblies and shielding facilities, have produced large quantities of physics data, such as average neutron cross sections or integral reactor physics quantities, which were needed to ascertain the calculational techniques used for reactor design. Over the years, with the progress of reactor modelling and computer simulations, the use of such facilities progressively shifted from studying engineering mock-ups to producing benchmark-quality experimental information (both separate-effect and combined-effect tests) for nuclear data and computer code validation. Today, many of the unique experimental data measured in these facilities have been curated and stored in databases, in particular the International Handbook of Evaluated Reactor Physics Benchmark Experiments (IRPhE) and the International Criticality Safety Benchmark Evaluation Project (ICSBEP) databases, and are routinely used for benchmarking activities.

As of the beginning of the 1980s, the number of ZPRs in operation started to decrease progressively, and this trend continues ever since. In 2009, the NEA report on Research and Test Facilities required in Nuclear Science and Technology alerted on the shortage of facilities for performing nuclear and neutron physics measurements and for new reactor development. The report concluded that there is "a need for versatile zero (or low) power reactors and sub-criticality assemblies for basic reactor physics experiments". Today, nearly all of the original ZPRs have been permanently shut down, without being replaced by correspondingly new facilities. This demise has resulted in a drastic reduction in experimental capability. Only a handful of facilities remain in operation worldwide and there is little prospect for an improvement in the near future. What is at stake is not only the loss of the experimental infrastructure and expertise, but also the future capacity at acquiring new data to support verification, validation and uncertainty quantification (VVUQ) of the simulation tools, as well as experimental investigation, such as new phenomena and materials to foster innovation.

This has caused concerns among the international reactor physicists' community, all the more as they anticipate that many new experimental data will be needed to back the VVUQ process in performance and safety demonstrations for fission, fusion, and accelerator type systems. Indeed, such demonstrations rely almost systematically on computer code simulations, which recent regulatory documents (e.g. IAEA, US NRC, French IRSN, UK ONR) require to support with appropriate experimental evidence.

In order to address this concern, the Nuclear Science Committee has decided to create an international specialists' Task Force, with the objective of:

- reviewing the projected needs for new reactor physics validation data and elaborating on their motivation; and

- recommending a consensual course of action for acquiring such data, including minimal functional specifications of the needed facilities and expertise.

Detailed specifications, economics considerations, and possible implementation plans are beyond the scope of the Task Force. The expected outcome of the Task Force activities is a report summarising the findings and recommendations, intended for use by decision makers.

Workshop objective

This NEA Working Party on Scientific Issues and Uncertainty Analysis of Reactor Systems (WPRS) Task Force workshop will provide an opportunity to discuss the needs for new reactor physics experimental data and to evaluate possible courses of action for acquiring such data.

In preparation of the workshop, the Task Force conducted interviews with international experts representing different stakeholder communities (research, industry, technical support organisations, regulators, government) and different job profiles (ZPR operators, ZPR data users, experimentalists, data evaluators).

Each workshop session will start with a summary of the key findings derived from the interviews. Workshop participants will then be invited to react and contribute to in-depth discussions. The objective is to collect the views and expectations of all workshop participants. The discussions and conclusions will serve as input for the Task Force report, which will summarise the stakeholders' positions and needs, and will provide recommendations.

Registration

Delegates and experts wishing to participate must register **by 16 June 2023 on the NEA registration page https://www.oecd-nea.org/confdb/confdb/conf?id=681** to ensure that access badges are available for them upon arrival. For the delegates participating in the meeting remotely, the Outlook invitation with connection details will be sent to registered participants in due course.

Meeting Material

An OECD NEA SharePoint space will provide updates to the agenda and all the documents supporting the agenda will be placed on the same SharePoint space and associated with the relevant agenda items as soon as they are available. Delegates are invited to check the web page for updates periodically **starting from 19 June 2023:**

https://mynea.oecd-nea.org/sites/WPRS/ZPR_TF/ZPRWorkshop2023

Please follow these steps to sign in to the SharePoint:

1. On the SharePoint sign in page, enter your email address as your username. Then type in your NEA password. (password reminder)
2. Please select 'MyNEA Access Authentication Agent 3.1' as next step, which is the 2-factor-authentication service for delegates.
3. You will receive an email with an additional access code. Enter the access code on the web site.

Sometimes access issues are experienced if the browser caches your access codes, because they change over time. Please try to refresh/delete your browser cache if you experience such problems.

Speakers are kindly invited to upload their presentations in electronic format to the SharePoint and dedicated information will be provided.

Contact information

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PROPOSED AGENDA

Thursday, 22 June 2023 – Lessons Learned and Needs			
ID	**Paris Time [CEST]**	**Agenda Item**	**Duration**
	09:00	Registration	00:30
1	**09:30**	**Welcome and Presentation of WPRS ZPR TF**	**00:30**
1.0	**10:00**	**Session I: Lessons learned from the operation of ZPRs**	
1.1	**10:00**	Summary of Interviews	00:20
1.2	**10:20**	Invited Presentation User/Research - reactor experiments	00:25
1.3	**10:45**	Invited Presentation User/Research - shielding	00:25
1.4	**11:10**	Invited Presentation User/Research - criticality safety	00:25
	11:10	*COFFEE BREAK*	*00:20*
1.5	**11:30**	Invited Presentation Curator - data preservation, benchmarks	00:25
1.6	**11:55**	Invited Presentation Operator/Research	00:25
1.7	**12:20**	Discussion	00:30
	12:50	*LUNCH BREAK*	*01:00*
1.8	**13:50**	Wrap-Up Session I	00:30
2	**14:20**	**Session II: Projected needs related to new reactor physics experimental data and more**	
2.1	**14:20**	Summary of Interviews	00:20
2.2	**14:40**	Invited Presentation - User/Industry	00:25
2.3	**15:05**	Invited Presentation - Regulator, TSO	00:25
2.4	**15:30**	Invited Presentation - Operator/Research	00:25
	15:55	*COFFEE BREAK*	*00:30*
2.5	**16:25**	Invited Presentation - User/Research	00:25
2.6	**16:50**	Discussion	00:30
2.7	**17:20**	Wrap-Up Session II	00:30
2.8	**17:50**	**Closing Day 1**	
	19:30-22:00	*Workshop Dinner*	

Friday, 23 June 2023 - Future			
	Paris Time [CEST]	**Agenda Item**	**Duration**
3	**09:00**	**Welcome Day 2 (and Recap Day 1)**	**00:20**
3.0	**09:20**	**Session III: New capabilities and cooperation models**	
3.1	**09:20**	Summary of Interviews	00:20
3.2	**09:40**	Invited Presentation - Envisioning new experimental capabilities - Part 1	00:30
3.3	**10:10**	Invited Presentation - Envisioning new experimental capabilities - Part 2	00:30
	10:40	*COFFEE BREAK*	*00:20*
3.4	**11:00**	Invited Presentation - Organization and cooperation models - Part 1	00:30
3.5	**11:30**	Invited Presentation - Organization and cooperation models - Part 2	00:30
3.6	**12:00**	Discussion	00:45
	12:45	*LUNCH BREAK*	*01:00*
3.7	**13:45**	Wrap-Up Session III	00:45
3.8	**14:30**	**Wrap-Up & Conclusions Workshop Days 1&2**	**01:00**
4	**15:30**	**Closing**	