

**NUCLEAR ENERGY AGENCY  
NUCLEAR SCIENCE COMMITTEE**

**OECD/NEA First Workshop on preservation of Thermal-Hydraulics experimental data (TH-1)**

**ANNOUNCEMENT & PROPOSED PROGRAMME**

**Garching, Germany  
June 24-25, 2019**

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**OECD Nuclear Energy Agency  
Nuclear Science Committee**

**OECD/NEA First Workshop on preservation of Thermal-Hydraulics  
experimental data (TH-1)**

**Hosted by Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) gGmbH  
Garching, Germany**

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***Sponsorship***

The First Workshop on preservation of Thermal-Hydraulics experimental data workshop (TH-1) is conducted under the auspices of new Expert Group on Reactor Core Thermal-Hydraulics (EGRCTH) within Working Party on scientific issues of Reactor Systems (WPRS) at Nuclear Science Committee (NCS), NEA/OECD.

Under the guidance of the WPRS, the EGCTH will perform specific tasks associated with multi-scale core thermal-hydraulics of present and future nuclear power systems. Coupling aspects of neutronics, fuel performance, coolant chemistry, and fluid structural mechanical interactions for normal and/or deformed core configurations will be considered, as will problems requiring high fidelity multi-scale multi-physics core simulation. Reactor types considered include, but are not limited to, present generation Light Water Reactors (LWRs), Heavy Water Reactors (HWRs), Small Modular Reactors (SMRs), Sodium cooled Fast Reactors (SFRs), High Temperature Reactors (HTRs), Molten Salt Reactors (MSRs) and other advanced nuclear systems.

The first objective is to provide expert advice to the WPRS and the nuclear community on the development needs (data and methods, validation experiments, scenario studies) for multi-scale core thermal-hydraulics modelling and simulation of existing and proposed nuclear reactor systems. A key activity associated with this objective is the identification and preservation of appropriate experimental data. The expert group will provide member countries with the guidance and processes for certifying experimental data for its use as a stand-alone core thermal-hydraulic validation or for use as part of validation pyramid of multi-physics modelling and simulation tools.

The second objective is to provide specific technical information regarding:

- The status of national and international programmes including experimental capabilities;
- State-of-the-art reactor core thermal-hydraulics methodologies on different modelling scales;
- Provision of experimental data for model development and validation to the The International Experimental Thermal HYdraulicS (TIETHYS) database;
- Provision to TIETHYS with a methodology for a systematic and standardized process for collecting facility hardware and experimental test data;
- Techniques for high to low fidelity/resolution model data exchange (Hi2Lo);
- Values and distributions of local safety-related parameters and margins.

The expert group will monitor, steer and support the continued development of the TIETHYS database. The expert group also will facilitate the dissemination of technical information and knowledge through activities such as workshops, benchmark studies and training activities.

This workshop (TH-1) will be held in conjunction with other meetings/workshops under the auspices of the NSC, NEA/OECD in order to facilitate co-ordination and sharing of work. Three other meetings are being held in Garching, Germany during the same week in order to combine efforts in common areas such as modelling and simulation; verification, validation and uncertainty analysis; and applications and to make the participation more efficient. The meetings/workshops concerned are:

- *June 24 – June 25, 2019* – OECD/NEA Rostov Unit 2 (Rostov2) VVER-1000 Multi-Physics Benchmark – First Benchmark Workshop (Rostov2 -1);
- *June 26 – June 27, 2019* – Second Multi-Physics Model Validation Workshop (MPMV-2);
- *June 26 – June 27, 2019* – AER group D meeting (AER-D).

The weeklong events are sponsored by GRS. Kiril Velkov from GRS is the local event host.

### ***Background and Purpose of the THED-1 Workshop***

Nuclear reactor, design and safety analyses are performed by computer codes based on different level formulations. These codes require suitable data for validation for intended applications. The traditional system codes are two-fluid codes with either one-dimensional or some approximation of three-dimensional flow model in the core. These codes require separate effects tests representing single phenomenon and integral effects tests (IET) simulating a reactor transient. With the need for better representation of core sub-channel thermal-hydraulics, sub-channels codes have been developed. These codes require data from sub-channel tests. In addition, there are models in the codes that are not based on first principle such as pumps, separators, etc. that have empirical base models. There is a need for experimental data to confirm these models.

In addition to traditional codes, there are high-fidelity multiscale codes that fall under category of computational fluid dynamics (CFD) codes. These codes represent flow field in different sections of the reactor in very fine detail with a very large number of nodes.

The validation of these codes requires experimental tests with extensive and precise instrumentation to provide measured data.

Another class of data is inclusion of International Standard Problem (ISP) based on selected IET or SET. These problems are designed to judge the capability of codes to predict blind tests and are good check on user effect on code prediction. The reports generated from ISP initiative provide good guidance for application of selected tests.

There are large number of tests performed for last four decades. Their description and the test data are available in different format and in different level of details about initial, and boundary conditions, geometry, and instrumentations. There is a need to preserve these data with improved documentation, instrument/measurement uncertainty, and medium of storage. In addition, there is also a need to preserve reports describing the use of data for validation applications.

Beside preservation, there is another need to organize these test data in a dynamic, expandable relational database to connect SETs and IETs to reactor transient scenarios. It will incorporate new information on existing tests and new tests.

### ***Scope and Technical Content of the Benchmark Workshop***

The technical topics to be addressed at the workshop include:

- a) Optimal use and preservation of experimental data and facility hardware information;
- b) To provide a summary of available experimental test today from different organization;
- c) Standardization and Consolidation of the experimental information (Geometry of the facilities and experimental test results);
- d) Catalogue of international thermal-hydraulic data for user awareness;
- e) Organize data in a relational database;
- f) Qualification of data in instrument uncertainty and scaling and modeling guidance;
- g) Preservation of test data at central location when possible or provide link to data at source;
- h) Designing validation experiments from existing experiments in the new facilities;
- i) Designing validation experiments in the new facilities;
- j) Validation data needs and multi-physics validation hierarchy;
- k) Experimental Data support in advanced modelling and simulation;
- l) To identify modalities to judge relevance of experimental data;
- m) International and national collaborative activities in experimental area.
- n) Develop guidelines for documentation for new tests.

***Organization of the Benchmark Workshop***

The meeting is organised around the discussion in depth of different aspects of management, preservation and exploitation of current international available experimental data including approaches, best practices, needs, challenges, methods, tools, data support, trends, and issues, emerging requirements, applications, collaboration and opportunities.

***Participation in the Benchmark Workshop***

For this workshop sponsored by the NSC, participation is open to students, faculty, engineers, scientists, and experts from academia, research laboratories, safety authorities, regulatory agencies, utilities, owners' groups, vendors, etc. from OECD/NEA member countries.

***Organisation and Programme Committee of the Benchmark Workshop***

An Organisation and Programme Committee has been nominated to make the necessary arrangements for this First Workshop and to organize the Sessions, draw up the final programme, appoint Session Chairmen, etc. The members of the Programme Committee are:

**Alessandro Petruzzi – Chair**

Nuclear and Industrial Engineering (NINE), Italy

**Upendra Rohatgi – Co-Chair**

Brookhaven National Laboratory (BNL), USA

**Maria Avramova**

North Carolina State University (NCSU), USA

**David Novog**

MakMaster University, Canada

**Kiril Velkov – Local Host**

GRS, Germany

**Kostadin Ivanov**

*Chair of WPRS at NCS, OECD/NEA*

NCSU, USA

**Tim Valentine**

*Chair of EGMPEBV at NSC, OECD/NEA*

Oak Ridge National Laboratory (ORNL)

Secretariat

**Shuichi Tsuda**

OECD/Nuclear Energy Agency, France

***Proposed Programme of the Benchmark Workshop***

The proposed programme for the OECD/NEA TH-1 workshop was drawn-up by the Programme Committee and is enclosed as ***Appendix 1***.

***Language of the Benchmark Workshop***

The official language of the OECD/NEA THED-1 workshop is English.

### ***Proceedings of the Workshop***

A summary of the workshop will be published by the OECD/NEA after the meeting. The summary will be distributed free of charge to the participants in the Workshop and to Delegates of the NSC. The programme committee and the session Chairmen will prepare a summary report on the main results of the meeting for presentation to the NSC. Presentations will be available free of charge to the participants to download from participants' restricted area after the workshop.

### ***Contacts and Registrations***

A common registrations webpage is made available for the participants of the Rostov2-1, TH-1, MPMV-1 and AER-D workshops/meetings:

[https://www.oecd-nea.org/science/egmpebv/workshops\\_grs\\_2019/](https://www.oecd-nea.org/science/egmpebv/workshops_grs_2019/)

Inquiries about registrations can be directed to: Shuichi Tsuda,

[Shuichi.TSUDA@oecd-nea.org](mailto:Shuichi.TSUDA@oecd-nea.org)

Please send the titles and authors of your presentations for MPMV-2 workshop to Kiril Velkov:

[Kiril.Velkov@grs.de](mailto:Kiril.Velkov@grs.de)

### ***Workshops' Location***

The meeting place for the four workshops/meetings during the week of June 24-28, 2019 is the GRS, Garching, Germany .

The information for transportation and hotels is provided also at the link given above. There is no registration fee for participating in the workshops. Coffee breaks, lunches and a banquet will be provided also free of charge.

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*Appendix 1***OECD/NEA First Workshop on preservation of Thermal-Hydraulics experimental data (TH-1)****Host Organization**

Hosted by Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) gGmbH  
Garching, Germany

**June 24-25, 2019**

**PROPOSED PROGRAMME**

T1-10: Session code

- T1. Introduction and opening remarks
- T2. Overview of OECD CCVM and current activities in OECD/NEA (TIETHYS Database)
- T3. Experiments from different organizations
- T4. Experimental Needs from Code developers and V&V perspectives
- T5. Methodology for the Standardization and Consolidation of the experimental information
- T6. International and national collaborative activities in experimental area
- T7. Requirements for developing a modern experimental database from Code developers and V&V perspectives
- T8. Develop guidelines for documentation for new tests.
- T9. Action items, next workshop, and plans
- T10. Conclusions and closing remarks