News briefs

International Reactor Physics Experiment Evaluation (IRPhE) Project

Since the beginning of the nuclear power industry, numerous experiments concerned with nuclear energy and technology have been performed at various research laboratories worldwide. These experiments have required a large investment in terms of infrastructure, expertise and cost; however, many have been performed without considerable attention to archiving results for future use. The results and techniques developed from these measurements remain of great value today and in the future. They provide the basis for recording, developing and validating methods, and represent a significant collection of data for present and future research. This valuable asset is, however, in jeopardy of being lost. If the data are compromised, it is unlikely that any of these measurements will be repeated in the future.

At present, there is an urgent need to preserve integral reactor physics experimental data including separate or special effects data for nuclear energy and technology applications, and the knowledge and competence contained therein. The International Reactor Physics Experiment Evaluation (IRPhE) Project was initiated by the NEA in May 2000 to this end.

Participants in the IRPhE Project currently include: Belgium, Brazil, Canada, France, Germany, Hungary, Japan, Korea (Republic of), Slovenia, the Russian Federation, the United Kingdom and the United States. Much of the work realised thus far by the IRPhE Project, in particular, the evaluation and review of selected benchmark experiments, was possible thanks to substantial funding provided by the Government of Japan. Other countries have contributed evaluations, reviews and data at their own expense.

Purpose

The purpose of the IRPhE Project is to provide an extensively peer-reviewed set of integral data related to reactor physics that can be used by reactor designers and safety analysts to validate the analytical tools used to design next-generation reactors and to establish the safety basis for the operation of these reactors. This work of the IRPhE Project is formally documented in the International Handbook of Evaluated Reactor Physics Benchmark Experiments, a single source of verified and extensively peer-reviewed reactor physics benchmark measurements data.

The evaluation process entails the following steps:

- identify a comprehensive set of reactor physics experimental measurements data;
- evaluate the data and quantify overall uncertainties through various types of sensitivity analysis to the extent possible, and verify the data by reviewing original and subsequently revised documentation and by talking with the experimenters or individuals who are familiar with the experimental facility;
- compile the data into a standardised format;
- perform calculations of each experiment with standard reactor physics codes where it would add information;
- formally document the work into a single source of verified and peer-reviewed reactor physics benchmark measurements data.

Benefits

The benefits from the IRPhE Project are multiple. They include:

- preservation of valuable reactor data and technology;
- support of advanced generation reactors;
- access to data from different countries;
- significant cost savings. (It is well-documented how the utilisation of integral experiments in final design analyses greatly reduces calculation uncertainties, thereby reducing design margins and producing significant cost savings. In addition, if a new research reactor can be designed and built using only IRPhE Project data, the cost of construction of a separate critical facility will be offset.)

Handbook

The International Handbook of Evaluated Reactor Physics Benchmark Experiments was prepared by a working party comprised of experienced reactor physics personnel from Belgium, Brazil, Canada, China, France, Hungary, Japan, the Republic of Korea, the Russian Federation, the United Kingdom and the United States. The handbook contains reactor physics benchmark specifications that have been derived from experiments that were performed at various nuclear experimental facilities around the world. The benchmark specifications are intended for use by reactor physics personnel to validate calculation techniques.

The 2007 edition of the International Handbook of Evaluated Reactor Physics Experiments spans over 15 000 pages and contains data from 21 experimental series performed at 13 reactor facilities. The handbook is organised in a manner that allows easy inclusion of additional evaluations, as they become available. Further evaluations are in progress and will be added to the handbook annually.

Further information can be found at www.nea.fr/html/dbprog/IRPhE-latest.htm and http://irphep.inl.gov. ■

Legislative update: United States

The US Senate consented to the ratification of the Convention on Supplementary Compensation for Nuclear Damage (CSC) on 4 August 2006. Both the House of Representatives and the Senate are now in the process of drafting legislation to implement the CSC before the State Department will deposit the necessary instrument of US ratification with the International Atomic Energy Agency. The US is optimistic that its ratification of this "new" Convention, adopted in 1997 under the auspices of the IAEA in Vienna, will lead to its entry into force within a short time frame. The Convention provides for its entry into force on the 90th day following the date on which at least five states with a minimum total of 400 000 units of installed nuclear capacity[1] have deposited an instrument of ratification, acceptance, approval or accession. At the time of writing, three countries (Argentina, Morocco and Romania) with a combined nuclear power generating capacity of approximately 1 586 MWe[2] (or 4 750 MWth) have ratified the CSC. After US ratification, it will therefore be necessary for one or more states with a capacity of approximately 100 000 MWth to ratify this instrument for it to enter into force.

The entry into force of the Convention on Supplementary Compensation will substantially change the face of the international nuclear liability regime. Up until now, there have been two regimes existing in parallel: the Paris/Brussels Convention regime and the Vienna Convention regime. These systems are linked to each other through a "bridge" convention – the Joint Protocol – which provides for the extension of the benefits of one regime to victims in countries party to the other regime, under certain conditions. The CSC is a free-standing instrument, open to all states. This means that countries can become party to a new global regime providing for liability and compensation for victims of a nuclear incident, without also having to become a contracting party to the Paris Convention or the Vienna Convention. This is certainly a major step forward given that at the present time, over half of the world's reactors in operation or under construction are not covered by any of the international nuclear third party liability conventions.

It is important to point out that the CSC will be of interest not only to states that do not currently participate in any of the nuclear liability conventions, but also to Paris and Vienna Convention states. Efforts to link Paris states and Vienna states through the Joint Protocol and to create a global regime through the CSC are compatible since a Paris state or a Vienna state can be a party to both the Joint Protocol and the Convention on Supplementary Compensation.

So what will the CSC actually do? The CSC creates an instrument by which states can ensure that more money will be made available to compensate more victims for a broader range of damage than ever before. A global nuclear liability regime, in order to be efficient, needs to be "attractive" both to nuclear-power-generating states and non-nuclear-power-generating states. The CSC was designed to do just that, by focusing on providing legal certainty with regard to the treatment of legal liability for nuclear damage resulting from a nuclear incident, and ensuring, in the unlikely event of a nuclear incident, the prompt availability of meaningful compensation with a minimum of litigation and other burdens.

The CSC achieves legal certainty by requiring each contracting party to have national nuclear liability law that is based on the Paris Convention, the Vienna Convention or the Annex to the CSC, and that incorporates the provisions contained in the CSC on jurisdiction, compensation and the