



## SARNET NEWS N°2

March 2005

### COMMUNICATION OUTSIDE THE NETWORK, LINKS WITH OTHER STRUCTURES

SARNET first year has been celebrated in Paris on March 17th on the eve of the second Governing Board meeting (see agenda in annex 1). Hosted by IRSN and introduced by IRSN (General Director: Jacques Repussard) and the European Commission (Head of the Nuclear Fission and Radioprotection Unit: Hans Forsstrom), this celebration gathered the Governing Board members, some representatives of French ministries and some journalists. The Coordinator illustrated the progress achieved during the first year; Philippe Jamet (deputy director of IRSN) animated a round table that gave the opportunity to Pr. Raj Sehgal (KTH), Dr. Victor Teschendorff (GRS), Dr. Jan Jakab (UJV), Dr. Jean-Pierre Hutin (EDF) and to the assembly to expose their views on SARNET and their expectations for future. It has been emphasized that an important expectation of the industry is a clear identification of research priorities.

The SARNET public Web site has been open beginning of March 2005:

[www.sar-net.org](http://www.sar-net.org) (*in order to make this site more visible, all the organisations are invited to implement this link in their public web-sites*).

The announcement of the first European Review-Meeting on Severe-Accident Research and management, **ERMSAR 2005** (to be held on 14<sup>th</sup> –16<sup>th</sup> November 2005 in Aix-en-Provence, France) has been delivered. It may be found on the public web site. A direct registration is possible: click [here for Online Registration](#).

Links have been established with other structures concerned by reactor Severe Accidents.

With **ISTC** (and in particular with the CEG-SAM: Contact Expert Group on Severe Accident and Management) links have been defined in order:

- To guarantee the coherence of positions and conclusions on R&D needs of both entities;
- To be sure that national R&D projects elaborated in Europe (or at least in R&D organisations participating to SARNET) will take properly into account the capabilities and proposals of the Russian research organisations;
- To widen the dissemination (through SARNET activities of interpretation, modelling, code and data base development) of ISTC results within the nuclear European community.

A formal document defining the interactions between the two structures has been formalized in collaboration with the EC and approved by SARNET Governing Board.

With **OECD/NEA/CSNI**, and in particular with GAMA, links have been established in order to:

- avoid duplication of actions
- combine efforts for common interest topics

No formal document has been established; it has been agreed that information on SARNET could be periodically given during GAMA meeting and that common seminars, ISPs or benchmarks should be organized.

A common action has already been initiated: a TMI2 benchmark (beyond the TMI2 scenario, alternative scenarios will be calculated using the same referenced TMI2 reactor geometry).

## **ASTEC**

The 1<sup>st</sup> ASTEC Users' Club, held in Köln from 21 to 24 February 2005, was very fruitful for direct discussion between code users and developers.

Model developments are under way by CEA/DEN, in close collaboration with IRSN, on in-vessel late-phase (DIVA module) and on vessel external cooling. As to model adaptation/extension to other reactor types, specifications are under way for VVER-440 and VVER-1000. A preliminary analysis of ASTEC capabilities for application to CANDU and RBMK reactors has started.

Validation has made significant progress. The code has been applied to more than 20 different experiments (analytical or integral ones). Results were good on core degradation and MCCI. Partners independent from the code developers confirmed IRSN-GRS former results on several ISP (44, 45, 46, 47) and PHEBUS FPT0-1 experiments. Code results were compared to containment data of Ignalina RBMK transient with acceptable preliminary results (model corrections or improvements will be necessary to improve them).

Calculations of PWR 900 complete severe accident sequences were performed with interesting comparison to MAAP4 and MELCOR results. As for VVER-440 and –1000 sequences, the comparison to MAAP4-VVER and MELCOR was limited to the in-vessel parts of the sequences until vessel lower head failure. Some numerical robustness problems (that should be reduced with next V1.2 version) prevented to extend most VVER calculations to fission product transport in the primary circuit: only one such calculation on a VVER-440 was successful. Westinghouse 1000 calculations are still under way. First exploratory calculations were performed on CANDU reactor (fission product transport in the primary circuit).

The syntheses of validation and benchmarking of current ASTEC V1.1 version will be now written before June 05.

## **PSA2 (level 2 Probabilistic Safety Assessment) ACTIVITIES**

The description and comparison of the main elements of methods used by the different partners to develop their PSA have already been achieved; the definition of improvement needs is underway. A review of methods for the uncertainties assessment in the level 2 PSA has been completed.

A State of the Art report on Dynamic Reliability methods has been delivered and the limitations of classical methods, which could be exceeded, were identified.

## **CORIUM, CONTAINMENT and SOURCE TERM**

Progress review seminars have been hosted by GRS in Köln (14-18 February, 2005) for all three jointly executed research activities (CORIUM, CONTAINMENT and SOURCE TERM). The main tasks are initially review and selection of available, relevant experiments, synthesis of analyses and interpretation of data from these experiments, and model synthesis and proposals of models for ASTEC. A schedule for uploading the experimental data into DATANET (databank) has been established, and a timetable for producing new and improved models for ASTEC. A forward programme has been developed for the second year, similar in nature to that of the first year, with a few adjustments based on the first year's experience.

### ***Illustrations of progress***

In the Corium domain, one may mention:

- The ongoing joint publication in a special issue of NED about the debris bed coolability and the new STYX results available for all partners.
- Joint test matrix definition: In the frame of the definition of International Source Term program, FZK and IRSN have decided to harmonize their test matrixes to study oxidation by air/steam mixture and to study B<sub>4</sub>C oxidation and degradation.

In the Containment domain, one may mention:

- Limitations of CFD codes (especially commercial codes) were identified with respect to wall condensation modelling and saturation conditions.
- Specific topics, such as mitigation system modelling, sprays and recombiners, were identified as tasks for the 2<sup>nd</sup> JPA
- In the subtopic Direct Containment Heating (DCH) a DISCO experiment with the geometry of a French reactor was performed in the frame of the EC-LACOMERA program, which will be used as a benchmark for calculations with lumped parameter codes, with the objective to use the improved future models for ASTEC. One joint technical report on DCH is in progress.

In the Source Term domain, one may mention:

- Particularly strong cooperations have been established on ruthenium release and transport, on the design of the CHIP facility, on aerosol retention in cracks, with more specific clustering on iodine chemistry issues.
- Two models for ASTEC model development are already being developed; namely for ruthenium release, and for aerosol deposition in cracks.

## **DATANET**

The deployment of DATANET (SARNET experimental database system) has been extended to FORTUM (a training week have been organized at JRC Ispra: 28 Feb. – 4 March 2005).

The data implementation from about 10 programmes is underway. Up to now, the results of about 50 experimental tests have been implemented.

## **EXCELLENCE SPREADING**

The preliminary agenda of a Course on SA phenomenology and on Level 2 PSA has been established, this Course will be hosted by CEA in Cadarache (France) in January 2006. The final agenda and the announcement should be ready in May 2005.

A mobility programme has been initiated; one delegation is underway (a CIEMAT scientist has been delegated beginning of 2005 at PSI for a 4-month period). A mobility programme is under definition for the next year, half a dozen delegations (researchers or students) should be initiated in the coming months.

## **MANAGEMENT**

The third meeting of the Management Team has been held in Paris on March 3<sup>rd</sup>, during this meeting several proposals were defined, in particular for:

- The activity programme for the "April 2005-September 2006" period (JPA2),
- The grant distribution for SARNET second year,
- The ERMSAR 2005 programme,
- The mobility programme.

All these proposals have been approved during the 2<sup>nd</sup> meeting of SARNET Governing Board held in Paris in March 18<sup>th</sup>.

## **FUTURE EVENTS:**

Project review by an expert panel nominated by the EC (J. Royen, K. Rahbar, G. Löwenhielm), 13 June 2005, Brussels.

Management Team meeting N°4 : October 2005

ERMSAR 2005, 14-16 November 2005, Aix-en-Provence.

Education course on severe accident (for students and young researchers), January 2006, Cadarache.

Governing Board meeting N°3: March 24<sup>th</sup>, 2006, Zürich