**Report on the SARNET meeting on VNIIEF experimental capabilities and
discussions on possible future collaboration**

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The objective of the meeting was to report to the SARNET WP6 the information collected on a pre-test for a large scale MCCI performed by VNIIEF in Sarov (Russia).

The final aim of the project, launched under the auspices of the Contact Expert Group on Severe Accident Management is to perform large scale (1t) 2D MCCI (Molten Core Concrete Interaction) experiments with corium-steel mixtures. VNIIEF has proposed an original technique in which the melt is generated by thermite reaction (exothermal chemical reaction) and the decay heat is simulated by the regular insertion of thermite briquettes (PTC[[1]](#footnote-1)) in the melt, so without any electrical heating. The use of this technique may give the possibility to detect system effects induced by other conventional heating techniques (inductive heating, direct Joule heating).

Due to the originality of this technique and the large cost of a large-scale test (estimated to 980 k$ in 2008, a 9-month project (from 1st May 2009 to 31st Jan 2010 of 98k$ or 10%) was launched by ISTC with EU funding to develop the technique and perform three feasibility tests of a medium scale up to 100kg of corium melt. This feasibility tests used a ZrO2-Fe melt to avoid export control problem (as would be the case if it had contained UO2) for this feasibility phase.

A meeting (has been organized on 26-27 January in Nizhny Novgorod with VNIIEF. The handouts and the report were expected to be distributed in April to the European collaborators (after security check and VNIIEF management approval). On May 7, VNIIEF informed us that due to bureaucratic delays these documents were delayed till mid June….The meeting was nevertheless maintained so that WP6 partners could get informed on this test and present their opinion. The presented viewgraphs, based on notes and photographs taken during the presentation in Russia are appended to this document.

It is a pity that we have not yet the experimental dataset. Therefore it was quite difficult to finalize any position on the topic. It has been decided that CEA and KIT would *analyze the data when they are received* and compare the experimental results with code calculations. Some questions must be answered:

* What is the difference between a transient test in which all the thermite is ignited at once and this type of test? In case, little difference is found, would it be the same with a longer test with a larger mass?
* Are the experimental heat fluxes and ablation rates coherent and are they prototypic? If not, what could be done to propose an interesting test procedure with this technique?

There have also been some general remarks:

* The initial and boundary conditions must be well described. VNIIEF shall indicate if if has been the case in this test and if not, how they plan to improve their system in further tests. This includes:
	+ Measurements providing precise data on the thermal conditions at the upper surface with the gas burners.
	+ Determination of the effectively released energy by a PTC briquette. Is it theoretical or was it measured?
* The introduction of some concrete materials in the briquette could lower the pool temperature and the crust thickness. This has been recommended by several participants.
* Focus has been put on the fact that 1 t may be too small (already studied, albeit in 1D) and 1 hour too short to reach steady state.
* Further details on the thermite fabrication (powder size, safety aspects of the briquette pressing) have also been requested.

For the future, it has been decided to wait before a thorough analysis of the results (possibly for the November 2010 meeting) and if needed a second feasibility test before a joint EURATOM-ROSATOM project on these issues could be seriously discussed.

1. PyroTechnic Components [↑](#footnote-ref-1)