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|  | EUROPEAN COMMISSIONDIRECTORATE-GENERAL ‘RESEARCH’ | INTERNATIONALSCIENCE ANDTECHNOLOGYCENTRE |  |

**CONTACT EXPERT GROUP on SEVERE ACCIDENT MANAGEMENT (CEG-SAM)**

*To:* R. Burmanjer (EC, DG-RTD / D.3) *Advice no.:* A-20

*Project code:* ISTC # 3936 *Date:* 6th April 2009

*Signatures:* P. Hofmann (Secretary)

*Linked meeting:* 15th CEG-SAM meeting, Villigen, Switzerland, March 10-12 2009

*Attending members:* Birchley, Güntay (PSI); Bottomley (JRC-ITU); Clement (IRSN); Ducros, Journeau (CEA); Fischer (AREVA); Herranz (CIEMAT); Koch (RUB-LEE); Krause (AECL); Lamy (EdF); Miassoedov, Palagin, Stuckert, Tromm (FZK); Oriolo (UniPi); Pretzsch, Schwinges, Trambauer (GRS);

*Copies:* CEG-SAM members; M. Hugon, J. Sanders (EC, DG-RTD / D.3), S. Webster (EC, DG-RTD / J.2), L.Tocheny (ISTC, Moscow)

\* Subject: - “Study of fuel assemblies with boron carbide absorber rods under severe accident conditions in the PARAMETER-SF tests series”

\* EU Collaborators: - CEA, EDF, FZK, GRS, IRSN, JRC-ITU, PSI, AEKI

\* Documents: Project proposal # 3936 “Fuel assemblies under severe accident conditions", LUCH, Podolsk; IBRAE, Moscow; GIDROPRESS, Podolsk.

\* Advice: - **EU funding recommended with high priority**

\* Justification: - This proposed project will last for 24 months for a total cost of 600,000 US$. This proposal extends the work of the PARAMETER-SF projects (#3194 and #3690) where four tests (SF1 – SF4) have been performed, two with top quenching, one with combined quenching and one with air ingress and bottom quenching.

The activities under the Project include preparation and performing of two experiments at the PARAMETER test facility studying the two model fuel assemblies (FA) of VVER-1000 with 18 heated fuel rods and the central boron carbide absorber rod (AR):

The project proposal comprises two main tasks:

* *Task 1*: heating-up of the fuel assembly in steam-argon flow to maximum temperature of fuel rods before the beginning of flooding ~1250°C or above (PARAMETER-SF5 test).
* *Task 2*: heating-up of the fuel assembly in steam-argon flow to maximum temperature of fuel rods before the beginning of flooding ~1450°C or above (PARAMETER-SF6 test).

In both experiments the top flooding water flow rate is 40g/s.

Following the experiments SF5 and SF6 the post-test material studies of model fuel assemblies will be carried out as well as the processing of the experimental data with preparation and issue of the R&D final report.

The studies of AR behaviour under accident conditions shall include the following:

* study of AR thermo-mechanical behaviour under tests of the model FA using different scenarios of DBA and BDBA;
* post-test material studies of FA and AR to determine (1) the degree of cladding oxidation over AR length; (2) the degree of eutectic melting of the cladding, guide tube and AR materials; (3) the composition of the solidified mixtures after flowing down as melt and formation of solidified structural material layers; (4) the character of cooling of the model assembly with AR under top flooding.

These two experiments are counterpart tests to the experiments Phébus FPT3, QUENCH-07, QUENCH-09 and CORA-W2 as well as to some extent to 6 CORA tests with BWR configuration. The behaviour of absorber material (AIC and B4C) has not only a strong impact on the bundle degradation but also on chemical speciation of fission products. Therefore this issue is still rated by “Severe Accident Research Priorities Team” of SARNET to be of high priority considering the risk relevance regarding the source term and the lack of knowledge.

\* Recommendation: The project is well worth funding.

\* Comments: The project will have close links to the EU SARNET2 Network of Excellence (FP7) and to the German QUENCH and French BECARRE programme. It is recommended to gather information regarding the reaction products of B4C with steam by grab samples or if possible by continuous measurements.

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| Dissemination level : RE: restricted to EC, CEG-SAM members, ISTC and CIS beneficiaries |