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|  | EUROPEAN COMMISSION  DIRECTORATE-GENERAL ‘RESEARCH’ | SCIENCE AND  TECHNOLOGY  CENTRE of  UKRAINE |  |

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

*To:* R. Burmanjer (EC, DG-RTD / D.3) *Advice no.:* A -22

*Project code:* STCU # 5243 *Date:* 7th Dec. 2010

*Signatures:* P. Hofmann (Secretary)

*Linked meeting:*  18th CEG-SAM meeting, St. Petersburg, September 27 – October 01, 2010.

*Attending members:* Azarian (AREVA); Bottomley (JRC/ITU); Clement (IRSN); Güntay (PSI); Herranz (CIEMAT); Hozer (AEKI); Journeau (CEA); Krause (AECL); Oriolo (Uni. Pisa); Pretzsch, Sonnenkalb, Weber (GRS); Schumm (EdF); Stuckert, Tromm (FZK);

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

\* Subject: Interaction Studies of Improved VVER Structural Materials at Severe Accident Conditions

\* EU Collaborators: - AEKI, CEA, ITU, KIT

\* Documents: - STCU Proposal #5243 Interaction Studies of Improved VVER Structural Materials at Severe Accident Conditions. Leading Institution: National Science Centre "Kharkiv Institute of Physics and Technology" of National Academy of Science of Ukraine

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

\* Justification: - This project proposal will last for 24 months for a total cost of 230,000 US $.

This project will be carried out by the Institute of Physics and Technology of UNAS, Ukraine, Kharkiv who have a wide range of experienced personnel and equipment to realize the project.

The proposal concerns experiments on interaction of advanced VVER structural materials in severe accidents. Such new constituent parts as Gd in fuel UO2 + Gd2O3 or Dy2O3•TiO2 and Hf in neutron absorber compositions theoretically can create different eutectic systems with a risk of lower liquefaction temperatures. The proposed test series can confirm if such effects exist or not with the typical concentrations of these materials in the reactor core. Corresponding processes are important for precise description of melt development and molten pool formation.

The project will provide data on interaction of new combinations of materials, mainly stainless steel + B4C; UO2 + Gd2O3; stainless steel + B4C + (Dy2O3•TiO2); stainless steel + B4C + Hf and interaction of these components with the melt of UO2 + Zr fuel materials. The study will cover phase composition of the generated melts, determine their viscosity and fluidity, and investigate the effects of changes in the melt phase compositions on their fluidity, which will allow a more accurate description of the kinetics of VVER core material melt formation and spread during beyond design-basis accidents.

The CEG-SAM group strongly supports this project, as the Institute of Physics and Technology of UNAS has the necessary materials, equipment and staff to carry out the proposed tests, and the results could significantly extend our knowledge on the role of some specific materials on core degradation process.

Comments: This project will have close links to the EU SARNET2-corium programme and CEA-Plinius project. The results will complement existing data basis with specific VVER fuel and absorber material compositions. Some of the investigated materials (e.g. Gd2O3 and B4C) are applied in different reactor designs, for this reason the results could be useful not only for VVERs, but for BWRs and PWRs as well.

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