

Executive Summary of the Workshop on Subcritical Neutron Production

A workshop on Subcritical Neutron Production was sponsored by the East-West Center of the University of Maryland on October 11-13, 2004. The subject of the workshop was the application of subcritical neutrons to transmutation of actinides. The workshop was attended by members of the fission, accelerator and fusion communities. Papers on the state of development of neutron production by accelerators, fusion devices, and fission reactors were presented. Discussions were held on the potential of these technologies to solve the problems of spent nuclear waste storage and nuclear non-proliferation presented by current and future nuclear power reactors. A list of participants including their affiliation and their E-Mail addresses is attached.

The workshop concluded that the technologies, presently available or under development, hold out the exciting possibility of improving the environmental quality and long term energy resources of nuclear power while strengthening proliferation resistance. The workshop participants agreed on the following statements.

The workshop considered a number of technologies to deal with spent nuclear fuels and current actinide inventories. The conclusion was reached that substantial increase in nuclear power production will require that the issue of spent nuclear fuel be resolved.

The Workshop concluded that 14 MeV fusion neutrons can be used to destroy nuclear reactor by-products, some of which would otherwise have to be stored for geologic periods of time. The production of 14 MeV neutrons is based on existing fusion technologies at different research institutions in several countries around the world. At the present time this technology is used to produce 14 MeV neutrons in JET. More development work will be required, however, to bring fusion technology to the level where it can be used for actinide burning on an industrial scale.

The workshop concluded that the potential of current fusion technology to utilize the actinides for generating energy and destroying long-lived fission products calls for a greater international effort in the area of fusion driven sub-critical systems

The Workshop recommends that a series of steps be carried out by the technical community leading to a proof-of-principle facility. The workshop strongly recommends that the fusion community work closely with other technical communities to ensure that a wider range of technical solutions is available to solve the spent fuel problem and to utilize the current actinide inventories.

The workshop formed a small group to facilitate follow-up interactions and cooperative work. It was agreed that a follow-on workshop, possibly under the aegis of the IAEA, will be held in April of 2005.

