

EXECUTIVE SUMMARY
TESTING FACILITY SESSION CQ4 (July 14-15, 1999)
Snowmass Chamber Science & Technology, August 6, 1999

Two sessions were held at Snowmass to discuss what facilities are needed to address fusion nuclear technology issues. These sessions were co-chaired by S. Zinkle and A. Ying, with M. Billone serving as the recording secretary. Presentations were given by E.E. Bloom (IFMIF), L.J. Perkins (laser neutron source), B. Hooper (GDT), E. Cheng (LEDA and VNS-ST), and A. Ying (non-irradiation facilities). About 30 scientists participated in these sessions. It is generally agreed that existing non-irradiation facilities, fission reactors and 14 MeV neutron sources can continue to provide information useful for fusion technology Concept Exploration (and in limited cases, Proof of Principle) issues for the next 10 years. However, construction of new non-irradiation and irradiation facilities are needed during this time frame to enable R&D on numerous technology Proof of Principle (PoP) issues in the years beyond 2005-2010. Any effort for a new proposed facility should consider opportunities for synergistic and multiple application researches and strive for reduction of costs. Potential new non-irradiation facilities include a large-scale thermofluid facility. The wrap-up discussion focused on the evaluation of performance capabilities of the presented irradiation facilities. However, due to a lack of time at Snowmass, no conclusion can be drawn on the relative merits of the various irradiation facilities and possible strategies for the deployment of neutron sources. Nevertheless, it is believed that the output from the Snowmass' discussions provide a stepping-stone to further stimulate and focus community input and debate. Specifically, with regard to the irradiation facilities, the following conclusions may be drawn:

The LASREF (spallation neutron) upgrade facility could provide useful information that is complementary to existing facility capabilities at a relatively modest cost, but it cannot address many of the technology PoP issues. Similarly, the laser point neutron source can investigate the microstructural stability of materials up to lifetime doses (a key PoP/Performance Extension issue), but it cannot provide information on a broad range of other technology issues. The LEDA (p-Li) upgrade facility has capabilities that are comparable to the LASREF upgrade facility. None of these facilities (LASREF, LEDA, laser neutron) are suitable for a comprehensive fusion materials (structural and nonstructural) materials development program, due to limitations in flux and/or volume. It is unclear at the present time whether any of these facilities would be of interest for international collaborations.

The proposed IFMIF (d-Li) would enable comprehensive fusion materials and FW/blanket/magnet component development (*technology Concept Exploration, PoP, and performance extension [lifetime] issues*), but the construction and operating costs are significantly higher than LASREF, LEDA or the laser neutron source. An increased commitment to fusion technology development would be needed in order for the US to fully participate in this proposed international facility.

The plasma neutron sources (GDT, VNS-ST, VNS-AT) offer the potential for investigating most of the key technology issues up through the Performance Extension stage, but at a higher risk (due to unresolved physics or technology issues) and cost compared to the other neutron sources. More detailed estimates of the availability and facility cost of the various plasma neutron sources are needed in order to judge which facility is most attractive for fusion technology testing.