Status of the Spallation Neutron Source with Focus on Target Region Materials*

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An overview of the design and construction of the Spallation Neutron Source (SNS) is presented. Key facility performance parameters are summarized and plans for initial operation are described. The R&D program for the facility produced a conceptual design in 1997, and the project itself was initiated in 1999, with the official groundbreaking taking place in December of 1999. As of February 2005 the overall project was approximately 90% complete, with the target region design and R&D complete and fabrication and installation of components underway. The first beam on target is expected in June, 2006.

The engineering design of the target region is described. The key systems comprise the mercury target, moderator and reflector assemblies, remote handling systems, utilities and shielding. Through interactions with the 1 GeV proton beam, the target, moderators and reflectors produce short pulse neutrons in thermal energy ranges, which are transported to a variety of neutron scattering instruments. The features of the mercury target module itself are described in more detail. Target thermal and particle transport performance are summarized. Materials issues are expected to govern the overall lifetime and influence the design, fabrication and planned operation. A wide range of materials research and development has been carried out to provide experimental data and analyses to ensure the satisfactory performance of the target and to set initial design conditions. This work is a focus of the presentation. Materials R&D has concentrated mainly on cavitation erosion, radiation effects, and mercury compatibility issues, including investigations of the mechanical properties during exposure to mercury. Questions that would require future materials research are discussed.

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