

SNS Hot Cell Design Philosophy

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ORNL's Spallation Neutron Source (SNS) utilizes liquid mercury as its spallation target material. The requisite infrastructure to support the operation and maintenance of the mercury process system must be reliable and robust to support safe neutron production operations, yet versatile and flexible to react to contingencies and adapt to changing operational requirements. Due to the unique hazards associated with liquid mercury, the entire process system is housed within a heavily-shielded hot cell. The philosophy of the SNS hot cell design is predicated on fully remote operations with no hands-on human involvement. Basic details of the hot cell design itself will be covered highlighting features that support both the facility safety basis and the nominal operational requirements. All aspects of hot cell operation and maintenance rely on the use of a complex dual-arm servomanipulator system supplemented by conventional master-slave through-the-wall manipulators and an in-cell overhead crane. Design and operational features of the servomanipulator system will be discussed. An overview of nominal hot cell operations will be discussed along with the expanding role of Post-Irradiation Examination (PIE) and mercury process system enhancements. Significant operational experience has resulted in an evolution of the operational philosophy since initial beam-on-target in 2006. A discussion of this evolution and the hardware and operational risks associated with this design philosophy will be presented.

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