

Health Physics Society Accelerator Section Newsletter

Spallation Neutron Source, Oak Ridge National Laboratory

Submitted by Don Gregory

Spallation Neutron Source (SNS) has completed a very successful operating year with ten commissioned instruments (two were added within the last month) and an average operating power just less than 700 kW. The week of Christmas 2008 saw beam availability level at 95% - we suspect it is not entirely coincidental that the machine runs more reliably (up to a point) when no one is around performing maintenance tasks that are promised to be "transparent to operations." Most of the active instruments are still aligning, adding detectors, calibrating, or running samples submitted by internal or closely associated external users, thus, the number of samples handled is much smaller than it will be in future years.

The total cumulative dose for the project was almost exactly 2 rem for 2008, and we again confirmed that it is difficult to accurately predict doses for complex tasks being performed for the first time in areas without well-established activation levels. How many of your dose predictions are based on experience gained from previous operations that are almost identical to the one being planned? In a new facility, there is no corporate history and so our projections include large uncertainties concerning anticipated area dose rates, temporary local shielding effectiveness, and time requirements to perform tasks associated with complex maintenance activities.

After nearly a year of planning, ORNL has submitted a proposal to DOE to allow sample release from the SNS and the High flux Isotope Reactor (HFIR) subsequent to neutron scattering experiment exposures. The SNS Neutronics group has developed an on-line tool that analyzes expected activation products in samples based on user-supplied data concerning the elemental sample make-up, the SNS instrument used, beam power, exposure time, stored neutron spectral information and instrument flux. At a specified time after the end of the exposure, the program predicts product isotope activity levels and the general sample gamma spectrum. This calculation constitutes the process knowledge needed to predict whether the sample will meet conservative release criteria that will (hopefully) be approved by DOE. A confirming independent measurement of the sample gross activity will be made by trained Radiological Control Technicians (RCTs) before the sample is released without DOE-imposed restrictions. The initial proposal includes 39 isotopes in five release groups with limiting total activities ranging from 0.001 micro-Curies (for Uranium) to 100 micro-Curies (for tritium). The proposal includes a protocol for adding isotopes to the release table without returning to DOE for additional approvals. The proposal was submitted to DOE-ORO the week before Thanksgiving. Approval can be made at the local-office level, but DOE-HQ also has a six-week opportunity to comment. As of the end of the calendar year, we have not been informed that the proposal has been transmitted to Washington. The proposal is very conservative and places isotopes in the most restrictive applicable category based on RESRAD calculations and various regulatory limits. We have high hopes that the

authorized-limit proposal will be approved with minor (or perhaps no?) improvements/revisions. Stay tuned...