Spallation Neutron Source
Oak Ridge National Laboratory
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The SNS project is pleased to welcome Scott Schwahn to our staff. Scott comes to us from DOE, and will perform general Health Physicist duties with emphasis on dosimetry and User services. As SNS User participation increases we expect to encounter a large number of radiation-related issues that have to be solved in ways that maintain safety in ways that are largely transparent to the Users. The easiest way to do the right thing is if you do not even realize there is any other option.

During the recent six-week maintenance period at SNS, the major dose-intensive task was repair to two cryomodules located in the accelerator tunnel. The decision was made to perform the repairs in place to save the time, dose, and alignment issues of removing and replacing the cryomodules. The task leader performed a detailed job break-down, including the time spent in each location on each task by each craft. Dose rate estimates based on radiological surveys performed on maintenance days during operations and in the first days of the extended outage were used to estimate doses to workers. The resulting spreadsheet is available on request to illustrate how even a rather complex task can be broken down to produce a detailed dose estimate. The task leader designed a shadow-shield to partially block radiation from other installed components along the beam line, and he built localized shields to cover what were predicted to be the most activated components inside the cryomodule outer shell. Since no cryomodule at SNS had ever been breached after significant beam exposure, all these dose estimates were very rough. The total collective dose estimate for the job was 600 mrem.

Once the actual work began there were some pleasant surprises. The external shadow shield was fairly effective in reducing dose from other installed components, and the localized shields for activated specific components inside the cryomodule (the bellows between the superconducting cavities) were found to be very effective. It turns out that the bellows were by far the most activated components in the cryomodules, and shielding them was more effective at reducing the near-field dose rates than expected. Repairs to the most complicated cryomodule segment turned out to be simple instead of complicated, and the job scope was greatly reduced. Actual total collective dose for the job was about 10% of the estimated prediction. Total collective dose for the six-week outage was only about 700 mrem, barely more than was estimated for the single job. The project continues to slowly gain experience in estimating doses for maintenance work, but estimating doses for first-time jobs with limited dose rate information remains a challenge.