

ANL IPNS Target Link Disassembly Project

The ANL Intense Pulsed Neutron Source has produced neutrons for a great variety of scattering and diffraction experiments for almost 25 years. The neutrons are produced by targeting 450 MeV protons on a depleted uranium target. In 2001 a program was initiated for recycling used targets. Most of the irradiated uranium disks can be recovered and combined with unirradiated disks to make new targets. After about two years, the short lived radionuclides have decayed sufficiently for a target to be processed. The linkage used to lower the target into position has to be disassembled and the cooling water lines cut. When the first target was disassembled, it was under a slight positive pressure which resulted in worker contamination upon opening. Contamination control was therefore an important consideration for the second target disassembly.

Planning

The exposure rate from the second target was 30 R/hr at 30 cm from the outer surface of the target. Since the trigger for a review by the ANL ALARA Committee is 10 R/hr, a task group of five members of the ALARA Committee chosen for their expertise in work involving high radiation and contamination levels conducted the review. The workers who would perform the linkage disassembly, their managers, the Division ALARA Coordinator, and the health physics personnel involved attended the meeting. The planning was extensive. For contamination control, nitrogen gas was used to dry out the cooling lines and the relative humidity was measured. Elaborate tenting, powered air purifying respirators (PAPR's), and other contamination controls were included. Videotapes from the earlier target disassembly were studied and lessons learned were incorporated. Long handled tools, a ratcheting cable cutter, and other special items of equipment were obtained; and four full-dress rehearsals were made. The storage hole, shielded container for disassembly of first link, radioactive waste bin, and transport cask were all lined up in a row to facilitate transfers with the overhead crane. There were hold points and contingency plans for any difficulties encountered removing the links, and a large number of special precautions were taken.

Execution

Only those participating in the operation were allowed in the building the day the disassembly occurred. The operation was videotaped with a remotely operated camera. This time there was no water and the level of contamination from the linkage was low. The only problem that occurred was a power drill with a long extension tool that jammed during linkage pin removal. The backup plan to knock out the linkage pins worked better and faster than anticipated, minimizing the dose. The estimate was around 500 person-mrem for the job, and the actual dose was about 50 person-mrem.