

8th High Power Targetry Workshop (HPTW2023)



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Moderator and Reflector Fabrication Challenges at the Spallation Neutron Source

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The inner reflector plug (IRP) at the Spallation Neutron Source (SNS) at the Oak Ridge National Laboratory (ORNL) is a 30-ton assembly responsible for moderating neutrons and increasing the yield of useful neutrons at instruments. When operating, it has three cryogenic hydrogen moderators and one water moderator. The assembly uses cadmium, gadolinium, beryllium, heavy and light water, stainless steel, and aluminum to shape the neutron pulses. Historically, the lifetime of the IRP is limited by the burn-up of its neutron poisons. The SNS is currently operating only its second IRP in its history. However, the design presently used would last less than three years in 2 MW operation. Two additional IRPs are currently under fabrication. The SNS has experienced several challenges in fabrication, including a shortage of vendors for specialty operations such as cadmium machining. The SNS is pursuing fabricating the IRPs using a multi-vendor approach. To address some issues, ORNL has found it necessary to develop in-house capabilities while we have located new vendors and methods in others. The desire to increase the lifetime of the IRPs has led to significant challenges in fabricating poison layers of sufficient thickness with the needed quality control. This presentation will discuss the challenges and lessons learned from fabrication, inspection, and quality control for these critical high-power components.

Themes for the contribution

6 Construction, fabrication, inspection, quality assurance:

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