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Shielding Assessment for Spallation Neutron Source Power Upgrade

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The Spallation Neutron Source (SNS) Proton Power Upgrade (PPU) project is in the last phase of accelerator and target equipment installation. Its goal is to double the proton beam power of the SNS accelerator facility from 1.4 to 2.8 MW in preparation for providing a 700 kW/15 Hz beam to a second target station. The SNS target station will receive a power upgrade from 1.4 to 2 MW beam power, with part of this power upgrade being achieved by the proton beam energy increase from 1 to 1.3 GeV.
While the target station was initially designed for 2 MW beam power and 1 GeV beam energy, numerous neutronics analyses were conducted to check the existing target station installations for compatibility with the changed parameters, primarily due to the proton energy increase. The analyses examined radiation attenuation of shielding, nuclear heating, material damage and associated component lifetime, and radionuclide inventories impacting waste streams and hazard scenarios.
The focus here is on shielding. Beside verifying the shielding of the existing facilities, such as soil thickness above the accelerator tunnel, target monolith, and neutron beamlines, including instrument enclosure shielding, the stub-out of the accelerator tunnel into the new STS proton beamline was assessed as it is part of the PPU project.

Scientific Topic 1

Scientific Topic 2

Scientific Topic 3

Scientific Topic 4

Shielding and dosimetry

Scientific Topic 5

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Scientific Topic 8

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