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Operation of and Upgrade Plans for the LANSCE Pulsed Neutron Sources

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The Los Alamos Neutron Science Center operates two pulsed neutron sources: the Lujan Center and the Weapons Neutron Research (WNR) facility. Both are driven by 800-MeV LANSCE proton linear accelerator. The Lujan Center delivers moderated neutrons to seven flight paths serving both nuclear science and materials science applications, while the unmoderated neutron source at WNR serves six flight paths measuring nuclear data, electronics effects testing, and fast neutron radiography.

The Lujan Center target-moderator-reflector-shield (TMRS) system was last replaced in 2010 with the so-called Mark III target, and is due to be replaced in 2020 with a Mark IV target. This replacement provides an opportunity to optimize the TMRS design to the evolving missions that the Lujan Center serves. The Mark IV target design takes advantage of the Lujan Center's two-tiered design to optimize the lower tier for cold and thermal neutron beams serving materials science instruments, and the upper tier for epithermal neutron beams serving nuclear science instruments.

The Mark III target installed in 2010 was the first Lujan Center target to employ cladding around the tungsten, which is resulted in drastic reductions in radiation levels in the water cooling system. In 2014, the WNR target was inadvertently operated without active water cooling, resulting in target overheating. A follow-on management assessment of this incident determined that the flow sensor that was tied to the Run Permit system did not indicate a fault condition due to improper design.

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