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## Upgrade of the Spallation Neutron Source Injection and Extraction Kicker Pulse Verification Systems

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The Spallation Neutron Source (SNS) injection system transports a chopped 1ms H<sup>-</sup> ion beam from the Linac into the accumulation ring where two electrons are stripped from each ion, resulting in a proton beam propagating in the ring. The injection kickers use a 1400A current source with a 1 ms discharge time to bump particles into the accumulator ring and transport waste beam to the injection dump. The accumulation ring stacks 1 us bunches from the 1 ms beam pulse to increase peak beam current by 1000 times. The accumulated beam is deflected by the fourteen 38kV 700ns pulsed extraction kicker magnets and delivered to the mercury target where neutrons are spalled for science experiments. Protecting the machine from errant beam, which results from asynchronous firing or insufficient magnetic field intensity in kicker systems, requires a system that monitors and verifies the pulsed current in the kicker magnets prior to and during each 60Hz beam pulse. In addition, the extraction system pulse forming network (PFN) is verified to be charged and ready for triggering prior to injecting beam into the Linac by the Ion Source. This paper describes the two verification systems requirements, limitations of the existing systems, and development of new systems.

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