

SNS Core Vessel Water Leak Saga

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ORNL's Spallation Neutron Source (SNS) operates its Core Vessel with a helium atmosphere in part to mitigate potential corrosion of critical components. Components within the Core Vessel are cooled by three independent water cooling loops. For the first time since SNS operations began in 2006, the presence of liquid water was detected in a Core Vessel drain in September 2016. While the design of the Core Vessel system provides a means to remove leaking water, the presence of liquid water represents an operational risk making it imperative to mitigate or eliminate the source of the leak. Following this leak indication in 2016, SNS engineering and operations personnel embarked on a journey to understand and solve this problem. Discovery of the initial leak will be discussed along with efforts to quantify the leak rate and origin. A subsequent maintenance outage enabled removal of the Core Vessel lid for further investigation revealing a source of the leak. An innovative solution to this leak was developed to remove the water the Core Vessel and return it directly to the cooling loop. Details of this solution will be discussed. Despite these efforts, leaks have persisted resulting in several operational impacts. Recent replacement of the Inner Reflector Plug provided the opportunity to perform a visual inspection of the Core Vessel. The results and findings of this inspection will be discussed along with potential actions.

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