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C2Po2A-02: Spallation Neutron Source Hydrogen Relief Analysis for the Cryogenic Moderator System

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The Spallation Neutron Source (SNS) at Oak Ridge National Laboratory (ORNL) operates the Cryogenic Moderator System (CMS) which provides hydrogen cooling at 20K to three neutron moderators. Each hydrogen circuit is protected by multiple burst discs and reclosing relief valves. As a result of the Proton Power Upgrade (PPU) project, the CMS moderator circuits will hold more hydrogen and thus require piping modifications. The design of a new hydrogen relief system and compliance with the national electrical code (NEC) will be discussed. Operational experience has demonstrated that transient pressure increases in these hydrogen loops often result in rupture of the burst discs. The causes for pressure transients in the system that might lead to hydrogen venting are varied and complex, for example loss of vacuum or cooling. Dynamic simulation and analysis of the parameters considered as the worst-case relief venting scenario were performed and will be presented.

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