

SAFETY QUESTIONS
HYDROGEN PROGRAM ANNUAL MERIT REVIEW

SAND2007-2395P

Project Title: Materials Compatibility

Project ID#: SA2

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Organization: Sandia National Laboratories

- 1. What hydrogen hazard associated with this project has the potential to result in the worst consequence, and what safety measures are you implementing or plan to implement to deal with this hazard?**

This project element focuses on measuring mechanical properties of materials exposed to high-pressure (up to 15,000 psi) hydrogen gas. General test protocols involve inserting test specimens in thick-walled, stainless steel pressure vessels and then filling these pressure vessels with high-pressure hydrogen gas. The most significant hazard associated with materials testing in high-pressure hydrogen gas is a sudden release of hydrogen due to failure of a pressure gauge, compressor, or fitting in the laboratory plumbing system during filling of the pressure vessels. The materials laboratory and testing protocols address safety in several ways. The laboratory is equipped with sensors to alert personnel of a hydrogen release. In addition, the laboratory space is continuously vented during filling of the hydrogen pressure vessels. Finally, operations are performed remotely so that personnel are outside of the laboratory enclosure during filling of the pressure vessels.

- 2. What hydrogen hazard associated with this project is most likely to occur, and what are you doing to reduce the probability that it will happen?**

The most likely hazard is a slow hydrogen leak from a pressure vessel after filling and isolation from the gas manifold. We use several measures to manage slow leaks from pressure vessels. First, we inspect the pressure vessels to ensure the hardware, especially seals, are in good condition. Second, we check for potential slow leaks from each sealed vessel by filling with helium prior to filling with hydrogen. Third, the primary pressure vessels are located in secondary containers. Hydrogen that is released from the primary vessel into the secondary container is vented from the laboratory.