# LESSONS LEARNED

# Reactor Vessel Explosion in BYU Laboratory

**What Happened:**

A BYU undergraduate research student suffered second-degree burns after a heated hydrothermal autoclave reactor violently burst inside a fume hood releasing its contents, penatrating down through the benchtop into the storage cabinet below and breaking a glass container of concentrated Hydrochloric acid (HCl). The student was working alone at the time of the accident, and was able to get themself to an emergency shower and call out for help from nearby students, who called for emergency services.

**What went right:**

- Researcher vacated the lab immediately
- Researcher rinsed his arm using an emergency shower
- The sash on the fume hood was lowered at the time of the accident which helped to contain the explosive force
- Graduate students called for help

**Lessons learned:**

The temperature and pressure generated during the experiment exceeded the reactors limits, thus causing the reactor to burst. The reactor did have some pressure relief capabilities but was inadequate for the pressures generated. This incident emphasizes the importance of completing a thorough risk assessment prior to starting hazardous procedures. A risk assessment could have helped to identify the risk of excess pressure build up within the vessel and identified the appropriate controls to prevent or release it safely.

**Areas for improvement:**

- Do not work alone in laboratories. Use the buddy system.
- Perform a thorough risk assessment before starting hazardous procedures
- Use equipment suitable for the type of work performed
- Verify proper function of pressure relief mechanisms before use

**Completing a risk assessment involves:**

- Identifying hazards and risk factors that have the potential to cause harm
- Analyzing and evaluating the risk associated with that hazard
- Determining appropriate ways to eliminate the hazard, or control the risk when the hazard cannot be eliminated

For EHS training on how to complete a risk assessment click on the link below:

https://utah.bridgeapp.com/learner/courses/9dea748e/enroll

ENVIRONMENTAL HEALTH AND SAFETY
THE UNIVERSITY OF UTAH

125 South Fort Douglas Blvd, Salt Lake City, UT 84113
**801.581.6590 | ehs.utah.edu**