Take 5 for Safety

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BROOKHAVEN NATIONAL LABORATORY

a passion for discovery

Office of Science

Pressure Safety Accident

- Tallahassee, Fla. — On Wednesday, Oct. 21, 2015 at about 10 a.m., an accident occurred at the National High Magnetic Field Laboratory that resulted in the fatality of a mechanical worker
- Two mechanical technicians were attempting to remove a blind flange from supply piping on a magnet cooling water system
- When loosening the nuts on the flange collar, an explosion occurred. The flange, the water behind the flange, or some combination of both, struck and propelled one mechanical technician backward and into the metal support structure for the cryostat, resulting in his death
- A second technician, who was approximately 10 feet away at the time of the explosion, sustained minor injuries

Analysis

- It was discovered that a compressed air valve that delivers the compressed air needed to positively seat a pneumatic valve for this water system was in a CLOSED position, and thus was not delivering compressed air to positively seat the valve
- Leakage of water past the valve caused high pressure water (~325 psig) to compress the air in the supply piping, which allowed pressurized water and pressurized air to be built up behind the flange
- Zero energy verification was initially performed for this segment of the piping approximately two weeks prior to the incident
- Although the water drain and vent valves on the water supply piping were initially opened, neither of these valves nor the compressed air valve were locked into their OPEN positions
- The flange was successfully removed and re-installed several times over the first week; during the second week of work, a LOTO was removed so that electricians could test solenoid actuators on the pneumatic valves
- Upon completion of the electrical tests, the LOTO was re-established; however a re-verification to confirm zero energy in the cooling water piping was not performed
- Sometime during this testing period, the compressed air valve needed to seat the pneumatic valve was CLOSED; this, combined with the fact that there was no re-verification to confirm zero energy prior to subsequent flange work, led to the incident

Causal Factors Identified

- There was no physical re-verification performed by the Primary Authorized Employee to confirm zero energy in the water piping prior to removal of the blind flange
- There was no single person coordinating day-to-day tasks
- Personnel relied on an ineffective LOTO process in their efforts to eliminate hazards
- Work planning and control for the work was less than adequate; documents to plan the work reduced the apparent risk down to a point that called for no additional reviews by subject matter experts or safety personnel
- Workers lacked a comprehensive understanding of the cooling water system
- The cooling water system was not designed with positive isolation points to enable complete and verifiable separation of high-pressure water from the worker
- Human factors, including labeling of piping, valves, and visual indicators, were not well integrated into the magnet cooling water system design

Picture of the Week – Safety Briefing Photo

Who convinced the guy to climb up and push the button in order to start the projector?