

Lesson Learned Briefing

No.: LL13-0019

Title: Handling of an Extremely Heavy Gas Cylinder Results In Injury

Event: LBNL Event

Event Date: 04/24/2013

Category: ES&H - Gases, Accident/Injury

Lesson Learned Statement:

This lessons learned is a follow-on to the Compressed Gas Cylinders - #1 Looks Can Be Deceiving! lessons learned, which highlighted the importance of handlers and users understanding the hazards related to the size, shape and weight of a gas cylinder.

This lessons learned focus is on a Lawrence Berkeley National Laboratory (LBNL) incident where a gas cylinder fell and rolled onto a graduate student's right foot, causing multiple broken bones in the foot. This incident re-enforces the importance of understanding the hazards associated with handling compressed gas cylinders.

Discussion:

On April 24, 2013, at approximately 11:55, at the compressed gas racks located outside between Building 6 and 7, an LBNL graduate student lost control of a large compressed gas cylinder while trying to transfer between the gas storage rack and a gas cart. The gas cylinder fell and then rolled onto the graduate student's right foot, pinching the foot between the cylinder and the ground. Emergency medical assistance was called and the graduate student was treated at the scene by the Alameda County Fire Department and paramedics. The graduate student was then transported to Alta Bates Emergency for further treatment and X-rays of the foot. Diagnoses were multiple broken bones in the right foot.

Analysis

Three factors contributed to the accident:

1. The configuration of the cylinder rack, which included an angled transition or "ramp" (see photograph #1): The cylinder tipped on the cylinder rack ramp and could not be controlled.
2. The weight of the cylinder (341.5 Lbs): This 6000 (6K) psi rated

cylinder is 2.6 times heavier than a typical K (133 Lbs) cylinder.
3. The recognition of the cylinder weight: There is no visual difference, or very little visual difference, between the 6K and a standard K type cylinder (see photograph #2).

There are several lessons that can be learned from this incident:

1. Cylinders that look similar in size, shape and color may be dramatically different in weight.
2. Different procedures, equipment and tools may be necessary when handling cylinders of excessive weight, size and shape.
3. Users should learn to identify cylinders by the stamped markings located on the top sides (see photograph #3). These are the markings required by regulation. Users should make it a practice to look at the markings before handling a cylinder. Do not expect any additional labeling from a vendor or manufacturer.

Actions to prevent a recurring incident

While LBNL may replace cylinder racks with "ramped" surfaces, all sloped surfaces cannot be removed from the facility. LBNL plans to:

1. Enhance existing training by producing a training video. The training video will address such subjects as how to identify cylinders by markings, how to handle cylinders safely, which carts and equipment to use, and how to recognize when assistance is needed (e.g. heavy cylinders, handling on sloped surfaces).
2. Distribute a series of additional Lessons Learned Briefings in the coming months covering these topics plus additional gas cylinder safety issues.
3. Develop procedures to track 6K cylinders onsite and to provide additional "Heavy" labels (see photograph #4) for 6K type cylinders while they are present at LBNL facilities.

While not an institutional requirement, on-the-job training (OJT) is encouraged and at the Divisions' discretion to determine whether it is appropriate for any of their personnel.

Lessons Learned are part of the ISM Core Function 5, Feedback and Improvement. Applicable Lessons Learned are to be considered during working planning activities and incorporated in work processes, prior to performing work.

Please contact the following subject matter experts if you have any questions regarding this briefing.

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Uploaded documents/attachments:

[Photographs 1,2,3,4.pdf](#)

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