



SCBA Bottle Opens Unexpectedly

Purpose

To share “lessons learned” gained from incident investigations through a small group discussion method format.

To understand “lessons learned” through a Systems of Safety viewpoint.



This material was produced by the Labor Institute and the United Steelworkers International Union under grant number 46DO-HT11 Susan Harwood Training Grant Program, for the Occupational Safety and Health Administration, U.S. Department of Labor. It does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does mention of trade names, commercial product or organizations imply endorsement by the U.S. Government.

Lessons Learned

Volume 07, Issue 98

© 2007 The Labor Institute

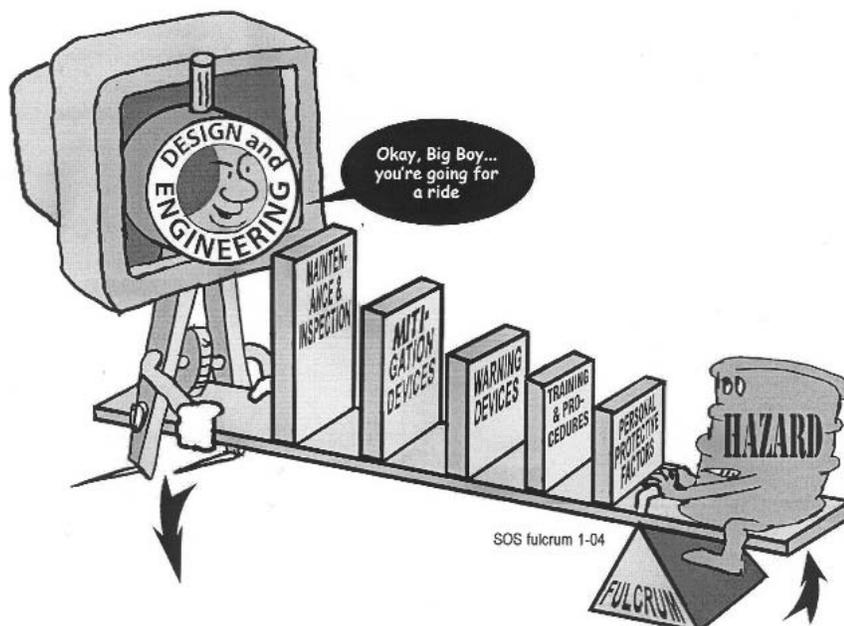
Background Information

Before beginning this Lessons Learned, please review this and the next page which contain information that will introduce the concepts of Lessons Learned and Systems of Safety.

Creating a safe and healthy workplace requires a never ending search for hazards that sometimes are not obvious to us. These hazards exist in every workplace and can be found by using various methods. Lessons Learned are just as the name suggests: learning from incidents to prevent the same or similar incidents from happening again.

Systems Are Not Created Equal: Not equal in protection and not equal in prevention.

Using our Systems Focus to uncover system flaws or root causes is only one part of controlling hazards. We also need to look at the systems involved to decide on the best way to deal with the problem. The most effective way to control a hazard is close to its source. The least effective is usually at the level of the person being exposed. The system of safety in which the flaw is identified is not necessarily the system in which you would attempt to correct the flaw.



| Major Safety System | Design & Engineering | Maintenance & Inspection | Mitigation Devices | Warning Devices | Training & Procedures | Personal Protective Factors |
|---|---|---|--|--------------------------------|--|--|
| Level of Prevention | Highest—the first line of defense | Middle—the second line of defense | | | Lowest—the last line of defense | |
| Effectiveness | Most Effective | ←————→ | | | | Least Effective |
| Goal | To eliminate hazards | To further minimize and control hazards | | | | To protect when higher level systems fail |
| EXAMPLES OF SAFETY SUB-SYSTEMS** | Technical | Inspection and Testing | Enclosures, Barriers Dikes and Containment | Monitors | Operating Manuals and Procedures | Personal Decision-making and Actions HF |
| | Design and Engineering of Equipment, Processes and Software | Maintenance | Relief and Check Valves | Process Alarms | Process Safety Information | Personal Protective Equipment and Devices HF |
| | Management of Change (MOC)** | Quality Control | Shutdown and Isolation Devices | Facility Alarms | Process, Job and Other Types of Hazard Assessment and Analysis | Stop Work Authority |
| | Chemical Selection and Substitution | Turnarounds and Overhauls | Fire and Chemical Suppression Devices | Community Alarms | Permit Programs | |
| | Safe Siting | Mechanical Integrity | Machine Guarding | Emergency Notification Systems | Emergency Preparedness and Response Training | |
| | Work Environment HF | | | | Refresher Training | |
| | Organizational (must address a root cause) | | | | Information Resources | |
| | Staffing HF | | | | Communications | |
| | Skills and Qualifications HF | | | | Investigations and Lessons Learned | |
| | Management of Personnel Change (MOPC) | | | | Maintenance Procedures | |
| Work Organization and Scheduling HF | | | | Pre-Startup Safety Review | | |
| Workload | | | | | | |
| Allocation of Resources | | | | | | |
| Buddy System | | | | | | |
| Codes, Standards, and Policies** | | | | | | |

HF - Indicates that this subsystem is often included in a category called Human Factors.
 * There may be additional subsystems that are not included in this chart. Also, in the workplace many subsystems are interrelated. It may not always be clear that an issue belongs to one subsystem rather than another.
 ** The Codes, Standards and Policies and Management of Change subsystems listed here are related to Design and Engineering. These subsystems may also be relevant to other systems; for example, Mitigation Devices. When these subsystems relate to systems other than Design and Engineering, they should be considered as part of those other systems, not Design and Engineering.

Revised October 2006



Title: SCBA Bottle Opens Unexpectedly

Volume 07, Issue 98

Date Issued: December 6, 2007

Lessons Learned Statement

Most people don't think of danger when they look at a self-contained breathing apparatus (SCBA) bottle. They think of life-sustaining and life-saving fresh air; but these bottles can be extremely dangerous; turning into missile-like rocket launchers if the valves are breached or broken accidentally.

When a worker was trying to put a SCBA bottle into a makeshift, non-regulation storage bin, the bottle was dropped and tragedy could have resulted.

A workplace that uses *Systems of Safety* thinking in all they do would recognize that **Design and Engineering** reaches beyond machinery and buildings. A Systems-thinking workplace would only use storage bins designed specifically for these bottles and would have harnesses and carry straps for the bottles so they could be lifted and carried with ease.

Mishandling of SCBA bottles can make a life saving device a life-taking device.

Discussion

After finishing up a job, a worker was returning an unused self-contained breathing apparatus (SCBA) bottle to the wooden storage box in the bed of his pickup truck.

The worker was very fatigued after working a double shift. He lost his grip on the cumbersome, heavy bottle. When the bottle fell onto the bed of the truck and hit the tailgate, the o-ring popped out and the high pressure release caused the bottle to start spinning around. The bottle then flew up into the air about 10 feet; came back down; and hit the cement base of a light pole. Eventually the bottle was emptied and came to rest about 25 feet from the light pole it hit. Fortunately, no one was hit and no damage was done to the light pole or surrounding equipment.

At some point, the valve stem assembly broke off of the bottle. In the investigation it could not be determined when the valve assembly actually came apart. The pieces of the valve assembly, the valve hand wheel, stem nut and valve stem, could not be located after the incident. The bottle was new and was not yet due for its annual inspection.

The storage rack for the bottles was hand made onsite by company carpenters and was not the same as the ones made by the manufacturer of the air bottles. This storage box has the bottles standing upright, forcing the worker to lift the heavy bottle up and over the box. This is even more difficult because the storage box was in the bed of a pickup truck; making the reach even higher. The manufacturer's storage boxes have the bottles laying on their sides and the bottles can be pulled straight out; thus avoiding having to lift them up and over obstacles.

Although harnesses and carry straps are available for these bottles, this facility did not use them.

Analysis

The Logic Tree is a pictorial representation of a logical process that maps an incident from its occurrence, “the event,” to facts of the incident and the incident’s root causes.



Recommended Actions

1. All bins for air bottles should be supplied by the manufacturer or be built to the manufacturer's specifications. Particularly, the bottles should rest on their sides so they can be pulled out of the bin from the front instead of lifting over the bins.
2. Bottles must have a sling or harness on them so there is a handle to grab onto so it is easier to maintain control of the bottle.
3. Staffing needs to be brought up to acceptable levels; meaning having enough people to cover all shifts without anyone having to work 16 hours.

Education Exercise

Working in your groups and using the Lessons Learned Statement, Discussion, Analysis and Recommended Actions, answer the two questions below. Your facilitator will give each group an opportunity to share answers with the large group.

1. Give examples of ways to apply the Lessons Learned Statement at your workplace.

2. Of the examples you generated from Question 1, which will you pursue in your workplace? (**Note:** When we say something you may pursue, we mean a joint labor-management activity or a union activity rather than an activity carried out by you as an individual.)

Trainer’s Lessons Learned Success Inventory

Following a Lessons Learned (LL) session, **the trainer who led the LL** should complete this form. This information will: 1) Help you reflect on the successes and challenges of the session; 2) Help USW with new curriculum development; and 3) Help USW as a whole better understand how the LL Program is supporting their workers.

By reviewing LL from different sites or from other areas of their workplaces, workers are able to analyze the information and apply these lessons to their own workplaces in order to make their workplaces healthier and safer.

1. Site name (if there are participants from more than one site, please list all).

2. Date of LL training _____
3. LL number used in today’s Training _____
4. Your name _____
5. **Summary of Education Question 1:** Please summarize participants’ examples of ways to apply this LL Statement to their workplace.

Please continue on reverse side.

- 6. Summary of Education Question 2:** Please summarize which actions or recommendations participants discussed pursuing at their workplace(s).

Thank you for completing this form.

EVALUATION

Lessons Learned: SCBA Bottle Opens Unexpectedly

Please answer the two questions below:

1. How important is this lessons learned to you and your workplace? (Circle one.) Rate on a scale of 1 to 5, with 5 being the most important.

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

2. What suggestions would you make to improve this Lessons Learned?

End of Training Trainer's Instructions

Please complete the information below.

Trainer's Name _____
(Please Print)

Date of training: _____

No. of Participants: Total _____ Hourly _____ Management _____

Location of Training: _____

USW Local # _____

Send:

1. This page;
2. The Education Exercise (page 8);
3. The Trainer's LL Success Inventory form (pages 9 and 10);
4. The evaluation for each participant (page 11); and
5. The Sign-in sheet (page 13) to:

Doug Stephens
United Steelworkers
3340 Perimeter Hill Drive
Nashville, TN 37211

Thank you for facilitating the sharing of this
Lesson Learned with your coworkers.

