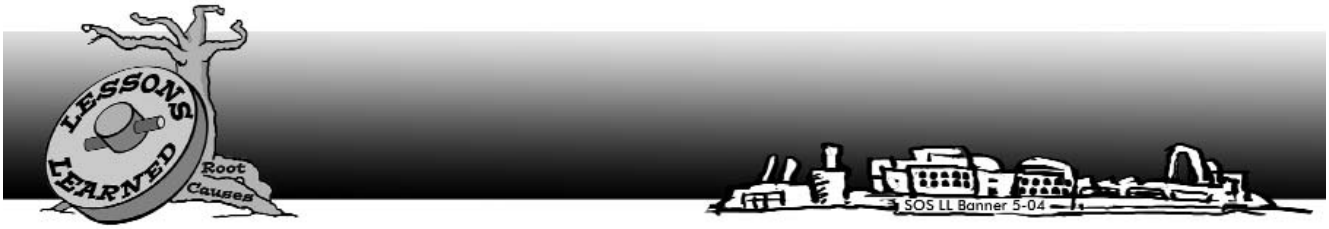


Worker Splashed with Acid

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.

TONY MAZZOCCHI CENTER
FOR HEALTH, SAFETY AND ENVIRONMENTAL EDUCATION
A PROJECT OF THE UNITED STEELWORKERS AND THE LABOR INSTITUTE

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 14

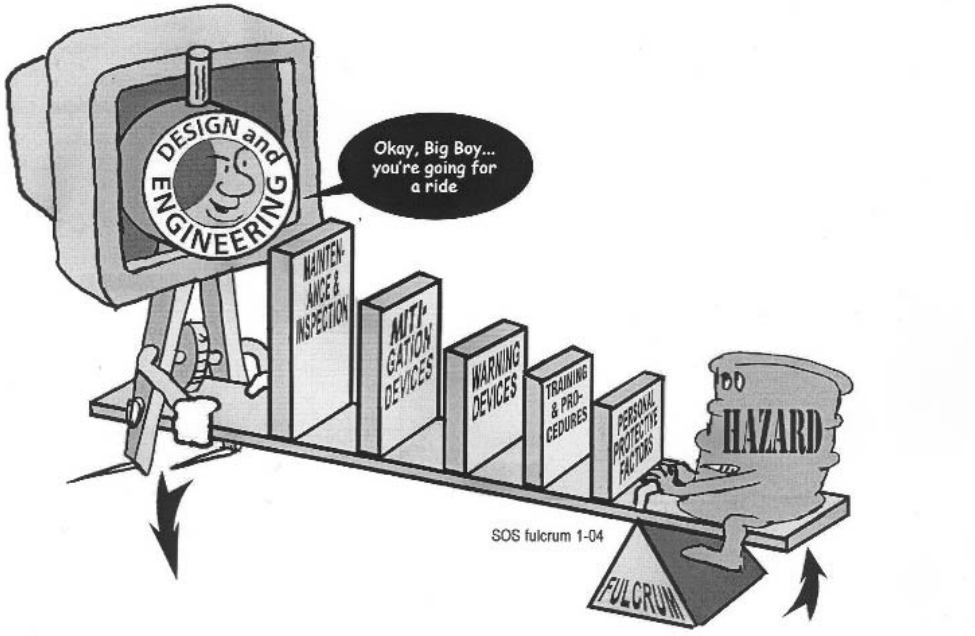
Background Information

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** Design and Engineering of Equipment, Processes and Software Management of Change (MOC)** Chemical Selection and Substitution Safe Siting Work Environment HF **Organizational *(must address a root cause)*** Staffing HF Skills and Qualifications HF Management of Personnel Change (MOPC) Work Organization and Scheduling HF Work Load Allocation of Resources Buddy System Codes, Standards, and Policies**	Inspection and Testing Maintenance Quality Control Turnarounds and Overhauls Mechanical Integrity	Enclosures, Barriers Dikes and Containment Relief and Check Valves Shutdown and Isolation Devices Fire and Chemical Suppression Devices Machine Guarding	Monitors Process Alarms Facility Alarms Community Alarms Emergency Notification Systems	Operating Manuals and Procedures Process Safety Information Process, Job and Other Types of Hazard Assessment and Analysis Permit Programs Emergency Preparedness and Response Training Refresher Training Information Resources Communications Investigations and Lessons Learned Maintenance Procedures Pre-Startup Safety Review	Personal Decision-making and Actions HF Personal Protective Equipment and Devices HF Stop Work Authority

HF - Indicates that this sub-system 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 sybsystem rather than another.
** The Codes, Standards and Policies and Management of Change sub-systems listed here are related to Design and Engineering. These subsystems may also be relevant to other systems; for example, Mitigation Devices. When these sub-systems relate to systems other than Design and Engineering, they should be considered as part of those other system, not Design and Engineering.

Revised October 2006

TONY MAZZOCCHI CENTER
FOR HEALTH, SAFETY AND ENVIRONMENTAL EDUCATION
A PROJECT OF THE UNITED STEELWORKERS AND THE LABOR INSTITUTE

Title: Worker Splashed with Acid

Identifier: Volume 07, Issue 14

Date Issued: January 31, 2007

Lessons Learned Statement:
Properly designed acid addition systems would not require workers to handle acid in unsafe ways. A ***System of Safety*** **Design and Engineering change** would require closed systems to be installed and working properly.

The **Maintenance and Inspection** ***System of Safety*** would require that when any system is being used, all critical parts need to be in the plant preventive maintenance program. If the caustics valves had not leaked through, there would have been a lot less acid handling.

Designing and installing an automatic addition system for caustic and acid (**Mitigation** ***Systems of Safety***) would greatly reduce the risk of reoccurrence this type of incident.

With a proper hazard analysis and good procedures for handling acid (**Training and Procedures** ***Systems of Safety***), this incident could have been avoided. Workers given the proper training and knowledge will perform the task safely.

When new safety products that can reduce the risk of injury become available to workers, the information needs to be communicated.

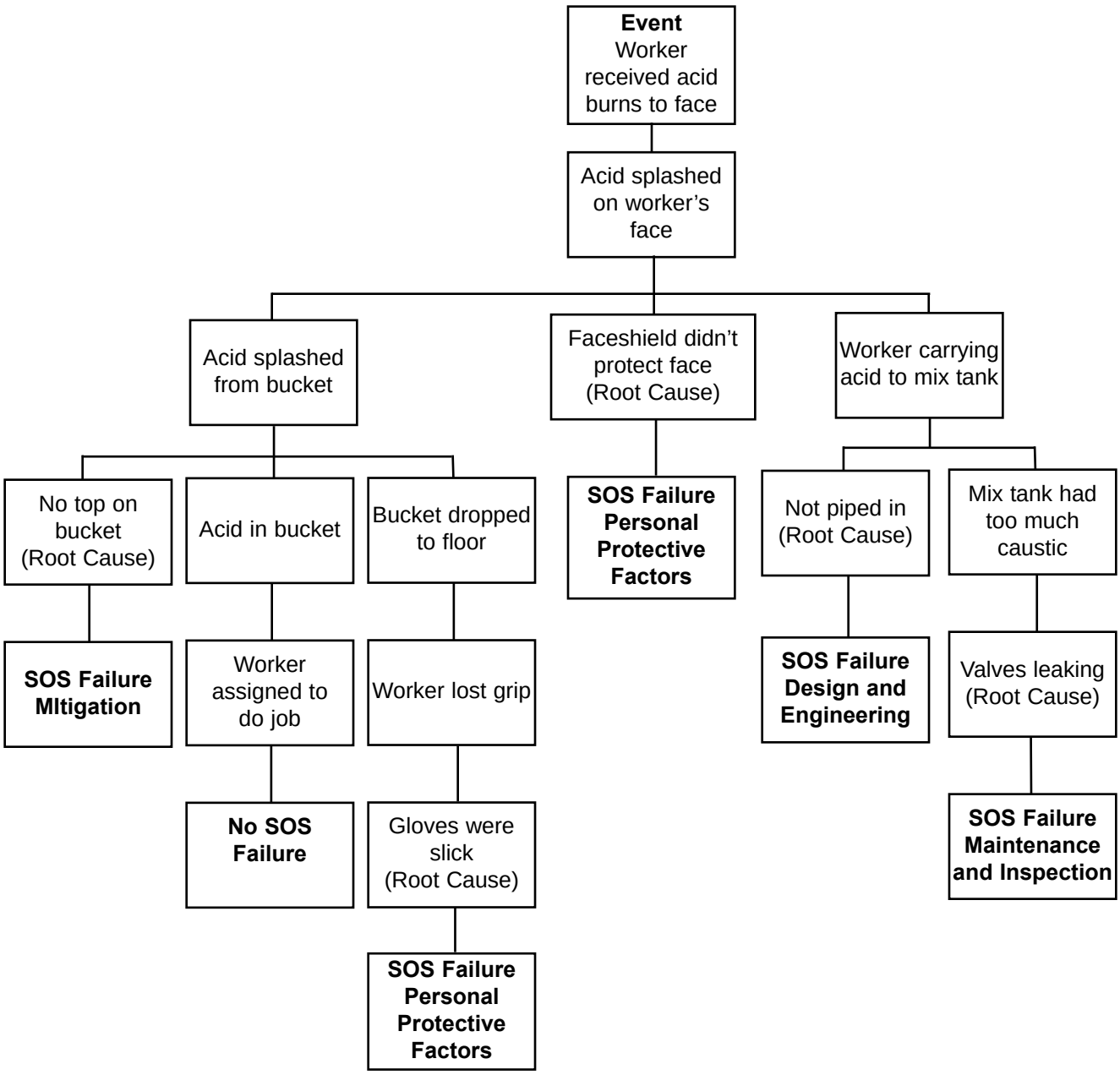
Discussion:

Worker was attempting to adjust the pH of a mixture manually by carrying a one gallon bucket 60 percent full of concentrated nitric acid. On the way to dump the bucket, the worker began losing their grip on the bucket. The worker bent down to get a better grip on the bucket and the bucket slipped from their hand and fell to the floor. The acid in the bucket splashed up and hit worker on the neck and face, causing burns. The worker was wearing the required PPE; but the acid splashed under their faceshield. The operator called for help and quickly removed the contaminated articles. A fellow worker escorted the splashed worker to the eyewash station. While the worker's eyes and face were being washed, 911 was called to get further assistance. EMTs showed up and gave further medical care. The worker was escorted to Medical where a topical ointment was applied to the burned areas. The worker was sent home for the rest of the day.

The investigation revealed that acid was used regularly to adjust the pH on the heavy metals tank. There was a general procedure on the addition of acid; but it was not real specific. There is a direct piping method for adding caustic through hard piping; but the closed system that used to add acid to the tank no longer operated. The caustic system, though hard piped, had to be run in manual and it is believed that the valves slowly leak through. This caused the tank to have to be adjusted on a regular basis with acid to keep pH in the line.

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. Design an acid addition system that will add acid to tank without worker coming in contact with acid.
2. Repair caustic addition system so it will not leak through.
3. Install pH probe that will control pH automatically, by adding caustic or acid as necessary.
4. Develop an acid handling procedure until above recommendations can be installed. Should require physical moving of acid in closed-top containers.
5. Review all acid use in plant and develop safety procedures as necessary.
6. Safety Department to notify workers when new safety equipment becomes available.
7. Train all workers on hazards when handling acids.
8. Develop a lessons learned bulletin for distribution.

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.**)**

EVALUATION

Lessons Learned: Worker Splashed with Acid

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 this page **plus the Education Exercise and Evaluation for each participant and the Sign-in sheet** to:

Doug Stephens
United Steelworkers International Union
3340 Perimeter Hill Drive
Nashville TN 37211

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

Sign-In Sheet

Name of Class_____ Date of Class_____

Instructors: _____

Please Check One* H	M	Print Name	Signature

***H = Hourly Worker**
M = Management or Salaried Worker