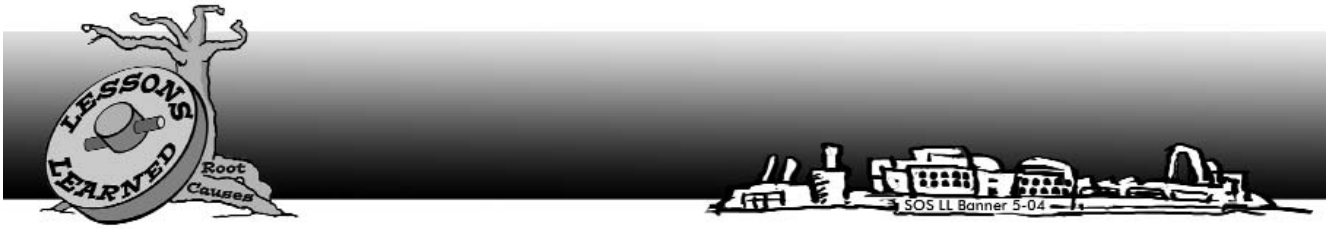

Product from Pump Splashes a Mechanic

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

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Lessons Learned

Volume 07, Issue 72

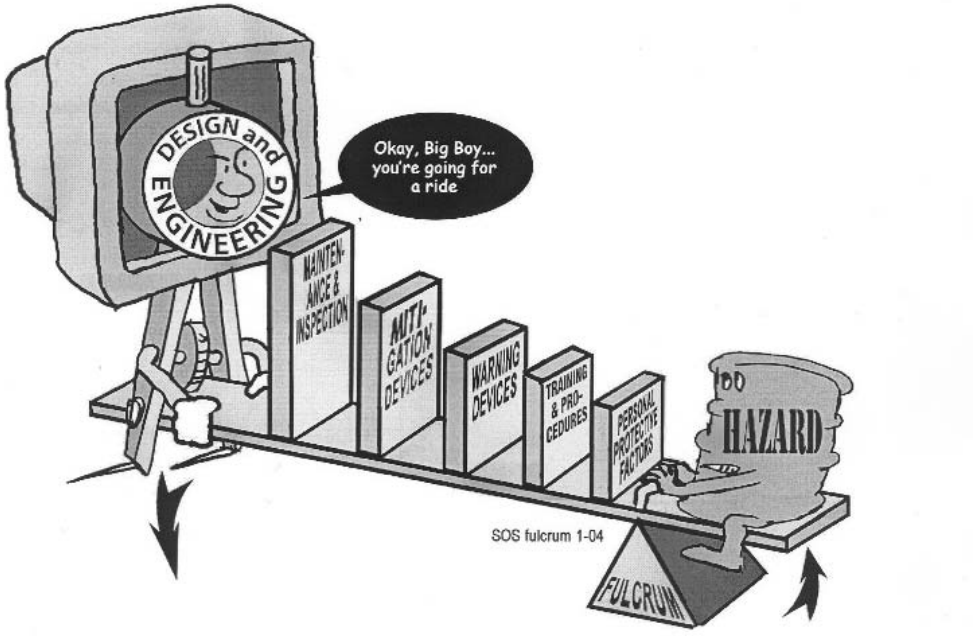
Background Information

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 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 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 subsystems 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

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Title: Product from Pump Splashes a Mechanic

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Date Issued: June 1, 2007

Lessons Learned Statement:

The inability to completely drain the residual liquid hydrocarbon and water from a pump (liquid caught below the bottom bleed valve in the pump sump) led to a potential process safety incident and a personal safety exposure hazard as a worker tried to remove a pump from its base for repairs. ***Systems of Safety*** are utilized as prevention from occurrence of this type of incident. The protection provided is well-defined as a **Design and Engineering** ***System of Safety*** approach. The practice of operating in this manner and not incorporating a better design that insures the complete and safe removal of all liquid from a pump should be avoided at all costs because of the potential hazards.

Despite a work order being written, the pump had been waiting for repair over a year. However, there was no action taken within the **Maintenance and Inspection** ***System of Safety*** to repair the equipment over this timeframe. No review was made within the **Design and Engineering** ***System of Safety*** to review if better technology was available for effective removal and repair of these pumps and what was the cause of the maintenance issue.

Discussion:

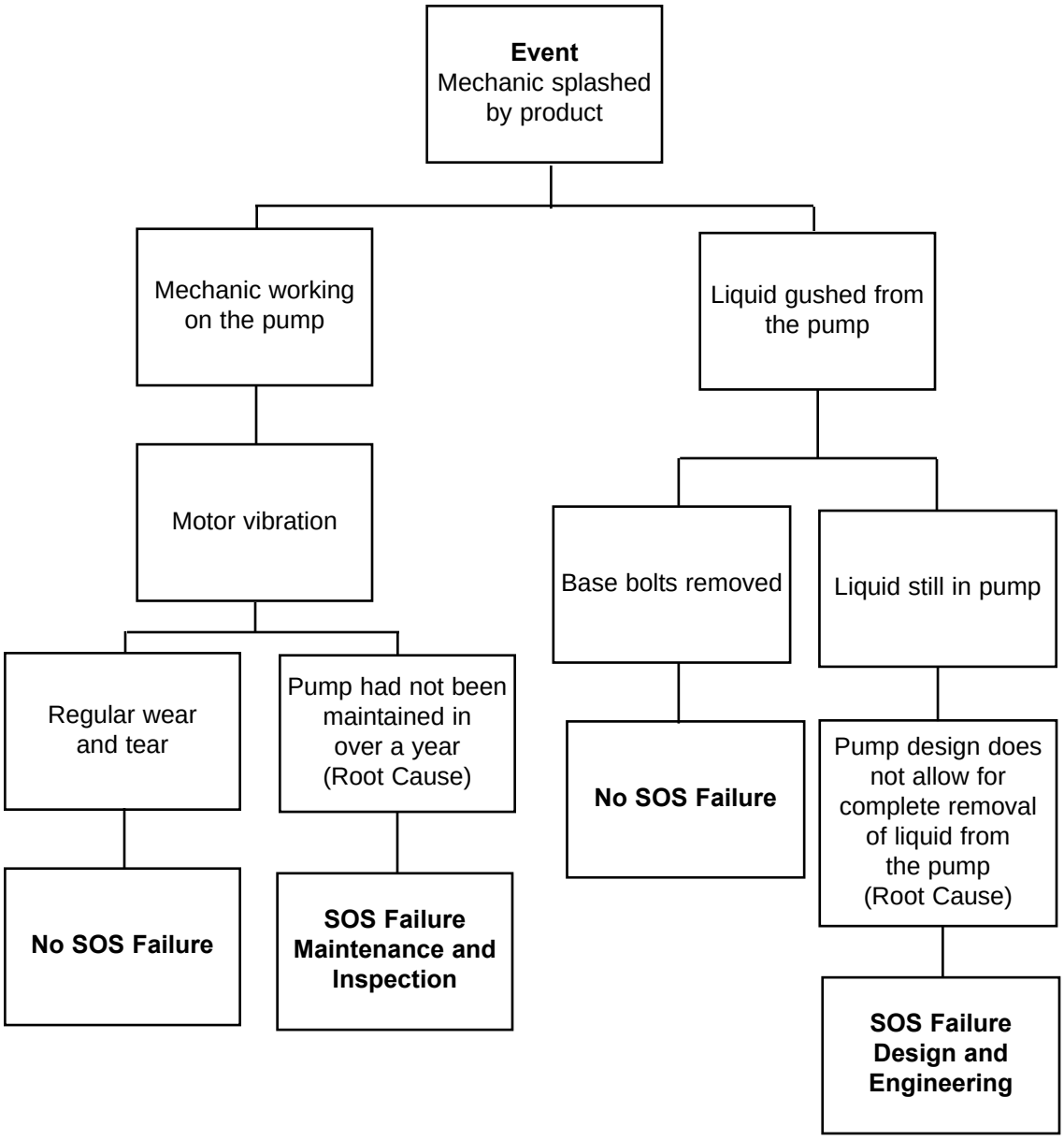
Mechanics arrived at the control room and visited with operations about the work order to remove the Flare KO Pot pump on the unit scheduled for repair. This pump had been scheduled for repair for over a year at this point. The operator showed the mechanics the job area and opened the bleeder on the suction line to the pump to demonstrate that no more liquid was coming from the pump and it was depressured. As the mechanics relaxed the seal on the pump, they noticed a small amount of material splash up from the seal. They immediately retightened the seal and reported their findings to the operator. The operator returned to the pump with the mechanic and opened the bleeder again to remove the liquid.

Once no more material was coming from the bleeder, the mechanics again proceeded to remove the seal. They then proceeded to unbolt the base of the pump from the sump. Upon completing this step, the amount of liquid remaining in the lower portion of the pump (below the lowest drain point the bleeder allows) came rushing out, splashing one of the mechanic's legs and boots with water that contains MTBE, methanol and other hydrocarbons.

This release was accompanied by a visible vapor cloud causing both environmental and potential ignition/detonation hazards. There were several ignition sources in the area, including a crane, which fortunately was shut down at the time of the release.

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.



Recommendations:

1. Develop a method to safely remove liquid from the Flare KO Pot pumps below the top of the sump to ensure that when the pump base flange is opened, the liquid does not discharge to the ground.

2. Develop a procedure for Flare KO Pot pumps to remove liquid below the top of the sump to ensure that when the pump base flange is opened, liquid does not discharge to the ground. Ensure that the procedure ensures complete draining of the seal pot. If any engineering changes are deemed necessary, incorporate the changes into the procedure. Emphasis should be captured in the procedure of the importance of clearing a pump for maintenance as completely as possible to avoid personnel exposure and the potential for a process safety incident resulting from the uncontrolled release of hydrocarbons.

3. Although not a direct cause of the incident, confusion over the Flare KO Pot pump system needs to be addressed. Recommend that operations evaluate the way the system is currently being operated versus the way the system was designed to be operated to determine what changes need to be incorporated to ensure safe and reliable operations of the pumps. The labeling that is currently on the pumps for control (normal/override) is confusing for operations and not everyone knew when the pumps were starting automatically or manually. This fact contributed to the "wear and tear" on the pump if it was not properly lined up when it was in automatic start mode.

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 ore 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.

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: Product from Pump Splashes a Mechanic

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 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