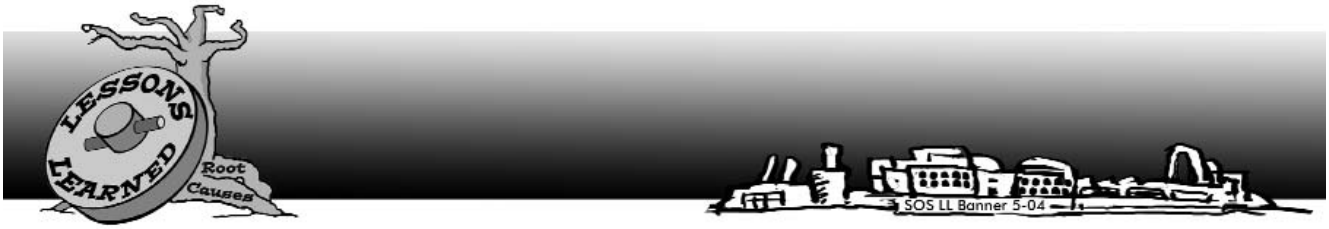

Crude Oil Containment Loss

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 24

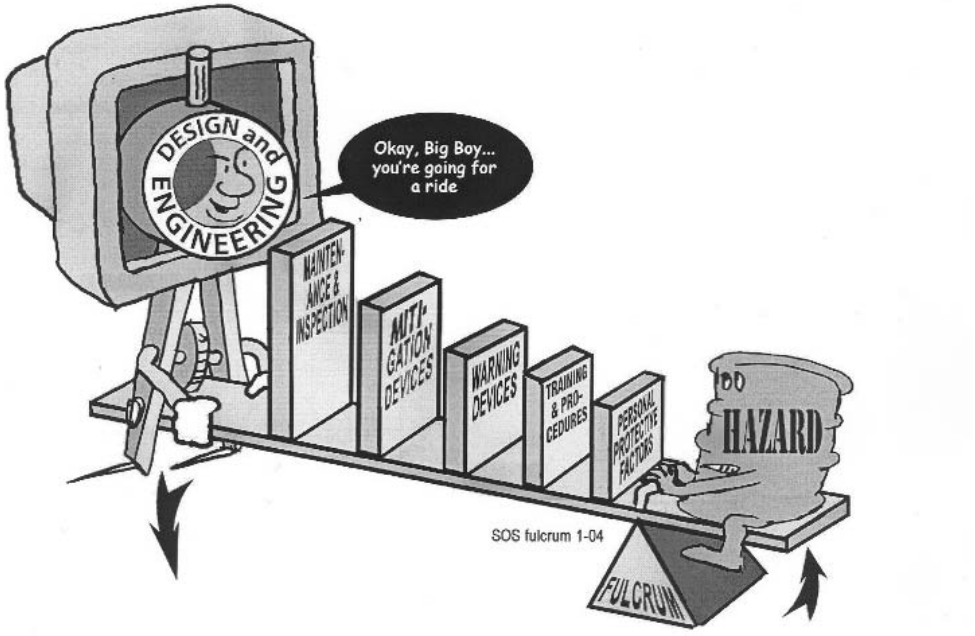
Background Information

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

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Title: Crude Oil Containment Loss

Identifier: Volume 07, Issue 24

Date Issued: March 1, 2007

Lessons Learned Statement:

A containment loss of crude oil occurred as contractors were performing a scheduled hot tap on a piping for an exchanger (Cold Gas Oil / GASO Exchanger) containing approximately 70 barrels of full range GASO. The investigation determined that an O-ring failure on the machine performing this hot tap was the root cause. If the **Maintenance and Inspection** ***System of Safety*** been followed this incident would not have happened.

Also, it was determined that the assembly of the adapter plate was incorrect. The O-ring journal (RTJ groove) extended beyond the outside of the mating surface of the adapter plate by just over 1/8 inch. This allowed the O-ring to extrude through this gap. Had the **Maintenance and Inspection** ***System of Safety*** been followed, this also could have been avoided.

Discussion:

There was a loss-of-containment (Crude Oil) incident at the GASO Unit which occurred while a contractor was performing a scheduled hot tap on piping for exchanger E-1959B (Cold Gas Oil/GASO Exchanger). The product involved was approximately 70 barrels of full-range GASO.

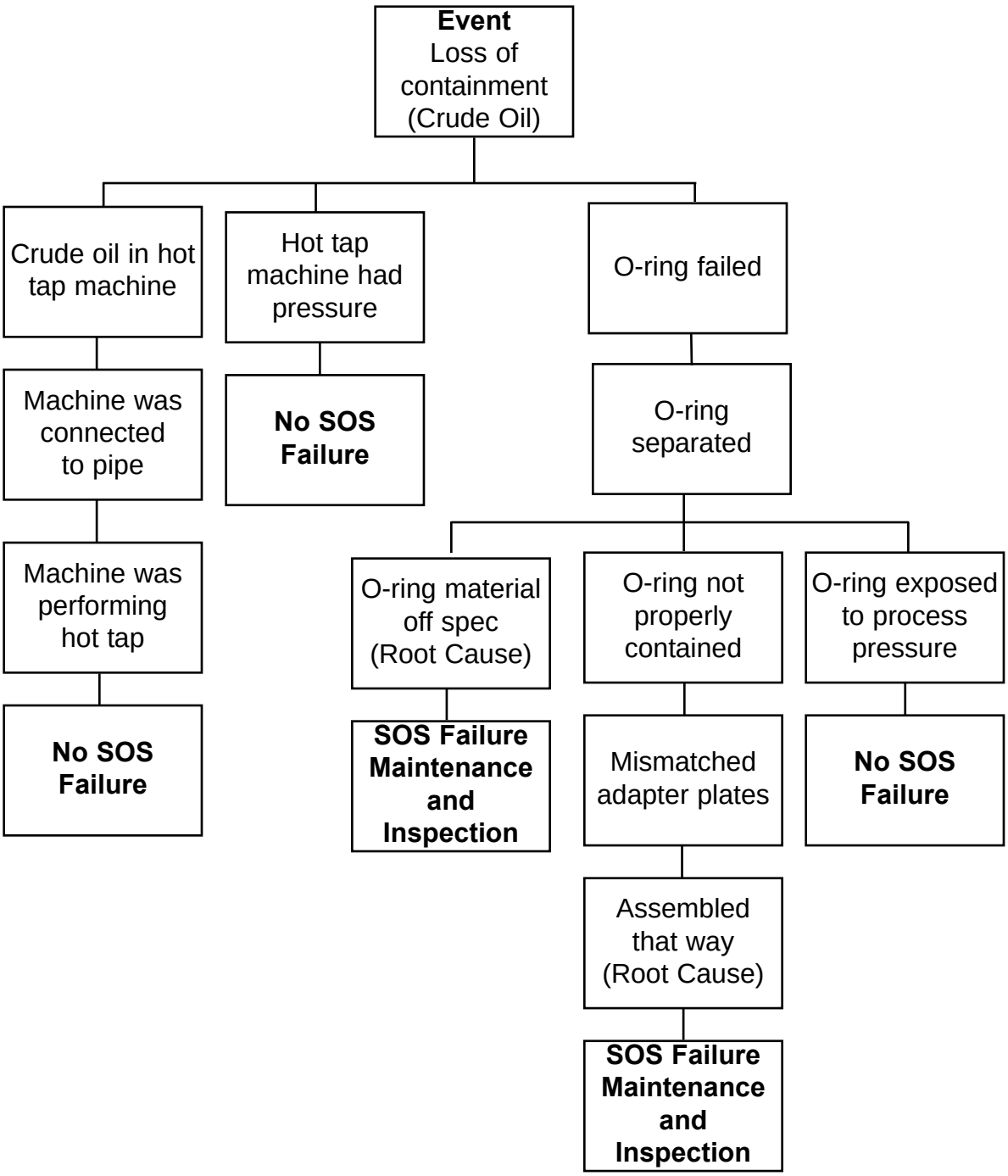
There was immediate response from operations personnel who opened and directed firewater from unit monitors onto the hot tap machine. Charge pumps were shut down and heater fires were extinguished. A plant emergency was initiated that required the Plant Emergency Response Team (ERT) to deploy and the Incident Command System to organize. The incident was brought under control by quick intervention of operations and ERT members who extracted the hot tap drill stem and closed the hot tap valve. There were no injuries and no equipment damage. The unit was restarted and resumed normal operations.

The probable cause for the loss of containment (Crude Oil) at E-1959B (Cold Gas Oil/GASO Exchanger) was the failure of a tapping adapter O-ring on a Hydro-Pro Cutter 5000 tapping machine. This occurred while the contractors were performing a routine hot tap. The O-ring failed due to brittle fracture under pressure. The cause of this may have been due to the way in which the O-ring was seated; or it may have also occurred due to O-ring material not being within specification.

The tapping adapter used was not correct for this application. The O-ring journal (RTJ grove) extended beyond the outside of the mating surface of the adapter plate by just over 1/8 inch. This allowed the O-ring to extrude through this gap.

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. Ensure that O-rings used in this application at the plant are consistent with material specifications.
2. Create and implement policy to address the quality control process of O-ring materials.
3. Remove similar plant-manufactured tapping adapters from service.
4. Check tapping adapter plates for proper design.
5. Single piece tapping adapters will be manufactured to eliminate the problem of extra joints.
6. Train all Technicians on proper assembly and testing of adapter plate hot tap and line stop setups.
7. Redesigns for tapping adapters, line stop housings and sandwich valves will include, where possible, the use of RTJ style joints.

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.

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: Crude Oil Containment Loss

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

TONY MAZZOCCHI CENTER
FOR HEALTH, SAFETY AND ENVIRONMENTAL EDUCATION
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Name of Class_____ Date of Class_____

Instructors: _____

Please Check One* H	M	Print Name	Signature

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