



## Hydrocarbon Spilled from Dock into River

### 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.



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### **Lessons Learned**

### **Volume 10, Issue 10**

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## Background Information

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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
<b>EXAMPLES OF SAFETY SUB-SYSTEMS**</b>	<b>Technical</b>	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	
	<b>Organizational (must address a root cause)</b>				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	
	Work Load					
	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.

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### **Lessons Learned Statement**

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Poor design of a bleeder system, the lack of proper mitigation and poor understanding of the potential for harm led to a small spill of hydrocarbon liquid into a waterway. *Systems of Safety* are utilized to prevent this type of incident.

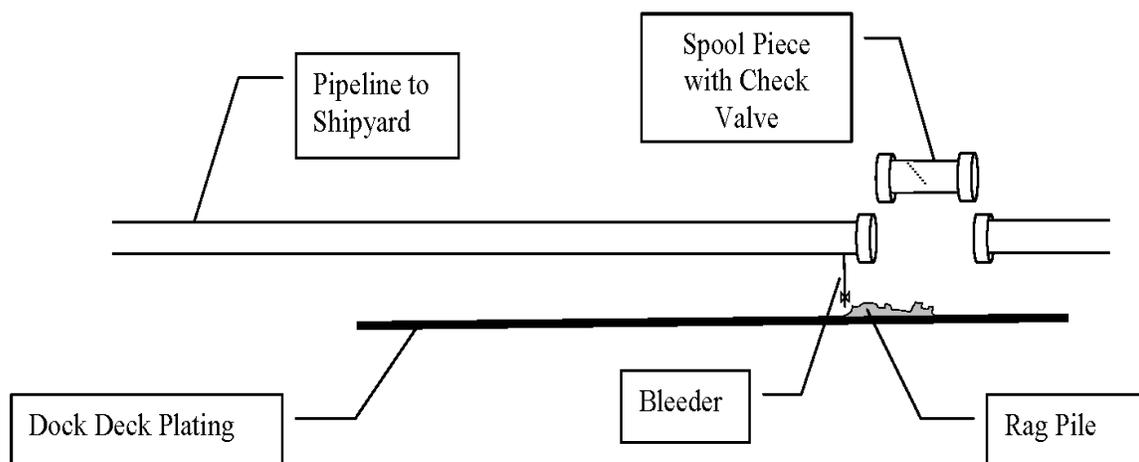
Bleeders were installed on a pipeline that did not allow complete draining of the line. These bleeders and their valves also prevented the use of a temporary catch basin while performing the work that required the line to be opened. Both were flaws in the **Design and Engineering System of Safety**. A permanent catch basin (**Mitigation Devices System of Safety**) under bleeders and line flanges, or even a temporary basin just used during the work, might not have prevented the spill, but would have protected the waterway.

Utilizing the **Training and Procedures System of Safety** would have made the workers aware of the hazard potential of a even a small spill and would have required proper containment of any potential spill.

## Discussion

A maintenance crew was in the process of removing a spool piece<sup>1</sup> from a hydrocarbon<sup>2</sup> pipeline at the ship loading dock. The purpose of the work was to replace a check valve<sup>3</sup> in the line. Prior to the work, the piping was drained from the closest bleeders<sup>4</sup> to remove as much liquid as possible and then rags were placed under the piping to catch any residual material. However, some of the liquid escaped through the rags allowing it to enter the river.

The work was required by the workplace predictive maintenance program which determines how long a check valve can be used in this service before replacement. Unfortunately, the angle of the bleeders on this line did not allow full draining of the line and workers were unaware of how much liquid could be left in the system. The location of the bleeder lines and their valves relative to the dock grating did not allow enough access to install a temporary drain pan under the spool piece.



<sup>1</sup> Spool piece — a short length of pipe added to a long run of piping to adjust the final length of pipeline or to enable the addition of valves or instrumentation to the pipeline.

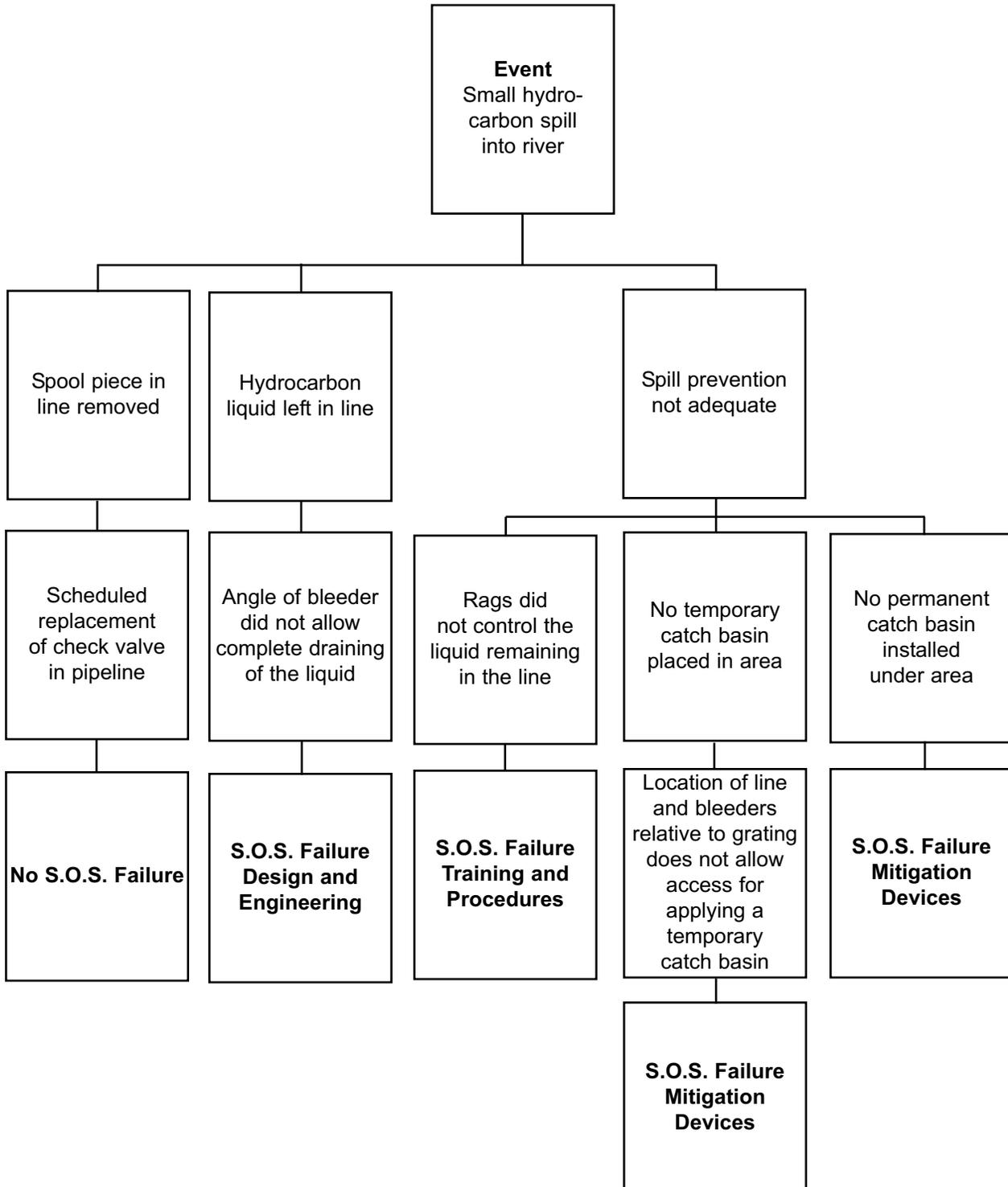
<sup>2</sup> Hydrocarbon — an organic compound made up of carbon and hydrogen, usually derived from petroleum. (Examples: Methane, propane, octane, naphtha, etc.)

<sup>3</sup> Check valve — a flapper valve installed internally in a pipe run to prevent the possibility of liquid flowing backward in the pipe.

<sup>4</sup> Bleeder — a small drain line tapped into the main piping run to bleed off pressure or liquid before breaking into the pipeline.

## 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**

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1. Replace existing bleeders with bleeders that allow full drainage of pipelines.
2. Install permanent catch basins under all bleeders above or near waterways and environmentally sensitive areas.
3. Maintain all catch basins and their associated drainage systems on a scheduled basis.
4. Inspect existing bleeders and check valves to determine if relocation is required to prevent further spills into waterways.
5. Provide training and modify work procedures to emphasize need for careful, adequate containment of any potential spillage during a work task.

## Education Exercise

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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.

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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).

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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 actions or recommendations participants discussed pursuing at their workplace(s).

**Thank you for completing this form.**

# EVALUATION

## Lessons Learned: Hydrocarbon Spilled from Dock into River

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

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## 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:

<p><b>If you are a TOP Site (excluding DOE TOP Sites)</b></p>	<p><b>Send to: Steve Cable 2915 Gradient Drive St. Louis, MO 63125</b></p>
<p><b>All other sites (including DOE TOP Sites)</b></p>	<p><b>Send to: Doug Stephens United Steelworkers 3340 Perimeter Hill Drive Nashville, TN 37211</b></p>

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



**SIGN-IN SHEET**      *(Please print clearly.)*

**Class Title:** \_\_\_\_\_ **Class Completion Date:** \_\_\_\_\_

**Location (City, State)/Facility:** \_\_\_\_\_

**Grant Program:** \_\_\_\_\_ **Dist. & LU #:** \_\_\_\_\_

**Instructors: 1)** \_\_\_\_\_ **2)** \_\_\_\_\_

**3)** \_\_\_\_\_ **4)** \_\_\_\_\_ **5)** \_\_\_\_\_

**Name (print first and last)**

**Check one:**

		<b>Hourly</b>	<b>Management</b>
1			
2			
3			
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