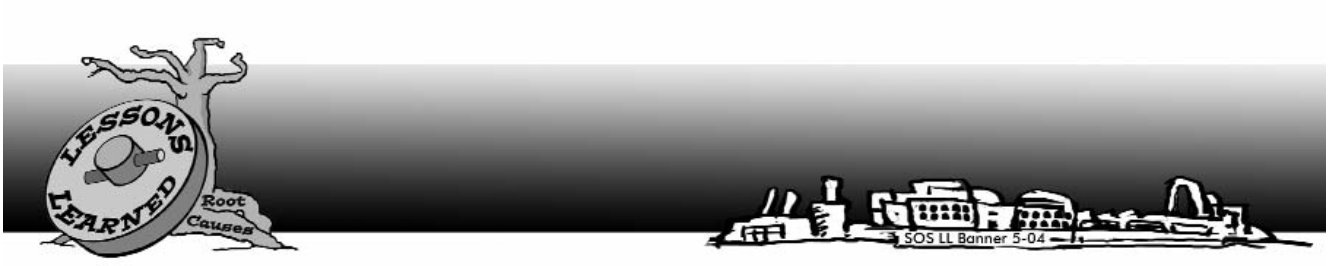

Contractor Mixes Chemical Waste

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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A PROJECT OF THE UNITED STEELWORKERS AND THE LABOR INSTITUTE

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Lessons Learned

Volume 08, Issue 42

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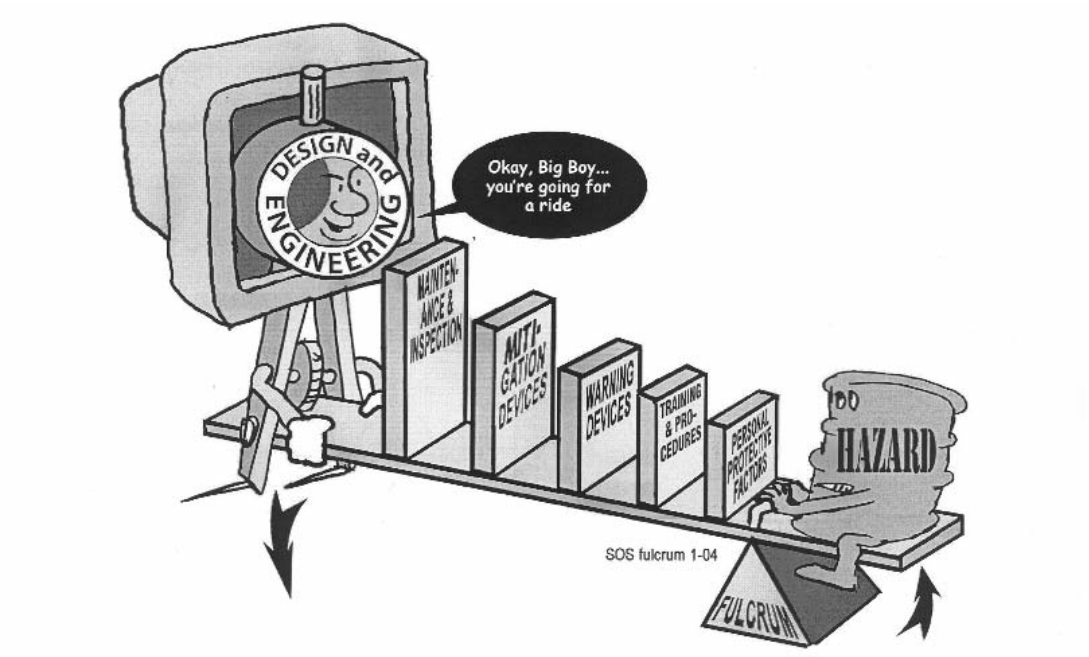
Background Information

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 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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Title: Contractor Mixes Chemical Waste

Identifier: Volume 08, Issue 42

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Lessons Learned Statement:

In this incident, bulging drums and test barrels of blended chemicals building pressure in storage were early indicators of a serious problem with the testing, storage and shipping process for waste chemicals.

Using the ***Systems of Safety*** approach, the process developed to test the blending of chemicals should have "raised a red flag" immediately. Attention to the **Training and Procedures** and **Design and Engineering** ***Systems of Safety*** could have prevented this serious incident. Mixing or blending chemicals can result in a volatile and dangerous reaction, including deadly vapors, explosion and corrosion, and could create many other short- and long-term, serious health effects. Blending chemicals based on a substandard test method invites disaster. In the **Design and Engineering** of the testing procedure, issues such as *Safe Siting*, *Codes*, *Standards* and *Guidelines* and equipment, materials and processes could have been addressed.

Use of **Mitigation Devices**, such as container pressure relief valves and spill containment and **Warning Devices**, such as alarms and monitors, would aid the subcontractor in the testing process, warn of impending problems with the blending process and contain any accidental release.

Discussion:

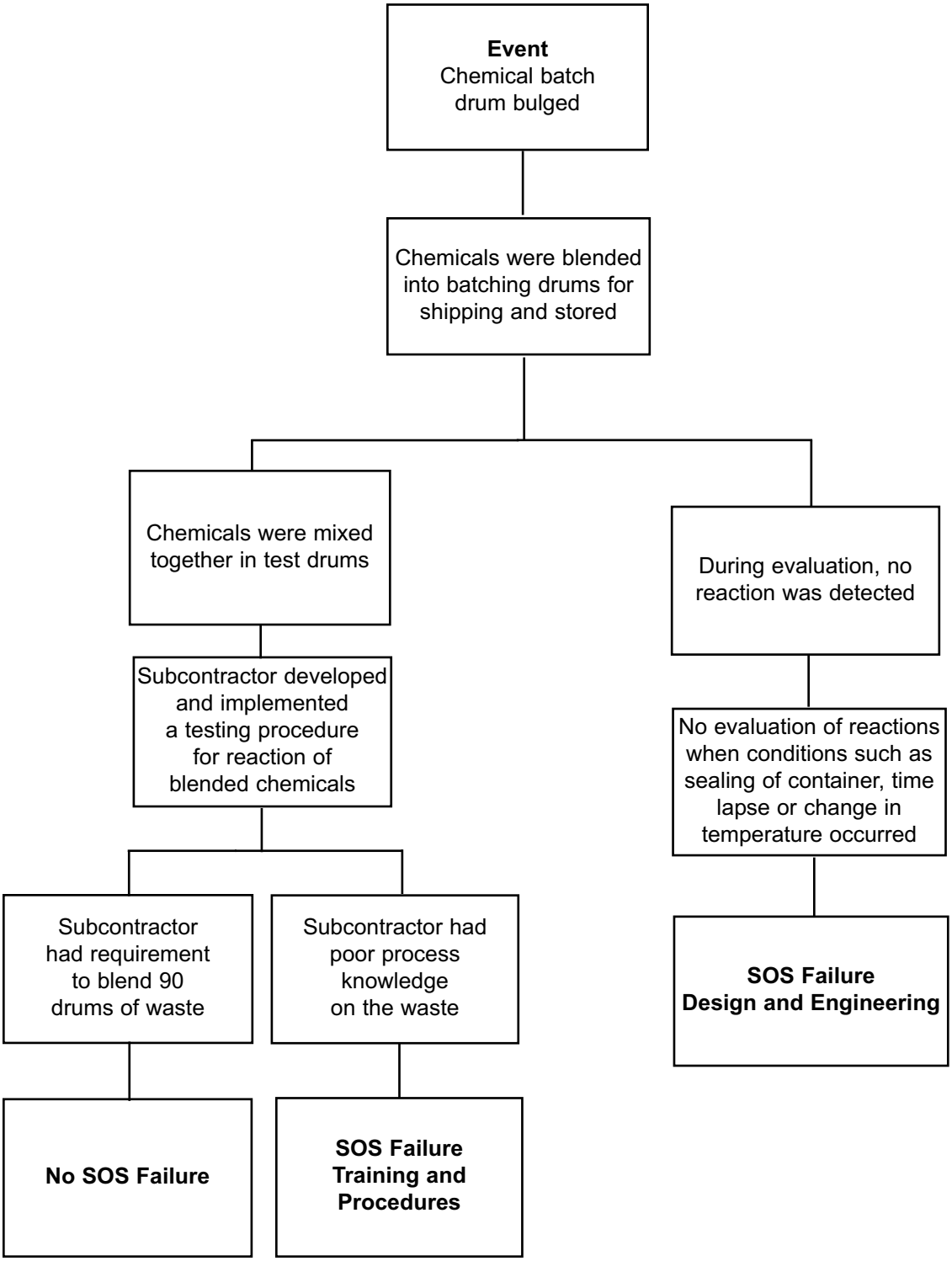
A contractor was tasked with blending or batching approximately 90 drums of liquid laboratory wastes with depleted metal powder to an acceptable assay level for shipment to a treatment facility. Because of poor process knowledge of the wastes, the treatment subcontractor developed and implemented a compatibility testing program to determine if any potentially harmful reactions would occur when mixing the waste with the down blend material.

The test consisted of a sample of material from each drum to be mixed with a proportionate quantity of the down blend material. As the mixing occurred, measurements and observations were made to determine changes in the mixture, including temperature rise and gas generation. Sample containers of the mixture were then stored for later return to the parent waste during full scale down blending operations.

After completion of the full scale batching operation, the resulting mixture was put into storage awaiting shipment to the treatment facility. Two containers of material later developed problems. The first problem occurred when one of the sample containers released pressure when the lid was removed in an effort to return the blended contents to the parent drum. The second problem was discovered when one of the batched drums, two days after the batching was completed, developed bulging which required pressurized drum procedures to be implemented to remove the pressure.

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. When planning the mixing or blending of chemicals, proper attention must to be given to all available sources of information; such as, but not limited to, NIOSH, OSHA, manufacturer's MSDSs, codes, standards and guidelines and any other available resource to ensure safe handling of the blended chemicals.

2. Safe Siting: If not already in place, a suitable testing and storage site must be created to ensure safe handling and minimum danger in case of an accidental spill or release.

3. When planning and executing batching or blending operations, compatibility testing must include testing for conditions which can change after the mixing occurs; such as, but not limited to, closed containers, passage of time, changes in temperature and rough handling.

4. Monitors must be used to detect changes in pressure inside stored test drums and air quality in the area of the storage facility.

5. A spill containment system must be used.

6. When test results indicate no reaction has occurred, contingencies such as ongoing inspection and container pressure relief devices must be considered in work plans.

7. Subcontractors must be trained, certified and required to have the proper level of knowledge about products they are tasked with handling.

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

Thank you for completing this form.

EVALUATION

Lessons Learned: Contractor Mixes Chemical Waste

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:

If you are a TOP Site (excluding DOE TOP Sites)	**Send to: Steve Cable 2915 Gradient Drive St. Louis, MO 63125**
All other sites (including DOE TOP Sites)	**Send 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.

Sign-in Sheet

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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