



Backhoe Boom Damage

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

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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.

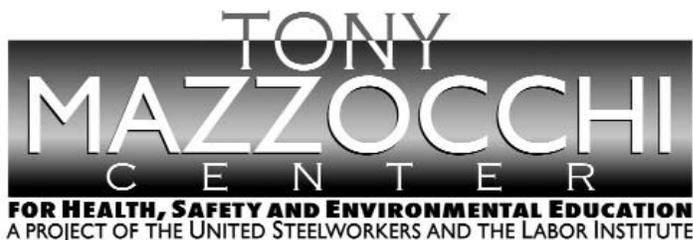
Using our Systems Focus to uncover system flaws or root causes is only one part of controlling hazards. We also need to look at the systems involved to decide on the best way to deal with the problem. The most effective way to control a hazard is close to its source. The least effective is usually at 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	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
	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**					

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:

The inability to use a locking device on a keeper bolt; lack of training and resources; and the lack of a proper preventive maintenance program have led to the damage of the boom. *Systems of Safety* are utilized to provide prevention from this type of incident. The prevention provided by a locking device on the keeper bolt would provide a well-defined **Design and Engineering System of Safety**.

The fact that the preventive maintenance program that was in place didn't meet the standards of the manufacturer was a **Maintenance and Inspection System of Safety** failure.

The lack of an operator's manual and equipment-specific training also contributed to this incident. It is key that all resources are available to employees to ensure that the work will be done safely. This would be a well-defined **Training and Procedures System of Safety** approach.

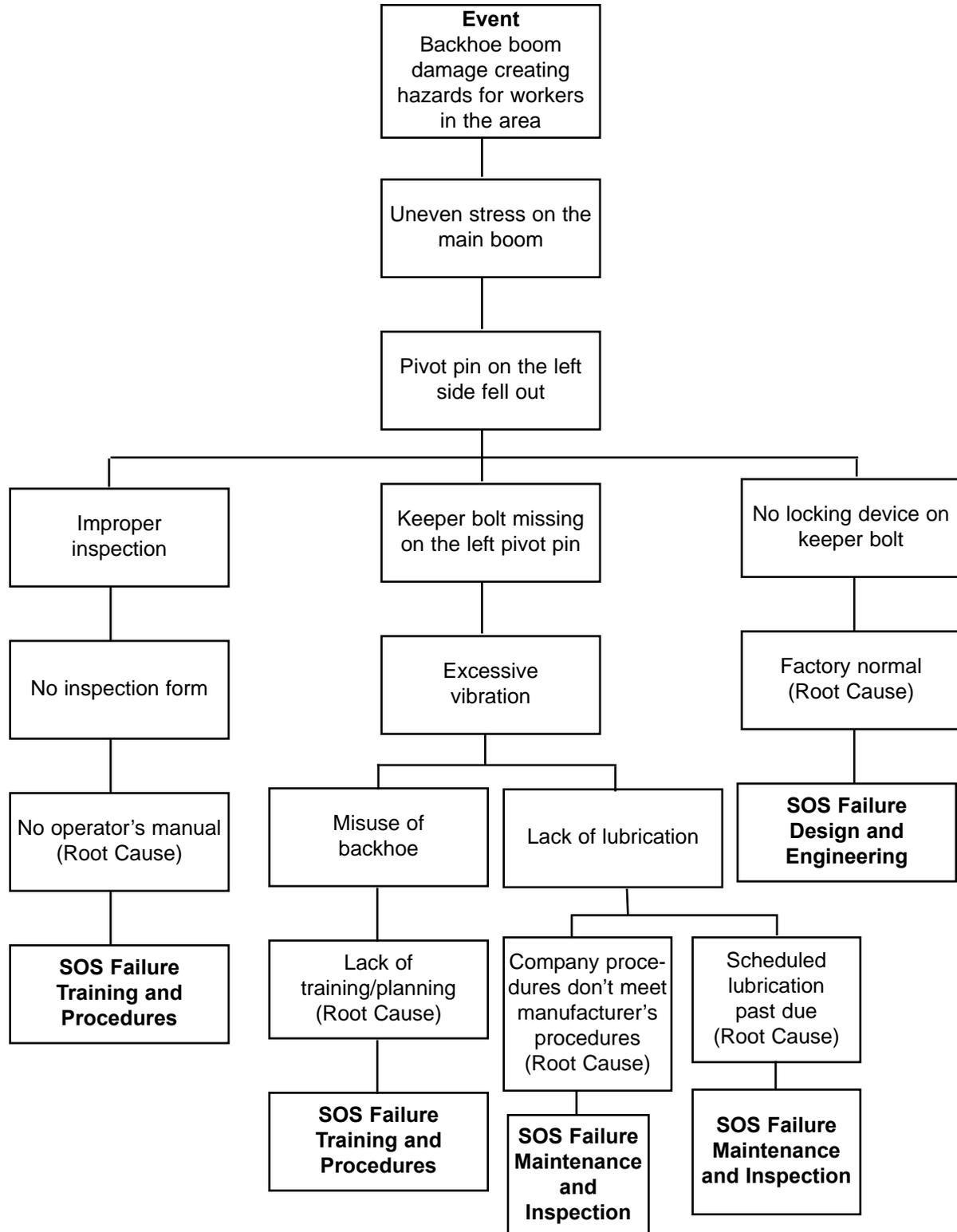
Discussion:

Two mechanics were given a work order to remove/destroy the yellow monitoring X109 B Station #13, a wood frame approximately 20 x 20 feet. As it was minor maintenance, the Front Line Manager (FLM) decided to use the case backhoe for this job. While the backhoe was moving, the dipper stick dropped which caused the backhoe to buck in an outward position.

The main boom of the backhoe broke on the right structural side, leaving the backhoe disabled. The operator then shut the equipment off, at which time he discovered a pin had slipped out of the boom. This failure put the two mechanics and any other personnel in the area in danger of being stuck by broken parts or dropped or uncoltrolled load or hook. The operator was also in danger when the backhoe bucked outward.

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. Evaluate the use of a locking device on the keeper bolt for the pivot pin.
2. Evaluate the use and kind of lock-tight for cast iron (duck tile).
3. Evaluate the proper torque specifications for a $\frac{3}{4}$ N.C. x 1 $\frac{1}{2}$ inch, three dash, head tempered steel, high-strength bolts used in cast iron (duck tile).
4. Increase lubrication frequencies to meet the manufacturer's specifications.
5. Insure that pivot points are greased daily.
6. Implement and train employees on individual equipment per manufacturer's specifications.
7. Make sure that an equipment manual is kept with all backhoes for operator's reference.
8. Develop an appropriate daily pre-use inspection form to include lubrication of weather-exposed pivot points.
9. Review all mobile equipment; evaluate the adequacy of the PM of each; and determine if the manufacturer's specified usage has been violated.
10. Ensure that the right equipment is being used for all jobs.

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

Thank you for completing this form.

EVALUATION

Lessons Learned: Backhoe Boom Damage

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?

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
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Nashville TN 37211

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

