



WASHINGTON STATE LOGGER SAFETY INITIATIVE

Keeping Washington loggers safe.

Quarter 3 Logging Safety Training: Three Guyline Yarders

June 24, 2015

This year there has been an increase in three guy line yarder's tipping over. Fortunately there have not been any serious injuries, but there has been equipment damage and close calls. This has happened enough to warrant training with the industry before it does cause a serious injury. This training focuses on three guyline machines, but is applicable to yarders with more guylines as well.

Some of the root causes of the tip overs appear to relate to inexperience and inadequate training.

- The lack of experience could derive from the crew or the owner of the logging company. Some owners purchasing yarders may not have experience in cable logging, and rely upon the crew they hire to have this knowledge.
- Stumps not being properly notched and improper guyline placement have also been causes of some of the tip overs. This usually indicates a lack of training and experience.
- There are resources available for assistance if needed.

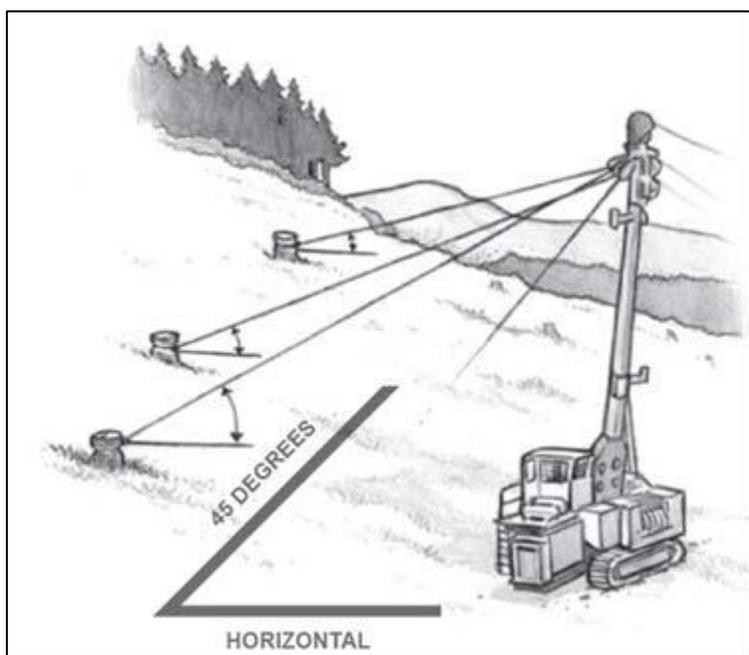
Overloading of lines is also occurring and many don't know it is happening. Increased breaking strength in new lines being used by loggers today has created a new hazard. These new lines may last longer, and not break as often, but manufacturer's specifications still need to be followed on all equipment. If you are using line that exceeds the manufacturer's specifications, you could overload the machine and cause damage and or failure of yarder components.

Other potential causes for yarders tipping over are logger's pushing the limit of their guyline layout and yarding outside the yarding window. These issues are addressed below.

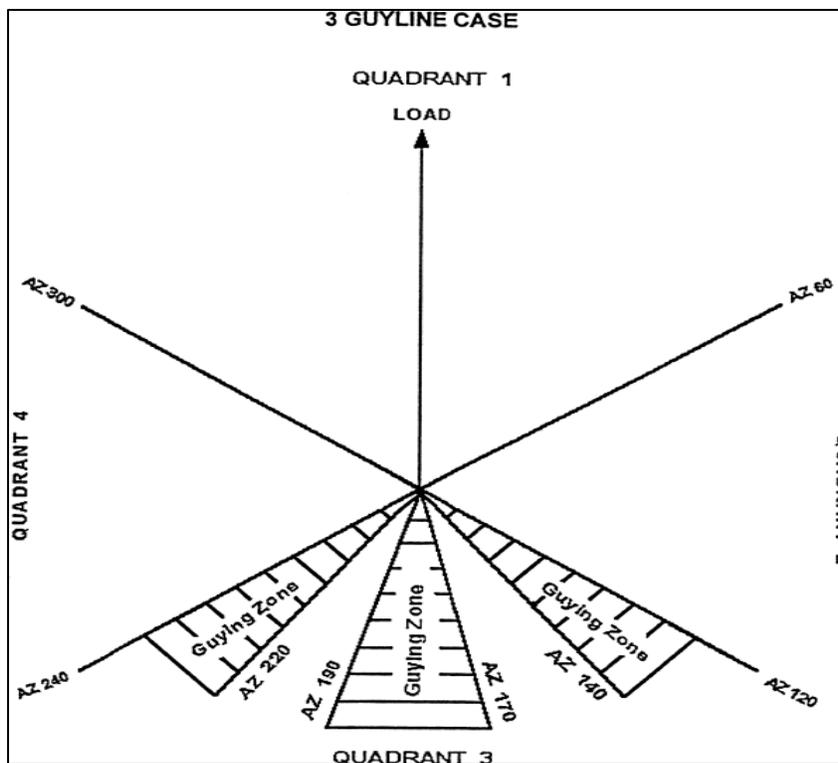
Below is guyline information directly from the Logger Safety Initiative (LSI) Accident Prevention Program relating to this issue:

Guylines

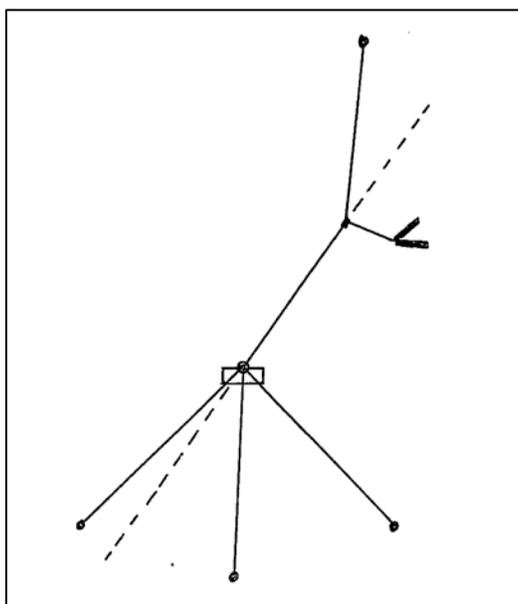
- At least the minimum number and angle of guylines recommended by the equipment manufacturer must be used.
- **Load bearing guyline angles must be no greater than 50 degrees measured horizontally.** If suitable anchors are unavailable or the terrain is so steep that the guyline angle exceeds 50 degrees, an additional guyline must be rigged to oppose the load.
- Angles greater than 50 degrees can place a buckling force on the tower and cause a catastrophic failure. The flatter the angle, the more effective the anchor. An anchor above the height of the tower will be less stable. Guylines too far above the tower will create a lifting force that could actually lift the tower off the ground.



- Guylines must be positioned according to manufacturer's specifications or as shown in the Washington Logging Safety Standards (**see 3 Guyline Case illustrations**). Guy zones are set so the guylines share the load on the yarding lines. If anchors are not available in a guy zone, or at the extreme edge of a guy zone, reduce the payload or adopt other measures to ensure stability. It may be possible, or necessary, to rig an additional guyline.



- The yarding direction will be one of the factors affecting the load on guylines.
- The guylines layout should be checked after each road change to ensure that guylines are still in the proper zone. The lateral movement of yarding lines must also be considered. For example, if you are lateral yarding with a motorized carriage and you are already near the outer limit of your yarding window, you could pull the skyline past the outer limit to where the guyline layout is no longer appropriate for the yarding direction (see illustration).



Business Management Practices Directly from the Industry

- When using a three guyline machine never get outside of guyline zone of the middle guyline.
- If you have four properly spaced guylines and kept your skyline in-between the middle two guylines, you would significantly reduce the number of tip overs.
- Consider adding a fourth guyline, especially when using a motorized carriage.
- Keep your yarder level.
- Use a dummy or snap guy.
- Use a load cell on your skyline or other guyline tension system to aid in monitoring your equipment.
- Avoid having your skyline too tight by watching the RPM's on your yarder. As an example, a logger's yarder will pull 75,000 lbs on the skyline in second gear at 2100 RPM's. If at 1000 RPM's it's loaded up to 37,000 lbs. and you cable up tight, you may overload the skyline.
- Follow manufacturers recommendations, and turn your yarder when needed.
- Keep your guyline layout narrower and even with a 90 degree outside-to-outside spacing.
- If a buncher is falling the unit, flag your guyline trees so the operator will leave you taller stumps.
- Keep good deflection whenever possible. If you cannot, mitigate the issue with lighter turns.
- It's important for foresters to understand when logging around PIPS and leave areas that you can only lateral yard so far with minimal lift.
- Don't be afraid to bring something to the attention of the forester if you are concerned.

“A logger recently said that is surprising how much he overloaded his yarder without knowing it until he had a load cell on his machine. For him it was an eye opener and made for some changes. “

An Industry Supplied Example

On March 17, 2015, a Thunderbird swing yarder running a Boman motorized carriage with a 1 1/8 inch swaged skyline without a fuse link tipped over. Fortunately there were no injuries associated with this incident.

The hook tender has 25 years of logging experience and 12 years of hooking. The yarder operator has 35 years of experience. This was the first guyline stump they pulled in this unit. The stumps were adequate,

but the ground was soft and the stumps were not tied back. The skyline was out 3000 feet and skidding 1000 feet. The turn when the yarder tipped consisted of three 14" diameter 60', and three 15" diameter 70' logs.

The middle guyline was on steep rocky soil, back right on a bank with loose silt soil, and were receiving most of the pull. The turn was directly under the skyline without any side pull, and was fully suspended. As soon as the crew went ahead on the skidding line, the guylines pulled. The middle guyline pulled causing the right back guyline to pull. The back left guyline did not pull, but caused the yarder to pivot and slowly tip over.

Root Cause Issues:

- Yarder was pulling on two guylines.
- Soil was saturated.
- Yarder was running an oversized skyline.
- Guylines stumps were in poor locations.
- Guylines stumps were not properly tensioned.
- Did not make use of equipment or other options for guylines anchors.
- Did not turn yarder.

Recommended Actions:

- Install a fuse link.
- More frequent safety audits.
- Create written guylines anchor safety procedures including stump selection and inspection.
- Ensure owner and crew understand procedures.