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Fatality Investigation Report: Struck by lumber at a sawmill

Fatality Assessment and Control Evaluation (FACE)
Safety & Health Assessment & Research for Prevention
Washington State Department of Labor and Industries

Report #52-1-98

Sawmill Unscrambler Operator Killed when Struck by a Board Ejected by Trim Saw in Washington State.

Investigation: #98WA06001

Release Date: December 14, 1998

SUMMARY

On February 15, 1998, a 43 year old sawmill "unscrambler" operator died of injuries sustained when he was struck in the chest with a 1" x 6" x 10' board, on the previous afternoon. The board traveled approximately 45 feet at a high rate of speed after being ejected from a "Trim Saw", striking the unscrambler operator at his workstation. The sawmill emergency team responded to the injured victim within minutes of the incident and placed a 911 call for assistance. The local community rescue and medical unit took charge of treatment for the injured individual at the site of the incident and then transported the victim to a local hospital. He died the following day.

To prevent future similar occurrences, the Washington Fatality Assessment & Control Evaluation (FACE) Investigative team concluded that employers should follow these guidelines:

- **Machine guarding should be in place to prevent exposure to the machinery and process materials.**
- **When new or reconditioned equipment is introduced to the work place, a review of safety precautions should be conducted in conjunction with the equipment manufacturer. The review should include any and all regulatory compliance parameters that apply to the equipment and the operation of the equipment.**
- **Routine hazard recognition audits/reviews should be conducted on a regular basis.**

INTRODUCTION

On February 17, 1998, the WA FACE Program was notified by WISHA* (Washington Industrial Safety & Health Administration) of the death of a 43 year old sawmill worker on February 15.

On March 20, 1998, the WA FACE Principal Investigator and the Field Investigator met with the regional WISHA representatives who were investigating the case. At the incident site, the employer was interviewed, the equipment and workstations were inspected and photographs were taken.

The facility is a family owned sawmill / planermill operation that produces finished lumber. There are three sawmills within the family group, each is owned / operated by a different family member. There were approximately 150 employees working at the sawmill/planermill. Fifty-five worked in the sawmill portion of the facility where the fatality took place.

The victim was a 43 year old male "unscrambler" operator and had been employed by the company for more than 18 years. The victim had developed considerable sawmill experience, primarily from on the job training. Training in WISHA-required safety items was presented to employees at the facility on an annual basis.

* The OSHA State Plan program in Washington State.

INVESTIGATION

On February 14, 1998, a Friday, the sawmill unscrambler operator was working at his normal workstation on the trim operation line. The morning shift started at 6:00 AM and the day's activities on the line had been uneventful.

The unscrambler operator worked with a trimsaw operator on the rough lumber line. The unscrambler operator's workstation was approximately 45' on the "upstream" side of the trimsaw system. The trimsaw operator's workstation was centered between the trimsaw and the unscramblers workstation (see diagram 1).

Though the company had been in operation for many years, they had recently built the current facility and it had gone on line in July of 1993. The facility was equipped with a combination of new and rebuilt equipment, which is a standard procedure for many forest products operations when they upgrade or build new facilities.

The equipment involved in the incident is an older trimsaw, that had been upgraded to operate with the rough lumber line. The trimsaw is a series of circular saws about 24" in diameter and run at a speed of about 20,000 fpm (feet per minute) or rotates at approximately 230 mph. This trimsaw system has 11 saws that extend 20' across the line under a full hooded canopy. There is a series of heavy gauge polypropylene strips, with overlapping ends that extend across the infeed side (the side where the trim operator and the unscrambler operator's workstations are located.) These polypropylene strips are fairly standard on the face of trimsaws and are used primarily to contain dust, help with noise reduction and possibly act as minor guarding for kickback of trim material, knots, chips etc.

The unscrambler operator's primary job is to operate the lumber unscrambler equipment, remove rejected rough lumber, and assure the lumber is aligned properly on the lug chain that feeds lumber to the trimsaw. The trimsaw operator's primary function is to operate the trimsaw, assure that the lumber is aligned properly prior to entering the trimsaw and monitor the system to ensure that it operating correctly. The trimsaw operation is computerized and through the use of scanners, data are fed into the system to determine the trim requirements of each board. This information then automatically

activates the saws to trim boards as they travel through the system. The trim saw operator has an E-Stop (Emergency Stop button) on his/her control panel to stop the system in the event of an operational malfunction or other system emergency.

Production was proceeding per normal operation until approximately a few minutes prior to 2:15 PM. The trim saw operator saw the blur of an object "fly" by his head. A few seconds later, he heard a noise from where the unscrambler operator was standing. He saw the unscrambler operator fall backwards, over a railing, down a short flight of stairs. The trim saw operator went to check on the victim and found him unconscious. He then proceeded to activate the facility's emergency alarm which was located around the corner from the trim saw system. The facility's emergency team responded and began CPR and had put in a call for the local community rescue and medical unit. A 1" x 6" x 10' board was located near the victim and based on the victim's bruising, it appeared to have struck the victim directly in the upper chest. The victim also showed signs of bruises/ injuries resulting from the fall over the railing and down the stairs.

The victim was transported to the local hospital where he was pronounced brain dead at noon on the afternoon of February 15, 1998 as a result of the injuries sustained to the chest.

In the investigation of the incident, it was noted that the board appeared to have been trimmed on both ends, which suggests that it had traveled through the trim saw. The board had a saw cut that extended 69" down and through the middle of the board. This would suggest that the board had rotated 90 degrees after having been trimmed and gotten caught by one of the saw blades. The saw blade proceeded to cut into the board starting at a point 21" in from the end that struck the victim (the cut was with the grain). Then after about 69", it appears that the blade began to lift from the board, grabbing rather than cutting the board, which provided the energy to propel the board toward the victim at a high rate of speed.

The hypothesis of how this occurred, was that a piece, or pieces of material and/or other debris (depicted as [B] in diagram 1) might have caused the board (A) to "hang up" after exiting the trim saw system, rotate 90 degrees, get caught by one of the saw blades and then be ejected from the system, while riding on top of board (C) (see diagrams 1 and 2).

CAUSE OF DEATH

The medical examiners listed the cause of death as cerebral anoxia due to cardiopulmonary arrest as a result of blunt trauma to the chest.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Machine Guarding should be in place to prevent exposure to the machinery and process materials.

Discussion: The investigation revealed that guarding or specifically the lack of guarding played a significant role in leading to the fatality of the unscrambler operator.

"Effective" machine guarding is a fundamental principal in protecting workers and others from the mechanical hazards of moving machinery. In designing guards for a process such as the trim saw operation, the first consideration should be for the employee working with the equipment. You need to look at what is needed to protect that employee from coming in physical contact with the equipment or process, and also protect the employee from a failure of the system such as what occurred in this incident.

Although the equipment setup for this trim saw system was not uncommon in regard to general practice within the industry, the guarding was inadequate in preventing exposure to personnel working or walking in the area.

Since the incident and prior to the FACE investigation, the employer had added guarding to the trim saw and to the two operator workstations.

- The employer fabricated expanded metal guards situated at both sides of the trim system extending the length of the saws. There is still space below the trim system guards to allow for production flow.
- The employer also set up expanded metal guards at the trim saw and unscrambler operator's stations. These guards act as a second layer of defense in the event a board gets by the trim system guards. WISHA had made the operator station guarding recommendation. (see photos #1 and #2)

- The employer "caged" the working platform ends of the trim system to prevent material being ejected or thrown from that direction into the workspace. These guards also prevent personnel from direct access into the trimsaw system from the working platform.

All sawmills should consider similar guarding application to prevent serious incidents from occurring around trimsaw systems. Some additional sources of information on guarding are listed in the references^{1,2}

Recommendation #2: When new or reconditioned equipment is introduced to the work place, a review of safety precautions should be conducted in conjunction with the equipment manufacturer.

Protection should be integrated into a machine at the design stage, when new equipment is introduced into a facility, when equipment has been reconditioned, and when a facility is rebuilding, starting up a new line or new operation.

Rebuilding and renovating projects provide an excellent opportunity to work with the equipment manufacturer and other industry consulting avenues such as industry organizations and WISHA's consultative group to help review a variety of safety issues to include machine guarding. During the rebuilding / renovation time frame, the facility would have the opportunity to address these types of safety issues without the pressures of production activities driving the immediate objectives.

The manufacturer would be able to discuss advances and recommendations (within their knowledge) in guarding applications that should be applied to the equipment that was being installed. The manufacturer is often the first contact a facility would make when an incident takes place involving their equipment. The industry organizations can help with industry communications related to guarding application and reports of serious and near-hit (near-miss) incidents that could alert facilities to take a close look at their system for any needed improvements. WISHA consultative services can provide insight into compliance requirements and interpretation of current regulatory standards. WISHA can provide insight on safety applications that other facilities are using that go beyond the scope of the standards and provide greater employee protection.

Recommendation #3: Routine hazard recognition audits/reviews should be conducted on a regular basis.

In using a Systems Safety Analysis approach, this approach tells us that with every incident, there are usually multiple failed opportunities to apply corrective action or preventive measures that would have eliminated the hazard or reduced the effects of the unplanned, unexpected event.⁵

Hazard recognition audits/ reviews should be a part of every organization's safety process. All levels of the operation should be included in the process in order to provide a variety of expertise and insight into the process.

In the case of this sawmill fatality, additional guarding could have been applied when this facility went on line. Hazard evaluations should be conducted on a regular basis, rather than having them be just one time events. This increases the opportunity to pick up issues and potential hazards that were missed in the previous evaluation.

This particular incident appears to have had a unique chain of events, but it is well recognized that saws and saw systems provide an opportunity for "kick backs" and for wood debris to be thrown or ejected from the system. Injuries involving machinery usually occur as the result of persons coming in direct contact with the machinery and also injuries resulting from the violent ejection of a workpiece, e.g. a piece of timber/lumber kicked back by a circular saw or even the disintegration of part of the machinery.

A hazard evaluation would have provided the opportunity to identify the need for improved safety application for this operation. Improved guarding of a sawmill trim system would be a direct result of regular routine hazard analysis.

The issue of potential accumulation of debris with the trim saw systems also could have been a focus area resulting from the hazard analysis. Based on this incident's hypothesis, a valid area for follow up and investigation would be to review the handling and management of trim waste and debris of the trim saw operation.

Other areas/equipment that should be reviewed in the hazard analysis of the Trim saw would be the proper operation and maintenance of "Hold Down Shoes", the adequacy of the lug heights to contain the boards in the process

flow and the tightness of the lug chain so that the lugs cannot slope backwards when pressure is applied against the direction of flow.

Known hazards should be identified and controlled. Unexpected hazards need to be identified via an approach that questions what could happen "if " the system does not function or does not behave as designed and then approaches should be developed to manage the unexpected hazards.

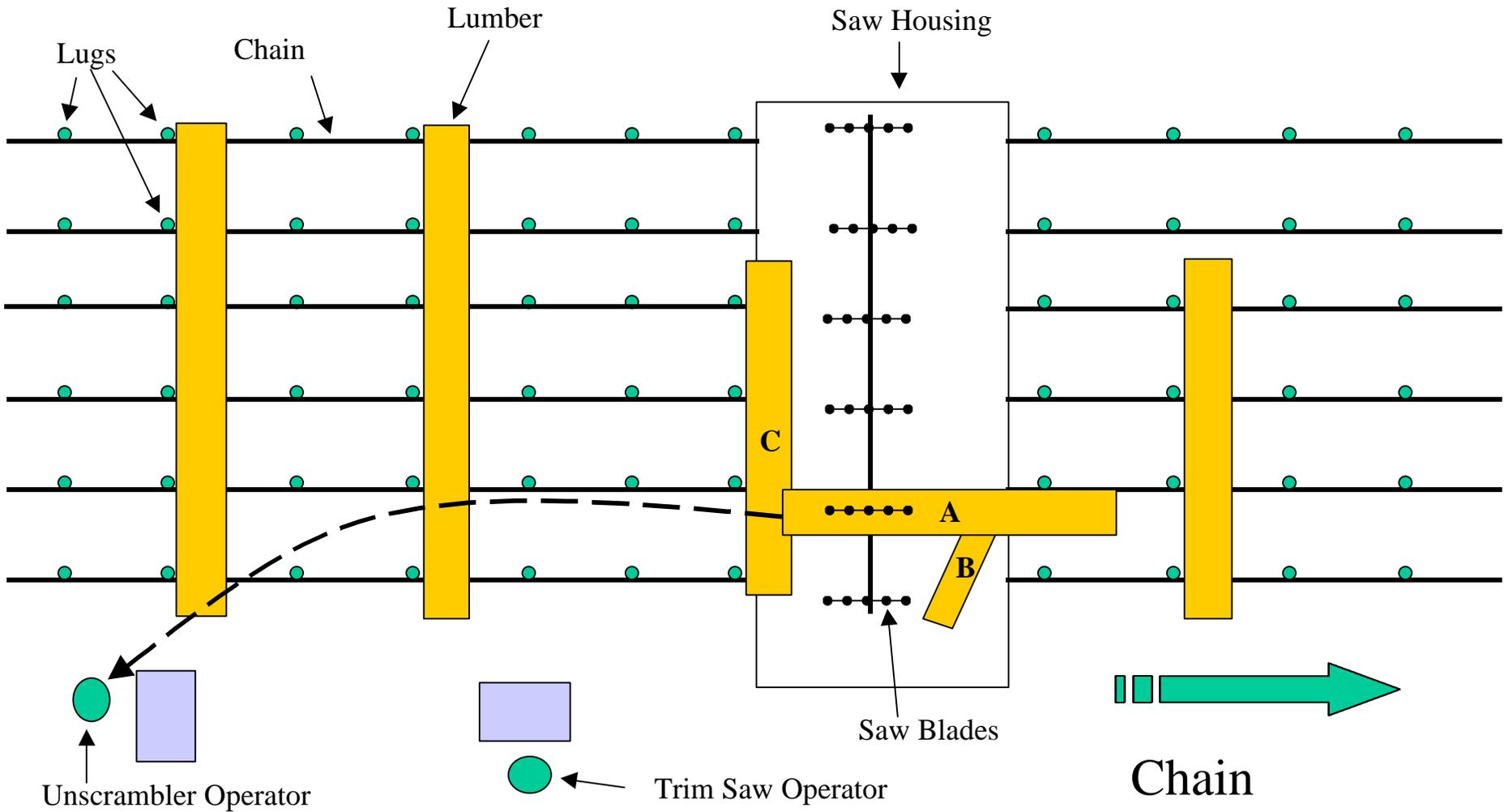
Safety has to be a continually improving process. If it is not proactive then it will continually be a reactive process, which responds only to serious injuries or significant events in applying corrective action.

Photo #1. "Unscrambler" operator's workstation - facing "trimsaw" operators work station and trimsaw system. New guarding in place.



Photo #2. "Unscrambler" operator's station viewed from "trimsaw" operators work station. New Guarding in place.





A - board that hit worker
 B - debris caught in the saw housing
 C - normal board going down the chain

Diagram 1

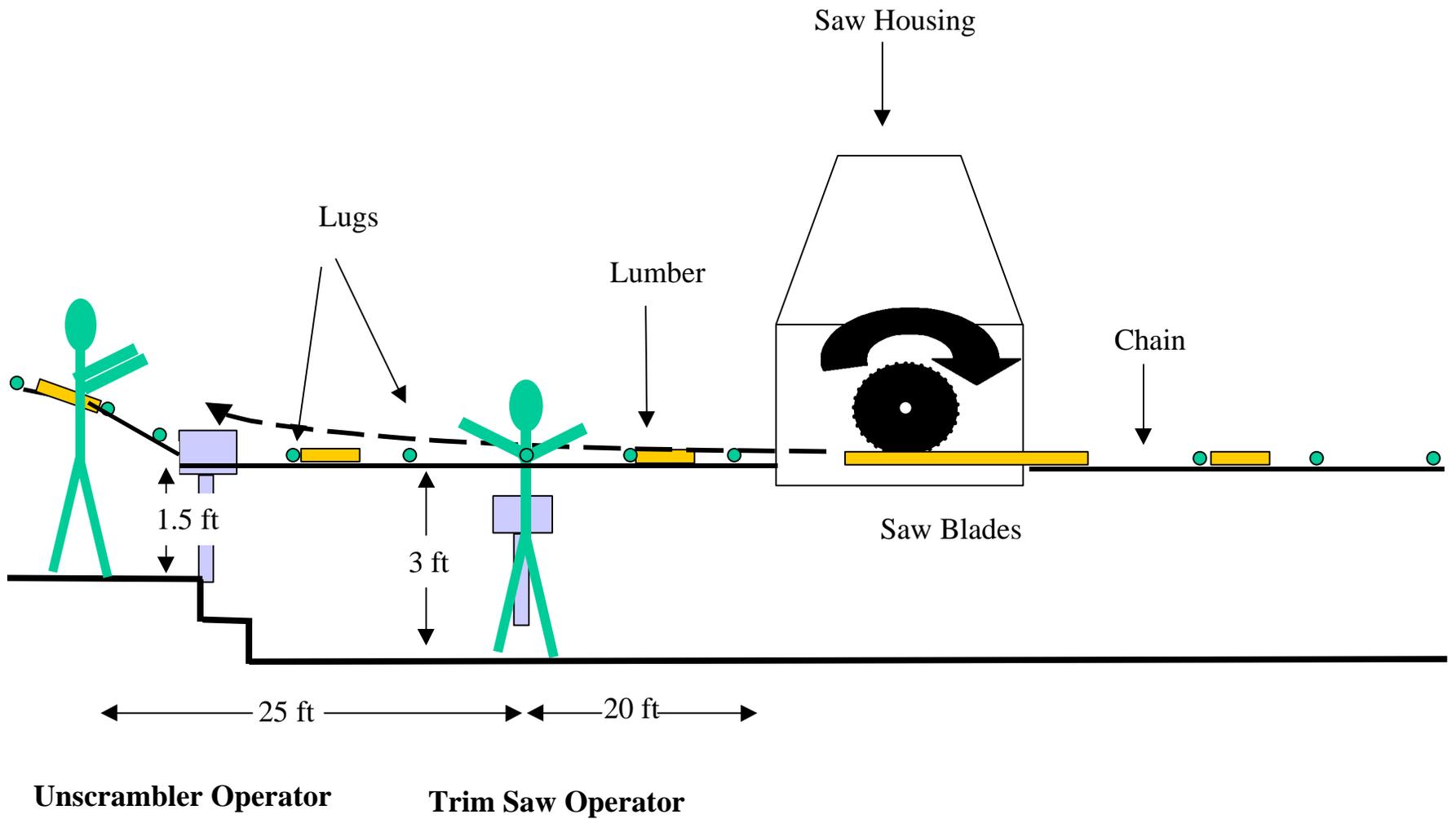


Diagram 2

REFERENCES

- 1) Code of Federal Regulations, Labor 29 CFR 1910 Subpart O: Machinery and Machine Guarding, U.S. Department of Labor.
- 2) Concepts and Techniques of Machine Safeguarding, OSHA 3067, 1992 (Revised), U.S. Department of Labor.
- 3) Safety Standards for Sawmills and Woodworking Operations, Chapter 296-78 WAC. State of Washington, Department of Labor and Industries
- 4) Selected Occupational Fatalities Related to Sawmills as Found in Reports of OSHA Fatality/Catastrophe Investigations, 1995, U.S. Department of Labor.
- 5) Kieger, Gary R., Montgomery, John F. editors. *Accident Prevention Manual: For Business & Industry / Administration & Programs*, 11th ed. Itasca IL: National Safety Council, 1997.

APPENDIX

Similar Incidents

In investigating this fatality, the incident was reviewed with numerous parties to determine whether similar events had ever taken place in their jurisdiction. Key representatives were asked whether they had seen or heard of an incident where a rough, uncut board was trimmed in a trim saw, spun around 90 degrees, was re-captured by one of the trim saw blades and ejected from the in-feed side of the saw housing at a high rate of speed. The question posed was to find knowledge or a history of any similar event regardless of outcome; fatality, injury, near-hit (near-miss), etc.

The following groups were consulted:

- The employer where the incident took place
- WISHA enforcement and consultation staff
- The trim saw system's manufacturer
- Business associations
 - Timber Operators' Council
 - Western Wood Products Association

- Labor Associations
 - United Brotherhood of Carpenters
 - Western Council of Industrial Workers

- Federal FACE Program Management

None of the individuals contacted could recall an incident of this type ever occurring, though numerous kickbacks involving jammed lumber being violently ejected were noted.

One similar incident was reported by OSHA in their report on sawmill fatalities (reference 4), but the contributory factor triggering the incident was an act of employee misconduct. The lack of guarding to prevent the boards from flying out were the same, but the mechanisms that allowed the board to gain the energy to be ejected at such a high speed, differed.

Applicable Regulations

In reviewing the WISHA standards¹, there are defined requirements that deal with the guarding of trim saw systems. The standard specifically states:

Trimmer of (and) slasher saws shall be guarded in front by a flat or round steel framework with a rigid metal screen or light iron bars attached thereto, or by wood baffles of not less than two inch wood material securely bolted to the frame. WAC 296-78-600(1)

and;

Front guards for the series of saws shall be set as close to the top of the feed table as is practical when considering the type of machine in use and the material being cut. WAC 296-78-600(2)

and;

The rear of a series of saws shall have a stationery or swinging guard of not less than two inch wood material or equivalent the full width of the saws and as much wider as is necessary to protect persons at the rear of the trimmer. WAC296-78-600(3)

This document should be copied and distributed as needed. More information about the FACE program can be found on our World-Wide Web site at "<http://www.wa.gov/lni/sharp/face>" or by calling us at 1-888-667-4277.