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MINUTES OF THE ADVISORY COMMITTEE MEETING FOR
PASSIVE SAFETY DEVICES FOR BRUSH AND WOOD CHIPPERS, PETITION 549,
JANUARY 29, 2019
SACRAMENTO, CA
(AS AMENDED BASED ON COMMITTEE DELIBERATIONS
OCTOBER 29, 2019)

1. Call to Order.

The meeting was called to order by the Chair, Michael Nelmidia, Senior Safety Engineer, Occupational Safety and Health Standards Board (Board) at 9:00 am on Tuesday, January 29, 2019, in Sacramento, CA. The Chair was assisted by Bernie Osburn, Associate Governmental Program Analyst.

2. Opening Remarks

The Chair welcomed the attendees and started the introductions of the committee. He then reviewed the Standards Board policy regarding the use of advisory committees. He also provided general information about the rulemaking process.

3. Petitioner's Presentation

The Petitioner shared his presentation with the committee. Within his presentation, the Petitioner: 1. Described what he perceived as the two predominate approaches to addressing wood chipper hazards; 2. Referenced wood chipper incident statistics from select publications; 3. Recounted the inciting event from which Petition 549 was spurred; 4. Addressed the criticisms that have been raised about his technology; 5. Introduced his concept of "passive systems" in contrast to "active systems" and; 6. Emphasized the need for a regulation to mandate passive systems to improve wood chipper safety.

The Petitioner described the contrast between the hazard remedies of "purchas[ing] and apply[ing] current technology" and "more safety training" Two articles related to wood chipper accidents were referenced by the Petitioner who opined that, each provided different "conclusions" regarding the safeguarding of brush and wood chippers.

According to the Petitioner, a March 2009 article appearing in Tree Care Industry Magazine, entitled "Chipper Accidents are More Common Than Reported" promoted continued improvements in mindset training.

The countering article, "Occupational Fatal Injuries Associated with Mobile Hand-fed Wood Chippers," was authored by Julia Zhu and Kitty Gelberg Ph.D., MPH, and published in the October 16, 2018 issue of the American Journal of Industrial Medicine. The Petitioner's attributed conclusion of the article was, that current feed wheel control devices are not effective for workers to self-rescue, and that technology is not being implemented.

The Petitioner drew attention to the 2009 article's statistic of 2,042 non-fatal injuries. [The Chair adds the 2009 article attributed the data to another article published in 2005 in the (Journal of the American Medical Association, vol. 293: 416-418), 2,042 non-fatal injuries between 1992 and 2002, in addition to the 31 fatal incidents in the same time period according to the Center for Disease Control which examined the pertinent Bureau of Labor Statistics data.]

The Petitioner addressed the criticisms his technology garnered from the Division of Occupational Safety and Health (Division) in the final Petition Decision. The first was mandating the use of a technology which is protected intellectual property without the availability of reasonable alternatives. The Petitioner expressed that the Division had previously identified patents and alternative detection technologies. The Petitioner inferred that such Division-identified alternatives should mollify the Division's intellectual property concerns.

The second criticism from the Division focused on the system being ineffective if employees neglected to wear the necessary accessories. The Petitioner sought to draw the parallel between the wrist and ankle accessories associated with his device and other personal protective equipment (PPE) such as head protection, hearing protection and protective eyewear which the user would be required to don and doff. The Petitioner argued that rejecting his device because the accessories could wear out is unwarranted. The Petitioner defended his position by arguing that other PPE also experience wear and tear and are replaced.

The Petitioner sought to define his concepts of "active systems" and "passive systems." To the Petitioner, "active" systems require user intervention. The Petitioner elaborated on his position by citing examples such as push, grab, pull, or bump as actions, from the Petitioner's perspective, would delineate an active system from a passive system (which he posited would not require such overt acts).

The Petitioner defended his position that a passive system would include devices that the protected employee would have to don and doff. The Petitioner explained his position citing "passive safety," a terminology used by the Automotive Safety Council:

Passive Safety is the general name given to occupant protection systems that don't require any action by the occupant once the accident occurs in order for them to work. These safety devices use crash sensors that determine if the collision is severe enough to cause significant injuries

and therefore deploys the appropriate occupant protection device. Examples of this include electronic crash sensors; seat belts; frontal, side, rollover and knee airbags; and seat belt pretensioners.

For reference, the Chair has also included the Automotive Safety Council's terminology for Active Safety:

Active Safety is the general name for automotive safety systems that prevent accidents or mitigate the severity of the accident through the active use of electronic sensors, braking systems, and steering systems. Active safety senses when the vehicle is beginning to lose control with respect to the intended direction of the driver or if the vehicle is failing to keep a safe stopping distance and takes action to warn, prevent or mitigate the potential issue before the driver realizes the issue is occurring. Examples of this technology are Electronic Stability Control (ESC), Automatic Cruise Control (ACC), Automatic Emergency Braking (AEB), Crash Avoidance (CA), Lane Keeping / Guidance (LK), Night Vision, Pedestrian Protection and Automatic Braking Systems (ABS).

The Petitioner sought to describe some perceived shortcomings of the industry's means to address wood chipper hazards. The Petitioner claimed that the machine manufacturing industry was solely relying upon training and instruction to protect workers, though he further explained that he perceived the industry's remedy was to include additional user-activated emergency systems ("stop buttons" and "panic bars"). Such training and user-activated emergency systems, the Petitioner claimed, are insufficient to allow an employee to attempt a timely self-rescue. The Petitioner reasoned that the rate at which an employee would be drawn into the chipper was too swift for an employee to react and trigger user-activated emergency systems. Moreover, the Petitioner opined that additional training would not serve a distressed employee at the moment the employee is pulled into the wood chipper.

The Petitioner cited a 1978 decision in the U.S. Court of Appeals *American Iron & Steel Inst. v. OSHA* 577 F.2nd 825, (3rd Cir, 1978) that described the OSHA Act is a "technology forcing" statute which may provide a basis to compel employers to include technologies or systems similar to his on wood chippers subject to employee usage.

4. Division's Presentation

Mr. Eric Berg of the Division shared a presentation originally exhibited to the Board in April 2016. The Division recounted alternative sensory technology with varying degrees of applicability to brush and wood chippers. The alternatives highlighted detection technologies as well as patents that could serve as a basis for passive sensing devices. The Division described that additional detection systems exist for forklifts and also described a detectible wearable vest system implemented by Amazon in 25 of their warehouses that shuts down robots in the area when an employee wearing the vest approaches. The Division shared the merits and

challenges of the potential implementation of such technology. The Division also explained that some international requirements afforded greater protection than existing Title 8 requirements, such as the placement of user operated emergency stops where distressed employees may realistically activate them. Peter Gerstenberger (TCIA) questioned statistics quoted in both the Division's presentation and the Petitioner's presentation. The Division acknowledged that not all fatal incidents were directly related to caught-in handfed chippers. The presentation also included a video regarding the speed at which ropes (and presumably an employee ensnared by the rope) would be drawn into brush and wood chippers when the rope is entangled with the cutting head.

5. Passive Sensing Systems

The committee established the terminology "Presence Sensing System" to replace "Passive Sensing Device" used by the Board in the Conclusion and Order of Petition 549. The Chair pointed out that the terms "Passive Safety Device", "Passive Sensing Device", and "Presence Sensing Device" possessed the same acronym (PSD) and raised the concern that such terminology could be unintentionally substituted. The Chair posed that only "Presence Sensing Device" bore context within Title 8 and based on the definition (within Section 4188), was restricted to power operated presses. The Chair suggested preserving, undisturbed, the terminology "presence sensing device" to ensure that the committee discussion and potential rulemaking would not adversely affect safeguards of power operated presses while retaining a distinction of the sensing technology being discussed by the committee. The committee members did not agree the word "passive" should be included. A committee member explained that the word passive was viewed as a means to protect all persons instead of restricting protections to those wearing detection devices. "Presence sensing system" was suggested, the committee agreed that "presence sensing system" would be a more appropriate terminology.

6. Definition of Presence Sensing Systems

A working definition was created based on the definition of "Presence Sensing Device" defined within Title 8, Section 4188 of the California Code of Regulations which is a definition specific to power operated presses. The committee consensus definition for presence sensing system is: "A system designed, constructed, and arranged to create a sensing field or area that stops or reverses the infeed system when part of an employee's body is within the [sensing] field or area." Additional concerns were raised by committee members regarding the term "employee." Some committee members suggested that the terminology should apply broadly, and suggested "person" or "worker." Others suggested a narrower terminology such as "operator." The Division and Chair clarified that the definition of "employee" would not exclude transitory labor. A committee member questioned whether an owner/operator would

be subject to the regulation. The Chair clarified that officers of a corporation have been considered employees, however owner/operators outside of such scenarios were excluded.

7. Merits of Presence Sensing Systems

A small number of detection technologies (light curtains, pressure mats, photoelectric, infrared, radar, and radio-frequency identification (RFID)) were identified and discussed by the committee. However, the committee consensus was that the current state of technologies in the context of presence sensing systems for brush and wood chippers, was not sufficiently mature to mandate a broadly applied requirement. Committee members spoke of potential in requiring an additional device but disagreed on the format of the potential regulatory proposal. One option some committee members suggested was prescribing a list of potential additional compliant devices (such as bump bars and other passive safety system). Another option other stakeholders raised was a performance-based proposal for the inclusion of the 'additional device'. Other stakeholders objected to equating user-activated emergency systems to presence sensing systems and proposed a hierarchy promoting presence sensing systems.

8. Identifying the Hazard

The committee identified the primary hazard of brush and wood chippers as someone being caught within the machine, or "caught-in" incidents. Additionally identified, were instances where employees would be "drawn-in" by [climbing] ropes or the winch line of some chippers. Certain committee members raised concerns that if climbing ropes were included in the discussion, rope manufacturers would need to be included as stakeholders.

A distinction was made between "caught-in" and "drawn-in". Some members delineated that "caught-in" hazards occur when employees kick or push material into the chipper or become caught between converging arbor material already engaged with the infeed mechanism of the chipper.

"Drawn-in" hazards were described as those instances where, by way of a rope or line drawn into the chipper, employees are entangled in a rope and pulled into the chipper by the infeed or cutting head. The Petitioner conceded that his own device would not be effective in addressing "drawn-in" accidents such as those involving ropes.

9. Injury Statistics

The Petitioner and Division drew attention to statistics of both fatal and non-fatal injuries involving employees being pulled into wood chippers. The Petitioner and the Division highlighted statistics from American Journal of Industrial Medicine in a 2018 article examining nationwide wood chipper related incidents, 41 of the 113 fatal injuries were "caught-in" incidents. [The Chair adds for clarity, that the article referenced does not delineate between instances of "drawn-in" vs. "caught-in".] The Petitioner also referenced another study which

identified over 2,000 nonfatal injuries involving wood chippers. Some committee members cast doubt on the relevance of the statistics and questioned whether the incidents cited in the article could have been prevented with the presence sensing systems. Mr. Josh Chard (Altec Environmental Products) argued that based on the fatality data quoted, the number of wood chippers in service and the person-hours of usage, there may only be one fatality per 70,000,000 hours of operation.

The Petitioner asserted that wood chipper injuries and fatalities were underreported. Mr. Doug Parker (Worksafe) mentioned that California Department of Public Health literature identified seven fatal injuries examined by the agency's FACE program (Fatality Assessment & Control Evaluation). Mr. Parker pointed to an additional fatality in Sonoma where a rope entangled within a chipper suffocated an employee. Mr. Parker hypothesized that these instances of fatalities inferred that lesser injuries could reasonably be expected as well.

Mr. Steve Crouch (Stationary Engineers, Local 39) raised concerns that the basis for necessity of this rulemaking effort did not appear to be driven by relevant statistics. Mr. Crouch's CalTrans constituents reported no injuries or fatalities related to brush and wood chippers. Similar concerns were echoed by labor stakeholders.

10. Mandating Passive Sensing Systems

The Petitioner argued that the Division, in its role as a "technology forcing agency", should mandate passive safety systems. He argued in the absence of regulatory intervention, such technology would be neglected by manufacturers of brush and wood chippers. The Petitioner further questioned the commitment of manufacturers of wood chippers to pursue "electro-technological" means of safeguarding their chippers; pointing to the lack of perceived interest in his device and a competing device "Unsafe" developed in by a company in Australia.

Committee members representing the manufacturers objected to the characterization and highlighted several instances where manufacturers voluntarily initiated and implemented safeguards such as bump bars, winch, and line severing systems. They also argued that research related to passive sensing systems had been ongoing for 20 years.

Further, some committee members questioned the safety of the Petitioner's own device, citing a lack of significant testing and a potential complication affecting employees with medical implantable devices (pacemakers and defibrillators).

11. Alternative Safeguards

The committee discussed alternatives proposed by the Tree Care Industry Association (TCIA), provided in a written comment by Mr. Peter Gerstenberger and supported by an additional written comment provided by David Marren (The F.A. Bartlett Tree Expert Company). The recommendations called for improvements to Title 8, Sections 3424(c)(1) and (c)(6) as they

relate to the requirements for a quick stop and reverse device and the length of the infeed table. Mr. Gerstenberger went on to suggest that the 2017 edition of ANSI Z133 to serve as the basis for potential improvements to the regulation which Mr. Gerstenberger opined have already been implemented by the manufacturers.

12. Chippers with Mechanical Infeed vs. Chippers without Mechanical Infeed

The committee discussed the differences between wood chippers with a mechanical infeed and those without a mechanical infeed. Committee members generally agreed that a majority of chippers presently manufactured and sold include a mechanical infeed, but that chippers without a mechanical infeed are still produced. Some of committee were also of the opinion that chippers without a mechanical infeed were less likely to pull or draw an employee into the cutting head.

The jargon “chuck and duck” was used to describe machines without a mechanical infeed. Committee members clarified that workers tended to be more vigilant while working around “chuck and duck” machines because of the perceived danger that the configuration of such machines garnered. In contrast, chippers with an infeed mechanism may require operators to manipulate branches within the hopper to engage the infeed system. More frequent operator interaction with mechanical infeed chippers results in greater exposure to hazards.

13. International Standards

The Chair requested input regarding the United Kingdom and British Columbia standards related to wood chippers. The committee generally agreed that EN 13525:2005+A2:2009 had been withdrawn by the European Union and was pending a replacement. Committee members also questioned the applicability of such requirements because chippers used in Europe are generally smaller than chippers used in the United States and there are key differences in the placement of user-operated emergency stops as well as the quick stop and reverse. The Division raised and the Committee discussed the hopper configurations included in international requirements. Longer feed tables increased the distance from to the feed rollers reducing the possibility of contact with the feed rollers. Similarly, increasing the height of the sidewalls of the hopper serves as a barrier to contact the feed rollers from the side of the machine. The Petitioner disagreed—recounting an instance which a pair of branches were feed into the chipper and the converging branches drew the operator (who was between the branches) towards the infeed. A committee member asserted that the concern with the existing California regulations pertained to a greater extent to the quick stop and reverse. While supportive of the changes to the dimensions of the hopper, committee members articulated that all wood chippers with a mechanical infeed should be augmented with a quick stop and reverse, rather than merely disk-type rotary chippers.

14. Committee Consensus

The committee achieved consensus regarding:

- Rephrasing “Passive Sensing Device” with “Presence Sensing System.”
- Defining Presence Sensing System as "A system designed, constructed, and arranged to create a sensing field or area that stops or reverses the infeed system when part of an employee’s body is within the sensing field or area."
- ~~¹Current presence sensing system technology is not sufficiently refined to mandate unqualified application on brush and wood chippers with a mechanical infeed system.~~
- There was insufficient information available to the committee such as underlying technology details, robustness, functional safety aspects, and applicable performance measures regarding the petitioner’s device for the committee to recommend mandating such a device to be installed on brush chippers with mechanical infeed systems.
- Augmenting brush and wood chippers with an additional mandated stop device should be explored. Such additional stop devices may include a bottom feed control bar, panic bar or other emergency system. Additionally, the committee members recommended the inclusion of ~~passive~~presence sensing systems as a permissible proactive measure so a proposal would not require additional rulemaking when such devices are viable and available on the market.

15. Concluding Remarks

The Chair thanked the committee members for their attendance and participation and adjourned the meeting at 3:00 pm.

¹ Amended on November 19, 2019 in response to committee discussion from the October 29, 2019 advisory committee meeting.