



**Oregon**

Kate Brown, Governor

**Department of Consumer and Business Services**

Oregon Occupational Safety and Health Division

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October 20, 2015

John Hickey  
Executive Director  
Asphalt Pavement Association of Oregon  
5240 Gaffin Rd SE  
Salem, OR 97317

Hello John,

**Question:**

This question is submitted by the Asphalt Pavement Association of Oregon, and the Oregon Department of Transportation (contacts for this issue being Joseph Squire, ODOT Construction and Materials Engineer, and Shelli Romero, Interim Area Manager Region 1).

Background: Some noise ordinances and permit conditions require paving contractors to disconnect manufacturer-installed backup alarms on vehicles and construction equipment for nighttime paving work. We want to know whether Oregon OSHA believes that disconnecting manufacturer-installed backup alarms is acceptable and advisable in light of the context of a paving project.

Whether OSHA believes it is acceptable and advisable to disconnect manufacturer-installed back-up alarms for night work on a paving project that is a mobile operation with numerous pieces of heavy equipment operating at different speeds and without fully enclosed barriers surrounding the workzone?

**Answer:**

Oregon OSHA generally considers disconnecting manufacturer-installed safety devices an unacceptable and inadvisable practice. The issue is typically addressed under 437-001-0760(1)(b)(D), where employers are required to ensure that employees do not remove, displace, destroy or carry off any safety device while its use is required by a safety and health rule. Under 1926.602(a)(9)(ii), earthmoving or compacting equipment that have an obstructed view to the rear must be equipped with an operational back-up alarm when used in reverse gear, or an employee who signals the operator that it is safe to do so. According to federal OSHA's Interpretation of 29 CFR 1926.602(a)(9)(ii) (January 21, 1987), "Obstructed view to the rear could include such obstacles as any part of the vehicle such as structural members, its load (gravel, dirt, rip-rap), its height relative to ground level viewing, damage to windows or side mirrors, etc. used for rearview movement of the vehicle; in addition, it could include restricted visibility due to weather conditions such as heavy fog; or work being done after dark, without proper lighting."

As mentioned, 1926.602(a)(9)(ii) provides employers two options to protect workers from struck-by material handling equipment hazards when traveling in reverse – an audible back-up alarm or a spotter. Given that the rule provides these two options, Oregon OSHA normally does not consider disconnecting a manufacturer-installed back-up alarm a violation of 437-001-0760(1)(b)(D) during times when the type of activities being performed with such equipment are conducive to the safe and effective use of spotters. In many cases, where there are multiple pieces of equipment in operation at one time and/or the level of background noise prevents equipment back-up alarms to be heard or distinguishable, Oregon OSHA considers the use of a spotter the safer option. However, in your description of the speed of a paving operation, you indicate that “Spotters cannot keep up with the fast moving equipment.” In such cases, where the speed of the operation is too fast for a spotter to keep up with earthmoving or compacting equipment, Oregon OSHA would not consider the use of a spotter a viable option. Please note, regardless of Oregon OSHA’s determination of a rule violation in such matters, employers (end users) are still responsible for following equipment manufacturers’ recommendations and specifications to prevent product warranty and liability issues.

Best regards,

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## Asphalt Pavement Association of Oregon

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September 30, 2015

Paul van Orden  
Noise Control Officer  
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**Re: Considerations for Pilot Program – Allowing Backup Alarms for Night Paving**

Dear Paul,

This letter follows up on our meeting involving industry, ODOT, and your office, in which we talked about a possible pilot program for night paving operations within the City of Portland that would allow backup alarms.

As you know, the City Code has been interpreted to preclude backup alarms for night paving and a common paving project permit condition requires contractors to disconnect backup alarms at night. Because of City Code, ODOT contracts within the City specifically require contractors to disconnect backup alarms for night paving. For the reasons set forth below, we believe disconnecting backup alarms for paving work creates an unsafe work area and, although we appreciate that backup alarms can annoy local residents, preventing a possible annoyance is not worth the risk of killing or severely injuring a worker, and with proper notice local residents can prepare. We have contacted other agencies to gather more information regarding the importance of backup alarms in construction work areas, and will forward any relevant information we receive.

Industry and ODOT ask that you consider the points below and let us know if the City will adopt a pilot program allowing backup alarms for night paving. At the end of this letter is one possible response to people who call to complain about backup alarms for night paving.

**Description of Typical Paving Operation:** Typical paving projects involve multiple-miles of roadway next to active traffic lanes. Various vehicles and pieces of equipment operate within the workzone at different speeds, with some constantly entering and exiting (e.g., trucks delivering asphalt pavement).

The most common type of project includes a pavement grinder that grinds off the top of the existing road surface. The grinder is followed by a sweeper that cleans the surface. Next, is the tack truck, which is a vehicle with a relatively large tank that sprays a type of liquid emulsion on the existing surface to help bond the existing surface to the new asphalt pavement. The grinder, sweeper and tack truck operate relatively fast (more than 5 mph).

Large trucks drive from an asphalt plant with hot-mix asphalt pavement and dump the asphalt mix on top of the bonding layer between the tack truck and the paver. The paver moves over the dumped asphalt and spreads it into a relatively uniform asphalt layer. Where there is no room for trucks to dump asphalt mix in front of the paving machine, the trucks will dump the material into a material transfer vehicle and the material transfer vehicle is used to transport the asphalt mixture from the dumping spot to the paver.

Approximately three rollers follow the paver, operating in separate sections. The first is called a breakdown roller. The breakdown roller will roll in a back-and-forth pattern parallel to the roadway being paved. The breakdown roller covers anywhere from 300 to 500 feet. After the breakdown roller covers a section, it moves to the next section, and the intermediate roller then rolls the same section. When the intermediate roller is finished with that section, the finish roller then rolls the section. Each roller rolls each section at different times and operates at speeds that are all significantly faster than a walking pace. The breakdown and intermediate rollers also vibrate as they roll, which creates a loud humming-type noise.

Almost every paving project will have areas where paving cannot be done by machine (e.g., sharp corners and areas with posts or other features that would block a paver or roller). Laborers pave those areas by shoveling and tamping asphalt pavement with hand tools. Often, the laborers are working directly adjacent to the paving machine and the rollers.

It is critical for a paving operation to move quickly because typical hot-mix asphalt pavement must be placed and compacted while it is very hot. Minutes matter. As such, trucks carrying asphalt from the asphalt plant to the project, must get to the project quickly, deliver the asphalt mix, and then get back to the plant quickly to get another load of asphalt mix. Everyone on a paving project is aware that time is of the essence.

### **Important Factors**

- 1. Night Work & Lights:** To lessen the impact on the traveling public caused by active construction workzones, paving is increasingly being performed at night, especially in urban areas. Often, paving contractors cannot shut down a travel lane until traffic has dropped below a certain level because owners want to minimize traffic delays and it is dangerous to have workers setting up traffic control devices when any more than a few vehicles are traveling a roadway. Once traffic has dropped below an acceptable level, the contractor will set up traffic control devices and begin the paving operation. Travel lanes typically must be open before traffic levels start to rise for the morning commute (about 5:00 am).

The restrictions on when work may start and stop severely restricts the amount of paving that may be performed in a night shift. Essentially, paving contractors are left with one-half of a typical work day when performing night paving. Additionally, under the standard Oregon specifications, paving typically must be completed by September 30 of each year. As a result, paving crews work with urgency that does not exist on other construction projects.

During night paving operations, contractors typically mount bright lights on the paver because it is important for the paver operator to be able to see the edges of the area to be paved. The rollers also operate with bright lights because it is important for the roller operators to see the texture of the asphalt pavement they are rolling. As a result, there are sections of night paving operations that are very well lit and sections in-between that are not. Near the paver, rollers, and some of the other equipment, strobe warning lights are ineffective because of the bright light from the lights mounted on the equipment.

- 2. Varying Background Noise:** Paving projects typically happen next to live traffic lanes – cars and trucks drive within inches of most paving workzones. On a highway, for example, large trucks commonly travel at night and ignore speed restrictions. The background noise in those areas goes from almost nothing to extremely loud in seconds and with varying frequency throughout the night. Even when projects are on city streets that have smaller vehicles operating at lower speeds, adjacent buildings tend to block the dispersion of noise generated by passing traffic and amplify it in the workzone.

The loud and varying background noise limits the effectiveness of smart alarms (alarms that vary their volume based on background noise) and spotters. The smart alarms do not have time to adjust to the wide variations (in terms of volume and timing) in background noise. Additionally, in an environment of varying background noise, the workers do not have time to recognize the backup alarm sound relative to other sounds (i.e., it is confusing to hear widely varying alarm sounds).

Moreover, because of the background and equipment noise, some paving contractors ask their workers to use hearing protection (e.g., ear plugs). Except when background noise is at its loudest, smart alarms are ineffective when hearing protection is used. Similarly, it is very unlikely that workers or other individuals in a workzone would be able to hear a warning from a spotter in many cases whether or not they were wearing hearing protection.

- 3. Speed of Operation:** As described above, paving projects cover large distances where different parts of the work get performed in different and varying locations within the work zone. Every part of the operation moves and equipment must act quickly because asphalt must be placed hot and it cools quickly, especially at night. Spotters cannot keep up with the fast-moving equipment. In most instances, the grinder, tack truck, rollers, material transfer vehicle, and mix delivery trucks all move faster than any spotter. Spotters are also difficult to see at night, especially behind the larger vehicles and pieces of equipment (e.g., the tack truck, material transfer vehicle, and mix delivery trucks), and the number that would be required would, in our view, create a more hazardous situation.
- 4. Limited Safe Zones:** Paving workzones often have no safe zones. Most highways and roads must remain open to traffic during paving. Contractors are typically allowed to block off one lane using barrels and signs or other traffic control devices, and traffic either merges into any remaining lanes or uses the opposite lane to pass by the workzone. In some instances, there is active traffic on both sides of a paving operation, and in other instances, the workzone is

abutted by private or fenced property on one side and active traffic on the other. Within the workzone, heavy equipment and vehicles are used at different sections of the workzone such that the equipment and vehicles move through the workzone at varying speeds that most would consider "fast."

The constraints on the size of the workzones as well as the need for heavy equipment and vehicles to move quickly within the workzone, limit available safe zones for workers and inspectors. There is nowhere in a paving workzone that can be considered completely safe. We believe that because of the limited availability of safe work areas, the number of individuals present in the workzone should be limited.

The use of spotters as an alternative to backup alarms would significantly increase the number of workers in a paving workzone. Almost all of the equipment has some view obstruction. Unlike building or bridge construction sites where construction operations are confined, a paving operation is spread out (often over a mile or more), and spotters would be needed at multiple locations and would need to move with fast-moving equipment, which is possibly impossible and, at a minimum, not practical. Requiring spotters increases the number of individuals that might get injured or killed in a paving workzone and does not, in our view, create a safer environment.

A related concern is pedestrians unexpectedly crossing the workzone. Almost no paving project is fenced, which makes it accessible to pedestrians. Even with night paving work, pedestrians commonly cross paving workzones. Most pedestrians have no knowledge of paving or the speed of the equipment used in paving, and it is impossible for workers concentrating on performing paving work to always be in a position to safely escort pedestrians through the workzone. Spotters and smart alarms would, in our view, be even less effective in protecting pedestrians as opposed to workers from getting crushed by paving equipment.

5. **History of Backover Fatalities:** There is a history of backover fatalities in paving workzones. Of the fatalities in and around paving workzones in Oregon this year, to our knowledge one was a backover where a worker was crushed by a material transfer vehicle operating in reverse without a backup alarm. National analyses of roadway workzone fatalities show that people die too frequently because they are backed over by construction equipment and that a significant percentage of the deaths occur when no back-up alarm was functioning. We believe that the statistics show that disconnecting backup alarms can lead to deaths.

The Roadway Work Zone Safety and Health Partners Alliance analyzed roadway workzone fatalities and found that "in about one-third (31.1%) of backover fatalities, no back-up alarm was functioning," and about 20% of workers who were killed were wearing high visibility clothing

([https://www.workzonesafety.org/files/documents/crash\\_data/Alliance\\_roadway\\_fatalities\\_graphic.pdf](https://www.workzonesafety.org/files/documents/crash_data/Alliance_roadway_fatalities_graphic.pdf)).

Steve Pegula of the Office of Safety, Health, and Working Conditions, U.S. Bureau of Labor Statistics, analyzed fatal injuries at road construction sites from 2003 to 2010, and reported:

Approximately seven out of every eight workers who incurred a fatal occupational injury at a road construction site were working at the site at the time. The largest single event that led to fatal occupational injuries for these workers was being struck by a vehicle or mobile equipment. In the 8-year period from 2003 to 2010, 442 workers (53 percent) were killed at the site after being struck by a vehicle or mobile equipment.

Workers are roughly as likely to be struck by construction- or maintenance-related equipment (dump trucks, bulldozers, graders, etc.) as by cars, vans, tractor-trailers, buses, and motorcycles. Workers were fatally struck 152 times by construction- or maintenance-related equipment and 153 times by the other vehicles.

Vehicles or mobile equipment that was backing up posed a particular hazard. Of the 143 cases in which a worker was fatally struck by a backing vehicle or mobile equipment, 84 involved a dump truck striking the worker. This statistic is particularly notable because section 6D.03, subpart D, of the MUTCD specifically identifies limiting backing-up maneuvers as a factor in minimizing worker risk

Back-up alarms were noted in 39 cases in which the worker was struck by a backing vehicle or mobile equipment. Twenty-five workers were struck by a vehicle or mobile equipment with a functioning back-up alarm; in 17 cases, the vehicle was a dump truck. Of the 14 workers who were struck by a vehicle or mobile equipment without a back-up alarm or with a nonfunctioning back-up alarm, 11 were struck by a dump truck.

Workers were flagging or performing other traffic control duties in 92 cases. Of these workers, 20 were noted as wearing reflective or brightly colored clothing, such as vests, to increase visibility. Only 32 of the workers were employed as flaggers; the other 60 worked in other occupations, such as construction laborers (23), highway maintenance workers (9), and operating engineers (7).

Steve Pegula, Monthly Labor Review, November 2013 (footnotes and table references omitted) (<http://www.bls.gov/opub/mlr/2013/article/an-analysis-of-fatal-occupational-injuries-at-road-construction-sites-2003-2010.htm>).

**Possible Response to Complaints:** We understand why you are upset and appreciate the importance of a good night's sleep. However, most paving work cannot be performed during the day and workers have been killed too frequently on paving projects by vehicles without backup alarms. Because paving projects do not stay in one area for very long and because of the tragic history of deaths, the City, ODOT, and the construction industry chose to allow backup alarms for night paving work. Although it may take

Paul van Orden  
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a night or two to get used to, ear plugs are effective at blocking out the noise and might be an option for you. We are willing to share the information we have about the project with you and we can have someone get back to you with the specifics of how much longer backup alarms will be used on the project.

If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,



John J. Hickey, P.E., Esq.

Executive Director

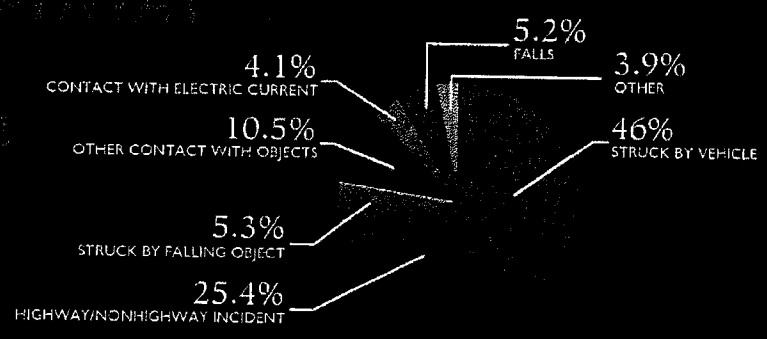
Asphalt Pavement Association of Oregon

cc: Joseph Squire, ODOT Construction and Materials Engineer  
Shelli Romero, ODOT Interim Area Manager – West  
Mark Bauer, Baker Rock Resources  
Dave Alexander, Lakeside Industries  
Garrett Frey, Knife River



# CAUSES OF ROADWAY INCIDENTS

Total Work Zone-Associated Worker Fatalities 2003-2010: 1,000



Source: Monthly Labor Review, Nov., 2013

**More than half (58.7%) of backovers involve a dump truck**

**In about one-third (31.1%) of backover fatalities, no back-up alarm was functioning**

**In about 4% fatalities, workers were flagging (3.3%) or performing traffic control duties (16.3%)**

**About 20% were wearing high visibility clothing**

**4% KILLED BY CONTACT WITH ELECTRICITY**

**2.4% TRENCH COLLAPSES KILLED OF ROAD WORKERS**

**FALLS TO LOWER LEVEL KILLED 20% OF WORKERS**

**YET**

**LESS THAN 2% OF WORKERS WERE KILLED BY A DRUNK DRIVER**

Through the OSHA and the Roadway Work Zone Safety and Health Partners Alliance, the Alliance participants developed this graphic for informational purposes only. It does not necessarily reflect the official views of OSHA or the U.S. Department of Labor.

