

June 16, 2022

The Honorable David Thomas  
Chair, Occupational Safety and Health Standards Board  
1017 L Street, PMB #254  
Sacramento, CA 95814-3805

Via email: [OSHSB@dir.ca.gov](mailto:OSHSB@dir.ca.gov)

Re: Petition File No. 596: Submitted by Monarch Tractor

Dear Chair Thomas:

AEM is the North American-based international trade group representing off-road equipment manufacturers and suppliers, with more than 1,000 companies and more than 200 product lines in the agriculture and construction-related industry sectors worldwide. The equipment manufacturing industry supports 2.8 million jobs in the U.S. Equipment manufacturers also contribute \$288 billion a year to the U.S. economy.

We appreciate the opportunity to express our support for amending California Title 8, Section 3441 (b) to promulgate appropriate safety regulations for the use of autonomous farm equipment.

Off-road autonomous equipment is here and destined to play an increasing role in agriculture. The governing regulations were last reviewed in 1985, long before technology was developed to create autonomous farm equipment. Within the next five-to-ten years, autonomous tractors will be widely available on the market, thus the time is right to begin examining the regulatory framework that would allow this equipment to operate safely.

### **Benefits of Autonomous Equipment**

Agricultural use of autonomous equipment promotes reduction of worker exposure to a variety of hazards:

- Driverless sprayers reduce incidents where employees are exposed to pesticides during their application.
- The undistracted nature of onboard sensors can provide an excellent level of detection for monitoring the environment to prevent incidents.
- The use of autonomous tractors can remove workers from environmental health and safety hazards such as dust, heat, and vibration, keeping workers healthier.
- Autonomous machines can perform physically demanding labor such as hauling heavy loads from fields, or shaking nuts from trees, thus lessening the wear and tear on a worker's body.

- Autonomous fruit pickers can keep labors from ladders, reducing fall hazards.

Furthermore, the diversity and inclusion benefits of off-road autonomy should not be overlooked. The nature of many employment opportunities on California farms restricts who can apply based upon the applicant’s physical abilities. Together, AEM and Cal-OSHA can enable off-road autonomy to pioneer farming operations that create employment opportunities for workers from an expanded range of physical abilities, including disabilities, and professional backgrounds who otherwise cannot be “reasonably accommodated.”

### **Safety Data**

Due to the emerging nature of this equipment, we do not have extensive data on the safe usage of autonomous farm equipment, however our industry can draw on the previous experiences of related industries and is currently studying the safety of autonomous farm equipment through a partnership with Cal-OSHA.

Since 1994, over 900 Caterpillar and Komatsu mining trucks outfitted with autonomous systems have hauled 8 billion tons of material across 90 million miles with zero system-related lost time injuries incurred. Employees deployed at these work sites operate in cooperation with the autonomous machines, resulting in a demonstratively safer environment that reduces human exposure to hazards.

Monarch Tractor, an AEM member company, is currently conducting research through an experimental variance period, granted by Cal-OSHA in August 2021 that will evaluate the safety of autonomous tractors through various conditions over several years. Once complete, this data will allow stakeholders to accurately adjudicate the safety of this technology in the environment in which it will be used.

We also encourage the Board to review other datapoints with similar equipment operating in similar environments:

- Through their seeding, spraying and spreading operations, Raven Applied Technology has accumulated 8,000+ hours of operational time, covering 69,000 acres with 18 machines.
- According to its website, Blue-White Robotics, an autonomous agriculture equipment manufacturer, has 10,000+ hours of safe operation.
- KeyBanc Capital Markets published its first Autonomous Truck Technology Dashboard. As of March 1, 2022, KeyBanc counted 147 autonomy-equipped trucks, traveling an estimated 4.1 million miles. KeyBanc reports no unsafe driver violations resulting from 40 roadside inspections in February.
- Schnuck’s Markets announced that it is rolling out artificial intelligence powered robots to all 111 of its stores in Illinois, Indiana, Missouri and Wisconsin. These robots will be interacting with customers that have had no special training to interact with autonomous machines.
- Because the technology used in autonomy has proven its reliability, the 27 countries of the European Union are considering allowing the self-certification of autonomous agricultural vehicles.

### **Design and Operation Prescribed by International Standards**

Autonomous agricultural equipment is designed and tested to international standards that are developed under an open and balanced consensus process. Any materially interested party may participate in the process, allowing all viewpoints and comments to be addressed before the standards are finalized and published.

The International Organization for Standardization (ISO) addresses highly automated agricultural machines (HAAM) in ISO 18497 Agricultural Machinery and Agricultural Machines – Safety of Highly Automated Agricultural Machines – Principles for Design (First Edition, 2018) (Attachment 2). ISO 18497 is a performance-based standard that specifies the principles in the design of self-driving tractors to achieve safe operation. To be compliant with ISO 18497, self-driving tractors must contain, at the minimum, all of the following features into their design:

- A perception system capable of detecting and locating persons or other obstacles relative to the machine;
- A perception system capable of locating and positioning the equipment to prevent unintended excursions beyond the boundary of the working area;
- Be able to ensure that there is no obstacle in the hazard zone prior to moving; Give audible or visual alarms and enter its defined safe state when an obstacle is detected, or an obstacle enters its hazard zone;
- Have the means to enable a local or remote operator to stop or start highly automated operation; and
- Allow for adequate supervision by a local or remote operator.

ISO 18497 is currently undergoing revision, which we anticipate will be complete by the end of 2023. The technical committee will meet at AEM’s headquarters office in Milwaukee, WI in the fall. We invite you to join us for this meeting.

We would also like to invite you to attend FIRA, USA in Fresno, Oct. 18-20. FIRA, USA is the leading industry event in ag robotics, and will host in-field robot demos at the California State University, Fresno campus farm. Attendees will have the opportunity to watch dozens of robots working in real conditions. By bringing this academic community together face-to-face in Fresno, FIRA USA aims to set priorities and focus on solving some pain points.

**Conclusion**

AEM is strongly in agreement that updating this regulation is needed for California to continue to be a world leader in both agriculture and the innovations that support it. AEM looks forward to collaborating with Cal-OSHA to develop a forward looking and effective regulation that ensures California workers have the safe workplace they are entitled to while preparing for the inevitable future that off-road autonomy is ushering in.

If you have any questions, please do not hesitate to contact Jeff Jurgens, AEM’s Director of Product Stewardship at [jjurgens@aem.org](mailto:jjurgens@aem.org) or 414-426-5233.

Sincerely,



Stephanie See  
Director, State Government Relations

AEM members offer their expertise as a resource to you, to provide information about the advancements in autonomous agricultural machinery.

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