Occupational Safety and Health Standards Board

Autonomous Agricultural Tractors Advisory Committee #3

August 6 – 7, 2025

Meeting Notes

These notes document comments, questions, and ideas recorded on large posters displayed throughout the meeting room during the Occupational Safety and Health Standards Board (OSHSB) Autonomous-Agricultural-Tractors third advisory committee convened in Salinas, CA on August 6 - 7, 2025.

As committee members discussed the various topics, their comments and questions requiring further consideration were recorded on these posters. The information has been compiled to preserve the discussion and ideas shared during the meeting.

These notes reflect discussion points and do not necessarily represent committee consensus or formal recommendations.

Poster 1 – "Brainstorming Scope"

- Define by weight, speed, hp?
- Framework that equipment can be used.
- Different based on where employee is intended, not intended to (on vehicle? operating remotely? while autonomous equipment is operating) (employees working in the same area?).
- Limit # of autonomous tractors per operator.
- Weight of vehicle more important for scope?
- What is the human-machine interaction? Possible relevant data is available from Hospital's Autonomous (Autonomous Robots) + other manufactures such as automotive manufacturing.
- Limit scope to equipment we have data on.
- Only allow autonomous vehicles when there is no employee exposure.
- Future-proof regulation – keep broad enough for future tech.
- Remote (tele operation) or on-board safety devices?
- Importance of limiting speed.
- Clarify no employees being polled by autonomous tractor.
- No retro fit kits w/o vs factory fit by Manuf. Approval / Cert IF? Like for R lifts.
- Signs -> "Autonomous vehicles in USE", Spanish, English
- yy – Define scope whether workers are or are not allowed in autonomous vehicle programmed path.

- Define scope to limit mass and speed if autonomous vehicle operates in vicinity of workers on foot.
- Acknowledge different levels of autonomy “similar to DMV” and propose regulations accordingly (Different between autonomous tractors + other equipment).
- Limit equipment to pre-authorized areas where tractor will be operating.
- Limit how close tractor can operate on fully autonomous mode next to public roads, regardless of if still on farm property
    - School zones
    - Residential
    - Any area tractor could interact with humans
- Redundancy Modality System
    - Computer on (onboard) machine vs. connecting (internet connectivity) elsewhere?
    - Evacuate risk to drive/operator
    - Redundant connectivity? (starlink, cellular, etc.)
    - On-board storage of data (black box) + recorded unredactable data + can be authenticated
- Stay within scope of Title 8

Poster 2 – “Brainstorming Scope - 2”

- Regulatory opportunity to create effective deployment of tech for autonomous tractors/equipment
- Minimum standards (3rd party / government agency verification before allowing autonomous mode) for phased deployment of permitted designs per site + task
- Include equipment that is already out there
- Regulate on effectiveness – to of autonomous equipment – enter a safe state vs focusing on weight / speed
- Regulate speed range that autonomous vehicles can operate – guidelines?
- Make sure that software / application is appropriate for equipment / operation.
- Visual indicators (lights) when in autonomous mode (ISO)
- Define autonomy – do we have the resources?
- Who is going to be the recipient of the data?

Poster 3 – “Field Observation Notes”

1. Signage for autonomous vehicle use
2. Horn volume / horn for obstruction
3. Speed limits / guidelines? Based on employee exposure
4. Consensus standards. May have guidance for visual/audio indicators.

Poster 4 – "Stage 1 – Incident data? Near miss, close calls, etc. Data on successful interactions (no injury) summarized."

- Data collection time period based on operational time (not just most recent 12 months)
- Summarized data should include broad range that can be chosen
- All data should be available if there is an incident (Glacial data?)
- Telemetry data
- Stats of categorized data (cars, trees, weeds, obstacles, etc.)
- Look at ISO for criteria data collection
- Include field conditions

Poster 5 – "Data Collection"

A3 – Third party verification

- National recognized testing UL lab.
- Additional labs? Private?
- University of Nebraska?
- Certifying test facilities? Manufacturers could have their own?

A1 – Adequacy of sensors

- Fully functioning?
- Different levels of sensors depending on exposure to employees?

* Concern about safety of open-source code? + minimum safety standards for all employers in industry.

A3 – Permitting permit / variance?

- Stages w & w/o driver
- Need criteria (A1 * A2)?
- Permit for each vehicle?

– Is unit able to have operator on vehicle or another location?

– What type of Equipment was data collected from?

– Not just color of objects for detection.

Poster 6 – "Implications of Data"

- Software updates in functionality?
- Proprietary data (trade secrets?)

    - Who owns it? What can be shared?
    - Grower data, OEM data (dashboards)
- Data from (variance) experimental data should be included.
- 1st layer of data (normal operation) is all data (tire "jams", human detections, object detections)
- 2nd layer is incident specific (hit object, disengagements, close-call, pause operations? Bumper stop [physical contact with object], etc.) (incidents that an operator has to restart tractor.)
- What is stop distance?
- Clear definitions for disengagement, close call and near miss
- Authenticate accuracy of data (digital certificate?)
- Be able to pull specific data for near misses (living vs non-living objects?)
    - Able to provide specific data in categories to differentiate between type of objects (classified into diff. categories)
    - "Near miss" may not indicate that incidents were inevitable.
- Safety success? Look at terms used in Occupational Safety Research needs… publication

Poster 7 – "Brainstorming Scope for Rulemaking"

- Expand regulations to include more than just tractors
- Geofencing to keep tractors within specified area (e.g. 300 away from school zones)
- Restricting access to areas autonomous operations
    - Signs
    - How to allow employees who need to work / support (refuel) tractors
        - Conditions the tractor will not enter autonomous mode
        - Conditions the tractor will exit autonomous mode
    - 2nd layer of lock out for operator – employee must be identified with access to tractor operator
- Future-proof so we don't limit development of new tech – look at operations that are being done
- Look for ways to isolate hazards
- How do tractors identify employees (cameras, employee vest / device?)
    - Proximity sensing tech.

Poster 8 – "Brainstorming Scope – 2 for Rulemaking"

- Low clearance to different/differentiate tractors
- Consider hazards posed to employees
- Distinguish categories based on human interactions, workplaces.

- Remote kill switch?
    - Way for operator to push kill switch in addition to automatic safety devices on tractors?

Poster 9 – “Questions”

- What are maximum speeds of vehicles when operating autonomous?
- How many autonomous vehicles are being used globally?
    - Data limited since there is limited # of autonomous tractors globally?
- Is there data from non-agricultural industries that use autonomous tech?
    - Difference between type of equipment that data was collected from.
- Where should the data be collected?
    - Other states? Worldwide?
    - California only?
    - Industries in California?
    - As many sources as possible?
- Many have similar crops / conditions
    - Should be the same type of data
    - Other than manufacturer?
    - Guards for securing data so it cannot be altered.

Notes on Document Organization

These meeting notes are organized according to the individual posters displayed throughout the meeting room. Each poster is identified by a number for reference purposes and original poster title, reproduced in quotation marks. The numbering and order of the posters and the number used does not indicate priority, sequency of discussion, or relative importance.