

REPORT#: 2020OR02

REPORT DATE: Sept. 01, 2021

INCIDENT HIGHLIGHTS



DATE:

March 16, 2020



TIME:

Between 1:30 and 3:00 PM



VICTIM:

41-year-old Hispanic female farm laborer



INDUSTRY/NAICS CODE:

Grape Vineyards, 111332;
Wineries, 312130



EMPLOYER:

Vineyard & Winery



SAFETY & TRAINING:

Insufficiencies in ATV safe use and agricultural chemical safety



SCENE:

Vineyard



LOCATION:

Oregon



EVENT TYPE:

Caught in/between

Farm Worker Crushed in ATV Rollover During Herbicide Application on a Hillside - Oregon

SUMMARY

On March 16th, 2020, a 41-year-old Hispanic female vineyard technician was killed when the sprayer system equipped all-terrain vehicle (ATV) she was operating rolled over and pinned her underneath. The decedent was part of a small crew, but working by herself applying agricultural chemicals to the lower half of the vineyard, out of sight of co-workers. Co-workers became concerned when she did not return when expected and went to look for her shortly before 3:00pm. They found the decedent underneath the ATV and removed the vehicle to attempt CPR. Emergency responders arrived and pronounced the decedent dead at the scene. There were no witnesses of the rollover event. Blunt force trauma was ruled as the cause of death.

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Insufficient supervision - employee allowed to work in an area not previously assessed for hazards by a competent person.
- Poorly maintained and overloaded ATV.
- Insufficient worksite-specific communication to the worker regarding the hazards of operating spraying equipment on a sloping terrain.
- No training to operate the ATV, or to assess the safety of its load.
- Insufficient training to work with the chemicals being applied.
- Employee working alone in an area with unreliable cellular service.

RECOMMENDATIONS

To help prevent similar occurrences, employers should:

- Ensure a competent person is on site each day employees are present, to identify and mitigate exposure to worksite hazards.
- Maintain and regularly inspect equipment for its operational safety.
- Train employees who are new to a work site or a task to recognize specific hazards unique to the work site or tasks.
- Train employees to operate equipment, and verify and check knowledge and skill level.
- Train employees on the safe use, transportation, and application of worksite chemicals.
- Consider providing emergency locator devices for employees working alone.



Oregon Institute of Occupational Health Sciences • Oregon Health & Science University
3181 SW Sam Jackson Park Rd. L606 • Portland, OR 97239 • 503-494-3940



Oregon Fatality Assessment and Control Evaluation Program

The Oregon Fatality Assessment and Control Evaluation (OR-FACE) Program is a project of the Oregon Institute of Occupational Health Sciences at Oregon Health & Science University (OHSU). OR-FACE is supported by a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH) (grant #U600H008472) through the Occupational Public Health Program (OPHP) of the Public Health Division of the Oregon Health Authority. OR-FACE reports are for information, research, or occupational injury control only. Safety and health practices may have changed since the investigation was conducted and the report was completed. Persons needing regulatory compliance information should consult the appropriate regulatory agency.

OR-FACE supports the prioritization of safety interventions using a hierarchy of safety controls, where top priorities are hazard elimination or substitution, followed by engineering controls, administrative controls (including training and work practices), and personal protective equipment.



SUMMARY

On March 16, between 1:30pm and 3:00pm, a 41-year-old Hispanic female vineyard technician was killed when the all-terrain vehicle (ATV) she was operating rolled over, pinning her underneath. Three co-workers, who became concerned when the decedent did not return when she was expected, went to look for her. One co-worker spotted the ATV lying on its side at the bottom of the lower half of the vineyard, but did not see the decedent. He assumed she went to the service garage to get help, so he went to look for her there. When he did not find her, he returned to the ATV and found her lying underneath the ATV and unconscious. The co-worker yelled for the others, and they pulled the ATV off the decedent, checked for and found no pulse, started CPR, and called 911 and the vineyard operations manager. The Sheriff and emergency responders arrived and took over resuscitation efforts. The decedent was pronounced dead at the scene. The Oregon Occupational Safety and Health Administration (OR-OSHA) was notified within hours of the incident. The investigation revealed several factors that contributed to this workplace fatality, including insufficient supervision, a poorly maintained and overloaded ATV, insufficient worksite-specific communication to the worker regarding the hazards of operating spraying equipment on a sloping terrain, no training to operate the ATV or to assess the safety of its load, insufficient training to work with the chemicals being applied, and the employee working alone in an area with unreliable cellular service.

INTRODUCTION

On March 16, 2020, the decedent arrived for work around 7:00am and met the vineyard manager. This was the first time the decedent had worked at this vineyard section on the estate. The decedent was to apply an herbicide/fungicide mixture along the vine rows, using an ATV modified with a broadcast spraying system. This vineyard was planted on a sloping hillside, with an approximate 6 to 8% grade; the lower half of this vineyard was out of view of employees working in the upper half. Around 12:30pm, the decedent contacted the field supervisor by cell phone for help with a faulty pressure gauge in the sprayer system. The field supervisor met the decedent, replaced the gauge, and left her at approximately 1:30pm. At about 2:45pm, concerned co-workers went to look for the decedent when she did not return to the service garage as expected. Therefore, the estimated time of the incident is between 1:30pm, when the field supervisor left her, and 3:00pm, when co-workers found her underneath the ATV. The Oregon Fatality Assessment & Control Evaluation (OR-FACE) investigator contacted the OR-OSHA Safety Compliance Officer (SCO) by phone on March 19th. Due to travel and in-person meeting constraints brought on by the COVID-19 pandemic, details of this investigation are from phone calls and emails between the OR-FACE investigator and the OR-OSHA SCO, as well as investigation notes and photos taken by the OR-OSHA SCO or the County Sheriff.

EMPLOYERS

The employer owns and operates an estate with several vineyards and a winery. The employer has been in operation for over 20 years and employs approximately 40 people full-time. The company founder also owns a labor contracting firm, and uses this separate company to recruit and hire seasonal labor to work at the vineyards and the winery. The number of seasonal employees can vary from 5 to over 100, depending on the needs of the vineyard. Nine months prior to the incident, the employer promoted the mechanic at the main service garage to the position of vineyard manager. The mechanic position, responsible for maintaining equipment and vehicles, was left vacant until the day of the incident. The vineyard manager (the former vineyard mechanic) had not visited the vineyard section where the incident occurred and was not a certified pesticide applicator or state/federal approved trainer. The field supervisor, who reported to the vineyard manager, was the direct supervisor of the decedent and the last person to see her alive.

WRITTEN SAFETY PROGRAMS and TRAINING

The employer had a written safety policy in an employee handbook, and provided the OR-OSHA SCO with written records of employee safety training. During the OR-OSHA investigation, the decedent's supervisor (field supervisor) informed the SCO he had provided verbal, but not written training to the decedent on the operation of the ATV-mounted sprayer system she was assigned to operate. The field supervisor stated that the employer has videos on the safe use of chemical applications by farm workers, as outlined in the Worker Protection Standard (WPS; 40 CFR 170), and administered by the U.S. Environmental Protection Agency (US EPA), under authority granted by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA; 7 USC, §136 et seq). The videos were available in Spanish. However, the field supervisor did not know if the decedent had viewed the required video training. Employers are required to ensure agricultural workers and handlers receive annual training on how to mix, store, apply, and dispose of biocidal chemicals safely. The employer provided WPS training records from 2017, but no annual WPS training records were available for subsequent years, including the year in which the incident took place. The vineyard manager stated he was unaware WPS training was required to apply herbicides. The employer held monthly safety meetings, as required in Oregon, and the previous month's safety meeting training, which the decedent attended, was on tractor safety training for operating on hillsides, but it was not specific for ATVs or ATV-mounted sprayer systems. The vineyard manager stated he had seen the decedent operate ATVs at other vineyards within the estate. The employer did not maintain vehicle safety inspection or maintenance records for the ATV involved in the incident.

WORKER INFORMATION

The decedent was a 41-year-old Hispanic female vineyard technician and pesticide handler, and started work on January 10, 2020. A vineyard technician is responsible for vine cultivation activities, such as pruning, tying and thinning vines, weeding and spraying herbicides/pesticides, and harvest activities. The decedent had worked at other employer-owned vineyard locations from January 10 through March 12 and her responsibilities during this time period did not involve operating ATV-mounted sprayer systems. Co-workers reported that the decedent had prior farm labor experience before she began working at the vineyard where the incident happened, and that she had previous farm tractor experience, but she was not experienced in operating ATV sprayer systems. The day of the incident was the first day she had worked in the vineyard where the incident occurred, and was the first time she had operated an ATV-sprayer system.

WEATHER

On the day of the incident, the weather changed from 35°F, partly cloudy with no wind at 7:00am, to 58°F and clear skies, with an east-northeast wind blowing ~20-25 miles per hour (mph) and gusts to 30 mph at the estimated time of the incident (1:30-3:00pm) (Weather Underground, 2020). The decedent was spraying the last row of vines, which would put the decedent downwind of any overspray. The previous week, it had snowed at the vineyard section where the incident occurred, and the melting snow made the ground soft and muddy in low spots. Weather and soil conditions were possible contributing factors in this incident.

INCIDENT SCENE

The incident occurred on a hillside in the lower half of the vineyard that was not visible to the decedent's co-workers. The vineyard section is approximately 20 acres. The terrain was sloped approximately 6-8% and uneven. The vegetation adjacent to the vine rows had not been mowed recently, which deviated from the employer's standard procedure of mowing prior to spraying activities so that workers have a better awareness of the slope and unevenness of the terrain.

The hillside sloped east to west, with the downslope on the west side. The decedent was driving south along the western-most (i.e., last) row of the lower half of the vineyard when the incident occurred (See Image 1). According to the Sheriff's report, there was a sunken grade at the bottom of the lower half of this vineyard, approximately at the midpoint of the vine rows. This sunken grade could have caused the right side of the ATV to drop 3-4 inches (See Image 1).

The decedent and ATV were found 10-12 feet downhill from the point of the last ATV tire tracks (Sheriff's report). Co-workers found the decedent underneath the overturned ATV in this sunken grade area. The ATV location and position in the Image 1 was where it settled when co-workers lifted it off the decedent so they could render aid.

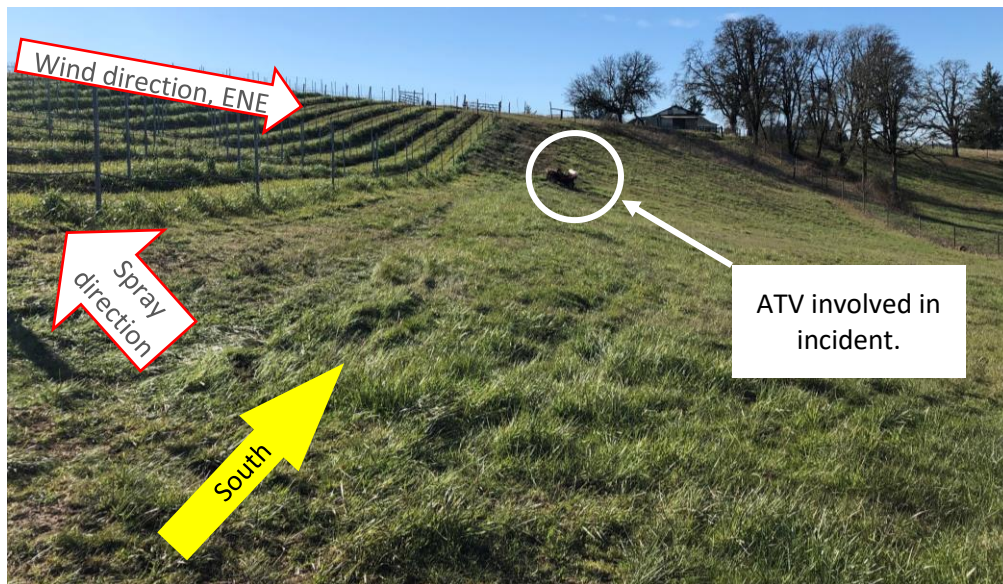


Image 1. Incident scene. Hillside slopes East to West, with West on the downslope. Decedent was operating ATV with broadcast spray system, driving south along last row of vines. ATV was lifted off decedent by co-workers and placed in the location in this image.

INVESTIGATION

From January 10 to March 9, 2020, the decedent was working in a different vineyard section from where the incident occurred, pruning and tying vines. From February 17 to March 12, the decedent was also assigned to spray herbicides using an ATV sprayer system at that same vineyard. The field supervisor said he provided a verbal overview to the decedent on how to operate the ATV and the sprayer system she would be using before she began that work. On March 13, the decedent received a group text message from the field supervisor, informing her she would be spraying herbicide on March 16 in the vineyard where the incident occurred. On March 16, 2020, the decedent showed up for work around 7:00am and met the vineyard manager (the former mechanic).

The decedent and three other co-workers were assigned to work in this vineyard. The decedent was assigned to operate a 2012 Honda TRX-420 Rancher FPM model (4-wheel drive, manual shift, power steering) ATV with a 450cc engine. According to the decedent's field supervisor, ATV operators are instructed not to exceed 5 mph because the

Oregon Institute of Occupational Health Sciences • Oregon Health & Science University
3181 SW Sam Jackson Park Rd. L606 • Portland, OR 97239 • 503-494-3940

speed of the vehicle is an important factor for the effectiveness of spraying applications (along with the spray pressure and other factors). However, the ATV was not modified with an inhibitor to ensure speed did not exceed 5 mph.

The decedent was applying a broad-spectrum herbicide for broadleaf and grassy weeds, mixed with a fungicide. Both the herbicide and fungicide are registered under FIFRA for use in grape production. According to the safety data sheets, the herbicide is approximately 25% glufosinate-ammonium and is an acute skin irritant, harmful if swallowed or absorbed through the skin, and can cause eye and inhalation irritation. Chronic effects of exposure also include neurotoxicity (herbicide SDS, 2015). The fungicide is 80% sulfur, and may cause eye and skin irritation (fungicide SDS, 2006).

A 20-gallon Spotlyte™ Model SL-6800-60 polypropylene pressurized tank was secured to the cargo area of the ATV (See Image 2). The Spotlyte™ broadcast sprayer system operates at 60 PSI and distributes 1.4 gallons per minute of aerosolized liquid. The ATV involved in the incident had been modified so that the main hose from the tank connected to a y-valve in which two hoses led to spray nozzles secured to metal booms on either side of the front of the vehicle (See Image 3). The booms were attached to a metal frame on the front of the ATV by a metal spring with carabiner-type fasteners at either end of the spring (See Image 3). The decedent had mixed the chemicals at the chemical mixing area of the field service garage. The chemical manufacturer procedures specify partially filling the tank with water through the fill port on top of the tank, adding the chemicals, then topping off the tank and closing the fill port.



Image 2. Spotlyte™ tank attached to cargo area of ATV involved in incident. Note the liquid level in the tank indicates the slope of the terrain (red arrow).



Image 3. Front view of ATV modified with herbicide sprayer apparatus.

After lunch with her co-workers, the decedent filled the spray tank on the ATV involved in the incident and drove the ATV to continue spraying activities, working toward the lower elevation part of the vineyard section. At approximately

1:00pm, the wind had change direction and speed, from a 6-9 mph north-northwest wind, to a ~20-25 mph east-northeast wind, with gusts of ~ 30 mph (Weather Underground, 2020).

At approximately 12:30 pm, the decedent contacted the field supervisor, requesting assistance with the pressure gauge on the sprayer system that was malfunctioning. The field supervisor met the decedent in the vineyard section and replaced the pressure value at approximately 1:30pm and returned to the field service garage.

At 2:45pm, the decedent's three co-workers in the higher elevation half of the vineyard became concerned when the decedent had not returned so they decided to go look for her. One co-worker saw the ATV lying on its side below the last row of vines in the lower section, but did not see the decedent and assumed she had walked back to the field service garage to get help. When he did not find the decedent in the garage, he walked back to the overturned ATV, which was when he saw the decedent's leg sticking out from underneath the vehicle. The co-worker ran up the hill and yelled for help from the other two co-workers, who ran down the hill and lifted the ATV off the decedent, who was lying on her side in what appeared to be a defensive fetal-like position. The co-workers checked for a pulse, administered CPR, and called 911 and the vineyard manager. First responders were County Sheriff officers and fire and rescue personnel. The emergency responders declared the decedent dead at the scene, with a time of death between 1:30 and 3:00pm.

During the OR-OSHA investigation, co-workers stated they are given maps of the vineyards where they were assigned to work, but they were not informed of sections of the vineyards that had hazardous sloping terrain and were unsafe to drive the ATV sprayers. The vineyard manager, who was designated as the competent person by the employer, said he goes out into the fields to inspect for hazards, but not in an organized fashion. He also stated he had not inspected the vineyard where the incident occurred and was not aware of the hazardous sloping terrain in this vineyard, as he relies on workers to inform him of such hazards. The vineyard manager speculated the decedent was heading south on the ATV and spraying the herbicide/fungicide mixture on the last row of the sloped hillside because when he inspected the ATV after the incident, the left nozzle was turned on and the right nozzle was turned off, indicating she was spraying a single row. One co-worker stated that when applying chemicals to this section of the vineyard in the past, he used a handheld spray gun and covered the area on foot because he thought the terrain was unsafe to use an ATV. It is not known if this information was communicated to the field supervisor or vineyard manager prior to the decedent being assigned to work in this vineyard section.

The ATV manual states that ATVs should be inspected before every use and to "perform all recommended maintenance." (2012 Honda TRX-420 FPM user manual, page 4). Co-workers stated there was no written procedure for reporting issues with agricultural equipment, including ATVs used for vineyard transport or ATVs used in spraying operations. There was also no process for scheduled maintenance. Some equipment, including the ATV involved in the incident, needed repair. The ATV involved in the incident had several reported issues including brakes not functioning at full capacity; the vehicle sometimes accelerating on its own; and the engine overheating, shutting off while going uphill, or continuing to run after the machine had been shut off. Co-workers did not know if these issues had been fixed prior to the incident because the mechanic employed by the vineyard was promoted to vineyard manager in July 2019 and the vineyard had been without a mechanic until a new mechanic started on March 16, 2020, the day of the incident. The field supervisor said the ATV involved in the incident was scheduled to be replaced, but was allowed to be used in the meantime. The field supervisor said he relies on employees to let him know if they are not comfortable using equipment. The mechanic who was hired the day the incident occurred, inspected the ATV post-incident and reported the machine was in first gear at the time of the incident; the front brakes were working at 50%, but the back brakes were not working because they were out of adjustment. The front brakes have more stopping power, but using the front brakes to stop while on a downward slope could potentially throw the rider over the handlebars or increase the

risk of a vehicle rollover (SAIF, 2018). As there were no witnesses, it is not known if the ATV rolled sideways pinning the decedent underneath, or if the ATV flipped forward, flinging the decedent over the handlebars, then falling onto her.

The ATV manual states the load limit for the ATV involved in the incident is 485 pounds, which includes the rider, cargo and accessories (page 48). The load limit for the rear cargo area is 133 pounds (page 48). The dry weight of the broadcast sprayer system was 39 pounds, confirmed by the OR-FACE investigator via a phone call to a local distributor (Prima Industries, Newberg, OR), who took a new unit out of the box and weighed it. The weight of herbicide mixture in a full tank was estimated at 207-211 pounds by the OR-OSHA SCO and the OR-OSHA Lab Manager (total weight of sprayer plus mixture = 246 to 250 lb.), based on the safety data sheets for each of the products used by the decedent on the day of the incident. The vineyard manager stated the tanks are filled completely at the chemical mixing area, prior to herbicide application. Therefore, when the decedent left the field garage to apply the herbicide in the lower field section, the spray system and payload in the rear cargo area likely exceeded the manufacturer's weight limit for the rear cargo area by 113-117 pounds.

Communications in the field were via text on personal mobile phones. The employer did not provide communication devices or emergency locator devices to employees working alone or in isolated areas. Co-workers said cellular reception was spotty in some areas of the vineyard, including the vineyard section where the incident occurred. Co-workers said the vineyard manager or field supervisor would drive to a vineyard section where employees were working, but would sometime leave the area without speaking to any of the employees.

Co-workers of the decedent stated they had received training pertaining to farm tractors and equipment trucks, but had not received training on the safe operation of the ATVs modified with the broadcast sprayer systems. When they were first hired, the field supervisor asked if they had operated an ATV sprayer before and if they were comfortable using the equipment. If employees told the field supervisor "yes" to both questions, no other conversations took place about the safe use of the ATV sprayers. Presumably, if employees answered "no", they would receive training. One employee interviewed by the OR-OSHA SCO remembered he had watched a video on the safe use of ATVs in 2017, but had been operating ATVs at employer vineyards prior to watching the video. The most recent ATV safe operation training took place in March 2018. Two co-workers said they thought the decedent did not have much experience with ATVs because on the morning of the incident, they noticed the decedent was having trouble putting the ATV into reverse. Co-workers also were concerned the decedent might have difficulty balancing or controlling the ATV due to her relatively small physical stature. The vineyard manager told the OR-OSHA SCO there was a form to record ATV safety training, but he had not had time to go over the form with employees. Employees were never given the user manual of the ATV to review for safe operation, and the ATV manual provided to the OR-OSHA SCO was in English only.

The ATV user manual includes instructions on the safe use of the vehicle and recommends operators take time to learn and practice, even if they have operated similar ATVs in the past (page 2). The manual urges operators to take a safety course offered by the ATV Safety Institute (<https://atvsafety.org/>). The ATV user manual also recommends operators "should always wear a helmet" while in use (page 2). The employer purchased helmets in 2019, but the helmets were stored at the main vineyard service garage/shop, not in the field service garage. Co-workers of the decedent said they were never informed they should wear a helmet when operating an ATV; the decedent was not wearing a helmet.

Several co-workers of the decedent said they had not received any training related to the handling of herbicides, fungicides, or pesticides. The field supervisor stated he thought employees watched a video on mixing and applying these chemicals safely, but had not provided this training himself. The field supervisor also stated he did not think the decedent had watched this video and the vineyard manager confirmed that she had not. The vineyard manager stated that while he was aware the employer possessed WPS training videos, he was not aware WPS training was required for

employees applying herbicides. The vineyard manager was not a certified trainer or a licensed pesticide applicator, which is a required WPS qualification for trainers of agricultural workers (WPS; 40 CFR 170).

The safety data sheet for the herbicide/fungicide mixture recommends wearing long sleeved shirt, long pants, shoes plus socks, chemical-resistant coveralls over clothing, and chemical-resistant gloves. For spraying applications, employers are required to provide and ensure employees wear safety glasses with brow and side shields or safety goggles (40 CFR 170.507(b)(7)). The OR-OSHA SCO noted that safety glasses supplied to employees (including the decedent) did not have the required brow and side shields, and on a windy day while spraying herbicide, could have put the decedent at risk of chemical spray exposure to her eyes, leading to eye irritation and impaired vision.

CAUSE OF DEATH

According to the Medical Examiner report, the cause of death was blunt force trauma. An autopsy and toxicological screen were not ordered by the Medical Examiner.

CONTRIBUTING FACTORS

The unrecognized hazards or inadequately controlled exposures that contributed to this incident include:

- Insufficient supervision - employee allowed to work in an area not previously assessed for hazards by a competent person.
- Poorly maintained and overloaded ATV.
- Insufficient worksite-specific communication to the worker regarding the hazards of operating spraying equipment on a sloping terrain.
- No training to operate the ATV, or assess the safety of its load.
- Insufficient training to work with the chemicals being applied.
- Employee allowed to work alone with unreliable cellular service.

Occupational injuries and fatalities are typically the result of one or more immediate contributing factors or key events that are part of a larger context or sequence of events. While the direct cause of death was being crushed by the ATV when it rolled over onto the decedent, there were several indirect or upstream contributing factors that led to the employee being exposed to the fatal hazard. In addition to exposure to mechanical, chemical and environmental hazards, there were several training insufficiencies. Recognizing and controlling exposure to these hazards may have prevented this tragedy.

RECOMMENDATIONS/DISCUSSION

- **Recommendation #1: Ensure a competent person is on site each day employees are present, to identify and mitigate exposure to worksite hazards.**

Discussion: Employers are required to designate a competent person who has the knowledge and ability to identify and mitigate workplace hazards, which can reduce or eliminate worker exposure to such hazards. In Oregon, a competent person in agriculture is defined as “a person who, because of training and experience, can identify existing and predictable hazards in equipment, material, conditions or practices; and who has the knowledge and authority to take corrective steps.” (OAR 437-004-0100). A competent person is required to “inspect every place of employment [involved in agriculture] at least quarterly.” (OAR 437-004-0099(3)). The initial inspection each site where employees will be working should include a Job Hazard Analysis (JHA), which can reduce or even eliminate worker exposure to workplace hazards. OSHA has published a guide for employers on how to conduct a JHA that includes forms and checklists (OSHA, 2002).

In agriculture, the type and intensity of workplace hazards can change over time, and sometimes rapidly. Ground conditions can change from dry and stable to muddy and slippery from a passing spring rain, including the potential for erosion. Plant growth can hide uneven terrain or terrain conditions. Also, wind shifts need to be taken into consideration when employees are engaged in chemical spraying activities. Oregon requires employers to “provide all health hazard control measures necessary to protect the employees’ health from harmful or hazardous conditions” [and] “inform employees about the known health hazards to which they are exposed, the measures taken for the prevention and control of those hazards, and the proper methods for using the control measures.” (OAR 437-004-0099(e and f)). In agriculture settings, it is especially important the employer designate person(s) who are on site where employees are working, who can competently identify hazards in a timely manner, and who have the authority to stop or redirect work if needed, to reduce risk of worker injury or illness, especially if environmental conditions change quickly.

In this incident, the vineyard manager (the employer’s designated competent person) was responsible for multiple vineyard sections spread across several hundred acres. Assessing and mitigating workplace hazards across such an estate requires more than one person be trained and available as a competent person, including hiring and training additional field supervisors for hazard assessment and workplace supervision. If a competent person had inspected the vineyard where the incident occurred, and assessed the hazards of spraying operations on the sloping hillside, or spoken with employees who had previously worked in that area who felt it was safest to be sprayed on foot, the rollover hazard could have been identified and addressed with workplace policies (i.e., by requiring on-foot spraying in that portion of the vineyard). When chemical spraying is in process, a competent person should also monitor and consider weather conditions and adjust or stop work accordingly if weather changes, such as change in wind speed or direction that might put workers at increased risk of chemical exposure from overspray.

In this incident, the size and scope of the vineyard operations made it difficult or impossible for the vineyard manager to fulfill his role as the single competent person for all vineyards where employees were working. It is the employer’s responsibility to ensure there are an adequate number of competent people at worksites where employees are working in order to assess workplace hazards and mitigate employee exposures. This includes assessment of the adequacy of the management and supervisory structure of the organization, the adequacy of total management and supervisory full-time equivalents, and the training and qualifications managers and field supervisors.

- **Recommendation #2: Maintain and regularly inspect equipment for its operational safety.**

Discussion: ATVs are increasingly used in agriculture in lieu of tractors and other farm equipment. In 2001, on the estimated 1.6 million farms in the U.S., there were more than 850,000 ATVs being used in agriculture (Neves, Brazile, and Gilkey, 2018). ATVs may be easier to use, more maneuverable, and more cost-effective to use than tractors, but can also increase the risk of a rollover “due to a high center of gravity and a relatively narrow wheelbase.” (NIOSH, 2012). According to a federal OSHA Safety Fact Sheet, from 2003 to 2011, 60% of the 321 ATV-involved work fatalities occurred in agriculture (OSHA, 2015). In that same time period, there were 2,090 ATV-involved work-related injuries in agriculture (OSHA, 2015).

The condition of any vehicle is a critical factor for worker safety. While ATVs are not explicitly listed as agricultural equipment or vehicles, Oregon requires ATVs used in agriculture to be in good working order before being put into use, and prohibits anyone from operating an unsafe vehicle (OAR 437-004-3410(3)(a)(A)). Brakes must be in safe working condition that can control them while fully loaded on any terrain where they are operated (OAR 437-004-3410(4)(d)(A and C)).

Oregon Institute of Occupational Health Sciences • Oregon Health & Science University
3181 SW Sam Jackson Park Rd. L606 • Portland, OR 97239 • 503-494-3940

The National Institute for Occupational Safety and Health (NIOSH) recommends establishing “operating and maintenance policies that follow manufacturer’s terrain guidelines, specified hauling and towing capacity, and passenger restrictions” for ATVs at work (NIOSH, 2012). Routine maintenance schedules, lockout/tagout procedures for vehicles and equipment, and maintenance/repair records are part of the recommended practices for employers to ensure a safe working environment. There are several farm vehicle/equipment maintenance guides, checklists, software and services available online. For example, the Oregon Farm Bureau published a safe workplace guide that includes a checklist for operation and maintenance of agricultural vehicles (OFB, 2017).

Vehicle loading is another critical factor of operator safety. Oregon rules for ATV use in agriculture specify “Do not overload any vehicle. Keep loads stable and well balanced.” (OAR 437-004-3410(3)(a)(I)). Rigid mounted equipment in the ATV cargo area changes the center of gravity of the vehicle and can increase the risk of a side overturn (USDA, 2021). Liquid loads, like the spray tank payload in use in this incident, present additional challenges. When working on sloped terrain, the weight of the liquid shifts to the downhill side, creating potentially greater vehicle instability (SAIF, 2015). Using a trailer-mounted tank (**Image 4**) is more stable alternative to an ATV-mounted tank. The ATV involved in the incident was rated for 850 pounds of tow load capacity, which was over 4 times more load capacity than front and rear cargo areas combined. Towing a trailer-mounted tank also puts the chemical emissions behind the worker, rather than in front of the worker in this incident.



Image 4. spraying system mounted on a trailer, hitched to an ATV. (Photo credit: OSHA, 2015).

In this incident, the employer did not have a written procedure for reporting issues with vehicles/equipment and experienced a 9-month gap in vehicle/equipment maintenance and repair due to the vineyard mechanic position not being filled until the day of the incident. The ATV involved in the current incident had several reported mechanical problems (e.g., vehicle accelerating its own; engine overheating or shutting off while going uphill; engine continuing to run after being shut off) as well as post-incident confirmation of inadequate brake performance. The employer did not check the ATV user manual to assess if the ATV sprayer systems exceeded the manufacturer’s load limit, which it did. In the current case, the ATV with a cargo-area mounted tank would have needed to be consistently underfilled to stay within load limits. The cargo-mounted system, with fluid and

weight shifting over the rear wheels of the ATV, was also a much less stable and less safe option than a trailer mounted system for the task and terrain.

- **Recommendation #3: Train employees who are new to a work site or a task to recognize specific hazards unique to the work site or tasks.**

Discussion: The employer should identify and mitigate workplace hazards and ensure employees (especially employees who are new to a worksite) have adequate training on limiting exposure to hazards associated with each task they perform. Training must be provided by a competent person who can instruct employees how to recognize hazards and ways to prevent or limit exposure. In agricultural operations in Oregon, “Employers must require employees to demonstrate their ability to work safely and ensure they follow safe operating procedures.” before they can engage in such tasks (OAR 437-004-0099(2)). In addition to providing training, employers should perform knowledge or task demonstration checks to verify employees have understood the training, recognize hazards work site and task hazards (especially new work sites and tasks), and perform tasks safely. Knowledge and skill verification should include the employee demonstrating under supervision the new task or a familiar task in a new work site. Employers should also ensure employees know they have the right to stop work if they feel it has become dangerous (29 CFR 1977.12).

In this incident, the sloping terrain of the lower vineyard section was known to some employees as an occupational hazard, but not assessed and mitigated by a competent person through policies and procedures (e.g., requiring spraying on foot or requiring trailer mounted spray systems in that area). The ATV cargo area was overloaded, and the liquid in the tank was also a potential further destabilizing force while operating the ATV on a slope. The decedent had never worked in this vineyard section before, so she was likely unaware of the increased risk of ATV roll-over where she was working. Further, the weather posed the additional potential hazard of pesticide spray drift during the time of the incident. The primary responsibility belongs with the employer to assess and suspend spraying operations when weather conditions might require it. The employer should also ensure employees understand they can stop work on the task and contact a supervisor if the employee feels the working conditions are, or have become, unsafe.

- **Recommendation #4: Train employees to operate equipment, and verify and check knowledge and skill level.**

Discussion: Employers are responsible that employees know how to safely operate equipment while on job. Employers must also maintain training records and renew training at least annually or when it is warranted due to equipment upgrade/replacement or when the equipment is used for the first time in a new area. In the current case the employer had ATV training videos available, but witnesses commented that worker access to that training was limited and highly inconsistent.

To operate agricultural equipment in Oregon, employers are required to:

- 1) “Instruct every employee on their initial assignment about the safe operation and servicing of all equipment they will use. Renew this instruction at least annually.” (OAR 437-004-1910(3)(a)).
- 2) “See that workers are properly instructed and supervised in the safe operation of any machinery, tools, equipment, process, or practice that they are authorized to use or apply” (OAR 437-001-0760(a); and
- 3) “[ensure that] Only trained and authorized employees may operate any vehicle.” (OAR 437-004-3410(3)(a)(B)).

In Oregon, an ATV is defined as a Class I all-terrain vehicle: 50 inches or less in width; a dry weight of less than 1,200 pounds, uses handlebars for steering, and has a seat designed to be straddled by the operator (ORS 801.190.1-6). The OSHA agriculture standard on roll-over prevention systems (ROPS) pertains to tractors (29 CFR 1928.51), not ATVs,

although ATVs are likely being used in place of small tractors. Thus, while the ROPS regulation is not specific to ATVs, employers should consider it best practice to install ROPS on ATVs that are used in place of tractors for agricultural activities. This especially applies to farming operations on rolling and sloped terrain.

As of January 1, 2014, ATV safety training is required for ATV operators of all ages in Oregon when operating on non-farmlands open to public use (OR OPRD, 2021). The ATV safety training is free of charge and publicly available online, although registration is required (OR OPRD, 2021). Operators are issued an ATV Safety card upon completion of the ATV safety training course. Although there is currently an exemption for ATVs used in agriculture, employers should consider it best practice to ensure employees operating ATVs complete this training.

Employers are required to provide training to employees in a language they understand so they know how to safely operate equipment. This includes training on how to identify and stay within ATV load limits, especially liquid loads that can cause ATV instability when the liquid shifts in the tank. Employers should also have written procedures in place to confirm the knowledge transfer, skill, and ability of employees who are new to a task or work site.

- **Recommendation #5: Train employees on the safe use, transportation, and application of workplace chemicals.**

Discussion: Scenarios where agricultural workers are at risk of exposure to harmful chemicals include mixing chemicals for spray applications; performing or being in proximity to chemical application activities; and handling treated crops. In the current case, the arrangement of the ATV spray system and weather made wind-blown chemical exposures and eye irritation possible. While speculative at this point, such an exposure could make safe vehicle operation more difficult. Under the Agricultural Worker Protection Standard, employers are required to ensure agricultural workers, including pesticide handlers, receive annual training on the hazards and safe use for each agricultural chemical in which they may become exposed (40 CFR 170.130(a)). Pesticide handlers, i.e., those who mix, load or apply pesticides, must receive additional training specific to the task. The training must be US EPA approved and provided by someone with a current pesticide applicator's license. The training can be presented orally, in written form, or audio-visually, but must be presented in a manner that workers can understand (40 CFR 170.401(c)). Training in a worker's first language may be required to achieve understanding when English is not their first language. The training must include 1) where, when and in what form pesticides are used at work; 2) the hazards of each pesticide resulting from exposure, including acute and chronic effects; 3) the routes through which the pesticide can enter the body; 4) signs and symptoms of pesticide poisoning; 5) how to obtain emergency first aid; and 6) hazards from drift (i.e., overspray), or residues on clothing (40 CFR 170.130(d)(4)).

Employers must provide access to chemical-specific information for workers and handlers, in a language each employee understands, at a central location during normal work hours, including 1) a current EPA WPS safety poster; 2) the names of agricultural chemicals used at each work site; 3) the safety data sheet (SDS) for each pesticide applied at work; 4) and the location of PPE and decontamination supplies. Employers must maintain training records for two years (40 CFR 170.501(d)).

Employers must also provide PPE specified in the SDS for the chemical's intended use. The PPE requirements are based on a risk assessment, conducted by the agricultural chemical manufacturer and required by the US EPA, based on the toxicological properties, intended use, and foreseeable misuse of the chemical. This information provides the basis for the US EPA risk management measures to control worker exposure to hazardous chemicals.

In this incident, the employer lacked a certified pesticide applicator to provide required WPS training. Importantly, a person with this credential may have advocated for the employer to consistently provide safety glasses with the required brow and side shields, as well as investing in trailer-mounted application systems, which place the spray behind

workers, instead of in front of them. The availability of a person with this credential would have also increased the chances that all those involved in applications knew that both herbicide and fungicide SDSs categorized the chemicals as skin and eye irritants, and the importance of having access to and using safety glasses with brow and side shields. The PPE required for mixing or applying these chemicals included chemically resistant overalls, glove, safety glasses with side shields, and a dust mask. The fungicide SDS specifies using a NIOSH-approved respiratory equipment where airborne exposure is likely (fungicide SDS, 2006). The employer did not ensure the decedent had received the required WPS training before she was assigned to mix and spray the herbicide/fungicide mixture. The employer also did not consistently have the appropriate PPE available where employees were working with agricultural chemicals.

- **Recommendation #6: Consider providing emergency locator devices for employees working alone.**

Discussion: It is not uncommon for agricultural workers (i.e., those employed in the production of agricultural commodities) to perform tasks in isolated areas or to work alone. In Oregon, employers are required to “Use a procedure, appropriate for the work, to check on the well-being of workers whose duties require them to work alone or in isolation.” [and to] “Instruct all workers about the procedure.” (OAR 437-004-0099(2)(d)). In this incident, the employer’s employee handbook had a section on safe work practices, but there was no mention of a policy regarding the company’s procedures for checking on the well-being of employees working alone or in isolated areas. Employees received information about their work assignments via text to their personal mobile phones, and contacted field supervisors via text when there was an equipment malfunction.

Employers who rely on mobile phone for communication and to perform well-being checks of employees should consider if cellular coverage is adequate in all areas where employees are working. Employers should also consider and plan for emergency situations when a lone/isolated employee may become incapacitated and unable to call for help. Employers should incorporate a lone/isolated worker protection plan into company policies that includes establishes an employee check-in procedure using technology that will work in remote areas without sufficient cellular coverage, such as radios. The employer should ensure employees working alone or in isolated areas are sufficiently trained on the lone/isolated worker procedures and can operate any communications technology provided. There are several products and services available, including 2-way radios, cellular signal boosters, GPS, and satellite communications. Some devices are equipped with a panic button that sends an alert to designated phones or emails, and/or emergency services. Other check-in devices can send automated warning/duress messages automatically in the absence of activity. In addition, employers should have a check-in policy at the beginning and end of any task where an employee is isolated or working alone.

It is unknown if the decedent would have had enough time to trigger a panic button before she lost consciousness if she had been issued an emergency locator device. However, it is plausible that her field supervisor and co-workers would have been able to find her sooner with such a device, or if a scheduled radio-based check-in had been missed.

ADDITIONAL RESOURCES

Agricultural Safety Fact Sheet: All-Terrain Vehicle Hazards during Farm Work. Occupational Safety and Health Administration, Publication DSG-FS-3578. July 2015. Retrieved from <https://www.osha.gov/Publications/OSHA3758.pdf>.

All-Terrain Vehicle (ATV) Safety at Work. National Institute for Occupational Health and Safety, Publication No. 2012-167. Retrieved from <https://www.cdc.gov/niosh/docs/2012-167/pdfs/2012-167.pdf>.

How to Comply with the 2015 Revised Worker Protection Standard for Agricultural Pesticides. US EPA Guidance Document. <http://www.pesticideresources.org/wps/htc/htcmanual.pdf>.

Oregon Institute of Occupational Health Sciences • Oregon Health & Science University
3181 SW Sam Jackson Park Rd. L606 • Portland, OR 97239 • 503-494-3940

Oregon ATV Safety Education Online Course. <http://www.rideatvoregon.org/>.

Oregon Institute of Occupational Health Sciences Resource Directory. <https://apps.ohsu.edu/oregon-institute-occupational-health-sciences/resources/>

Oregon Healthy Workforce Center. <https://www.ohsu.edu/oregon-healthy-workforce-center>.

USDA, 2021. All-terrain vehicle safety training. Agricultural Research Service, Northeast Area, U.S. Department of Agriculture. Retrieved from <https://www.ars.usda.gov/northeast-area/docs/safety-health-and-environmental-training/all-terrain-vehicle/>.

DISCLAIMER

Mention of any company or product does not constitute endorsement by Oregon FACE program (OR-FACE) or the National Institute for Occupational Safety and Health (NIOSH). In addition, citations to websites external to OR-FACE or NIOSH do not constitute endorsement of the sponsoring organizations or their programs or products. Furthermore, OR-FACE or NIOSH are not responsible for the content of these websites. All web addresses referenced in this document were accessible as of the publication date.

REFERENCES

2012 Honda TRX-420 FPM owner's manual. Retrieved from <https://www.manualslib.com/manual/860790/Honda-2012-Trx420tm.html>.

29 CFR 1928.51. Roll-Over Protective Structures. Oregon Administrative Rules for Agriculture, Order 2-2018.

29 CFR 1977.12. Discrimination against Employees under OSHA Act of 1970: Exercise of any Right Afforded by the Act. Retrieved from <https://www.osha.gov/laws-regs/regulations/standardnumber/1977/1977.12>

40 CFR 170.130(a). Standards for Workers: Pesticide Safety Training for Workers. Worker Protection Standard, U. S. Environmental Protection Agency.

40 CFR 170.130(d)(4). Standards for Workers: Pesticide Safety Training for Workers, Training Material Requirements. Worker Protection Standard, U. S. Environmental Protection Agency.

40 CFR 170. Worker Protection Standard, U. S. Environmental Protection Agency. Retrieved from <https://www.ecfr.gov/cgi-bin/text-idx?SID=6942b67fbc68b31428dfe72409f7b76c&mc=true&node=pt40.26.170&rgn=div5>.

40 CFR 170.401(c). Requirements for Protection of Agricultural Workers: Training Requirements for Workers. Worker Protection Standard, U. S. Environmental Protection Agency.

40 CFR 170.507(b)(7). Personal Protective Equipment, Employer Responsibilities for Providing PPE, Protective Eyewear. Worker Protection Standard, U. S. Environmental Protection Agency. Retrieved from <https://www.epa.gov/pesticide-worker-safety/agricultural-worker-protection-standard-wps>.

40 CFR 170.501(d). Requirements for Protection of Agricultural Pesticide Handlers: Training Requirements for Handlers, Recordkeeping. Worker Protection Standard, U. S. Environmental Protection Agency.

ATV Safety Institute. <https://atvsafety.org/>.

Cheetah™ SDS. Retrieved from <https://www.greenbook.net/nufarm-americas-inc/cheetah>.

Federal Insecticide, Fungicide and Rodenticide Act, registration and safe use of pesticides, herbicides and fungicides. 7 USC 19, §3 -19. Retrieved from <https://www.epa.gov/laws-regulations/summary-federal-insecticide-fungicide-and-rodenticide-act>.

Microthiol Disperss™ SDS. Retrieved from <https://www.greenbook.net/united-phosphorous/microthiol-disperss>.

Neves, H., Brazile, W., and Gilkey, D. P., (2018). "ATVs and Agriculture: A Review of the Literature." *Acta Scientifical Agriculture*, 2(10): 178-194). Retrieved from <https://actascientific.com/ASAG/pdf/ASAG-02-0215.pdf>.

NIOSH, 2012. All-Terrain Vehicle (ATV) Safety at Work. National Institute for Occupational Health and Safety publication No. 2012-167. Retrieved from <https://www.cdc.gov/niosh/docs/2012-167/pdfs/2012-167.pdf>.

OAR 437-004-3410(3)(a)(A). Vehicles: General Requirements, Operation of Vehicles. Oregon Administrative Rules for Agriculture, Order 2-2018.

OAR 437-004-3410(4)(d)(A and C). Vehicles: Vehicle Components, Brakes. Oregon Administrative Rules for Agriculture, Order 2-2018.

OAR 437-004-3410(3)(a)(I). Vehicles: General Requirements, Operation of Vehicles, Load Capacity and Stability. Oregon Administrative Rules for Agriculture, Order 2-2018.

OAR 437-004-0099(2)(d). Supervision and Competency, Well-being check-in requirements for lone/isolated workers. Oregon Administrative Rules for Agriculture, Order 2-2018.

OAR 437-004-0099(2)(a). Supervision and Competency, Demonstration of worker ability to work safely. Oregon Administrative Rules for Agriculture, Order 2-2018.

OAR-437-004-0099(2)(e and f). Supervision and Competency. Oregon Administrative Rules for Agriculture, Order 2-2018.

OAR-437-004-0099(3). General Standards, Inspections and requirement for a Competent Person to inspect workplaces. Oregon Administrative Rules for Agriculture, Order 2-2018.

OAR-437-004-0100. Universal Definitions. Oregon Administrative Rules for Agriculture, Order 2-2018.

OAR 437-004-1910(3)(a). General Equipment Guarding: Operating Instructions. Oregon Administrative Rules for Agriculture, Order 2-2018.

OAR 437-001-0760(a). Rules for All Workplaces: Employers' Responsibilities. Oregon Administrative Rules for General Administration, Order 3-2019.

OFB, 2017. "Sowing the Seeds to a Safe Agricultural Workplace". Oregon Farm Bureau Health and Safety Committee. Retrieved from <https://oregonfb.org/safety/>.

OPRD, 2021. The Oregon Online ATV Safety Education Course. Oregon Parks and Recreation Department. Retrieved from: <http://www.rideatvoregon.org/>.

ORS 801.190.1-6. General Provisions and Definitions for Oregon Vehicle Code. 2020 Oregon Revised Statutes, Vol. 19. Retrieved from <https://www.oregonlaws.org/ors/801.190>.

OSHA, 2002. Job Hazard Analysis. Occupational Safety and Health Administration, Publication 3071. Retrieved from <https://www.osha.gov/sites/default/files/publications/osha3071.pdf>.

OSHA, 2015. Agricultural Safety Fact Sheet: All-Terrain Vehicle Hazards during Farm Work, DSG-FS-3578. July 2015. Retrieved from <https://www.osha.gov/Publications/OSHA3758.pdf>.

SAIF, 2015. Understanding ATV Stability. Retrieved from <https://www.youtube.com/watch?v=nEYsl8V63h0>.

SAIF, 2018. ATV Safety Guide, S923, 09/2018. Retrieved from [https://www.saif.com/Documents/SafetyandHealth/Agriculture/S923_guide ATV safety.pdf](https://www.saif.com/Documents/SafetyandHealth/Agriculture/S923_guide_ATV_safety.pdf).

USDA, 2021. ATV Safety for Agricultural Producers. (2012) Farm and Ranch extension in Safety and Health (FReSH) Community of Practice. Retrieved from <http://www.extension.org/pages/64338/atv-safety-for-agricultural-producers>.

Weather Underground (2020). Retrieved from <https://www.wunderground.com/history>.

WPS (2015). US EPA Guidance Document, “How to Comply with the 2015 Revised Worker Protection Standard for Agricultural Pesticides”. U. S. Environmental Protection Agency, Pesticide Educational Resource Collaborative. Retrieved from <http://www.pesticideresources.org/wps/htc/htcmanual.pdf>.

FACE INVESTIGATION INFORMATION

This investigation was conducted by Barbara Hanley, MPH, Research Associate, Fatality Investigations Team, Oregon FACE (OR-FACE) at Oregon Institute of Occupational Health Sciences at Oregon Health Sciences University (OHSU). The report was peer-reviewed by Nikolas Smart OR-FACE Project Coordinator, and Dr. Ryan Olson, Professor and Co-Director, Oregon Healthy Workforce Center - a NIOSH Center of Excellence in Total Worker Health®.

ACKNOWLEDGEMENT

The OR-FACE Program would like to acknowledge the staff of the Oregon Department of Consumer and Business Services, and Jackie B. Branch, Oregon OSHA Senior Safety Compliance Officer, Portland Office, for providing assistance and information for this investigation.