

Episode Title: Anhydrous Ammonia

Summary: In this episode, we talk with Dan Neenan, director of the National Education Center for Agricultural Safety, about anhydrous ammonia. Dan has worked as a firefighter and paramedic responding to anhydrous ammonia releases.

“I’ve been a paramedic coming up on 30 years now and I don’t think I’ve seen anybody in more pain than a gentleman that I had that was sprayed in the face and on the eyes with anhydrous ammonia.” Dan describes anhydrous ammonia and the PPE you need to wear when working with it. He also talks about the increased presence of anhydrous tanks on the roads this time of year.

Expert: Dan Neenan

Episode Quote:

“You’ll see in the springtime a lot of slow moving vehicles transporting anhydrous... and we have a lot of incidences where those tanks will get hit [by] a motorist from behind who’s really not paying attention.”

– Dan Neenan, National Education Center for Agricultural Safety

Transcript

00:04 K. Crawford

Welcome to the FarmSafe Podcast brought to you by the Great Plains Center for Agricultural Health. In the blink of an eye, an injury can change your life and your farm forever. During each episode, we share first-hand stories and real-life tips for making safer and healthier decisions while on the farm.

In this episode we are going to talk about anhydrous ammonia, which is used as a fertilizer for crops, but is a dangerous chemical that can cause severe injuries to anyone exposed during an unexpected release. Our guest today is Dan Neenan who has developed training programs for firefighters responding to anhydrous ammonia releases.

D. Neenan

Hi, I'm Dan Neenan. I'm the director for the National Education Center for Agricultural Safety. Got in to be able to do agricultural safety through my work as a firefighter and paramedic with fire departments and have created several safety and health as far as working with agribusiness, and then agricultural rescue programming for firefighters.

01:00 K. Crawford

I asked Dan to start off by giving us a little background on how anhydrous is used and why it's so hazardous.

D. Neenan

So anhydrous ammonia has a couple different uses. It's used in agriculture as a fertilizer to put nitrogen back in the ground. It's also used as a refrigerant. If you ever notice if you're ever on the back side of a hospital, you'll see a big anhydrous tank. It's used as a refrigerant or coolant in that nature.

The word “anhydrous” itself means “without water” and anhydrous is desperately seeking water, and of course we're made up of about 70% water. So, an anhydrous release in the presence of a human, that anhydrous is going to be attracted to our eyes, our nose, our mouth, our sweat glands, and our genitalia are all places that have moisture that it's going to be attracted to.

Anhydrous has a resting temperature of negative 44 degrees Fahrenheit. So, it's going to freeze burn, and it's going to take the moisture out of the tissue. So, it's going to be a more painful burn. So, we need to take care of how we deal with anhydrous, and wear the personal proper protective equipment, as we're dealing with it.

02:14 K. Crawford

When anhydrous ammonia gets on you, it tries to pull water out of your tissue. It is able to pull six times its weight of water, so if you get one ounce on your skin, it quickly tries to pull 6 ounces of water out of your skin in the area of this contact. Because this ammonia is seeking water to react with, it is important to protect yourself should there be a release by wearing appropriate personal protective equipment or PPE.

D. Neenan

Yeah, the PPE. So, you want to take a look at covering your skin. You want to stay away from shorts and short sleeve shirts and have long sleeve shirts and long pants that you're wearing. You know you need to take a look at wearing non-vented goggles, you know, so any of that can't get into your eyes, and then to go one step further with that and respiratory protection so a respirator with ammonia cartridges, that are in there. You know the gloves, you're going to want them to be neoprene lined, you know, anhydrous gloves, you know you're also going to want to cuff them. So not so much that you're trying to make a fashion statement with that but remember that anhydrous is looking for moisture so if I'm dealing with anhydrous, and I get some on my gloves and then I reach up to be able to shut the valve off if; I don't cuff my gloves that anhydrous is going to run down my arms right into my sweat glands and burn that tissue.

And of course, if you are somebody who wears contacts, you want to wear your glasses on a day that you're dealing with anhydrous, because if you get sprayed in the face when you're wearing your contacts, it can weld your contact to your eye.

03:47 K. Crawford

Wearing the right kind of PPE can reduce your risk of injury if exposed to anhydrous ammonia. Dan went on to describe what happens when people are exposed and how paramedics treat anhydrous burns.

D. Neenan

The other thing that I think that it's important for people to know is that the treatment for an anhydrous burn is the same for a lay public person, and a trauma surgeon. For the first 15 minutes, it's going to be water, water, water. We need to get in there and we need to dilute that anhydrous, we need to get it to you know evaporate out of the pores. So, some of the normal things that we use for burns, such as creams, ointments, and salves, we don't want to use those on an anhydrous burn for at least 24 hours, which takes it out of our care and puts it in the hospital setting to be able to do that. Because if you do the creams, the ointments, the salves, it's going to trap that anhydrous in the pores, and the burning process will continue.

When somebody gets injured in the eye, their number one thing that they're going to do is slam that eye shut. We need to get moisture in there. Okay, so remember that your eyes are filled with fluid, vitreous fluid, which is attracted to the eyes. I've been a paramedic coming up on 30 years now and I don't think I've seen anybody in more pain than a gentleman that I had that was sprayed in the face and on the eyes with anhydrous ammonia. So, we're going to need to get that eye open, and we're going to need to do copious amounts of fluid.

Now, things to remember when you get your tank delivered, there are saddle packs of water on that. Okay, that's only going to get you so far. So, I always recommend to folks to take a little squeeze bottle of water and put it in their pocket with them, as they're going. Again, what you want to do is to be able to cool that off and stop that burn process, and it's going to be water, water, water. You're not going to see the ambulance come and grab somebody that was sprayed with anhydrous and just take off, they're going to need to decontaminate them. Because remember, if we put them in the back of the enclosed ambulance and shut the door, then you got all the anhydrous fumes that are there. Same thing with the helicopter, in fact even more so, they're not going to take somebody in the helicopter that has not been decontaminated with that.

The other thing is, you know, for folks to understand, this is not just a burn that you're going to have a burn and a week later you're going to be fine. Back in the day it used to be first, second, and third, degree burns— now they call them partial thickness and full thickness burns. Somebody with a partial thickness burn is going to be complaining, a lot louder about the pain than somebody with a full thickness burn, which is counterintuitive, but actually a full thickness burn burns through the nerve endings. You know, so people don't feel those deep burns. So that's one thing that the EMS folks always need to be keeping in mind as they're dealing with that. The other thing is, is of course your respiratory tract, your nose and your mouth is full of moisture. So, the anhydrous is

attracted to that. And think about the last time you cut, or you burned your finger for the body to work on repairing that, the tissue is going to swell, and your airway is only so wide, so if that tissue swells it's going to close off your airway. So, we always want to try to keep somebody that's been sprayed with anhydrous in the face talking with us. And as their voice may change and start getting really raspy, you know, that's a sign to me that their airway is compromised and we need to work on maintaining that airway, or it's well shot.

07:26 K. Crawford

When are we most likely to see these injuries happen?

D. Neenan

A couple of things when you're dealing with anhydrous. It's now really, and for several years has been a 2-season product. It used to always get done in the spring. Now you'll see it being applied in the fall and in the spring. It's always on a very, very short period of time with the weather, you know, from the time the frost gets out of the ground in the spring or the time the frost gets into the ground in the fall, and [with] harvest and planting to be able to do that so it always seems to have a week, week and a half period, where it needs to be put in. So, that's mean there's going to be a lot of anhydrous on the roadway. And, you know with delivery systems that are there, they can't get up to road speed.

So, you know, you'll see in the springtime, you know a lot of slow moving vehicles, you know, transporting the anhydrous from Co-Op facility, out to the farm, and then back, and we have a lot of incidences where either those tanks will get hit from a motorist from behind who's really not paying attention, or, you know, again in the spring and the fall of maybe a soft shoulder, and that tank rolls over.

Anhydrous itself is heavier than air. So, if that tank rolls over into the ditch and it's not really a windy day, that anhydrous is going to stay down there in that ditch. So, anybody going in there, you know to check and see about a leak and or to right the tank, or pump it off, that anhydrous is a danger to them.

08:55 K. Crawford

We have heard from farmers and workers who transport anhydrous that they also worry about the hazards involved with having these trailers on the roadways. So, for instance, I'll read a couple of quotes we've collected. Somebody told us, "I get worried driving my anhydrous applicator from field to field. Many people do not realize that we have to stop at railroad crossings, and they get in a hurry." Another person also commented about having to stop at railroad crossings and said, "Cars come very close to rear-ending the tanks when they stop." Do you have any recommendations for transporting anhydrous on the road?

D. Neenan

A lot of times the co-op will transfer the tanks and take them to the farm and back. Myself, I've never done that, but I think it would take an incredibly patient person. You're driving, you know 10 miles, doing 25 miles per hour or so, it's going to take you a long time, you know, to do that amount of distance, and you got to be on top of your game.

Of course, you need to take a look at the truck. You need to take a look at the anhydrous tank, make sure that the connections are there. Make sure that the hitch pin is hitched, you know, because bouncing down the road that hitch pin has come out. If the safety pin is not in there, making sure that you use the chain so in case something would happen with the hitch, and it would become unhooked that that safety chains will hopefully still keep it connected to the vehicle that's doing that.

The thing to remember— a lot of the carriages that the anhydrous nurse tanks are on, don't have trailer brakes, so when that anhydrous tank is full, you got a lot of weight there, and most of your pickup trucks, it's not going to be a problem getting that moving. Where the problem's going to be is stopping, and what's going to happen is when you need to stop quickly or slow down to make a turn that weight behind you is going to push you through the intersection, and if you're trying to turn, then possibly into the ditch. So, we have incidents like that.

10:49 K. Crawford

Exposure to anhydrous can happen suddenly and unexpectedly, especially if there's a leak if equipment malfunctions or fails. I asked Dan if he had any examples of these types of equipment malfunctions or recommendations for maintenance.

D. Neenan

With the leaks, a lot of times it's when it's hooked up to the tractor and to the toolbar that it may come loose and pull that loose. Now there is some mechanisms in there, you know valves that are supposed to close, but you know you need to remember that you're probably about in your life that that valve is going to work or serious injury, if that valve doesn't work.

You know, if you're going to be using the anhydrous toolbar, make sure that it's clean and serviced before you hook up the anhydrous to it— if you plug one of the knives on there, remember that when you go to clean that out, there's going to be on high risk under pressure. So, when you actually get that cleaned out, you're going to get a spit of anhydrous. So, when you're unhooking the tank from the toolbar, you know you want to shut off the tank but then there's a pressure release valve, you want to release that pressure first before you disconnect the hoses and we've had several times where people have gotten burned or gotten sprayed in the body and in the face, because they unhooked that one when there's still pressure on it, you know, to be able to do that.

So, taking that time and realizing, again it comes down to a timing thing, folks are in a hurry, when they're applying and using the anhydrous. And, you know, the more you're in a hurry, and you may take shortcuts, the more the opportunity is that you might get in trouble.

12:28 K. Crawford

I think that's an important point. If something goes wrong, it can have really devastating consequences and it sounds like it can happen very quickly. It makes me think about how long it takes to respond to a call like this when time is such a crucial factor in treatment.

D. Neenan

I think that one thing that folks need to take a look at is, more and more farmers are either renting land or buying land that's not attached to the home farm. So, they're on the roadway and they're at these locations. And back 20-30 years ago, when each small community had their own 911 Center, you can call up and say, "Hey, I'm at the Old Joe Smith farm," and everybody knew where that was at. But as those smaller town 911 dispatch centers have closed and it's gone to more of a county-wide, region-wide dispatch center, you can't do that. So, a lot of the farms you know in places that are going to be listening to this podcast have the 911 signs.

So, if I could give folks a little bit of homework is that every vehicle, every tractor, every combine, that's going to be going from farm to farm. If you're renting that farm, if you bought that farm, write it down on a piece of paper and make copies of it, the 911 sign, 8674 is the Old Joe Smith farm. Here is the actual physical address of it, so that way if you need to dial 911 from your cell phone, you're going to want it to be a hurried response and you're going to be pressed to remember that information. So, if you have that with when you give that 911 number it's automatically going to pull up on the dispatcher screen, which fire department, which ambulance, which law enforcement to respond and it can make that response just that much quicker.

14:08 K. Crawford

You have developed training on anhydrous ammonia safety. Are there any resources you want to share?

D. Neenan

There's two things right now: we have a Susan Harwood OSHA training grant. So, we have been doing Zoom broadcasts of those. You can either wait for one of the live ones to happen or if you'd like to go watch one of the taped ones, you can go to the AgriSafe networks' website, and they have a library of those videos that you can click on, and you can watch that. We also have a hands-on component. So, we have an anhydrous tank, that's mounted on to a goose neck trailer that we can actually roll a tank over on the trailer. And then we use theater smoke to represent the anhydrous coming out, and it, to be honest with you, it really works well if we get a slight breeze, you know the smoke coming out looks like anhydrous and what it will do.

We also train fire departments in anhydrous ammonia. So, in the state of Iowa, our anhydrous ammonia emergency response training is covered by the volunteer firefighters training fund. So as long as you have 12 volunteer firefighters, we can come to your

community and do the program for them at no charge. So actually, right now with Harwood grant from the ag side of it at you know everything would be covered under the grant, and then through the volunteer firefighters training fund to train the fire departments. Now if you happen to be an outside state, that's not Iowa, we do charge for that. But we were actually just up in Walnut Grove, Minnesota and did a training program for a co-op. We did both anhydrous ammonia hands-on and grain bin [rescue] hands-on with them.

15:45 K. Crawford

Thanks for talking with us today, Dan. As we wrap up, do you have any final thoughts or recommendations for people working with anhydrous ammonia?

D. Neenan

The capability of having somebody working with them, you know, because if there would be a release and somebody's getting burned out there by themselves. If you do get sprayed into the face, you know vision is going to be a problem to get you back where you need to be. Again, the capability if you get sprayed in the front side, where is your cell phone at? Was your cell phone affected by the release of anhydrous? So there's all these "could-be, would-be's" that you need to deal with, you know, but when you're dealing with the anhydrous, at least let somebody know that you're going to be working with that, what fields you're going to be in, maybe a checkpoint that when we're done with this field, and we're moving to the other, we just call in and make a check, hey I'm down there and I'm moving to this field. You know if something would happen. It's— getting to you is the biggest thing that we need to worry about.

16:42 K. Crawford

Have an emergency plan in place when working with anhydrous ammonia. Make sure you can call for help if you need it and check in with others, so they know you're okay. Wear appropriate PPE when working with anhydrous and be aware of trailers being transported on the road this time of year.

D. Neenan

Please listen to the FarmSafe podcast and join in on the conversation about keeping safe on the farm.

K. Crawford

We want to hear from you. Share your stories about health and safety issues on the farm, about injuries that made you change the way you work, or about the ways you keep yourself and others safe on your farm. Also let us know if there are any topics that you want to hear about on the air. You can visit our website at gpcah.org or email us.

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Episode Resources

- [Iowa State University Extension: Play it safe with anhydrous ammonia \(2-page pdf\)](#)
- [AgriSafe webinar: Anhydrous ammonia safety for farmworkers](#)
- [NECAS Anhydrous Ammonia Safety Fact Sheet](#)
- [Preventing Ammonia Burns and How to Treat Them](#)

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