

Hello Denise,

I'm told that during testimony on Pilot Positions from our Secretary (Sue Minter) and Deputy Secretary (Chris Cole) there was some concern raised by the Gov Ops committee about salt brine and its effects on vehicles.

As you may imagine this is a topic that comes up from time to time, and certainly more so in the winter. Would you please share this email with the committee? I've also attached a 'frequently asked questions' that I hand out to the Transportation Committees every year. I hope your committee finds it useful.

At VTrans, we are tasked with providing quality service to our customers (the traveling public) in the most economical and efficient way possible. To do this, we keep an open mind to explore new technology and to try to find better ways to do our job. One of the ways we do that is to talk to and learn from other 'snow states' around the country, including and especially our close neighbors like Maine and New Hampshire. Those 'snow states' are all utilizing salt brine to some degree.

Salt brine is a "technology" that has been around for quite some time, but until the past 5 years never made it to Vermont. In fact, I believe we are the very last 'snow state' to try it. We have approached salt brine carefully, and have implemented it gradually. In fact, today we still are not manufacturing brine in all of our maintenance districts. Our belief is that salt brine is a tool, not a silver bullet solution. And like all tools we need to learn how best to use it to realize the full benefit and avoid any pitfalls.

As for the science, I'm still comfortable saying with 100% certainty that salt brine is absolutely not more corrosive than regular rock salt. Salt brine is nothing more than salt and water mixed together. And we make the salt brine with the exact same rock salt we use on the highways. Come to think of it, when you consider it in that way, we have actually been using "salt brine" ever since the first grain of rock salt was dropped in the snow on a Vermont highway many decades ago. The rock salt reacts with the snow and ice, and as melting occurs the salt mixes with water to form brine on the roadway surface. When you pass over a road that was salted you can see the "wetness" spreading across the snow and ice as things start to bare up. That is salt brine. The problem is... rock salt takes time to work. It takes time to react with snow and ice to form brine on the highway. In addition, rock salt bounces when its spread and so up to 30% of it can end up in the ditch where it doesn't do anybody any good. By making salt brine in tanks at our garages we can speed things up. We either apply it to the road directly, or we apply it to the rock salt as it comes out of the spinner on the truck to make it stick to the road. The philosophy here is that we can actually use less salt to treat the roadways with brine than we did previously using just rock salt. And the studies I've seen to date all suggest that the biggest influence on corrosion potential is how many chlorides are used... and not the method by which they are applied. So, if we use less salt as a result of the brine initiative, we should contribute to less corrosion overall. That applies to vehicles as well as infrastructure.

Now, unfortunately the last two winters have been two of the worst winters we've had. Salt brine usage has been high. This is in large part due to the weather, but is also due in part to how well brine works. We have realized that our crews (who as a rule of thumb hate anything new) have found brine to be incredibly effective and as such they have started to use it enthusiastically. And why wouldn't they? It works, and it works well. In addition, as I mentioned previously this is a new tool to us, and as such we are still figuring out how best to use it. Every year when we implement it in a new region of the state we learn a little bit more. But I personally believe that the process of learning to use it has contributed to higher than expected brine usage. And I fully expect to be able to demonstrate decreased salt usage in time.

Back to the question of whether or not brine is making corrosion worse. I've said – and will continue to say – that salt brine is NOT more corrosive than rock salt. Chemically, that's a fact. Salt and water is just salt and water, whether you mix it in a tank or on the highway. But there are some other factors we need to consider when discussing whether or not salt brine is changing the corrosion dynamic. For starters, the fact that the brine is a pre-mixed liquid may allow it to get into places in vehicles that it previously didn't. Obviously when we're out before a storm "anti-icing" by spraying brine on the road, we are putting a corrosive liquid out that cars will drive through and it will get into places. As far as "anti-icing", that may be a valid point. And the discussion then becomes whether or not providing a safer road at the beginning of the storm is 'worth it' from a potential corrosion standpoint. I'm personally not entirely sold on "anti-icing" although many other states do it. My observations in Vermont are that it's hard to apply the brine at exactly the right time before a storm. If you apply it too early it gets worn off by passing vehicles. If you apply it too late, well, the storm has started. As a result we are actually doing a little less "anti-icing" this winter, and this will result in less brine usage and less exposure for vehicles. But as far as prewetting rock salt with brine to help it stick to the road, I'm not entirely convinced this usage is making the corrosion problem worse. As I mentioned before, rock salt reacts with snow and ice to make brine on the road and that still splashes up onto vehicles that drive through it. That dynamic is not new.

Another factor to consider is that we use a chemical additive at times with our salt brine, or to prewet our rock salt. This additive goes by many different market names, but for the purposes of this discussion we'll use the name "Ice B Gone", or IBG for short. IBG is essentially magnesium chloride and molasses (which explains the brownish color). It has a lower effective working temperature than rock salt or salt brine, and so by using it we can make our salt more effective at lower temperatures. On the positive side, the additive is incredibly effective and is actually less corrosive than sodium chloride (our rock salt). Also a positive is that the molasses make it "sticky", which helps it stick to the road where it will be effective. On the negative side, it's very expensive. Also a negative is that the molasses make it "sticky", which helps it stick to vehicles. When we get complaints about salt brine not washing off, it actually has nothing to do with the brine itself. It has to do with the IBG additive. If we used straight brine and no IBG, we would no longer see the brine solution stick to vehicles in the same way. But we'd also lose the ability to effectively melt snow and ice below 15 degrees. That said I believe our IBG usage was high last year, and I think this has to do with learning to use the new

salt brine tool in the tool box. Our districts tried mixing different brine/IBG blends to battle different types of storms, and we saw mixtures as high as 30% IBG. This year we've directed them to use more straight brine where possible (no IBG) and when a blend is needed to try a 5% solution and gradually increase the IBG as needed to fight the colder storms. The decreased IBG usage should be noticeable.

The fact that we're implementing brine slowly has led to some interesting observations. One observation is the number of complaints we get from folks in parts of the state where salt brine is not even being used. People hear the state is doing something new and they immediately react with mistrust and suspicion, and they are quick to cast blame. This is unfortunate. The reality is we've got a half a billion dollar fleet, and we want to make sure we aren't rusting it out more quickly either. No vehicles are more exposed to brine than our plow trucks.

Another observation is that although brine is only part of the equation, people are quick to make brine the "fall guy" for any increased corrosion. Other factors need to be considered and discussed. Do people wash their vehicles? What about the manufacturer of the vehicle, has anything changed? We all know that some vehicles have always been more corrosion prone than others, and that has nothing to do with salt brine. We also know that some manufacturers stopped using certain coatings on fittings and connections, and as a result those things are more prone to rust. We also know that state inspection standards have become more rigid over the years. A rusty vehicle that was road worthy 20 years ago might not be by today's standards. I'm not sure we can pin that on brine. Even paint jobs from the factory are not what they used to be. My uncle's one year old GMC pickup truck already has paint peeling off the frame. That has nothing to do with salt brine, but will certainly expose some vulnerable parts of the truck where corrosion can occur. So I think we need to consider all the factors that could be at play.

The bottom line is that we are not trying to do something to make corrosion worse. We're trying to implement a new technology to provide safer roads at lower costs during winter storms, with the hope that we can actually reduce chlorides in the environment over time and maybe even reduce the potential for corrosion. And we really appreciate the opportunity to have meaningful conversations about what we're doing along the way.

Please let me know if you have any questions,

Scott

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