

STATE OF NEW YORK COURT OF CLAIMS

JOHN FREDERICK AND JAN
FREDERICK d/b/a FREDERICK FARM,

Claimants,

DECISION

-v-

NEW YORK STATE THRUWAY
AUTHORITY,

Claim No. 121048

Defendant.

BEFORE:

HON. RENÉE FORGENSI MINARIK
Judge of the Court of Claims

APPEARANCES:

For Claimants:
KNAUF SHAW LLP
BY: AMY K. KENDALL, ESQ. and JONATHAN TANTILLO,
ESQ.

For Defendant:
HON. LETITIA JAMES
New York State Attorney General
BERNARD F. SHEEHAN, ESQ.
Assistant Attorney General

Claimants John and Jan Frederick, doing business as Frederick Farm (Claimants), own and operate a dairy farm at 2090 McBurney Road in the Town of Phelps, New York. Claimants' farm is adjacent to the New York State Thruway - Interstate 90 (Thruway). In their claim, filed on March 16, 2012, Claimants allege that, because of the grading of the Thruway, chemicals used by Defendant to deice the Thruway in the winter flow onto their property and, as a result, have contaminated their well water with high levels of sodium and chloride. This trial concerns Claimants' allegation that this contamination has resulted in the sickness and death of their

livestock, as well as a reduction of their income due to losing approximately one-third of their milk production. Claimants further allege property damage.

Prior to trial, Defendant moved for summary judgment, arguing that the claim should be dismissed as untimely and that the testimony of Claimants' expert witnesses, environmental geologist Kenneth R. Pike and veterinarian Dr. Sean McDonough, should be precluded.

Defendant also argued that, because their expert veterinarian has opined that it is impossible to tell within a reasonable degree of expert certainty what killed Claimants' cows, and that as Claimants' expert veterinarian Dr. McDonough did not disagree with this statement, summary judgment should have been granted in Defendant's favor. Claimants opposed and moved for partial summary judgment in their favor on the issue of whether deicing agents migrated from the Thruway onto Claimants' property and into their well. My decision and order dated October 31, 2019 granted partial summary judgment to Defendant whereupon the causes of action sounding in inverse condemnation and state constitutional violations were dismissed and Claimants' partial summary judgment motion on the issue of deicing agents migrating onto Claimants' property was also granted.

I held a unified trial in Rochester, New York January 13 - 17, 2020. The parties submitted post-trial briefs and sur-reply briefs thereafter.

FACTS

John H. Frederick inherited his parents' farm in 2001. His parents had owned it since 1955 and, while his parents were living, Mr. Frederick worked on the farm with his father. The Frederick Farm sits adjacent and north of a stretch of the Thruway and at the time of trial encompassed 191 acres. Mr. Frederick sold 96 acres in or about 2016 to help pay his bills.

McBurney Road, which runs parallel to the Thruway, crosses through the farm (Exhibit 2). Mr. Frederick testified that he owns the land between the Thruway and McBurney Road, as well as land north of McBurney Road as depicted in the aerial photograph, Exhibit 2a, where Mr. Frederick indicated with a red pen the land he owned. He described himself as a cash crop and dairy farmer, meaning he grew corn, soy beans and sunflowers and raised cows.

The dairy farm produces milk and does so by cultivating its herd of cows. Cows provide the milk and produce more cows. He explained the animals are referred to as calves from birth to almost a year old, then heifers when they turn one year old. Calves and heifers do not produce milk. Heifers are bred at 1 year and 3 months, or upon attaining 700 pounds, whichever milestone they reach first, with the hopes that they have a calf when they are approximately 2 years old. A heifer produces milk after her first calf is born. Mr. Frederick testified he keeps an average of approximately 100 dairy cows on his farm.

Mr. Frederick uses artificial insemination for his heifers. The semen is collected in Ithaca, New York and a technician transports the semen samples to the farm. Mr. Frederick can pick attributes in his stock that he would like to improve and the experts in Ithaca can help select a bull that will address the issue. He also has to consider the price, as semen can sell anywhere from \$180.00 to \$300.00 per inseminated heifer. He also purchases only female semen which gets costly, but helps him build his herd faster. He prefers artificial insemination because working with bulls can cause injury.

Mr. Frederick testified he kept a handwritten record of his herd. He explained it was a chronological birth record of the calves in his herd that identify who the parents were, the calf's gender and notes on what happened to the animals. For example, most male calves are sent to

the market because he needs a female herd to function as a dairy farm. Once cows begin producing milk, they are in service for eight to ten years at approximately 60 to 90 pounds of milk per day.

The milking apparatus is prepared before each milking by sanitizing the stainless steel pipe that transports the milk from the cow to the milk tank. He uses two ounces of Zinicin and 30 gallons of water to flush the line and the waste water goes into the wash back tank, not the milk tank, and eventually into a floor drain. This process removes any possible bacteria in the milking system. Once the system is sanitized, the cows are hooked up to the suction cups with plastic lines that draw the milk into the stainless steel pipe which takes the milk to a transfer jar then finally into the milk tank. Prior to hooking the cows up to the milking apparatus, he will hand test whether or not the milk is safe by drawing a few streams of milk to make sure it looks appropriate for human consumption. After the milking is complete, the system is washed out with 30 gallons of clean water then soap, 2 ounces of Tri-pfan, is applied and the suction moves the soap and water mixture around the system. The final cleaning step is 2 ounces of Oracid with 30 gallons of water to rinse the system and make sure the soap is gone. The waste water from this process is piped to the wash vat or sink in a separate area, which drains into the floor drain (Exhibit B, p. 2). The floor drain is cast iron, sits approximately 30 feet from the well, and directs waste water into a leach field on the north side of McBurney Road (Exhibit 2d). The waste water has been disposed of in this manner since 1968. He goes through this process twice each day.

Mr. Frederick explained that the stainless steel milk tank he uses could hold up to 545 gallons of milk. The tank operates to cool and stir the milk until the milk cooperative (co-op)

picks it up with a tanker, which happens every two days. The milk is intended for wholesale, but must be tested before it is taken from his milk tank. They test for antibiotics, bacteria and water to determine if the milk is fit to ship. The co-op paid him, on average, \$.17 a pound.¹ Exhibit 15 contains copies of checks that Claimants received from the co-op that show Claimants were paid twice a month. The amount of money the co-op paid each month varied slightly based on the amount of proteins and butter fat a tanker of milk carried. The co-op performed those tests when the milk was delivered, disclosing test results on the checks Claimants received (Exhibit 15).

Mr. Frederick stated he had been taking care of dairy cows since he was able to walk and at the time of trial he was 70 years old. He helped his parents with the farm and now his two children help him take care of the daily tasks. Claimants have a veterinarian, but that individual is not on the farm every day. Claimants and their children have been trained by the veterinarian on how to perform simple medical procedures like administering antibiotics. However, if a cow lays down and fails to get up, Claimants call the veterinarian for help.

Mr. Frederick explained the term “cow down.” He testified this happens after a cow lays down to give birth and then refuses to stand up after delivering the calf. The cow’s legs are typically folded underneath her. She cannot stand because her legs are too weak to get her to a standing position. This event is triggered by the milk glands starting to produce milk, causing the cow to experience a calcium deficiency. He refers to this condition as milk fever. Mr. Frederick calls the veterinarian when a cow is down and he or she treats the cow for milk fever by injecting calcium directly into the cow’s blood system. Mr. Frederick testified this almost

¹ A gallon of milk is 8 pounds. Mr. Frederick explained that the 17 cent figure was his own estimation of an average cost per pound.

always works and became concerned in mid-2009 when a cow did not respond to this treatment. The veterinarian arranged for a blood test to determine if something else was causing the cow's illness. The test was done in August 2009 (Exhibit 3). Mr. Frederick took photographs of the cow which did not survive.

He also observed, in this and other cows that subsequently fell similarly ill, that instead of folding their legs underneath them as they normally did, these cows began to lay down with their hind legs splayed out behind them (Exhibit 4A, 4B). When Mr. Frederick assisted the veterinarian with an autopsy of a cow that died in this manner, he observed that the back leg muscles were torn and stretched with spots that looked like blood clots where the leg muscle ruptured. Mr. Frederick said more cows and calves died in this manner over the next three or four years. Claimants and their veterinarian could find nothing conclusive from the blood work. Mr. Frederick did say that the butcher would not take his cows that died in this manner as the meat was not good. Mr. Frederick ended up burying the cows in the ground.

Mr. Frederick then had his feed tested in September 2009 (Exhibit 6). According to the test results, Claimants were feeding their herd the correct mix of protein and fiber. Next, he looked at the water source which was a well on his farm. The well is located 125-150 feet from the farm's property line, then another 60-70 feet from the edge of the eastbound lane of the Thruway. He tested the well water in early 2010 after another cow died in February of that year.

Dairy One Forage Analysis Laboratory in Ithaca, New York performed a livestock water analysis from water sampled on March 11, 2010 and April 7, 2010 from the Frederick's well (Exhibit 7). In March, the sodium and chlorides were higher than expected and at a level that could create health problems for cows. He stated that he tested a well owned by his neighbor to

the west to see if he could dig a new well on that side of his property. His neighbor's well was sampled on March 24, 2010 and also showed a high sodium level, but in his estimation, the water was acceptable and in fact he understood that his neighbor was using it in his house. Mr. Frederick had a second test of his own well water the next month to verify the results. Sodium and chlorides remained high the second time, confirming for him that his well water was a problem. Mr. Frederick testified that, in May 2010, 10 days after receiving the April test results, he hooked up to public water. While Claimants waited for the public water hook up, they used bottled water in the house and changed the feed for his cows to one with no salt added. He also testified that his cows stopped experiencing these symptoms after he switched to public water.

Also around this time frame, Claimants had been experiencing the rapid deterioration of metal appliances that held well water. Mr. Frederick explained that he had purchased a second milk tank anticipating greater milk production. Unfortunately, he ended up not needing to use it because the cows began dying and producing less milk. To maintain the integrity of the tank, he filled it with well water and after a while, the tank developed a leak. He also had to replace water heaters in the barn after one and a half to two years - he ended up replacing about five of them before he hooked up to the public water. There was also a hot water furnace that had a lifetime guarantee that he had to replace, as well as three water pumps in the well. The wiring on the motors in the gutter (the channel that collects excrement and moves it out of the building) kept corroding and needed replacement approximately three times. The appliances were stainless steel and the wiring and connections were aluminum.

On cross-examination, Mr. Frederick explained in greater detail the mortality rate in his herd. He testified that he typically has 50 milking cows in any given year and that on average,

one milking cow would die per year. He did not suspect anything was wrong if two died in a given year, every now and then. But when that number started creeping up in 2004, he and his veterinarian decided they needed to keep more detailed records. Mr. Frederick believes more cows actually started dying in 2001, when he and his wife took over the farm.

Once Claimants understood what was wrong with their water, they contacted their New York State Senator who arranged for representatives from the New York State Thruway Authority (Authority) to meet on Claimants' property to determine what, if any role, the Authority's actions played in the sodium and chloride levels in their well water. According to Mr. Frederick, the Authority performed work on their property at a later date by installing a pipe and changing the slope of the land to prevent cars from rolling over when they left the roadway. He identified the area adjacent to his farm where the Authority did work on the eastbound lane and where the water was ponding. It was not the area that was creating the problems for him (tr Day 1 at 73-74;² Exhibit 2c). Mr. Frederick noticed significant ponding of water next to his property and in the median (middle) of the two Thruway lanes both before and after the work performed. Exhibit 4 is a series of pictures taken by Mrs. Frederick. Exhibits 4C, 4D, 4E, 4F, 4I, 4J, 4R, and 4AA illustrate the condition of the land in the area. Exhibits 4O, 4P, 4X, 4Y, 4Z and 4BB illustrate the amount of water ponding and Exhibits 4H, 4K through 4N, 4Q and 4S through 4W show the work done by the Authority. Surface runoff and groundwater continued to flow onto and into Claimants' property.

² Transcript references will be stated as "tr Day ____ at page."

Mrs. Jan Frederick has worked with Mr. Frederick on the farm since 1981. She stated she was familiar with the milk cooperative's billing statements and that Exhibit 11 was a summary of the pounds of milk purchased by the co-op per month with annual totals. Per Exhibit 11, Claimants sold 722,814 pounds of milk in 2002, the first full year after they came to own the farm themselves, which was reduced to 409,630 pounds by 2009.

Kenneth R. Pike, a tax assessor at the time of trial, testified that prior to that profession, he was an environmental geologist for 23 years. He operated a business called Earth Works Environmental for 20 years that specialized in identifying and remediating environmental problems on real estate. His work included groundwater contamination from elements such as solid and hazardous waste, petroleum, heavy metals and solvents. He testified that he had worked on approximately 30 sites with groundwater contamination issues. Claimants hired him in September 2011 to investigate and determine if groundwater contamination was the problem causing the premature death of their cows and the corrosion they were experiencing in their appliances and machinery.

Mr. Pike took water samples from two different ponded areas, one on the Thruway property near the farm property line and the other on the Claimants' farm, as well as a sample of ponded water in the Thruway median directly across from the farm (tr Day 1 at 143-144; Exhibit 2e). He made his own notes on the February 28, 2013 visit which oriented his water samples to the Thruway, property line and barns, as well as indicating higher ground and potential ground water flow (Exhibit 26). He then took the samples to Paradigm Environmental Services, Inc. (Paradigm) on February 28, 2013 and ended up testing for total cyanides, chloride and sulfate (Exhibit 25, p. 7). Mr. Pike testified he would have liked Paradigm to run more tests, however

he was limited by Claimants' financial position. Mr. Pike's analysis of the test results from Paradigm led him to conclude that the samples contained elevated levels of chloride by 70% and ten times the recommended amount of sodium (tr Day 1 at 149). Mr. Pike also observed that the surface water runoff appeared to flow from the pond in the Thruway median to a culvert under the eastbound lane, then flow north into the pond next to Claimants' farm (tr Day 1 at 149-150, 156).

Paul L. Richards PhD., PG is a hydrogeology professor at the State University of New York at Brockport (Brockport). He is also President and Founder of Liddell Hydrogeology PLLC, a hydrogeological consulting firm (Exhibit 27). He teaches and conducts research on how water, and what is in the water, moves through landscape. He was retained by Claimants in 2014 after Mr. Pike asked him for help determining what was happening on Claimants' farm. Based on Dr. Richards' qualifications and background, I consider him an expert in the field of hydrogeology.

Dr. Richards testified that his first step was to create a topographical map of the area using Geographical Information Systems (GIS) and Lidar. The maps he created were detailed enough to identify even the slightest contour changes in the landscape. He also visited the site and noticed a large melt water pond between the eastbound Thruway lane and Claimants' property (Exhibits 2f, 28). He considered this melt water pond a possible mechanism that delivered sodium and chloride to Claimants' well. In January 2017, he confirmed that surface water runoff from the Thruway flowed onto Claimants' property, which he videotaped (Exhibit 29).

Dr. Richards also established the type of bedrock underneath Claimants' farm to help with his analysis. The Onondaga Formation laid down during the Devonian Era, 420 to 360 million years ago, is directly under the top soil of the farm, while to the north, the Akron-Bertie Formation, older than Onondaga, was laid down during the Silurian Era, 440 to 420 million years ago (Exhibit 30). Dr. Richards explained that, generally speaking, in Western New York, over time, the older rock formations sank in the north by the Great Lakes, pushing rock laid down later in time south and higher - the land in Western New York slopes up from north to south. Rock layers are not perfectly horizontal, but have been pushed up or tilted due to compression forces, forces that built mountain ranges. So while Claimants' farm sits squarely on the Onondaga Formation, below Onondaga sits Akron-Bertie (Exhibit 30a), and below Akron-Bertie is the Camillus Formation, also laid down during the Silurian Era. Dr. Richards described the bedrock in this area as covered by a thin layer of soil and riddled with cracks and voids (Exhibit 52; tr Day 2 at 121-122, 162-163). The particular outcropping depicted in Exhibit 52 sits where the Onondaga Formation and the Silurian formations meet on Route 88 (Exhibit 30). He tested the various strata in the outcropping and determined the Onondaga Formation was mostly limestone which weathers easily (tr Day 2 at 125-126).

In 2015, Dr. Richard sampled eight wells. Five wells, including Claimants', were in the Onondaga Formation and the remaining three were in the Silurian bedrock (Exhibit 30). He measured the water level, the electric conductivity, sodium and chloride in each well. The water level is the distance between the water and the top of the well casing. The electric conductivity is how the amount of dissolved and charged particles in water are measured, the more particles present, the more conductive the water. Dr. Richards measured the amounts of sodium and

chloride using the same laboratory as Mr. Pike, Paradigm. He also performed his own analysis for chlorides using a process called “selective chloride electrode” (tr Day 2 at 29).

Dr. Richards testified, based on his analysis of all the test results, that Claimants’ well had the highest amount of chloride of the eight wells sampled. He also found that the levels of chloride began to recede as you moved south and north of the Thruway and Claimants’ well. Exhibit 31 contains the raw data from Dr. Richard’s testing.³ The electric conductivity testing confirmed his water sample analysis as the water on the farm and near the Thruway was highly conductive, in other words, full of sodium and chloride particles (tr Day 2 at 38-39).

After the work in 2015, Dr. Richards began testing for sulfates based on a hypothesis presented by Defendant, that the naturally occurring gypsum and salt in the Camillus Formation might be affecting the particles in the water, given the close proximity of a gypsum mine. Based on the data collected, he found higher sulfate levels in the Silurian wells and the deep ground water wells than Claimants’ well and concluded the gypsum and salt in the deeper Camillus Formation were not having an impact on Claimants’ well (tr Day 2 at 37, 78-79).

Dr. Richards arranged the excavation of three identical sealed deep groundwater (DGW) wells to confirm the direction that groundwater flowed. Dr. Richards directed DGW3⁴ be drilled near McBurney Road and DGW1 and DGW2 were closer to the Thruway (Exhibit 32). Dr. Richards believed that Claimants’ well did take in deep groundwater and it was important to understand the chemical composition of that water without the influence of the surface water

³ Exhibit 31 also includes data collected from three deep ground water wells drilled in 2017.

⁴ Test results from this well supported Dr. Richards’ conclusion that the rock salt from McBurney Road was not a contributing factor (tr Day 2 at 193).

runoff. He consulted with Ravi Engineering & Land Surveying, PC, as they had more sensitive measuring instruments (Exhibit 33) Dr. Richards also employed hand dug, shallow monitoring wells to sample the surface water runoff from the Thruway, which are plotted on Exhibit 32.

Based on all this work, he concluded that while some of the water on the west side of Claimants' property flowed north/northwest, most of the water actually flowed north/northeast (tr Day 2 at 165-167). He even had one measurement where the water flowed directly east and another flow direction to the southeast (tr Day 2 at 169). He concluded that the water flow can, depending on the depth of the recharging water at the time, move circuitously through the bedrock. He also addressed the fluctuating sodium and chloride levels in Claimants' well water data. The lower levels occurred during a snow melt or rain event when the precipitation diluted the chemical level (tr Day 2 at 174-175).

Dr. Richards also explored the integrity of Claimants' well walls using a camera to inspect whether or not there were fractures in the rock where water above the water table could flow or seep into the well. He prepared a report, Frederick Farm Well Contamination - Borehole Camera Analysis of Bedrock Structure (Exhibit 49). The report concluded that the well casing was intact, but that Claimants' well was actually a cascading well, or a well with fractures and voids, where water leaks into the well. Dr. Richards discovered such fractures and voids above and below the water table.

Dr. Richards also tested the water in the farm cistern, an underground tank, five feet north of Claimants' well. The cistern is used to collect water running off the barn roof. Dairy One performed a sample analysis in February 2017 (Exhibit 54). Dr. Richards testified there really was nothing significant in terms of particulate found in the cistern water. In fact, Dr. Richards

found only 28 parts per million chloride in the cistern compared to 702 parts per million in the well. The cistern was not a source of the salt (tr Day 2 at 97). Dr. Richards also examined the manure pits.

He described the manure pits as watertight rooms underneath the barn where the cows live, where cow excrement is collected, then moved by gravity, then a conveyor belt to a leach field. Because water is used in this process, he also tested for fecal coliform and E.coli as possible well water contaminants. Dr. Richards' test results showed de minimis to negative presence of either substance in the well water (Exhibits 53, 45, 46). In addition, the chloride level in the manure pit is high with little sodium present, which is typical of animal waste, and dissimilar to Claimants' well (tr Day 2 at 100-101).

Dr. Richards concluded that water in Claimants' well was contaminated by the rock salt used by the Authority to deice the Thruway. He reached this conclusion because rock salt is composed of one atom of sodium for every atom of chloride, a 1:1 ratio. However, an atom of sodium weighs less than an atom of chloride or 23:35, a ratio of 0.649. The chart on Exhibit 47 illustrates where all the water samples analyzed by laboratories compared in terms of the weight ratio. The perfect alignment is represented by the dotted line and the plot points are the specific water samples and their respective ratios. All samples taken on the farm were either on the line or within a statistically acceptable proximity to the line, with a perfect weight ratio indicating it was rock salt that was dissolved in the water in Claimants' well (tr Day 2 at 102-106).

Dr. Richards provided the Court with a master list of all samples taken, their locations, dates, conductivity, distance from the Thruway and concentrations of chloride, sodium and sulfates (Exhibit 57). Based on his test results, samples taken south of the Thruway showed very

low levels of chloride, moving to a higher level, and reaching the highest level at the Thruway, then tapering off moving north (tr Day 2 at 114). He plotted a graph of chloride as a function of distance from the edge of the Thruway to illustrate this point (Exhibit 48). Dr. Richards presented the test results in another graph that also included graphic connection to the particular collection spot (Exhibit 50).

In addition to the work testing and analyzing Claimants' water, Dr. Richards also assisted Claimants' presentation, in graph form, of the number of animal deaths from 1988 through 2016, based on Claimants' records in Exhibit 22. Exhibit 23 is a straightforward expression of a peak of cow and calf deaths just before Claimants switched from well water to public water.

Sean Patrick McDonough is a Board Certified Veterinary Pathologist and Associate Professor of Veterinary Pathology at Cornell University. He received his doctorate of veterinary medicine from Colorado State in 1981 and a Ph.D. in comparative pathology in 1996 from University of California Davis (Exhibit 56). I recognized Dr. McDonough as an expert in the field of veterinary pathology.

Dr. McDonough opined that cattle should have drinking water containing less than 500 parts per million (ppm) salt. Should the salt level in water reach 2,500 ppm, milk production will decrease. At approximately 7,000 ppm, cows will begin to suffer fertility problems, and despite all outward appearances being normal, cows will not be able to get pregnant. If the salt is 10,000 ppm or greater, cows can develop neurological symptoms and this is referred to as salt intoxication (tr Day 2 at 215-216).

Dr. McDonough distinguished between acute salt intoxication, which he defined as exposure to a high level over a 48 hour period, and chronic salt intoxication, where there's

exposure to a high level of salt from “five days to a week.” The neurological symptoms are the same for either exposure. Common signs are a cow’s inability to tell where its feet are, thus appearing uncoordinated and being susceptible to falls. Or, the legs are unable to hold the cow’s weight, which leads to a “down cow” (tr Day 2 at 217). Other signs of salt intoxication include staring into space, continuous circling, head pressing and throwing their head over their shoulder (*Id.*).

Claimants’ counsel presented Dr. McDonough with a hypothetical wherein chlorides measured 807 ppm and sodium measured 484 ppm in drinking water, which happened to be the test results from Exhibit 7. Dr. McDonough stated that while a cow could experience salt intoxication at these levels, he would need additional evidence to confirm.

Dr. McDonough opined that salt intoxication can cause a cow to become dehydrated. Signs of dehydration include sunken eyes from the loss of water in the tissues behind them; dry and tacky mucus membranes around the mouth and skin tenting (tr Day 2 at 221). Also, a dehydrated cow may produce reduced amounts of urine, or stop producing urine completely, and produce dryer than normal feces. Dehydrated cows will drink more water and may exhibit signs of depression. However, dehydration is not a common cause of a down cow (tr Day 2 at 222).

Depending on the severity of the dehydration, a cow’s muscle tissue could die because of the decrease in the amount of blood circulating. This is called necrosis and the cow is still alive when this occurs. Dr. McDonough stated the muscle tissue can look like “cooked fish,” very pale in color and not the dark red color expected. The tissue can also become soft and wet (tr Day 2 at 223).

Dr. McDonough also explained milk fever in greater detail. Milk fever occurs in cows either close to giving birth or just after. The mother cow's system experiences a sudden greater need for calcium and, if they are unable to acquire enough calcium to meet the need from their diet, their blood calcium levels drop (tr Day 2 at 225). Cows with milk fever are treated by injecting calcium into the cow's bloodstream. A down cow may need two injections, but if the cow is still down, other causes would need to be considered (tr Day 2 at 226).

Dr. McDonough did not offer any opinion to a reasonable degree of veterinary certainty as to why Claimants' cows were sick and dying or why Claimants' herd experienced a decrease in milk production.

John Ciampa is a New York State licensed professional geologist, who has specialized in hydrogeology and contaminant transport for the last 35 years. Based on his education and work history as set forth in his curriculum vitae, Exhibit A, I consider Mr. Ciampa an expert in the fields of hydrogeology and contaminant transport.

Mr. Ciampa testified that sodium and chloride are naturally occurring elements in some soil and groundwater in Western New York. Sodium chloride, or rock salt, was used to deice the Thruway and McBurney Road. Animal waste also has related chloride compounds and, because animal waste is on Claimants' farm, these compounds can break down into sodium and chloride in water. Testing would not be able to differentiate sources of the chloride and sodium.

Mr. Ciampa observed the land features around Claimants' well. Exhibit N #002384 depicts the melt water pond on Thruway property, what was referred to as the ponding area by Claimants and Dr. Richards. The amount of water in the melt water pond varies depending on the season and it is located downhill from Claimants' well, which would lie to the left of the

white building at the top of the photo. Exhibit N #002381 is a picture of Claimants' well house, a short red building with a white roof situated between the milking barn on the right and the propane tanks on the left. The fence at the bottom third of the photo is Claimants' property line, corresponding to the fence seen in the top third of the prior photo (N #002384).

Exhibit N #002394 shows the front of the well house. The entrance is on the far left of the structure. The white brick building behind it is the milk house with the two manure pits in the sub-basement. Between the well house and the propane tanks is the cistern. The inside of the well house is depicted in Exhibit N #002418. To enter, you walk down steps, approximately four feet below the surface (tr Day 3 at 28-29).

The propane tanks abut another part of the milk house as seen in Exhibit N #002393. Mr. Ciampa noted a pool of oil to the right of the propane tanks and underneath a pipe in the wall above it where he observed oil dripping. On the other side of the wall where the propane tanks sat, inside the building, Mr. Ciampa observed a plugged floor drain with what appeared to be manure and oily substances. He admitted the floor drain was not connected to Claimants' well (tr Day 3 at 85). Containers of chemicals used to sanitize the milking equipment were seen here, too (Exhibit N #002401). An area with general debris was also seen in this building and noted because an Agway chemical drum was observed (Exhibits N #002407, N #002421).

Exhibit B shows the chemical containers Mr. Ciampa observed in the milk house, as well as the sink and floor drain where the waste water from the milk machine sanitizing process is disposed. Mr. Ciampa notes what appears to be corrosion on the floor and floor grate near the sink and notes the type of chemicals stored, specifically Zinicin, Oracid and Tri-Pfan. Mr. Ciampa researched each chemical for information on its composition, toxicity and other hazards.

He relied upon the product labels, Exhibit C, and product information from the manufacturers, in particular. Mr. Ciampa explained Zinicin contains bleach, a chlorinated sanitizer. Oracid is an acid and Tri-Pfan is an alkaline or chlorinated detergent.

Zinicin is sodium hypochlorite and sodium hydroxide, which completely dissolves in water in recommended dilution levels. If it does decompose, sodium chloride, rock salt, and sodium chlorate (not rock salt), among others, result (Exhibit D). Oracid is composed of two acids, nitric and phosphoric, and when diluted according to directions, the way Claimants use it, the solution contains approximately 20% to 55% acid. It is completely soluble in water at the recommended dilution level and is considered corrosive (Exhibit E). Tri-Pfan is a chlorinated alkaline detergent containing sodium hydroxide that completely dissolves in water in recommended dilution levels (Exhibit F).

Mr. Ciampa took a water sample from Claimants' well on September 1, 2016 and analyzed it for bacteria, volatile and semi-volatile organics and nitrates (Exhibit G). Mr. Ciampa's test found evidence of dibromochloromethane and bromoform, both byproducts of chlorination. While the dibromochloromethane was at or below regulatory standards, bromoform exceeded them, indicating to him that chlorine was seeping into Claimants' well, likely from the milking machine cleaning process (tr Day 3 at 50).

Mr. Ciampa also testified about the rock formations in this location. Exhibit K, Figure 6, is a more formal depiction of the information in Exhibits 30 and 30a regarding strikes and dips and the approximate locations and thickness of the various bedrock formations. The Village of Seneca Falls is noted, happens to be situated north of Claimants' farm, and sits directly on Camillus Shale, laid down before the Akron-Bertie Formation. Given the mountain creating

forces in the area over time, the various bedrock layers sit at an angle which is why Seneca Falls sits directly on Camillus Shale from the Silurian Era while Claimants' farm, farther south, sits on Onondaga Limestone from the Devonian Era (Exhibit K, Fig. 6). The angle for the various bedrock strata is significant because if one drills straight down into the ground, you can potentially pass through multiple bedrock formations at shallower depths than expected. Mr. Ciampa provided a generalized depiction of the various bedrock layers, depths and thickness. Exhibit K, Figure 7 shows the Onondaga Formation at the lower middle, however, it's undisputed that Claimants' farm sits on top of Onondaga bedrock. The forces that created the strikes and dips, effectively cracking and tilting the various layers, made this possible. As a result, Mr. Ciampa believes that the Akron-Bertie and Camillus Formations are a larger part of Claimants' well, closer to the surface and well casing, than as presented by Claimants and Dr. Richards.

In addition to the generally accepted geologic cross-section, Exhibit K, he has evidence that the Onondaga Formation and Akron-Bertie Formation actually meet, a geologic contact, near the farm, Exhibit L, confirming these layers are indeed angled. While the geologic contact is east of Claimants' well, the elevation of that geologic contact would put that contact at the approximate middle of the well, suggesting that the well draws water not just from the Onondaga Formation, but from the Akron-Bertie, too (Exhibit M).

Mr. Ciampa found further evidence to support this position in Dr. Richards' video log from inside the well. Vertical cracks or fissures were seen in the well walls, some were seen in the deeper end of the well, which allows the deep groundwater to flow up and into the well (tr Day 3 at 73-74). The deep groundwater flows through bedrock formations that have naturally

occurring salt which is sodium and chloride. Mr. Ciampa confirmed his hypothesis with the lab results from the other wells tested, in particular the Russell and Jansen wells, in that they were most similar to Claimants' well (tr Day 3 at 78-79; Exhibit 57). He opined that chlorides naturally occurring in the deeper formations influenced the readings in Claimants' well.

Mark Hixson is a licensed professional engineer in New York State and Director of Maintenance and Operations for the Authority since June 2017. Prior to that, he was the Deputy Director of Maintenance and Operations from 2008 to 2017. He has worked for the Authority for 33 years. One of his many responsibilities included deicing. Mr. Hixson testified that the Authority uses several substances for deicing. Rock salt mixed with snow, ice or rain lowers the freezing point of the liquid. Salt brine, created by the Authority by mixing water and rock salt, is applied to the road ahead of a snow or ice event. The water evaporates and salt residue is left on the road surface to help prevent the snow or ice from bonding with the pavement. The Authority also uses salt brine as the rock salt is being spread to "jump start" the rock salt reaction. This also helps the rock salt stick to the road surface (tr Day 4 at 10). Adding salt brine to the rock salt allows the Authority to use less rock salt (tr Day 4 at 20). The Authority also uses magnesium chloride, which is added to the rock salt so it can perform better in colder temperatures (tr Day 4 at 34). Recommended application rates for the deicing chemicals are contained in the Authority's Winter Maintenance Manual (Exhibit U).

Exhibit U #D002703 is "Table 3 Recommended Application Rates for Solid and Liquid Sodium Chloride" in 2017. Mr. Hixson testified that maintenance section supervisors and plow and snow equipment operators refer to this information in relation to ambient and pavement temperature and how they are trending, the type and intensity of the precipitation expected and

road conditions. These parameters are just the start of the analysis. Local conditions would also be considered, for example, the typical amount of traffic, the amount of shade and sun on the pavement, the existence of bridge decking and ramps and the propensity for snow drifting.

Snowplows use an automated delivery and tracking system to control the amount of rock salt and brine applied. An important part of the process is removing as much precipitation as possible prior to laying down deicing agents. This also served to minimize the amount of rock salt and brine needed. The computer used in the plows is CompUsread, which is calibrated prior to each winter season for accuracy.

The Authority records deicing activities during a weather event on a Storm Activity Report which details the storm duration, amount of precipitation, temperatures, number of plows and any other relevant information. It also notes the amount of deicing materials used and the number of trips a plow made (Exhibit X). The records are kept by the maintenance section. The farm is located in the Syracuse Division, Manchester Section (tr Day 4 at 29).

Mr. Hixson testified that the Authority has tried other materials to deice the Thruway. A beet juice byproduct and a molasses byproduct were tested. The Authority also tried calcium magnesium acetate. These treatments were allegedly less corrosive, however, they proved to be expensive and no better performing than rock salt. The Authority also trains operators and supervisors to appropriately minimize the use of rock salt. Mr. Hixson said the judicious use of snow fencing to reduce drifting and upgraded equipment to control application rates have helped.

Dr. Lisa Murphy is a licensed veterinarian in California, Pennsylvania, New Jersey and Illinois. She is also a diplomat of the American Board of Toxicology. She is currently an Associate Professor of Toxicology at the University of Pennsylvania School of Veterinary

Medicine (UPenn) (Exhibit P). Dr. Murphy explained that toxicology is the study of poisons. She is the section head for UPenn's toxicology laboratory and oversees cases from admission through testing and the determination of results. She has worked specifically with dairy cows and diagnosing cause of death. I consider her an expert on veterinary toxicology.

She defined salt toxicity as an excess of sodium and that it can occur in any animal, including humans. Generally speaking, cows would need some sodium to live and dairy cows typically get that in their normal diet, however, the benefits of sodium consumption do level off and excess sodium can cause illness or death (tr Day 5 at 20-21). Dr. Murphy would expect to see an abnormally elevated sodium level in blood work to support a diagnosis, but she would investigate further (tr Day 5 at 17-18). Dr. Murphy would also want information on the animal's environment to look for a possible source of poison. She would ascertain the serum sodium levels, too (tr Day 5 at 19). In the case of death, Dr. Murphy would sample brain tissue and the fluid of the cow's eyes (tr Day 5 at 21).

Dr. Murphy testified Defendant asked her to review Claimants' cow's blood test and water sample analysis, Exhibits Q and R, to diagnose how Claimants' cows died. In her opinion, the information was insufficient to determine a conclusion within a reasonable degree of veterinary certainty (tr Day 5 at 10).

Dr. Murphy opined that the blood work results for the cow that died were unremarkable and in fact in the normal range for sodium and chloride (Exhibit Q; tr Day 5 at 12, 13). Nor did Dr. Murphy see any evidence of possible salt toxicity in the water analysis in Exhibit R. Again, she determined those results to be unremarkable and indicated they would not support a diagnosis of salt toxicity without further investigation (tr Day 5 at 14-15, 17).

DECISION

The following facts are undisputed. Claimants' farm sits on the Onondaga Formation and in close proximity to the eastbound lane of the Thruway. Surface water runoff ponds between Claimants' farm and the Thruway and then flows onto Claimants' property. The surface water runoff contains high concentrations of sodium and chloride. The sodium and chloride result from the breakdown of the rock salt and brine used to deice the Thruway. Once on Claimants' property, the salt infused surface water runoff migrates through the cracks, fissures and voids in the bedrock, into Claimants' well. The salt infused surface water runoff is able to migrate to the well because Claimants' well is a cascading well - a well with cracks in the wall that permit water to flow into it. Claimants' cows died at the rate of zero to two per year from 1988 until 2006. Then, inexplicably, four died in 2007 and 2008, eleven died in 2009, followed by five in 2010. Deaths continued to decline in 2011 and 2012 until only three deaths, in total, between 2013 and 2015 (Exhibit 23). Milk production also trended generally downward between 2002 and 2010 (Exhibit 11). Claimants switched from their well water to municipal water in 2010.

While I have previously decided that the water containing sodium and chloride from the Thruway deicing process migrates onto Claimants' farm, it remains to be determined whether or not that occurrence constitutes negligence, private nuisance or trespass.

Negligence

The issue in this case is not how the Authority performs its governmental function of snow and ice removal, nor the reasonableness of the type and amount of rock salt used. The issue here is whether or not the Authority's management of the salt infused surface water runoff was performed with reasonable care under the circumstances and in a manner that avoids

foreseeable harm (*Basso v Miller*, 40 NY2d 233, 241 [1976]; *Sanchez v State of New York*, 99 NY2d 247, 252 [2002]).

In *Aragona v State of New York and New York State Thruway Authority* (UID No. 2017-029-051 [Ct Cl, Mignano, J., Aug. 25, 2017]), claimants presented the Court of Claims with salt-infused well water, in multiple wells, in Orange County, New York. Evidence of salt-infused surface water runoff from as early as 1993 was admitted and claimants' claim involved the defendant's failure to correct the salt contamination. The Authority provided affected well owners with bottled water, paved a gutter, built a berm and widened the road shoulder to redirect surface water runoff and deployed snow fencing. The Authority also did their own water sample testing. Finally, the Authority concluded a long range plan was needed to address the situation and officials from the Authority, the New York State Department of Transportation and the local municipality met in an attempt to do so. By the time of trial, no long term plan had been executed.

The *Aragona* Court heard expert testimony from a hydrogeologist who opined the salt infused surface water runoff traveled through fissures in the bedrock into claimants' wells. Citing the circumstantial nature of the evidence presented, the *Aragona* Court determined claimants failed to prove defendants were unreasonable in their actions, thereby creating a risk of harm, and that in fact, defendants had acted to mitigate the harm, therefore defendants were not negligent. The Frederick's case is distinguishable.

Mr. Frederick contacted the Spill Unit at the New York State Department of Environmental Conservation on March 31, 2010 and was referred to the Authority for assistance

(Exhibit 8). Mr. Frederick testified he also contacted his New York State Senator for assistance. An agent or agents from the Authority, the Senator, Claimants and Claimants' representative met at the farm. According to Claimants, work was performed on Thruway property near their farm, but not the section where the ponding was, after the meeting and after the first round of well water testing. Claimants observed that the work changed the slope of the land immediately adjacent to the road surface and a pipe was installed. Mr. Frederick stated the work was done to prevent cars from rolling over when they left the road surface. Mr. Frederick's assertion stands unchallenged. Claimants observed the water ponding in the same spot and manner before and after the roadwork was performed. The Authority did not sample and test water from Claimants' well until after this litigation was commenced, nor did the Authority offer to provide potable water to Claimants. The Authority was aware of the impact of rock salt on surface water runoff since early 1993 based on the evidence presented in *Aragona* and as Mr. Hixson testified, was working to decrease the amount of rock salt used because it was expensive and corrosive. Claimants have proven by a preponderance of the evidence that Defendant's inaction regarding control of the salt infused surface water runoff was unreasonable and created a foreseeable risk of harm given the Authority's experience as described in the *Aragona* case.

Mr. Frederick's lifelong work on the dairy farm qualifies him to opine authoritatively on the behavior and the look of his animals. Thus, milk fever treatment, splayed legs, soft flesh and knotted tendons, as seen in his herd, are fact. However, I cannot make the jump from those observations to his assertion the conditions were caused by excessive salt consumption without the assistance of an expert. While both veterinary experts opined that high sodium and chloride

intake could cause health problems in livestock, neither one would state affirmatively that it happened to Claimants' livestock. In fact, both opined more testing needed to be done to determine how the livestock died.

Although I am sympathetic to Claimants' position and appreciate the financial and emotional impact Claimants suffered with the loss of their cows and calves and the reduction in their farm's milk production, Claimants have not shown that the Authority's failure to properly manage the salt infused surface water runoff is the proximate cause of livestock death and diminished milk production to a reasonable degree of veterinary certainty.

Regarding the effect of the salt infused water as a corrosive that caused water heaters and other appliances to stop functioning and necessitate replacing, I find that particular circumstance within my knowledge and I can determine causation without the aid of an expert. Even the Authority, according to Mr. Hixson, was researching less corrosive, but effective deicing materials. I will award Claimants damages here, as Mr. Frederick testified regarding the appliance and wiring failures where well water was used in their operation.

Regarding the spoiled well and Claimants' loss of potable water, Claimants have proven by a preponderance of the evidence that the well water was no longer fit for consumption due to the high sodium and chloride content. Claimants are awarded the cost of moving to public water and for the past and future monthly water costs.

Defendants ask that I consider comparable negligence as the Authority is not the only source of sodium and chloride that migrated to Claimants' well. I find Defendant has proven by a preponderance of the evidence that a vertical fissure exists in the bottom of Claimants' well

that can bring deep groundwater from the Camillus Formation where sodium chloride naturally occurs. I find that this circumstance reduces Defendant's culpability by 10%. I make no further reduction in culpability based on Claimants' use of the chemicals needed to properly clean the milking machines. While Mr. Ciampa's water test showed evidence of a slight amount of cleaning chemical byproducts in the well water, I had no proof of how these contaminants got into Claimants' well. In fact, these chemicals have been used on the farm since 1968. If there was a leak in the farm's waste water system, no evidence was presented.

Private Nuisance

The *Aragona* court succinctly stated the elements of a cause of action for nuisance citing *Copart Indus v Consolidated Edison Co. of N.Y.* (41 NY2d 564, 570 [1977]): "1) an interference substantial in nature, 2) intentional in origin, 3) unreasonable in character, 4) with a person's property right to use and enjoy land, 5) caused by another's conduct in acting or failure to act." Intent to invade another's use and enjoyment of land is " 'when the actor (a) acts for the purpose of causing it; or (b) knows that it is resulting or is substantially certain to result from his conduct' " (citations omitted) (*Id.* at 571).

Claimants allege the Authority has caused an unreasonable and substantial interference with their property. Surface water runoff migrates onto Claimants' property and, as discussed above, the surface water runoff is infused with higher than reasonable levels of sodium and chloride from diluted rock salt. Claimants have also shown by a preponderance of the evidence that the rock salt infused surface water runoff migrates to Claimants' well. What Claimants have

not shown by a preponderance of the evidence is that the Authority knew or was substantially certain the surface water runoff would flow into Claimants' well and raise the sodium and chloride levels.

Mr. Hixson testified that the Authority constantly monitored the deicing process using technology, training and procedures to decrease the amount of rock salt used. He stated he never thought that the sodium and chloride from rock salt would enter Claimants' well water (tr Day 4 at 39). On cross-examination, Mr. Hixson testified there were no specific engineered controls in place to prevent sodium and chloride from getting into groundwater, but he did state the Authority maintains drainage systems, testifying that the Authority started working on the culverts and grading near and around the section of the Thruway by Claimants' property after the surface water runoff had been tested for contaminants (Exhibits 4H, 4N, 2C). However, I have no evidence regarding the purpose of that work or whether or not that work was performed to mitigate Claimants' situation. Because Claimants did not prove that Defendant's actions were intentional, that is, designed to pollute their well water, their cause of action for private nuisance must be dismissed.

Trespass

“ [W]hile the trespasser, to be liable, need not intend or expect the damaging consequences of his intrusion, he must intend the act which amounts to or produces the unlawful invasion, and the intrusion must at least be the immediate or inevitable consequence of what he willfully does, or which he does so negligently as to amount to willfulness’ ” (*Ivancic v Olmstead*, 66 NY2d 349, 352 [1985] quoting *Phillips v Sun Oil Co*, 307 NY 328, 331 []).

In *Aragona*, claimants' expert testimony was that rock salt infused water runoff was transported to their wells via a circuitous route through bedrock fissures. The *Aragona* Court determined claimants failed to show that it was more likely than not that defendants knew the rock salt would contaminate the well in this manner and found claimants failed to prove trespass.

Here, Claimants also had expert testimony regarding the ability of bedrock to carry rock salt infused water from the surface circuitously to Claimants' well. Defendant did not argue that did not or could not happen, but their expert added that naturally occurring salt could move up from the lower bedrock formation in the form of deep groundwater and contaminate Claimants' well water, too. As discussed above, this was the inevitable consequence of the negligent management of surface water runoff.

I find Claimants have proven a case of trespass by a preponderance of the evidence in that they have shown that Defendant's Thruway maintenance and use of rock salt resulted in salt-infused surface water runoff ponding, then migrating to Claimants' property, constituting an unlawful invasion of their land, which produced the immediate consequence of elevated levels of sodium and chloride in Claimants' well water.

DAMAGES

Defendant maintains Claimants' failed to mitigate their damages, thus any award should be reduced. Specifically, Defendant believes Claimants should have begun investigating and moved to public water in 2002 since that was when their milk production began to decrease. "It is, indeed, a rule of broad acceptance that 'No recovery may be had for losses which the person injured might have prevented by reasonable efforts and expenditures' " (citations omitted)

(*Wilmot v State of New York*, 32 NY2d 164, 168-169 [1973]). Claimants had a duty to make reasonable efforts “to avoid the consequences of the act complained of” (citation omitted) (*Id.* at 168). The burden is on Defendant to prove Claimants failed to act reasonably (PJI Civil 2:235). I find nothing in the record to support Defendant’s contention that Claimants should have known as early as 2002 that their well had been contaminated and taken steps to mitigate greater financial harm.

Based on the testimony and proof presented at trial, Claimants were compelled to switch to municipal water, which required the installation of a public water line at \$11,560.00 (tr Day 1 at 66-67; Exhibit 16) and its connection to the municipal system (tr Day 1 at 68). Claimants have been paying for municipal water since 2010. The yearly costs are:

<u>Year</u>	<u>Payment Amount</u>	<u>Exhibit</u> ⁵
2010	\$ 950.50	20
2011	\$2,243.76	20
2012	\$1,614.22	20
2013	\$1,342.54	20
2014	\$1,555.72	20
2015	\$1,839.96	20
2016	\$1,764.72	20
2017	\$1,748.00	21
2018	\$2,140.92	21
2019	<u>\$2,366.64</u>	21
Total	\$17,566.98	

In addition, the salt infused water damaged equipment Claimants owned and used to operate the farm. Specifically, pumps for the well (four at \$250.00/each) for a total of \$1,000.00 (tr Day 1 at 102-104).

⁵ Exhibits include penalty charges which are not included in Claimants’ claimed damages.

The gutter cleaners required a higher level of maintenance as the wiring had to be replaced three times over five years and the three motors in the gutter cleaners needed replacing at the same time and Mr. Frederick testified that each motor cost \$375.00 to \$400.00 (\$375.00 x 3) (tr Day 1 at 108-109). The replacement, service and repairs for the furnace and hot water heater are documented in Exhibit 18 and total \$3,416.14. Total damage to Claimants' equipment was \$5,541.14.⁶

I make the following award of damages:

Installation of public water line (Exhibit 16)	\$ 11,560.00
Water line connection (tr Day 1 at 68)	\$ 2,185.00
Water cost - past (see Exhibits 20, 21)	\$ 17,566.98
Equipment replacement	\$ 5,541.14
Liddell Hydrogeology costs (Exhibit 58)	\$ 14,820.00
Water cost - future (\$2,500/year x 20 years)	\$ 50,000.00
Total Damages	\$101,673.12
Reduced by 10% for comparable negligence	\$ 91,505.81

Claimant's total award is \$91,505.81, together with appropriate interest from the date of December 18, 2011 (90 days prior to filing their claim) to the date of entry of judgment.

All motions not heretofore ruled upon are now denied.

To the extent Claimant has paid a filing fee, it is recoverable pursuant to Court of Claims

⁶ The small bulk tank Claimants had intended to use for the planned increase in milk production was rendered useless because of a hole in the tank (Exhibit 17). However, I have no evidence of replacement value.

Act § 11-a (2).

LET JUDGMENT BE ENTERED ACCORDINGLY.

Rochester, New York
December 9, 2020



RENÉE FORGENSI MINARIK
Judge of the Court of Claims