

June 26, 2018

Ohio Governor John R. Kasich
Riffe Center, 30th Floor
77 South High Street
Columbus, OH 43215-6117

RE: Letter of Concern for contamination resulting from the spread of AquaSalina as a deicer.

Dear Governor Kasich,

The purpose of this letter is to express our concerns and outrage regarding the spread of radioactive oil and gas waste in Ohio communities. This product was tested by your own Ohio Department of Natural Resources and was shown to have high levels of Radium-226 and Radium-228.

Issue 1: Protection of Public Health and Safety

The Ohio Department of Natural Resources' own test data showed samples of Aqua Salina purchased right off the shelf tested high for radioactivity. A sample taken from a hardware store in Hartville, Ohio tested over 500 times the USEPA Drinking Water limits for Radium-226 and Radium-228. The average of the samples tested by ODNR was 300 times federal drinking water limits for Radium-226. We have been told over and over that this product is safe because it is produced from waste from conventional wells and not unconventional horizontal wells. As we suspected all along this statement is not true.

Radium-226 is especially dangerous because, unlike a lot of radioactive isotopes, it dissolves readily in water. When ingested in water, the body incorrectly recognizes Ra-226 as dissolved calcium and deposits it in bone tissue. Radium-226 is an "alpha particle emitter," meaning that an atom of it is energetic enough that it will bombard surrounding cell tissues and cause cell mutations. It is a bone seeker. Radium-226 causes bone cancer. In fact, radon gas - radium in gas form - is the second leading cause of lung cancer in the U.S.

Alpha particles are difficult to detect and have a greater potential for damage in biological tissue. Exposure to high levels of radium results in an increased incidence of bone, liver, and breast cancer. The EPA and the National Academy of Sciences' Committee on Biological Effects of Ionizing Radiation, have stated that radium is a known human carcinogen (ATSDR ToxFAQs). Allowing the spreading of these alpha particles in the environment is a serious health issue that must be halted now!

We are extremely concerned about health risks to members of the public exposed to this radioactive material through direct skin contact, ingestion of particles from contaminated hands, inhalation of radioactive dust, ingestion of radioactive dust on crops, and via contamination of drinking water supplies.

It is outrageous that ODNR merely advised the company that "human consumption of any amount of AquaSalina is highly discouraged." ODNR should have ordered a stop production order instead.

Issue 2: Protection of the Environment

Once this contamination is allowed into the environment, it will migrate via air pathways, water, and biological vectors, contaminating water, soil, crops, other vegetation, wildlife, livestock and pets. The radioactivity will persist in the environment for millennia. The half-life of radium 226 is 1600 years.

As we are sure you are aware, the Ohio House Energy and Natural Resources Committee voted HB 393 out of committee on May 22, 2018. As governor, it is your duty to protect the citizens of the State of Ohio over the profits of one company that does not respect Ohio laws and is intent on ignoring them and trying to get a law passed to green light its dangerous practices. Citizens need you to step up and halt this unnecessary and potentially deadly practice of spreading oil and gas waste, so-called "brine," on Ohio roads and stop the marketing of radioactive waste to an unsuspecting public.

HB 393 and its companion bill in the Senate, SB 165, would not only take away most of ODNR's authority to regulate the radioactive oil and gas waste, but the bills would actually prohibit ODNR from ever regulating this waste once destined to be a product.

The public will never know where this product has been used and it would not be because ODNR will not say -- they won't know either! We beseech you to veto any bill that comes across your desk that would allow this radioactive waste fluid to be used in any way in any community. You still have time to do the right thing as Governor, use your executive power to stop the spreading of this waste.

Sincerely,



Teresa Mills on behalf of the attached list of signees

Please note that we have attached a toxicologist report beginning on page 8.

Buckeye Environmental Network
Teresa Mills, Executive Director

Appalachian Ohio Group of the Sierra Club
Athens County

The Alliance of Nurses for Healthy Environments
Katie Huffling, Executive Director

Torch CAN DO
Felicia Mettler, Athens County

Sierra Club Ohio Chapter
Guy Marentette

Concerned Citizens Ohio, Portage County
Lori Babbey

Ohio Ecological Food and Farm Association
Amalie Lipstreu, Policy Program Coordinator

Coshocton Environmental and Community
Awareness, Nick and Bard Teti, Educators

Ohio Farmers Union
Joe Logan, President

Action septic Service, Inc
Tim and Roberta Kettler, Business owners

Thrive_At_Life: Working Solutions, Business owner,
Peggy Berry, PhD, RN, COHN-S, SHRM-SCP, PLNC

Frack Free America National Coalition, OH
Jane Spies

Sustainable Medina County
Kathie Jones, Organizer

Massages by Maggie LLC
Margaret Kimble owner, Stark County

The FracTracker Alliance, Walter E. (Ted) Auch, PhD
Great Lakes Program and Lead Researcher

Concerned Citizens Lake Twp./Uniontown IEL
Superfund Site, Chris Borello

Fresh Water Accountability Project
Lea Harper, Managing Director

The Earth Outreach Missions, Mahoning County
Rev. Monica Beasley-Martin

Ashtabula, Geauga, Lake Counties Farmers Union
Mardy Townsend, President

Indivisible Columbus District 3
Franklin County

Ashtabula County Water Watch
Stephanie Blessing, Coordinator

Indivisible
Ashtabula County

Garrettsville Board of Public Affairs
Fran Teresi, Trustee, Portage County

Moving Forward Together
Ashtabula County

Medina County Democratic Club
Patricia A. Walker

Indivisible Ohio District 12, Delaware, Franklin,
Licking, Marion, Morrow, Muskingum, Richland

Athens County Fracking Action Network
Heather Cantino, Steering Committee

Indivisible Appalachian Ohio
Liz Shaw President

Guernsey County Citizens Support on Drilling Issues
Greg Pace, administrator

Ohio Environmental Stewardship Alliance
Vickie Askins, Wood County

Radioactive Waste Alert.org
Caroline Harding, organizer

Concerned Barnesville Area Residents (CBAR)
Cathy Burkhart

Concerned Citizens of New Concord
Meghan Wynne

The Guardians of Mill Creek Park
Lynn Anderson

Athens County Bill of Rights Committee
Sara Quoia and Sally Jo Wiley

FaCT-Faith Communities Together for a
Sustainable Future, Ron Prosek, President

Columbus Community Bill of Rights
Bill Lyons, co-organizer

Communities for Safe and Sustainable Energy
Steve Hammond, President

Cleveland Divestment Project
Kimberly Mann

John Elder
Lorain County

Julie Weatherington-Rice, PhD, CPG, CPSS
Franklin County

George E Elias
Mahoning County

Judy Peyko
Mahoning County

John Williams
Trumbull County

Marcia Wolff
Summit County

Michael Jerryson
Trumbull County

Diana Shaheen
Mahoning County

Warner Lange
Trumbull County

Tina Jurich
Mahoning County

Jean Tucker
Trumbull County

Christine Flak
Mahoning County

Kathleen Berry
Mahoning County

Michele Garman
Trumbull County

Kim Dupere
Trumbull County

Jenny Morgan
Franklin County

Gloria Douglas
Trumbull County

Andrea Reik
Athens County

Catherine Ball
Summit County Educator

Pat Walker
Medina County

Drake Chamberlin
Athens County

Ralph Jocke
Medina County

Michele Papai
Athens County

Nicholas Baker
Medina County

Anastasia Birosh
Medina County

Karen Guthrie
Portage County

Joseph McLaughlin
Athens County

Dr. Randi Pokladnik
Harrison County

Leslie Christensen
Portage County

Joel Pokladnik
Harrison County

Claudia Miller
Portage County

Renee Bogue
Stark County

Barbara Brovarone
Portage county

Ann Money Penny
Athens County

Sydney Benson
Medina County

Michael Kleinman
Athens County

Pete Benson
Medina County

Rachel Kleinman
Athens County

Ardith Hayes
Lorain County

Anne Wardwell
Lorain County

Edward Wardwell
Lorain County

Robert Longsworth
Lorain County

Dina Schoonmaker
Lorain County

Carol Ganzel
Lorain County

Melissa Reed
Lorain County

George Blomgren
Lorain County

Deborah L. Young
Medina County

Vera Cooke
Lorain County

Shelly Stark
Athens County

Loran Conley
Athens County

Mary McDaniel
Lorain County

DeeDee Giese
Wayne County

Max Burkhart
Belmont County

Bob Maher
Athens County

Carol Apacki
Licking County

Robin Kocher
Median County

Ken Apacki
Licking County

Christine Hughes
Athens County

Brad Brotje
Portage County

Kevin Barnet
Nominee for Ohio 1 House Rep.

Eric Messenger
Belmont County

Mary Emhoff
Medina County

Kerri Bond
Noble County

Kathy Kinstler
Medina County

Jeff Bond
Noble County

Milena Miller
Athens County

Jodi Carter
Noble County

Isabel Kopp
Portage County

Barbara Weber
Noble County

Valerie Frank
Guernsey County

Lisa Stillion
Guernsey County

Elizabeth Duche
Guernsey County

Connie Hammond
Franklin County

Gene Wright
Monroe County

Fr. Michael Ziebarth
Belmont County

Carolyn Stanley
Belmont County (formerly)

Russ Leewood
Belmont County

Jack Wallingford
Portage County

Frederick Cooper
Belmont County

Eric Fenster
Belmont County

Sandra Perebzk
Belmont County

Scott Whitacre
Belmont County

Mary Lang
Portage County

Susan Whitacre Spence
Belmont County

Julie Kronenberger
Franklin County

Nancy Jesser, PhD
Franklin County

Stephanie Goodwin
Portage County

Thomas Collins
Portage County

Roxanne Groff
Athens County

Linda Hood
Franklin County

Garry Hood
Franklin County

John Morgan
Belmont County

Steven Cochran, MD
Akron, Summit County

Loraine McCosker
Athens County

Maria Montanez
Trumbull County

Deb Olson
Portage County



June 22, 2018

Teresa Mills
Executive Director
Buckeye Environmental Network
2319 Park Ridge Court
Grove City, OH 43123

Dear Ms. Mills:

I have reviewed the Ohio Department of Natural Resources Division of Oil and Gas Resources Management (DOGRM), Radiation Safety Section Interoffice Memorandum, prepared by Chuck McCracken, Manager of the Radiation Safety Section on July the 26th, 2017 at the request of Richard Simmers, Chief, Division of Oil & Gas. This memo clearly and irrefutably shows that AquaSalina deicing brine is not fit to be sold to the public as it contains levels of radioactivity that pose significant risks to public health and the environment.

This report evaluated the results of radiological testing of samples collected from a consumer product, AquaSalina, produced by Nature's Own Source. The product is sold as a deicing liquid that is produced from radioactive oil and gas industry waste. This report makes clear the public health risks that this product poses for consumers and for the environment. Unfortunately, the recommendations of the Radiation Safety Section of the DOGRM do not go far enough to protect the public and the environment from the high levels of radiation found in this consumer product. The testing done by DOGRM found the average level of radiation in the ten samples collected from around the state to be 346 times greater than the U.S. EPA Drinking Water standard for combined Radium-226 and Radium-228. The concentrations of combined Radium-226 and Radium-228 ranged from a low of 1,395 picocuries per Liter (pCi/L) to a high of 2,491 pCi/L. The average concentration was 1,731 pCi/L.¹ The U.S. EPA Drinking Water standard for combined Radium-226 and Radium-228 is 5 pCi/L. The highest concentration found was almost 500 times this standard. This sample was taken from a container of AquaSalina purchased from a hardware store in Hartville, OH.

¹ DOGRM calculated an average concentration of combined Radium-226/228 of 1,579 pCi/L after deleting the highest concentration found without stating their rationale for doing this. Perhaps their rationale was to consider the highest reading as an outlier. Whatever their reason, it is inappropriate to do this because of the small number of samples. The analysis in this letter report includes the results of all samples including the highest reading.

In addition, the concentration of combined Radium-226 and Radium-228 in all samples exceeded the environmental discharge limit of 120 pCi/L established in the Ohio Administrative Code 3701:1-38-12, Appendix C, Table II. The average concentration of combined Radium-226/228 was more than 13 times the administrative code limit, with a range from 11.6 to 20.8 times greater than this limit.

DOGGRM staff collected samples of the liquid deicing brine, AquaSalina, produced and sold to consumers by Nature's Own Source. A total of 14 samples were collected from 6 locations in Ohio. Four of these samples were background samples, two of which were untreated tap water and two were tap water mixed with halite solution. The remaining 10 samples of the AquaSalina product were collected from 5 locations. Eight of these samples (including 2 duplicates) were collected from 3 different production facilities where samples were collected as a pre- and post-production liquid product. The final two samples were collected from two stores where the finished AquaSalina consumer product was purchased.

The brine used in Nature's Own Source's AquaSalina product is treated radioactive oil and gas industry waste. The company's treatment process appears to increase the concentration of combined Radium-226/228 in the final product. All three post-treatment samples collected from Nature's Own Source production plants had substantially more radiation than the pre-treatment samples indicating that the addition of the radioactive oil and gas industry waste was the primary source of the radiation. The increase in combined Radium-226 and Radium-228 ranged from 11% to 92% in these three samples as shown in the DOGGRM memorandum. Left untreated, the waste produced as a by-product of the oil and gas activity would be classified as a Naturally Occurring Radioactive Material (NORM). However, the treatment process used by Nature's Own Source to manufacture AquaSalina increases the radioactivity of the material resulting in a Technologically Enhanced NORM, or TENORM.

DOGGRM wrongfully dismissed the potential health risks these findings pose by arguing that "it is unlikely that radiation exposure to Ohioans from road spreading of vertical brine would exceed the 100 mrem/year [millirems per year] public dose limit" established by the U.S. Nuclear Regulatory Commission. This conclusion is inappropriate because it is based on a study conducted by the Pennsylvania Department of Environmental Protection (PA DEP) in May 2016 which may or may not reflect similar radiation levels and exposure conditions. Unfortunately, the details on how the exposure calculations were estimated are not included in the DOGGRM report.

DOGGRM did prepare a follow-up calculation in July of 2017, using the maximum concentration of combined radium found in the AquaSalina samples to calculate an estimated dosage of radiation a recreational Ohio citizen would experience from roads treated with the

spreading of the radioactive brine product. This analysis did find that radioactive exposures were twice as high as in the PADEP study, as DOGRM simply adopted the PA DEP exposure estimates without providing any details on how the exposures were determined. For example, no details are provided on how the recreational user is exposed including by what routes of exposure, how often, over what period-of-time, via how many routes of exposure, or whether cumulative exposures were taken into consideration. These details have potentially huge variability. Furthermore, no specific reference to the PA DEP report is provided.

A paper published in the scientific peer-reviewed journal *Environmental Science & Technology* in May 2018 by researchers at Penn State University evaluated the potential environmental and human health impacts of spreading oil and gas waste on roads for deicing and dust suppression. The findings in this paper are quite relevant to the questions raised about the risks posed by the sale of AquaSalina for deicing purposes. Over the course of six years of research, the authors of this paper found that radium was not fully retained by the roads where it was applied, and that the majority of contaminants (the authors looked at chemical as well as radioactive contaminants) were absorbed into runoff, entering groundwater, lakes, and streams where it could impact the environment and human health. The median concentration of radium in the commercial wastewater evaluated in this study was only 1,230 pCi/L, significantly less than the average concentration found in the commercially available AquaSalina samples analyzed by DOGRM staff.²

The researchers commented that the “release of radium, a known human carcinogen, is a potential threat to human health. In Pennsylvania, we found that radioactivity associated with radium released to the environment via road spreading exceeds the radioactivity of radium released by spill events or waste water treatment plants.” The authors found that spreading oil and gas waste brine releases more radiation to the environment than typical oil and gas activities including all other wastewater disposal options. They estimated that spreading oil and gas brine released over four times more radium than oil and gas waste treatment facilities and over 200 times more radium than oil and gas spill events. The authors concluded that oil and gas brine that is applied to roads should contain less than 60 pCi/L radium and recommended that standards be developed for oil and gas waste water that would be spread on roads to “help reduce the potential toxicity concerns associated with this problem.”

It is clear from this paper that these researchers are very concerned about the public health and environmental risks posed by spreading of radioactive brine as a deicing agent or as a dust suppressant. This paper provides hard scientific evidence that was not previously available that spreading oil and gas wastewater is a potential threat to human health and

² Radium in this paper is identified only as “radium” and is not separated into radium-226 and radium-228.

aquatic life and that the radium concentration in the waste water should not exceed 60 pCi/L.³

Without details on the exposure estimates used by DOGRM to evaluate public health risks, it is not possible to independently evaluate how this estimate was made. It is important, to note, however, the ease with which AquaSalina can contaminate watersheds, recreational areas, and drinking water supplies if its continued use and application is allowed. The inherent purpose of the product is to lower the freezing point of water, either preventing liquid water from freezing or making it easier for solid water to melt. The intended use of this product brings huge volumes of water into direct contact with highly radioactive waste material before it flows off and joins the greater watershed. Streams, rivers and lakes used for recreation, fishing, and ultimately for drinking water, can be adversely impacted by this product that contains high levels of radioactivity, increasingly so as more consumers apply this product. It is also problematic that AquaSalina is not only used for deicing roadways, but it can also be used by consumers on sidewalks, driveways, and steps increasing the risk of tracking the radioactive waste into residential homes.

The recommendations by DOGRM call for more testing, which certainly makes sense, especially in light of the recent findings by the researchers at Penn State University. The DOGRM recommendations, however, fail to require the company to take any action to address the uncertainty of the public health and environmental risks that exist when using this product as a deicing agent. Consequently, the public will continue to be unaware of the risks using this product poses not only to human health but to the environment. Consumers will also be needlessly exposed to high levels of radiation including to radon gas, a decay product of radium, when they open the packaging of AquaSalina.

The state of Ohio would be derelict in its duty to protect the public and the environment from the high levels of radiation found in this consumer product if it takes no further action. At a minimum, more testing is needed, and further sales of this product should be halted until additional testing information can be acquired and evaluated.

I hope these comments are helpful. Feel free to contact me if you have any questions or need further clarification.

Sincerely,



Stephen Lester
Science Director

³ The full paper is "Environmental and Human Health Impacts of Spreading Oil and Gas Wastewater on Roads, Tasler, TL, Burgos, WD, Piotrowski, P, Castillo-Meza, L, Blewett, TA, Ganow, KB, Stallworth, A, Delompre, M, Goss, GG, Fowler, LB, Vanden Heuvel, JP, Dorman, F and Warner, NR., *Environmental Science & Technology*, DOI: 10.1021/acs.est.8b00716. The paper can be found at <https://pubs.acs.org/doi/10.1021/acs.est.8b00716>.