NAIMA
NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION

VIA E-MAIL (david@yourgreenid.com)

October 2, 2024

Mr. David J. Byrnes
Green Integrated Design
1950 E. Watkins Street
Phoenix, AZ 85034

RE: "Is Your Home Insulation Hazardous to Your Health?"

Dear Mr. Byrnes:

INTRODUCTION

Green Integrated Design's ("GreenID") article entitled "Is Your Home Insulation Hazardous to Your Health?" has come to the attention of the North American Insulation Manufacturers Association ("NAIMA"). NAIMA is the trade association for the manufacturers of fiber glass and mineral wool insulation products. NAIMA promotes the energy efficiency benefits of insulation. NAIMA also challenges misinformation about its members' products; it is in this context that this letter is written. GreenID should be aware of the false and misleading information contained in the article. This letter, the content of which has been sent to GreenID, is also being sent to Medium.com in the hope that you will remove the article from your website and modify it so that it reflects the scientific record.

The GreenID article states that fiber glass insulation "poses many health risks." GreenID compares fiber glass insulation to glass from a broken window and that fiber glass insulation "is extremely sharp and is very dangerous." GreenID claims that fiber glass insulation has the same effect upon lungs, skin, and eyes as broken glass and that fiber glass insulation causes serious respiratory conditions. GreenID states: "Much of the concern over the potential carcinogenic aspects of man-made mineral fibers relates to very small diameter fibers that can be inhaled." For these reasons, GreenID concludes that "Fiberglass insulation is our least preferred type of insulation." GreenID offers a caveat in that "fiberglass is not significantly risky unless you live near a production facility or work with it on a regular basis." GreenID also claims that the resins used on fiber glass insulation emit small amounts of toxic fumes. Lastly, GreenID states during a fire, fiber glass insulation will create hydrogen cyanide.

NAIMA appreciates your effort to review the potential hazards of various different insulation products, but if such an effort is undertaken, it is important that you get your facts straight and communicate to your audience accurate information. As this letter will demonstrate, there are some serious errors in GreenID's characterization of fiber glass. First, fiber glass is not a carcinogen. Second, fiber glass fibers are biosoluble, which means they dissolve in the lungs unlike more durable fibers; therefore, it does not create the "serious respiratory conditions" you claim in your article. Fiber glass insulation is safe to manufacture, install and use when

recommended work practices are followed. Third, fiber glass insulation can cause temporary, mechanical irritation, but it does not do the damage broken glass could do to skin. Fourth, epidemiological studies prove that fiber glass exposure to factory workers does not cause cancer. Moreover, exposures near production facilities are very low. Fifth, GreenID's hydrogen cyanide claim is misleading.

LIKENING FIBER GLASS INSULATION TO BROKEN GLASS IS MISLEADING

GreenID compares fiber glass insulation to glass from a broken window and that fiber glass insulation "is extremely sharp and is very dangerous." GreenID claims that fiber glass insulation has the same effect upon lungs, skin, and eyes as broken glass and that fiber glass insulation causes serious respiratory conditions.

The following description of the fiber glass insulation manufacturing process demonstrates why comparing fiber glass insulation with sharp broken glass is unfounded and ridiculous. Fiber glass is made from sand (silicon dioxide, silica, SiO_2), glass cullet (recycled glass), soda ash, limestone, and borax.

During the production of glass wool raw materials (as described above) are blended and melted in furnaces or melters. The heat from the furnace converts these raw materials into a homogenous molten liquid.[1] Melting of the glass and its forming into a fiber consists of two distinct stages. The first involves the chemical reaction between the ingredients and results in a sticky molten mass of glass that occurs at temperatures on the order of 1650°C.

In the second stage, the glass is cooled until it has the required viscosity for fiberization. The molten glass flows from the furnace through the channel to the forehearth, where, after losing a good deal of heat along the way, the glass drains into spinners that fiberize the glass. At that point, a binder is applied to the newly formed fibers. The fibers are collected on a conveyor and a blanket of glass wool is formed. The blanket is conveyed to an oven where the binder is cured/dried. The blanket exits the oven, is cut into desired sizes, and packaged for shipment to customers.

At no point is the product comparable to broken glass.

INSULATION FIBER GLASS IS NOT CLASSIFIED AS A CARCINOGEN

Green ID suggests that fiber glass is a carcinogen. In October 2001, an international expert review by the International Agency for Research on Cancer ("IARC") re-evaluated the 1988 IARC assessment of glass fibers and removed glass, rock and slag wool fibers from its list of substances "possibly carcinogenic to humans."[2] All fiber glass and rock and slag wools that are commonly used for thermal and acoustical insulation are now considered not classifiable as to carcinogenicity to humans (Group 3). IARC noted specifically:

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[1] F.J. Terence Maloney, *Glass in the Modern World*, p. 74 (New York: Doubleday, 1968).

[2] International Agency for Research on Cancer, *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Man-Made Vitreous Fibres*, Vol. 81 (Lyon, France: WHO/IARC, 2002).

> Epidemiologic studies published during the 15 years since the previous IARC Monographs review of these fibres in 1988 provide no evidence of increased risks of lung cancer or mesothelioma (cancer of the lining of the body cavities) from occupational exposures during manufacture of these materials, and inadequate evidence overall of any cancer risk.[3]

IARC based this decision on new and better research and data on fiber glass hazard. IARC also retained its Group 3 classification for continuous glass filaments used for composite reinforcement purposes and the Group 2B "possible carcinogen" classification for certain special purpose glass fibers not used for insulation purposes.

In June 2011, the U.S. National Toxicology Program ("NTP") removed from the Report on Carcinogens ("RoC") biosoluble glass wool fibers used in home and building insulation.[4] NTP stated that "not all glass wool fibers cause cancer."[5] In fact, the vast majority of glass fibers manufactured in the United States are not considered even possible carcinogens by NTP. Also, in 2011, California's Office of Environmental Health Hazard Assessment ("OEHHA") published a modification to its Proposition 65 listing to include only "Glass Wool Fibers (inhalable and biopersistent).[6] Fiber glass fibers used in building insulation are not included on the Proposition 65 list.

The action taken by IARC, NTP, and OEHHA removes all legal requirements – Federal or California – for a cancer warning label on packages of the biosoluble fiber glass used in today's fiber glass insulation.

The NTP and IARC decisions are consistent with the conclusions reached by Health Canada in 1993,[7] the Agency for Toxic Substances and Disease Registry ("ATSDR") in 2004,[8] and the U.S. National Academy of Sciences, which in 2000 found "no significant association between fiber exposure and lung cancer or nonmalignant respiratory disease in the MVF [man-made vitreous

[3] IARC Press Release, 24 October 2001.
[4] U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program, *Report on Carcinogens, Twelfth Edition*, 2011.
[5] National Institute of Environmental Health Sciences, National Toxicology Program, Fact Sheet, "The Report on Carcinogens," June 2011.
[6] Biosoluble glass wool fibers dissolve more rapidly in body fluids than other fibers that have been associated with human disease.
[7] Canada, Government of, *Priority Substances List Assessment Report – Mineral Fibres (Man-Made Vitreous Fibres)* (1993).
[8] *Toxicological Profile for Synthetic Vitreous Fibers* (U.S. Department of Health and Human Services, Public Health Services, Agency for Toxic Substances and Disease Registry), September 2004, pp. 1-11, 13.

fiber] manufacturing environment."[9] These findings are further supported by one of the most comprehensive epidemiological studies ever created.[10]

FIBER GLASS FIBERS ARE BIOSOLUBLE AND FIBER GLASS IS SAFE TO MANUFACTURE, INSTALL AND USE WHEN SAFE WORK PRACTICES ARE FOLLOWED

Fiber glass fibers dissolve in human body fluids and also dissolve in the lungs.

ATSDR's Toxicological Profile also offers specific distinctions between mineral fibers, referred to as synthetic vitreous fibers, and asbestos:

- "Synthetic vitreous fibers . . . differ from natural mineral fibers such as asbestos because they do not have a crystalline molecular structure."[11]
- "Synthetic vitreous fibers dissolve more readily in the lung than asbestos fibers."[12]
- "While naturally occurring mineral fibers such as asbestos are crystalline in structure, synthetic vitreous fibers are amorphous materials."[13]
- ". . . synthetic vitreous fibers can be distinguished from other fibers, like asbestos, based upon their morphology."[14]
- "Synthetic vitreous fibers differ from asbestos in two ways that may provide at least partial explanations for their lower toxicity. Because most synthetic vitreous fibers are not crystalline like asbestos, they do not split longitudinally to form thinner fibers. They also generally have markedly less biopersistence in biological tissues than asbestos fibers because they can undergo dissolution and transverse breakage."[15]
- "Synthetic vitreous fibers have amorphous molecular structures that do not have planes of cleavage such as those in the crystal structure of chrysotile asbestos. The longitudinal cleavage of asbestos fibers can form thinner fibers that may more readily move into the interstitium or the pleura cavity. This property is not expected with synthetic vitreous fibers and may contribute to the difference in potency between asbestos and synthetic vitreous fibers."[16]

Scientific evidence demonstrates that fiber glass is safe to manufacture, install and use when recommended work practices are followed to reduce temporary mechanical irritation. The International Labour Organization ("ILO") has developed work practices for the handling of fiber

[9] NRC Subcommittee on Manufactured Vitreous Fibers. 2000. Review of the U.S. Navy's Exposure Standard for Manufactured Vitreous Fibers. National Academy of Sciences, National Research Council, Washington, D.C.: National Academy Press.
[10] "Historical Cohort Study of US Man-Made Vitreous Fiber Production Workers," *Journal of Occupational and Environmental Medicine*, September 2001, Vol. 43, No. 9.
[11] ATSDR at p. 1.
[12] *Ibid*. at p. 4.
[13] *Ibid*. at p. 163.
[14] *Ibid*. at p. 208.
[15] *Ibid*. at p. 17.
[16] *Ibid*. at p. 123.

glass and other synthetic vitreous fibers. These work practices were developed collaboratively by representatives from labor unions, government health and safety officials, and industry representatives from all over the world during ten days of deliberation. These work practices specifically addressed the issue of skin irritation.[17]

Furthermore, NAIMA, in its capacity as the North American trade association for the fiber glass insulation industry, developed safe work practices in collaboration with the Occupational Safety and Health Administration ("OSHA") in 1999. The effort resulted in the Health and Safety Partnership Program ("HSPP") which included very specific work practices that addressed such issues as irritation. See http://insulationinstitute.org/wp-content/uploads/2016/02/N059.pdf (link to NAIMA's Product Stewardship Program's Work Practices).[18]

These established work practices recommend the use of basic personal protective equipment, including long pants, long sleeve shirt, gloves, and eye protection. A dust mask (N95 respirator) to protect against exposure to fibers is recommended only when exposures to glass fibers exceed the 1 f/cc PEL, which, based on NAIMA's exposure database, rarely occurs. Those fibers that do enter the lung are biosoluble and will dissolve. Insulation glass fibers are not durable and do not pose the risk suggested by GreenID.

IRRITATION ASSOCIATED WITH FIBER GLASS IS TEMPORARY AND OF A MECHANICAL NATURE

Moreover, it is well known that exposure to any insulation glass fibers may cause temporary irritation of the skin and respiratory system. This temporary irritation is entirely mechanical in nature. Fiber glass fibers are not dangerous and there is no evidence that the fibers can be likened to broken glass from a window.

The following direct quotes from the ATSDR on skin irritation demonstrate that the suggestion that fibers are similar to broken glass has no support in the scientific literature:

- Synthetic vitreous fibers can cause irritation of the eyes and skin known as "fiberglass itch." They can also irritate the upper respiratory tract (the nose, throat) and parts of the lung, causing sore throat, nasal congestion, and cough. These effects usually go away with time. Because most people are not exposed to high levels of synthetic vitreous fibers, serious health effects are not expected to happen in most people.[19]
- Reversible acute irritations of the skin, eyes, and upper respiratory tract are well-known health hazards associated with direct dermal and inhalation exposure to refractory ceramic fibers, fibrous glass, rock wool, or slag wool in construction and manufacturing workplaces. Wearing protective clothing and respiratory equipment has been recommended to prevent these health hazards (and possible chronic health hazards) when

[17] International Labour Organization. *Code of practice on safety in the use of synthetic vitreous fibre insulation wools (glass wool, rock wool, slag wool)*. International Labour Office. Geneva. 2001.
[18] These are identical to the HSPP Work Practices.
[19] ATSDR at p. 5.

time-weighted average (TWA) airborne concentrations of fibers exceed recommended occupational exposure limits of 1 NIOSH fiber (length >5 μm; aspect ratio ≥3:1)/cc for continuous filament glass fibers, glass wool, rock wool, slag wool, and special purpose glass fibers or 0.2 NIOSH fibers/cc for refractory ceramic fibers.[20]

- Absorption of synthetic vitreous fibers across the epithelial layers of the respiratory tract, the gastrointestinal tract, and the skin is expected to be low to negligible due to the relatively large physical dimensions of these elongated particles.[21]
- No studies were located examining the possible absorption of synthetic vitreous fibers across the skin of humans or animals.[22]

EPIDEMIOLOGICAL EVIDENCE CONTRADICTS GREENID'S PREMISE THAT WORKERS ARE PARTICULARLY VULNERABLE TO RISK

The extensive epidemiology data on MMVF manufacturing workers comprise the best and most conclusive information on the safety of fiber glass and other man-made vitreous fibers. These data have not shown any evidence of chronic disease, malignant or nonmalignant, directly attributable to fiber glass exposure.[23]

When IARC evaluated all the epidemiology data in its 2002 review, it concluded that the epidemiology data were inadequate to suggest any adverse effect.[24] On human carcinogenicity data, the IARC experts concluded that:

> Results from the most recent cohort and nested case-control studies of US workers exposed to glass wool and continuous glass filament and of European workers exposed to rock (stone) and slag wool have not provided consistent evidence of an association between exposure to fibres and risk for lung cancer or mesothelioma. . . .[25]

These conclusions are based on an unusually robust body of data from many countries – a European cohort study, an American cohort study, a Canadian cohort study, a Swedish cohort study, cohort studies narrowly focused on certain population segments or single production facilities, and case-control studies in England, Europe, the United States, and others. In Europe, the epidemiological studies were conducted under the direction of P. Bofetta, IARC, Lyon, France, with the associated industrial hygiene being carried out by the Institute of Occupational Medicine ("IOM"), Edinburgh. The epidemiological research in the United States was undertaken at the

[20] ATSDR at p. 16.
[21] ATSDR at p. 112.
[22] ATSDR at p. 115.
[23] Marsh, Gary, *et al.*, "Historical Cohort Study of US Man-Made Vitreous Fiber Production Workers: I. 1992 Fiberglass Cohort Follow-up," *Journal of Occupational and Environmental Medicine*, September 2001, vol. 43, no. 9, pp. 741-834.
[24] International Agency for Research on Cancer, *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Man-Made Vitreous Fibres*, Vol. 81, 2002, World Health Organization, pp. 133-179.
[25] IARC Monograph at pp. 329-30.

University of Pittsburgh, in the Department of Biostatistics and the Center for Environmental Epidemiology, with Gary Marsh as Principal Investigator. The industrial hygiene program was also conducted at the same University, in the Department of Industrial and Environmental Health Sciences. To this day, these two studies – Europe and the United States – separately are among the largest occupational cohort studies ever undertaken.[26]

Specifically, IARC found the U.S. MMVF cohort showed no association with "duration of exposure or with time since first exposure."[27] Moreover, IARC found that standardized mortality ratios ("SMR") were no longer elevated when indirect adjustment for smoking was made. The nested case-controlled study for rock wool showed no association between respiratory cancer and estimated cumulative exposure to respirable fibers, with or without adjustment for possible confounding by smoking or other occupational exposures.[28] IARC concluded that the "results from these studies provide no evidence of an increased risk for pleural mesotheliomas or any other tumours."[29] The extensive European epidemiology studies included a case-control study with "detailed information on exposure to fibres, individual smoking habits and potential occupational confounders, no increased risk of lung cancer with increasing fibre exposure was reported."[30]

In its Toxicological Profile for Synthetic Vitreous Fibers, ATSDR, after extensive review, reached the same conclusion as did IARC on the epidemiological evidence:

- "Epidemiologic studies (cohort mortality and case-control studies) of causes of mortality among groups of workers involved in the manufacture of fibrous glass, rock wool, or slag wool provide no consistent evidence for increased risks of mortality from nonmalignant respiratory disease, lung cancer, or pleural mesothelioma. A number of reviews of these cohort mortality and case-control studies concur that the studies provide inadequate evidence for the carcinogenicity of synthetic vitreous fibers in humans."[31]
- "[C]ohort mortality studies of workers involved in the manufacture of . . . rock wool . . . fibers have not found consistently increased risk of mortality associated with nonmalignant or malignant respiratory disease."[32]

These comprehensive epidemiological studies have already received exacting scrutiny from the world's foremost experts.

Moreover, exposure testing outside of various manufacturing facilities in the United States showed no elevated exposure to airborne fibers.[33]

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[26] IARC Monograph at p. 338.
[27] IARC Monograph at p. 329.
[28] IARC Monograph at p. 329.
[29] IARC Monograph at p. 330.
[30] IARC Monograph at p. 330.
[31] ATSDR at p. 18.
[32] ATSDR at p. 31.
[33] E.D. Switala, *et al*., "Measurement of respirable glass and total fiber concentrations in the ambient air around a fiberglass wool manufacturing facility and a rural area," *Regulatory Toxicology and Pharmacology*, 20, S76-S88 (1994).

HYDROGEN CYNANIDE CLAIM IS MISLEADING

The hydrogen cyanide from burning fiber glass insulation is a scare tactic frequently used by fiber glass insulation competitors, but it is very misleading. The facts demonstrate a large number of building materials and other consumer products, including paper, will give off traces of hydrogen cyanide when burning; if paper is a source of hydrogen cyanide, that certainly implicates cellulose. Natural wool (carpets and upholstery) gives off larger volumes of hydrogen cyanimide.

Smoke generated in structural fires from products composed of carbon and nitrogen contains various concentrations of hydrogen cyanide. Commercial products made up of materials such as wool, paper, cotton, silk, and plastics may produce hydrogen cyanide when they burn. Hydrogen cyanide is formed when natural fibers, such as wool and silk, and synthetic polymers, such as polyurethane and nylon, are not completely consumed during a structure fire. These materials are used in insulation, floor coverings, and other construction materials and furnishings that may be ubiquitous throughout the built environment.[34]

It is important to understand that carbon monoxide is the toxic gas responsible for the great majority of fire fatalities and is generated by burning all materials. Therefore, singling out fiber glass is not only unfair but misleading because it suggests that other insulation products will not create hydrogen cyanide.

Regardless of its origin and exact composition, all smoke is toxic and poses a serious threat to the health of building occupants and firefighters. Reducing exposure to any form of smoke is a key objective of fire safety strategies in buildings.

CONCLUSION

NAIMA hopes that these documented facts will be used for correcting and modifying the misinformation on your website. If you have any questions, please do not hesitate to contact me at (703) 300-3128.

Sincerely,

Angus E. Crane

Angus E. Crane
Executive Vice President, General Counsel

Enclosure

[34] https://www.firehouse.com/rescue/article/10502165/hydrogen-cyanide-the-real-killer-among-fire-gases.

cc: Mr. Evan Williams
CEO
Medium.com
799 Market Street
San Francisco, CA 94102
(yourfriends@medium.com)