

The Hershey Company Shareholder Resolution Memo

Report on Nanomaterials

Executive Summary

This resolution asks The Hershey Company (Hershey) to report on its use of nanomaterials in food products and packaging, including actions the company is taking to: assess the extent of its use of nanomaterials; investigate the safety concerns associated with the nanoparticles it is using; and report on how it might reduce or avoid those risks.

Nanotechnology is the science of manipulating matter at the molecular scale to build structures known as nanoparticles. One nanometer is approximately one-millionth the length of a grain of sand. The novel properties of nanomaterials offer new opportunities for food industry applications, however studies indicate that these same properties may also result in greater toxicity for human health and the environment.

Rationale for a Yes Vote

- 1) Engineered nanoparticles have not been proven safe for human consumption or the environment.
- 2) A number of peer-reviewed studies that exist on engineered nanoparticles, including the type of nanoparticle found in Hershey's Good and Plenty candy, indicate that ingestion of these materials may cause health harms. Nanoparticles can travel throughout the body in ways that larger particles cannot, reaching organs and causing damage and inflammation.
- 3) The requested report will provide Hershey and investors with additional information about the company's policies regarding nanotechnology and whether and how the company is addressing the risks associated with putting nanoparticles into products that people eat, before they have been proven safe. Risks to the company include reputational harm, costly and time-intensive litigation associated with health harms, and the potential for substantial monetary damages. The benefits of a marginally whiter candy are outweighed by the magnitude of potential risks of using these materials in food.

Resolution

Be It Resolved: Shareholders request the Board publish, by October 2016, at reasonable cost and excluding proprietary information, a report on Hershey's use of nanomaterials, including the products or packaging that currently contain nanoparticles, the purpose of such, and actions management is taking to reduce or eliminate risk associated with human health and environmental impacts, such as eliminating the use of nanomaterials until or unless they are proven safe through long-term testing.



What is a nanoparticle?

Nanoparticles are materials with extremely small dimensions. A particle that measures one nanometer is *one-millionth* the size of a grain of sand. While nanoparticles may be more effective than their larger counterparts as dispersants or pigments, due to their small size nanoparticles are able to go places in the body that larger particles cannot. Nanoparticles also have unique physical, chemical, and biological properties that may contribute to health harms.

Concern About Nanomaterials in Growing

In 2008, the insurance giant Swiss Re noted that “what makes nanotechnology completely new from the point of view of insuring against risk is the unforeseeable nature of the risks it entails and the recurrent and cumulative losses it could lead to, given the new properties – hence different behavior -- of nanotechnologically manufactured products.”¹

Lack of Health and Safety Research; Initial Studies Indicate Potential Harms

Recent research on the ingestion of nanoparticles has raised concerns regarding their toxicity to humans and the environment.² Research suggests that nanoparticles of many materials are more biologically active than their normal size counterparts because they have significantly greater surface area per mass. Peer-reviewed scientific research indicates that nanoparticles (including those larger than 100 nm) may cause a range of negative health effects, including cell damage, inflammation, and toxicity. Recent nanotoxicology research has found that:

- Mice fed certain kinds of titanium dioxide nanoparticles with their drinking water for 5 days exhibited DNA and chromosomal damage and inflammation.³
- Male offspring of pregnant mice injected with certain titanium dioxide nanoparticles experienced genital malformations and neurologic damage⁴ as well as changes in gene expression in the brain.⁵
- Cell culture studies have suggested that some types of titanium dioxide and zinc oxide nanoparticles are toxic to human brain and lung cells.^{6,7}

¹ Swiss Re, *Nanotechnology: Small Matter, Many Unknowns*,

<http://www.nanowerk.com/nanotechnology/reports/reportpdf/report93.pdf>

² See, e.g., James Yeagle, “Nanotechnology and the FDA,” *Virginia Journal of Law & Technology*, Summer 2007, Vol. 12, No. 6, http://www.vjolt.net/vol12/issue3/v12i3_a2-Yeagle.pdf.

³ Trouiller, B., et al, 2009, Titanium dioxide nanoparticles induce DNA damage and genetic instability in vivo in mice (Cancer Research), <http://janderslaw.com/blog/wp-content/uploads/2010/04/nanotechnology-titanium-dioxide-health-issues.pdf>.

⁴ Takeda, K., et al, 2009, Nanoparticles transferred from pregnant mice to their offspring can damage the genital and cranial nerve systems (Journal of Health Science),

http://www.researchgate.net/publication/228666236_Nanoparticles_transferred_from_pregnant_mice_to_their_offspring_cause_damage_to_the_genital_and_cranial_nerve_systems.

⁵ Shimizu, M., et al, 2009, Maternal exposure to nanoparticulate titanium dioxide during the prenatal period alters gene expression related to brain development in the mouse (PubMed), <http://www.particleandfibretoxicology.com/content/6/1/20>.

⁶ Lai, J.C., et al, 2008, Exposure to titanium dioxide and other metallic oxide nanoparticles induces cytotoxicity on human neural cells and fibroblasts (International Journal of Nanomedicine), <http://www.ncbi.nlm.nih.gov/pubmed/19337421>.

⁷ Gurr, J.R., et al, 2005, Ultrafine titanium dioxide particles in the absence of photoactivation can induce oxidative damage to human bronchial epithelial cells (Toxicology), <http://www.ncbi.nlm.nih.gov/pubmed/15970370>.



- TiO₂ micro-particles and nanoparticles induced cell death on both human neural cells and connective tissue cells in a concentration-related manner.⁸

Scientists are only now beginning to develop methods to characterize how nanoparticles react in the human body. For instance, the International Life Sciences Institute (ILSI)'s NanoRelease Food Additive Project (a project made up of representatives from industry, government, academia, and NGOs) sought to evaluate and develop the methods to detect, characterize, and evaluate nanoparticles released from food along the alimentary tract.⁹ The outcome was a series of articles discussing how scientists might begin to test and measure how these particles react in the body. This project demonstrates how little we know about these particles when they enter the human body, let alone what impacts they may have over time.¹⁰

Regulatory Inaction Despite Acknowledged Potential Risk

There is currently insufficient funding for human health and safety research on nanomaterials.¹¹ The President's Council of Advisors on Science and Technology has expressed concern about "a lack of integration between nanotechnology-related [environmental health and safety] research . . . and the kind of information policymakers need to effectively manage potential risks from nanoparticles."¹² In 2012, the National Research Council found that "...regulators, decision-makers, and consumers still lack the information needed to make informed public health and environmental policy and regulatory decisions."¹³

Although the U.S. Food and Drug Administration (FDA) has recognized that nanoparticles can have chemical, physical, and biological properties that differ from those of their larger counterparts,¹⁴ it has not yet enacted regulations governing the use of nanoparticles in food. However, the agency's voluntary guidance to industry (finalized in July 2014) indicates that companies may *not* assume that ingredients that are generally recognized as safe (GRAS) at the macro level are safe at the nano level:

"At this time, we are not aware of any food ingredient or FCS [food contact substance] intentionally engineered on the nanometer scale for which there are generally available safety data sufficient to serve as the foundation for a determination that the use of a food ingredient or FCS is GRAS."¹⁵

⁸ Lai, James CK et al, 2008, "xposure to titanium dioxide and other metallic oxide nanoparticles induces cytotoxicity on human neural cells and fibroblasts" (Cytotoxicology), <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2636591/>

⁹ See, International Life Sciences Institute, accessed Mar 18 2016, "NanoRelease Food Additive Project Scope," http://www.ilsa.org/ResearchFoundation/RSIA/Pages/NRFA_ProjectScope.aspx and, International Life Sciences Institute, accessed Mar 18 2016, "NanoRelease Food Additive Project," <http://www.ilsa.org/ResearchFoundation/RSIA/Pages/FoodAdditiveMainPage.aspx>

¹⁰ *Id.*

¹¹ See, the Project on Emerging Nanotechnologies, Apr. 16 2008, Limited Transparency in Federal Nanotech Research May Hamper Development, http://www.nanotechproject.org/news/archive/hsc_4-16/

¹² Congressional Research Service, 2013, The National Nanotechnology Initiative: Overview, Reauthorization, and Appropriations Issues, p.41. <http://www.fas.org/sfp/crs/misc/RL34401.pdf>.

¹³ *Id.*

¹⁴ Food and Drug Administration, Nanotechnology, <http://www.fda.gov/ScienceResearch/SpecialTopics/Nanotechnology/default.htm>;

¹⁵ Food and Drug Administration, 2012, *Draft Guidance for Industry: Assessing the Effects of Significant Manufacturing Process Changes*, Paragraph III Section E, <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/IngredientsAdditivesGRASPackaging/ucm300661.htm>



The same guidance warns that “nano-engineered food substances can have significantly altered bioavailability and may therefore raise new safety issues.”¹⁶

Nanomaterials Are Used in Hershey’s Products

Testing commissioned by As You Sow and conducted at an independent laboratory indicates that there are titanium dioxide nanoparticles in Hershey’s Good and Plenty candy. In addition, Hershey’s has not demonstrated that the company has policies and supplier standards in place to prevent other engineered nanomaterials from being incorporated in the company’s food products or packaging. The report requested by this proposal would provide shareholders information about such policies, if they exist, and whether they are sufficient to protect the company from material risk.

Nanomaterials in Hershey’s Products Pose Risk to Company

Proponents believe that Hershey’s is exposed to significant risks associated with the company’s use of nanomaterials in food. When technology is used before ensuring that it is safe for humans and the environment, and before regulatory standards exist – especially when studies indicate the potential for health harm -- significant financial, legal, and reputational risk is created. This risk is only underscored when emerging technologies are used in food products.

A. Litigation Risk

Tort claims may be the most likely to emerge following exposure to nanomaterials in food products. Other types of claims are also possible, including public entity suits to recover the cost of responding to a health crisis or of cleaning up environmental releases.

Asbestos litigation is a good example of the risks that can arise from using an emerging technology before it is proven safe. Use of asbestos (a nanomaterial) has created the longest, most expensive mass tort in national history with total U.S. costs now standing at over \$250 billion.¹⁷ If companies had been asked to investigate and minimize or avoid risks prior to adopting asbestos technology, a sad and expensive chapter in worker harm might have been avoided.

Lead in paint provides another example of how companies can be held responsible for their actions decades later. In January, 2014, Sherwin-Williams, NL Industries, and ConAgra were ordered to pay \$1.15 billion to replace or contain lead paint in millions of homes in 10 California cities and counties based on a public-nuisance lawsuit brought by those localities. The industry’s early knowledge of, and disregard for, the potential harm of lead in paint impacted the judge’s decision to find the defendants responsible for the health-associated harms caused by their products.¹⁸

¹⁶ *Id.*

¹⁷ The Economist, Jan. 26 2005, The War on Tort, <http://www.economist.com/node/3598225>.

¹⁸ Bloomberg, 2013, “Sherwin, NL, ConAgra Lose \$1.1 Billion Lead Paint Ruling,” <http://www.bloomberg.com/news/2013-12-16/sherwin-nl-conagra-lose-1-1-billion-lead-paint-verdict-1-.html>



B. Reputational Risk

In addition to legal risk, and the associated disruption and cost if Hershey's is found to have used dangerous materials in its products despite studies demonstrating likely harm, its public reputation could potentially be irreparably harmed. Hershey's faces the immediate risks of consumers moving to other brands if the company does not either demonstrate the safety of the nanoparticles or cease using them until such studies are done.

In 2015, a coalition of advocacy groups in the U.S. and abroad released a policy recommendation for companies in food-related industries to assist them in avoiding or reducing the risks from nanomaterials in food products and packaging.¹⁹ Their recommendation: :

Company adopts a public policy, readily viewable on its website, clearly explaining the Company's practices regarding use of nanomaterials in its food and beverage products and packaging, whether those use are in the research and development phase or in a commercialized product. . . The policy will include the company's understanding of the technical effects to be achieved by incorporation of nanomaterials and/or application of nanotechnologies in its products. The policy will include in an appendix a bibliography of peer reviewed studies used by company scientists and risk managers to determine environmental health, public health, and worker safety risks of the nanomaterials incorporated into their products.

Hershey's Competitors Are Avoiding Nanoparticles

Several food companies have responded to concerns about nanoparticles in titanium dioxide by committing to remove titanium dioxide from food products.

- Dunkin' Brands: Removed titanium dioxide from white powdered donuts; in process of removing from other products.
- Krispy Kreme: Removing titanium dioxide from all its products; have reformulated cream cheese donuts.
- Starbucks: No new products with titanium dioxide. Will be phased out of existing products by 2017.
- Panera Bread Company: Titanium dioxide added to list of prohibited ingredients in 2014.

Hershey's Does Not Have Adequate Disclosure About Nano Risk or Safety Measures

Hershey's has not mentioned nanotechnology, nanomaterials, or nanoparticles on either of its domains (www.hersheys.com and www.thehersheycompany.com) or its most recent Corporate Social Responsibility Report.²⁰

¹⁹ <http://www.asyousow.org/our-work/environmental-health/nanomaterials/policy-for-nanomaterials-in-food-and-food-packaging/>

²⁰ Report available at: <http://www.thehersheycompany.com/social-responsibility/shared-goodness/>



Proponent's Response to Hershey's Proxy Statement in Opposition

Hershey's statement in opposition to the shareholder resolution demonstrates the need for a much more thorough analysis of this issue. Proponent's response to each argument is set forth below.

- 1. "The science behind and research into nanotechnology as it relates to the food industry remains in its very early stages. The FDA has not issued final regulations regarding nanomaterials in food products and importantly, there remains no agreed upon method for analyzing a product for the presence of nanoparticles."**

Response: Rather than supporting the company's position, this argument serves to highlight the need for a report to evaluate the potential risks of using this nanoparticles. As noted by Hershey's, the FDA has not proposed or issued regulations that would direct company action; it has not set safety levels or approved the use of nanomaterials. Similarly, since the science around nanomaterials is in its early stages, its safety for use in foods has not been established.

The inaction of regulators does not protect companies, especially when the regulators themselves warn of the dangers of nanoparticles' largely unknown risks. The final guidance issued by the FDA raises questions about the safety of nanoparticles and reiterates the general lack of knowledge about the technology and its effects.²¹ This lack of regulation, far from being a rationale for use of nanoparticles, should serve as a cautionary point for the company.

The company next argues that there remains no agreed upon method for analyzing a product for the presence of nanoparticles. While there is no single agreed upon method for analyzing a product for the presence of nanoparticles, a varieties of methods exist to test for the presence of nanoparticles,²² including a method called Nanoparticle Tracking Analysis.²³ If, by the above argument, Hershey's is suggesting that it cannot determine the existence or amount of nanoparticles in the titanium dioxide ingredient it is purchasing, this is simply incorrect. Suppliers of food-grade titanium dioxide analyze and produce, in product data sheets, information to purchasers about the inclusion of nanoparticles in their products.²⁴

Not only can Hershey's obtain the necessary information from the supplier's product data sheet, but it could also present its product to any number of laboratories to assess the presence of nanomaterials.

- 2. "We reviewed the ingredient of concern identified to us by As You Sow – titanium dioxide – which is commonly used as a food colorant. Our review indicated that when we use this ingredient in our food products, such usage is within the FDA's approved usage level..."**

²¹ Food & Drug Administration, 2011, Considering Whether an FDA-Regulated Product Involves the Application of Nanotechnology, <http://www.fda.gov/RegulatoryInformation/Guidances/ucm257698.htm>

²² See, e.g., the International Organization for Standardization (ISO)'s Technical Committee 229 Nanotechnologies, http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=381983

²³ See, e.g., over 900 third party papers published citing Nanoparticle Tracking Analysis or NTA data on the developer's website, <http://www.nanosight.com/publications/third-party-papers>

²⁴ The major suppliers of food grade titanium dioxide, Huntsman International and Kronos Worldwide (distributed in North America by Brenntag) provide a product data sheet upon request.



Response: Hershey's does not dispute that the titanium dioxide used in their food products is a nanomaterial. Although titanium dioxide was approved by the FDA 50 years ago, FDA's current guidance (described earlier in this documents) states that the agency is not aware of any nanomaterials for which there is enough data sufficient to make a Generally Recognized As Safe claim.

3. "... The Board feels strongly that the requested report would would be an unnecessary diversion of the Company's resources with no corresponding benefit to the Company or our stockholders, customers, or consumers."

Response: Assessing and reporting on what, if any, of its other ingredients or packaging might contain nanomaterials; seeking safety data; and, if none is found, identifying alternative ways of achieving the Company's goals with less risk or without using nanoparticles, is not likely to be a highly costly endeavor. Nor is the expense of such a report likely to be seen as unreasonable or imprudent by the average investor.

Comparing the cost of a report to the millions or even hundreds of millions of dollars that could be at stake if nanoscale titanium dioxide is later proven to cause harm to people or the environment demonstrates the value of the proposed report. While any human health harm associated with titanium dioxide nanoparticles appears likely to be sub-lethal, the harms could still be significant and the claims disruptive if lawsuits are brought against the company. The reputational risks of such an outcome are obvious and significant. In addition, operations would likely be disrupted if Hershey's had to immediately cease use of an ingredient and had identified no alternative ingredients to replace it. Finally, reputational risk is possible just by using nanoparticles if customers become aware of the potential risks of nanoparticles and choose other food companies as a result.

Proponents so far have not been informed of any benefits associated with using titanium dioxide nanoparticles in Hershey's products or, if there are any, what the value of any such benefits might be, and how and why those benefits are worth the potential risks. Can candy and other food products be made white without resort to nanoparticles? Is there an alternative titanium dioxide product that does not contain nanoparticles? If not, are there other whiteners that do not contain nanoparticles? Is a whitener necessary? This is the type of information that is crucial to the company and to investors as they assess the potential future value of investing in this company.

Conclusion

When technology is used before ensuring that it is safe for humans and the environment, companies create significant potential risk for themselves and their shareholders. By selling Hershey's products containing nanomaterials without adequate safety testing, and without any notice or warning of their presence or potential hazard, the company has placed itself in potential peril.

Support of this resolution will encourage Hershey's to report on its use of nanomaterials and to investigate methods to reduce its associated risk. Shareholders need to be informed not only of the company's exposure to the risk posed by nanomaterials in food and food packaging, but also how the company is addressing and reducing this risk.