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Nanotechnology: Understanding the Benefits and the Risks

July 27, 2016 by Gerry Finley (/author/gerry-finley/)

Nanotechnology is embedded in the products or processes of nearly every major industry and has become a mainstay of product innovation and enhancement. These products will likely generate value and benefit but may create new risks and loss scenarios that could directly impact the insurance and reinsurance industries.

Nanoscale particles and material have been in existence literally since the beginning of time. For example, they can occur from volcano eruptions or fire, or from auto exhaust fumes or cigarette smoke. But only in the last few decades have scientists been able to intentionally create, design and manipulate a wide variety of nanoscale material to achieve specific objectives.

The development and use of nanoscale material enables the production of objects with quality and character beyond prior capability—making things lighter, stronger, more durable and with greater reactivity, storage capacity, color and conductivity. It can impact everything from consumer products such as clothing, cosmetics, toiletries, food and household cleaning products to commercial products such as construction material, solar energy batteries and computers.

The insurance industry could directly benefit from nanotechnology as well, through the development of improved safety equipment for workers, improved damage resistive material for cars and buildings, and the enhanced ability to contain environmental pollution using nanoparticles to decontaminate chemically contaminated soil or water.

Nanotechnology Risks

As beneficial as nanotechnology can be for society, there are also risks, as with any new technology. That's where the insurance industry comes into play. The two major areas of potential insurance-related exposures are personal health (workers and consumers, including health care related) and environmental risks.

Health risks arise most prominently in workers and consumers/users of nanomaterial or products. Workers that are engaged in nanotechnology environments where the nanoparticles are in a freeform state, such as a facility that develops and produces nanoparticles, are the most exposed. Less exposed are workers or consumers engaged with nanomaterial that is contained, for example, in a finished product.

Workers may be exposed not only during the production stage of nonmaterial or products but also during the disposal, end of life and recycling stages of products.

Potential environmental exposure generally arises in the production stage (both raw material as well as intermediate and finished products) as waste material or industrial emissions. The environment may also be exposed at the end of a product life stage as the products are either incinerated or disposed of in a landfill. The nature and degree of environmental exposure could also indirectly affect health risks.

Legal and Regulatory

Executive Summary

Lack of data makes nanotechnology a challenge for insurers and reinsurers, writes Munich Re America's Gerry Finley, who provides some basic considerations for qualitative underwriting of nanotechnology risks.

Even though there has been very little litigation to date, the potential for nanotechnology litigation, including potential mass torts, exists as the potential hazards of certain aspects of nanotechnology have been publicized in professional literature. Much of this has been more speculative than science-based, but the possibility has been highlighted. As the litigation landscape evolves, regardless of actual liability or the actual validity of the claims, the legal costs in the early stages of litigation will likely be high in part because of the highly complex and scientific nature of the claims.

While nano litigation is yet to fully emerge, the regulatory landscape has started to take shape albeit with some challenges. First, there is the issue of the decades-old question of how much regulation is needed and how much is too much. Too little or the wrong type of regulation may result in harm to the public; too much regulation may undercut a growing economic force and may slow research leading to the development of potentially lifesaving technology.

Additionally, the science is new and developing so quickly that the issue of how to monitor and who is best qualified to monitor nanotechnology is a challenge itself. While there is some state regulatory activity, this is the type of issue that lends itself more to federal regulation because of the systemic product liability, national—and even global—exposure inherent in nano products.

Products that use nanotechnology are not limited by state borders, and thus a coordinated federal regulatory scheme is needed. Federal regulation is now largely splintered among several agencies such as the EPA, CPSC, FDA, etc. The National Nanotechnology Initiative (NNI) is intended to coordinate the current separate federal agency attention on nanotechnology. The key agency at this point in time is the FDA, and they are just starting to develop protocols specific to nanotechnology.

The FDA advises that additional guidance for the industry will be developed as needed, so the agency appears to be moving gradually toward more robust regulation. However, the FDA continues to rely on existing protocols and laws, leaving it up to individual manufacturers to define whether they are using nanomaterials and if specific labeling is warranted.

Underwriting

From an underwriting perspective, the insurance industry generally faces challenges with new risks initially because of the lack of data. With nanotechnology, the challenges are tremendous in that regard. There is no credible loss experience, not even a body of judicial activity to examine, and while there are numerous scientific studies, they often produce mixed conclusions.

The lack of data and other definitive loss predictive information means underwriters need to rely more on qualitative underwriting measures. Some of the broad topics to consider include: class selection, coverage, and risk selection and management. This includes an evaluation of the following:

- **Hazard**—Using available scientific/expert analysis, assess the specific engineered nanomaterial and determine the level of risk associated with each to the extent possible.
- **Industry**—Determine the specific industries and industry segments that are most exposed to various nanomaterials based on how the nanomaterial is manufactured, processed and used.
- **Exposure**—Assess the exposure throughout the entire life cycle of the product. Where is the exposure highest and lowest?
- **Insurance impact**—Determine the specific classes and lines of business that may be impacted, the extent to which they will be impacted, and how best to manage the risk and potential losses from an underwriting perspective.

The insurance industry could directly benefit from nanotechnology through the development of improved safety equipment for workers, improved damage resistive material for cars and buildings, and the enhanced ability to contain environmental pollution using nanoparticles.

In the absence of a specific exclusion, the industry is likely already covering nanotechnology exposure under the standard CGL policy, perhaps unknowingly. However, when a carrier desires not to provide coverage, there are several problems with applying a broad nanotechnology exclusion. Nanotechnology itself is a process, not a product or a thing. This makes it virtually impossible to exclude just nanotechnology without excluding the product that it is embedded in, meaning that an insurer is better off excluding products liability for designated products if they have concern about the manufacturers' use of nanotechnology.

Challenges Ahead

Understanding and managing the risk of nanotechnology is one of the challenges of the insurance industry. Broadly speaking, the role of insurers and reinsurers is to enable advancements like nanotechnology to succeed in delivering value to society by helping to manage the related risk and mitigating the impact of potential economic losses that might arise from those risks.

Nanotechnology, at this stage in its evolution, is challenging for the insurance industry for several reasons. First, in most cases, the underwriter may not be aware that nanomaterial is being used to manufacture a finished product unless they specifically inquire. Secondly, reported loss activity directly tied to nanotechnology has not been robust enough to generate broad industry concerns.

The potential latent exposure present in nanotechnology, even if it is relatively remote, is perhaps the greatest nanotechnology-related risk for insurers and reinsurers, particularly with respects to bodily injury. The industry would be well served to actively monitor nanotechnology developments and underwrite manufacturing operations with nanotechnology in mind.