No Small Issue: EPA’s Proposed Nano Rule and the Paint & Coatings Industry

Nanoscale materials have a variety of benefits in commercial and public applications, including medicine, clean energy, and the environment, and have enhanced the effectiveness of products, including coatings. Nanoscale materials are characterized by their small size, where a single unit is generally sized between 1 and 100 nanometers. “Nanomaterials” can be made from nearly any chemical substance since they are, by definition, a chemical substance in the nanoscale range. Nanoscale particles of a material can have optical, magnetic, electric, or other properties that differ greatly from those of larger-sized particles of the same material. Some nanomaterials occur naturally, while some are specifically engineered to take on certain properties.

The U.S. Environmental Protection Agency (EPA) has acknowledged that minimizing the size of a material from conventional particle size can produce unique properties that are desirable for a variety of commercial applications. However, these unique and enhanced properties have raised new questions, such as whether the material in the smaller form may present increased hazards to humans and the environment.¹ To address this concern, EPA created a voluntary Nanoscale Materials Stewardship Program (NMSP) in order to gather more information from a number of industries, including the chemical industry, about the use of nanoscale materials in today’s marketplace. According to EPA estimates, companies provided information on only 10 percent of the chemical substances manufactured in the nanoscale range that may be commercially available, and identified data needs for existing nanoscale material production, uses and exposures.² In order to address this gap in information, on April 6, 2015, EPA proposed³ a rule under its Toxic Substances Control Act (TSCA) Section 8(a) authority, requiring chemical manufacturers and processors to report information on their use of nanoscale forms of “reportable chemical substances” within the past three years.

The American Coatings Association (ACA) is a voluntary, nonprofit trade association representing paint and coatings manufacturers, raw materials suppliers, distributors, and technical professionals. While ACA appreciates concerns surrounding possible health effects of nanomaterials, it believes EPAs proposed reporting and recordkeeping rule for nanomaterials presents serious concerns for any industry subject to the rule. As drafted, the proposal could be the most expansive reporting rule issued by EPA under TSCA Section 8(a) authority, triggering overly burdensome and unnecessary reporting that threatens innovation with a proposed 135-day waiting period prior to manufacturing or processing new nanomaterials. This Issue Backgrounder addresses why EPA should make a number of practical changes to its proposal — which is scheduled to be finalized in fall of 2016 — in order to make the rule workable for the coatings industry, and to allow the agency to appropriately focus its information collection efforts and resources on the most pertinent nanomaterials.

Use of Nanomaterials in the Paint & Coatings Industry

Nanotechnology has opened the door to developing new and improved coatings that address some of the most pressing issues for end-users, including: corrosion mitigation and protection, durability, ultraviolet (UV) and heat resistance, strength and durability in thinner films or lighter weight substrates, water and dirt repellency, anti-fouling, and enhanced colors, to name a few. “[T]he benefits derived from [nanomaterials] novel properties has continued to fuel enthusiastic research at universities, special institutions and government laboratories, in particular.”⁴ In the coatings industry, research to develop nanomaterials has focused on nano-sized inorganic particles, which offer the aforementioned myriad benefits. Some examples of general improvements currently available to coatings through the use of nanotechnology are:

- Paint-primer-in-one architectural paint;
- A highly scratch-resistant surface coating that, in some cases, can reconfigure to provide self-healing when an energy source is provided;
- One-part wood floor coatings with near two-part durability, chemical, and stain resistance;
- Water-based paint and coatings with increased crosslink density for superior chemical, block, and UV resistance;
- A conductive coating system requiring 50 percent less zinc content in the primer and that eliminates the need for a midcoat; and
- Self-cleaning coatings for windows, and antimicrobial coatings utilizing nanosilver particles as the active ingredient.⁵
The coatings industry continues to invest in research and development of innovative nanomaterials, with carbon nanotubes receiving the highest amount of investment. As Nano technology progresses, these advancements will impact the coatings market through the improvement of existing products and the introduction of new products that current technology simply cannot replicate.

Apart from engineered nanomaterials, nanomaterials may unintentionally appear in the coatings industry as a result of inexact manufacturing and chemical processes. For example, during the production of emulsion polymer dispersions, manufacturers may aim for an ideal particle size in the micron range; however, polymers by nature vary in size, and some molecules are produced that are below 100 nanometers (nanoscale). Emulsion polymer dispersions are used as binders in most waterborne coating, adhesive and sealant applications, e.g., paper and wood glue, flooring adhesives, latex paints (low volatile organic compound, or VOC) and coatings, paper and paperboard coatings, plasters and textile finishing agents. Emulsion polymer dispersion technology has been used successfully for more than 50 years and has contributed to a significant reduction in VOC emissions from these product categories by eliminating high-VOC solvents. Paint, coatings, adhesive and sealant formulators, or processors under TSCA, buy emulsion polymer dispersions from the manufacturer and simply mix them into a paint or coating formulation.

Another instance where nanoscale materials result is from the milling of pigments in paint processing. Generally speaking, paint formulators buy pigments in bulk quantity and size and mill the pigments to a smaller particle size. Manufacturers decrease the particle size in order to increase the dispersion of the pigment into the mixture to develop the exact properties needed to meet product performance specifications. This process produces a range of particle sizes; manufacturers aiming for an average particle size in the micron range could inadvertently generate particles in the 1 to 100 nanometer range. The formulation of paint, coatings, adhesive and sealants with emulsion polymers and finely milled pigments has been occurring for decades; long before “nano” became a trend, and has been proven safe.

**Low Risk, Low Exposure of Nanomaterials in the Coatings Industry**

As explained above, inadvertently generated nanoscale particles in coatings formulations are present as a product of the manufacturing process, and cannot be avoided or removed. During paint application, water evaporates, and the polymers link and are converted to a dry film, with the fillers and pigments embedded in an interlinked web, referred to as a polymeric matrix. Consequently, when nanosubstances are embedded in a polymer matrix, the release of isolated nanomaterials from paints and coatings — if present at all — is very unlikely. The low exposure to these pigments, after introduction into a paint film, is well documented. A consortium of European research centers has compared the dust released from epoxy and paint nanocomposites with conventional (i.e., no nanomaterial content) products during sanding and sawing. In their research, which involved rigorous sampling and analysis using scanning electron microscopy (SEM), the consortium observed no significant differences in the particle size distributions between the two categories of products, and analysis found any observed nanoscale chemical substances were enclosed or partly enclosed in the underlying matrix.

Similarly, a comprehensive literature review of occupational exposure studies on nanotechnology workplaces — defined as those where nanosize materials are utilized — has affirmed very low concentrations of nanosubstances in paint and coating application operations, with observed nanoscale chemical substances embedded in the sampled matrix. Little-to-no additional risk due to nanoparticles in the form of emulsion polymer dispersions and milled pigments is anticipated in the life cycle of paint, coatings, adhesives and sealants.

**EPA Proposed Reporting Rule on Nanoscale Materials**

EPA’s proposed rule would require chemical manufacturers and processors to report information on their use of nanoscale forms of “reportable chemical substances” within the past three years. The agency vaguely defines a “reportable chemical substance,” and as a result, the scope of nanomaterials and associated products to be reported on is potentially vast. Manufacturers, importers, and processors would have to report information such as the specific chemical identity, production volume, methods of manufacture and processing, exposure and release information, and existing data concerning physical-chemical properties, environmental effects, and health effects. Additionally, the rule would require any company that intends to manufacture or process an existing nanomaterial on the TSCA inventory to notify EPA 135 days prior to manufacture or processing. EPA could determine during this time that more information is needed, and seek to delay commercialization by requiring testing under TSCA Section 4, or risk management measures under Section 5 and Section 6, if certain hazards are identified.

Given the coatings industry’s use of nanomaterials, ACA has serious concerns with EPA’s proposed reporting rule because it lacks necessary clarity for the definition of nanomaterial. Under the proposed rule, common nanosubstances created in the processing of paint could be interpreted to be nanomaterials subject to the rule. This would require paint and coatings manufacturers to report as processors of emulsion polymers and as manufacturers of nanosized pigments. Also, the proposal’s unnecessary and sweeping reporting burdens could stifle the commerce of intentionally engineered nanotechnology used to greatly improve the quality and effectiveness of innovative coatings technology.

On Aug. 5, 2015, ACA joined the NanoManufacturing Association (NMA) to provide comments to EPA on the proposed rule. ACA and NMA argued that without withdrawing and repurposing the rule, there would be a considerable burden placed on the chemical industry, as well as the agency itself, and that the rule is unlikely to lead to risk management decisions based on scientific evidence. The coalition addressed major concerns with EPA’s proposed rule as follows.
Overly-Broad, Vague Definition of “Reportable Substance” Creates Potentially Massive Reporting Rule

EPA defines reportable chemical substances as substances that are “solids at 25°C C and atmospheric pressure and that are manufactured or processed in a form where the primary particles, aggregates, or agglomerates are in the size range of 1-100 nanometers (nm) and exhibit unique and novel characteristics or properties because of their size.” Manufacturers and processors of multiple nanoscale forms of the same chemical substance would need to report separately for each discrete form of the reportable chemical substance. EPA includes exemptions for trace amounts, salts, proteins, DNA, RNA, nanoclays, and substances manufactured as part of a film on a surface. As written, EPA’s definition of nanomaterial places the burden entirely on manufacturers and processors to identify whether or not a chemical must be reported. ACA believes that defining the threshold for reporting solely in terms of a substance’s size and properties places too great a burden on manufacturers and processors to identify and decide whether or not a chemical substance should be reported. In contrast, other countries that have issued reporting rules for nanomaterials, such as Canada, actually enumerate a list of substances to be reported.

Additionally, due to EPA’s lack of clarity regarding the meaning of “primary particles, aggregates or agglomerates” and “unique and novel characteristics or properties because of their size” within this definition, it is likely that the production of emulsion polymers and the milling of pigments in the coatings industry would trigger reporting because of the presence of nanoscale particles within the molecular size distribution. While these particles are not intended to be the “primary particles,” EPA does not provide any indication of how to calculate what particle range is considered “primary particles or provide guidance on “unique and novel characteristics.” Given the low exposure and low risk of these applications, ACA and NMA requested that EPA exempt these substances from the reporting requirements.

Processor Reporting Will Create Duplicative Reports and Increase Costs

The proposed rule also presents a significant problem for chemical processors. For the first time, and for a reporting rule of such massive scale, chemical processors would have to report on their use of nanomaterials in addition to chemical manufacturers. They would be obligated to report the same information as manufacturers, including chemical identity, physical properties, byproducts, impurities, general population exposure information, and health effects data.

The extensive amount of information requested by EPA — much of which is outside the boundaries of the TSCA 8(a) statutory authority and information that is not readily known to processors — will create significant burdens on the coatings industry. Processors will have to spend many hours working with their upstream suppliers to obtain this information, and learning how to report, since they are not experienced with TSCA section 8 reporting. Information, such as particle size, maximum weight percentage of impurities and byproducts, and description of how the product may be exposed to the environment at a customer’s facility would be incredibly difficult to obtain. In particular, small processors will have to hire employees or dedicate hundreds of hours to be able to complete the information on EPA’s proposed form when they are simply blending the nanomaterials they purchase.

The reality of duplicative reporting occurring, coupled with the costs associated with this new reporting obligation for processors, makes this provision unworkable. ACA and NMA recommended that EPA either exempt chemical processors, or change the proposed requirements to support a phased-approach for reporting that requires information from manufacturers and importers first, then secondarily calls upon processors to fill in information gaps.

135-Day Pre-Notification Requirement Threatens Innovation

EPA’s proposed 135-day waiting period for companies that intend to manufacture or process discrete forms of existing nanoscale materials is a matter of grave concern to the coatings industry. This proposal would establish a notification program for existing chemicals that takes longer and is more burdensome than for new chemical substances under TSCA Section 5. The proposed reporting form that EPA wants companies to complete even asks for significantly similar information as a pre-manufacture notice (PMN) form for new chemicals.

In effect, EPA proposes to use Section 8(a) of TSCA to function like Section 5 of TSCA for new chemicals because companies would be forced to submit notice and delay manufacture of a substance. Under TSCA Section 5, new chemicals are evaluated for safety during the 90-day waiting period. For this proposed rule, it is unclear what EPA plans to do in the 135-day waiting period for nanoscale substances that are reported under Section 8(a), although the agency has suggested it will evaluate these substances for safety during that waiting period and potentially take action to regulate substances. This is inappropriate because nanomaterials are not new chemicals; they are existing substances at the nanoscale and EPA’s only authority to regulate the uses of an existing chemical substance is a Section 5 Significant New Use Rule or risk management under Section 6. If EPA wishes to prevent or ban uses of existing substances, it must use its Section 5 or Section 6 authority and make the necessary risk-based finding. Section 8 does not authorize EPA to delay or prevent companies from going to market.

EPA has required ongoing reporting under Section 8(a) of TSCA in only limited circumstances, narrowly targeted at specific chemicals with established hazards and when necessary to implement other ongoing management measures implemented by the agency under other sections of TSCA. EPA has made no risk-based finding for nanoscale substances. In fact, such rules only required reporting after manufacture. EPA’s nano-reporting proposal would pose a significant hurdle to the coatings industry, since manufacturers and processors would have to report every time a nanosubstance is used that was not reported during the initial reporting period. This will be incredibly difficult to determine, which would lead to either underreporting or, more likely, over-reporting of thousands of nanosubstances.

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Moreover, this evergreen reporting requirement would discourage the paint and coatings industry from exploring the innovation opportunities of nano-sized inorganic particles, and also hinder its ability to compete internationally. Because the proposal requires any company that intends to manufacture or process an existing nanomaterial on the TSCA inventory to notify EPA 135 days prior to both manufacture and processing, businesses will have to wait 270 days before a new nanomaterial can be fully commercialized. Opportunities to further enhance the properties of coatings, find radically new functionality, conserve resources, and reduce solvent emissions will become severely burdened or completely missed with the implementation of the reporting program as it is currently written. A program of this magnitude would need to be supported by risk-based findings in order to be reasonable, yet EPA states numerous times that no risk-based findings are established by the proposed rule. ACA and NMA encouraged EPA to withdraw this part of the proposed rule entirely.

ACA’s Message to EPA

Despite multi-stakeholder requests that EPA withdraw and re-propose its nano-reporting rule because of major issues identified in ACA and NMA’s written comments, and in subsequent meetings with EPA’s Office of Pollution Prevention and Toxics (OPPT) and the Acting Deputy Administrator, the agency appears intent on finalizing a rule in the fall of 2016. Given this critical time as EPA considers changes to the proposal, it is imperative that the agency understand that, as written, this proposed rule is simply unworkable, will substantially burden the coatings industry — in fact, and all chemical processors and small businesses — and will generate an enormous amount of data on substances that pose little-to-no risks to human health or the environment.

ACA implores EPA to make these significant clarifications and a reduction of scope to the proposal in order to make this information collection feasible. It is critical for EPA to exempt processors from reporting to prevent duplicative reporting, eliminate the 135-day pre-notification proposal in order to prevent unnecessary barriers to commerce, and narrow and clarify its definition of a reportable chemical substance. ACA urges the agency to exempt from the reporting rule pigment dispersions containing nanomaterials, polymers, and polymer dispersions given that these are well-established products proven to be safe for decades. Instead, EPA should focus its time and resources on nanomaterials that are likely to present hazards and exposure to the public.

ACA also urges Members of Congress to ask EPA to make these necessary revisions to the proposed rule in order to address the serious potential burdens it will have on the coatings industry, small businesses, and on the future of innovation.

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The American Coatings Association (ACA) is a voluntary, nonprofit trade association working to advance the needs of the paint and coatings industry and the professionals who work in it. The organization represents paint and coatings manufacturers, raw materials suppliers, distributors, and technical professionals. ACA serves as an advocate and ally for members on legislative, regulatory and judicial issues, and provides forums for the advancement and promotion of the industry through educational and professional development services.

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