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Consumer Product Safety Commission  
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**ORGANIZATION:** Project on Emerging Nanotechnologies, Woodrow Wilson International Center for Scholars

**SUBJECT:** CPSC FY2010 Agenda and Priorities

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My name is David Rejeski, and I direct the Project on Emerging Nanotechnologies (PEN), an initiative of the Woodrow Wilson International Center for Scholars and The Pew Charitable Trusts. PEN is dedicated to helping business, government, and the public anticipate and manage the possible health and environmental implications of nanotechnology. As part of the Wilson Center, the Project conducts non-partisan, independent policy research organization that works with researchers, government, industry, non-governmental organizations (NGOs), and others to find the best possible solutions to developing responsible, beneficial, and acceptable nanotechnologies. The opinions expressed in this testimony are my own and do not necessarily reflect the views of the Wilson Center or The Pew Charitable Trusts.

Our goal at PEN is to take a long-term look at nanotechnologies; to identify gaps in nanotechnology information, data, and oversight processes; and to develop practical strategies and approaches for closing those gaps in order to ensure that the extraordinary potential benefits of nanotechnologies will be realized. We aim to provide independent, objective information and analysis, which can help inform critical decisions affecting the development, use, and commercialization of nanotechnologies across the globe. All research results, reports, and outcomes of our meetings and programs are made widely available through printed publications and our website: <http://www.nanotechproject.org>.

In short, both the Wilson Center and The Pew Charitable Trusts believe there is tremendous opportunity with nanotechnology to “get it right.” Societies have missed this chance with other new technologies and, by doing so, forfeited significant social, economic, and environmental benefits.

## Project on Emerging Nanotechnologies



## State of Commercialization of Nano-enabled Consumer Products

I would like to begin by providing an overview of the state of commercialization of nano-based consumer products that may fall under the jurisdiction of the CPSC, share some observations, and end with a set of specific recommendations. These products are important because they will be where the public first experiences nanotechnology and where the CPSC's ability to protect consumers will likely be tested.

- **The number of nano-enabled consumer products is increasing rapidly.** PEN maintains a public inventory of consumer products (Consumer Products Inventory or CPI) identified by manufacturers as being based in some way on nanotechnology. Three years ago, we had 212 manufacturer-identified, nano-enabled consumer products in the inventory. This number now exceeds 1,000.<sup>1</sup> A linear regression analysis conducted shows a near perfect fit in the increase of consumer products available over the past 4 years. An extrapolation out till 2011 is also shown. The trend line of products that potentially fall under CPSC jurisdiction is also consistent with the trend of overall products available (roughly 50% of all products listed). This figure is probably a very low estimate of the actual number of products currently on the market that use nanotechnology, since there likely are hundreds of more products that have not been identified as using nanotechnology by their manufacturers and thus have not been included in our inventory. This number also does not take into account the many commercial and industrial uses of nanotechnology and nanomaterials that can currently be found on the market.
- **Production and distribution of nanotechnology products is increasingly global.** The products in our inventory come from nearly 500 companies in over 20 countries. These products are available in shopping malls or over the Internet, and we have purchased many of them online. Thanks to business-to-consumer (B2C) e-commerce, nanotechnology products easily flow across international borders, raising control, trade, and oversight issues. Increasing numbers of nanotechnology products originate in the Pacific Rim, especially from countries like China and Korea. As a recent Government Accountability Office (GAO) report pointed out, the CPSC has no access to certain types of customs information that could be used to identify potentially unsafe consumer products.<sup>2</sup>
- **Silver is currently the most commonly used nano-engineered material in consumer products.** The type of nano-engineered substances in these products has shifted dramatically in recent years from materials like carbon to silver, which is now used in over 200 products, primarily as an antimicrobial. However, with

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<sup>1</sup> Nanotechnology Consumer Product Inventory. Washington, DC: Project on Emerging Nanotechnologies, Woodrow Wilson International Center for Scholars. Available at <http://www.nanotechproject.org/consumerproducts>

<sup>2</sup> Philip Curtin, a senior analyst from GAO, recently noted that, "...advanced notice, combined with other data that they have, would help [the CPSC] better identify risks before the products enter the country," Quoted in: "Safety Agency Lacks Risk Data, Report Says," *Washington Post*, August 17, 2009.

production costs of new materials like carbon nanotubes dropping rapidly, this mix is likely to shift in the future.<sup>3</sup>

- **The number of children’s products is on the rise.** Within the last three years, an increasing number of products on sale have been targeted towards children, including: pacifiers, toothbrushes, baby bottle brushes, and stuffed animals. These products originate from the United States, Australia, China, Germany, and Korea. This remains a category to watch as nanotechnology’s commercialization proceeds, especially since young children and babies generally have a greater vulnerability to potentially harmful materials.
- **Products are penetrating the market in areas where oversight regimes are weak.** In 2007, as shown in Figure 1, about a half of the products in our inventory fell under the purview of the CPSC, which, according to CPSC Commissioner Thomas Moore, had spent only a total of \$20,000 to do a literature review on nanotechnology at that time.<sup>4</sup> According to our latest analysis, there are now 613 products that potentially fall under the purview of the CPSC, over half of all the products listed in our inventory (1015).

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<sup>3</sup> “Over the past two years, scale up of multi-wall carbon nanotube production has led to a dramatic price decrease down to \$150/kg for semi-industrial applications. According to [*NanoSEE 2008: Nanomaterials Industrial Status and Expected Evolution*], the run for industrial CNT production plants has started in order to achieve a sustainable business with the commercialization of these high-tech materials with a mid-term price target of \$45/kg.” “Nanotechnology Industry is Moving from Research to Production with over 500 Consumer Nano-Products Already Available,” *NanoVIP.com*. Available at <http://www.nanovip.com/node/6020>, accessed April 17, 2008.

<sup>4</sup> Testifying before a Senate Subcommittee in 2007, CPSC Commissioner Thomas H. Moore, who has served at the agency since 1995, summed up the situation: “I do not pretend to understand nanotechnology and our agency does not pretend to have a grasp on this complicated subject either. For fiscal year 2007, we were only able to devote \$20,000 in funds to do a literature review on nanotechnology.” Available at: <http://www.cpsc.gov/pr/moore2007.pdf>, accessed April 17, 2008.

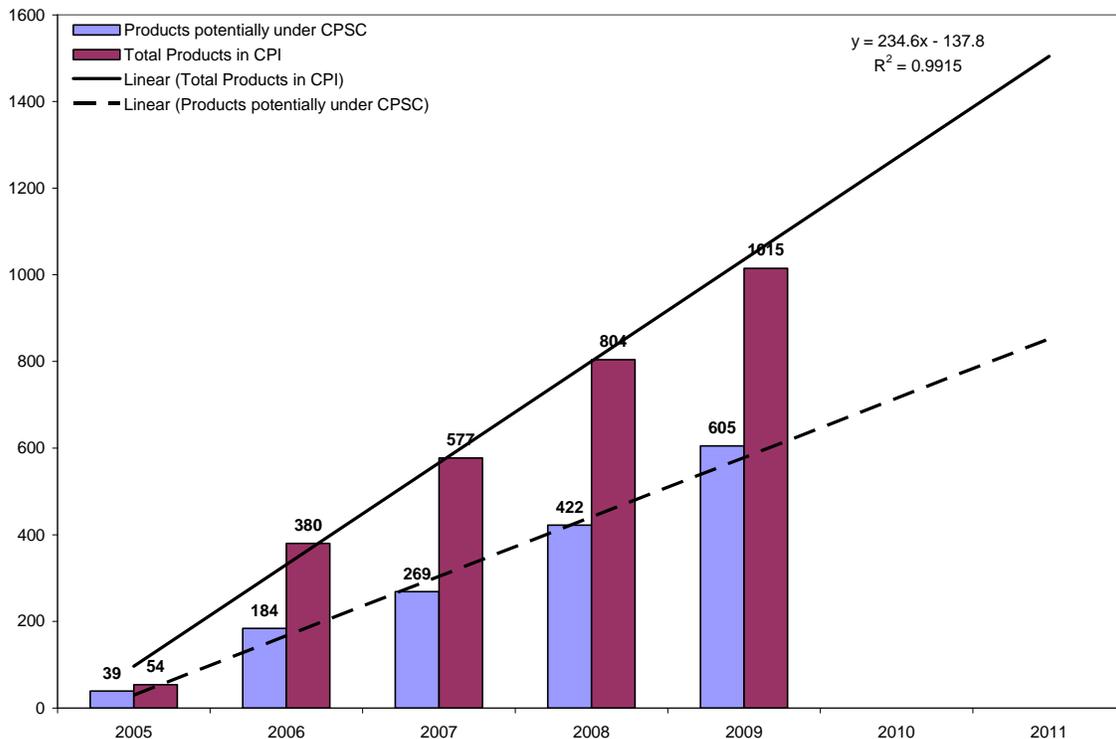


Figure 1. Growth in the number of manufacturer-identified, nanotechnology-enabled products listed on PEN's CPI from 2005 to 2009 (in red) showing products under possible CPSC jurisdiction (in blue).

This suite of already-commercialized products tells us something about the emerging face of the nanotechnology industry and the challenges we face as we begin to introduce nanotechnology into the marketplace. These changes are a sign that a set of issues related to consumer safety and health is emerging that was not as apparent when our inventory was first released. In addition, the current state of oversight regimes should raise serious concerns for policymakers tasked with the challenge of encouraging nanotechnology innovation in a responsible and sustainable manner.

### The Issue of Public Trust

It is important to keep in mind that the willingness of the public to “buy nano” will be affected by changes that impact the overall climate in the commercial marketplace and influence consumer trust and confidence. Let me explore some of these changes.

Over the past year, American consumers have painfully learned that the federal oversight system is failing. The public has had to deal with lead in toys (a use that was banned 30 years ago by the CPSC), rat poison in pet food, antifreeze in toothpaste, and *E. coli* in meat. More recently, over 100 deaths were tied directly to a compromised blood thinner<sup>5</sup> and worries about contaminated peanuts have left the public with serious doubts as to

<sup>5</sup> “FDA Links More Deaths to Blood Thinner,” *Associated Press*, April 8, 2008. Available at: <http://ap.google.com/article/ALeqM5iT7Y6m5N3h8XK-CDe9bU7wuYNCcQD8VTUN6O0>, accessed April 18, 2008.

whether federal agencies tasked with protecting the public from unsafe consumer products have the needed regulatory tools and are adequately staffed and funded.

These were equal opportunity failures involving multiple government agencies: the Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), and CPSC. In most cases, the agencies were not dealing with exotic toxins but ones with long histories of pernicious effects. One logical question consumers will have is: “If the government can’t protect my children from lead, how will they deal with nanotechnology?” The challenge for the CPSC is how they will answer this question in the future.

Not surprisingly, a series of national polls we have conducted over the past four years on public awareness of nanotechnology show declining trust in the government’s ability to manage the risks of emerging technologies. We will repeat our survey on trust in government this year in early September. Considering the events of the past year, it would not be surprising to see an even greater drop in the levels of confidence in government regulatory agencies.

Consumer confidence will be further undermined if companies continue to make claims about nanotechnology in their products that cannot be supported. Last year, the Environmental Protection Agency (EPA) fined a California company \$208,000 for making unsubstantiated claims involving the anti-bacterial benefits of a nano-silver coating for computer mice and keyboards. Since that time, the claim about the use of nanomaterials has been removed from the manufacturer’s website, though the product appears to have remained unchanged. This phenomenon is one that has been seen with other products, including food storage containers and stuffed animals. This tendency for nano to go “underground” will make the CPSC’s attempt to identify nano-enabled consumer products more difficult in the future, potentially requiring expensive sampling and testing regimes.

In addition to disappearing product labels, the nanotechnology commercial landscape is awash with hyperbolic product claims so obtuse that no consumer could possibly unravel their meaning. Here are a few examples of products from the CPI that are geared towards children and could fall under the purview of the CPSC:

Nano Silver Teeth Developer – originates in Korea.

- Claims to utilize nano-silver.



NANOVER™ Wet Wipes – originates in Korea.

- “NANOVER™ is nano silver-based antimicrobial colloid.”
- “Safe to use for children’s toys Soft like cotton, protect babies’ frail skin Low irritative natural ingredients protect and moisturize your skin, and prevent skin trouble Cleans hands and around lips After using NANOVER(™) Water Tissue, not sticky”



Nano Silver Baby Mug Cup – originates in Korea.

- “Through silver nano poly system 99.9% of germs are prevented and it maintains anti-bacteria, deodorizing function as well as freshness.”



## CPSC Nanotechnology Goals

**The 2010 strategic plan, which is the focus of this public hearing, contains a number of statements on how the CPSC hopes to address the challenges of nanotechnology. Though these objectives make general sense, the CPSC is entering the nanotechnology arena late and needs to make up for lost time and lost opportunity.**

**Goal:** In 2010, a literature search will be completed and the experimental procedures, which use scientifically credible protocols to evaluate exposure potential to nanosilver from consumer products, will be developed to quantify releases and consumer exposure to nanosilver from treated products. Special emphasis will be placed on exposures to young children. Product testing and a final report on the results will be completed in 2011.<sup>6</sup>

**Problem:** While we applaud the CPSC for recognizing the potential risks associated with products containing nanotechnology and beginning to evaluate those risks; there are 9 products geared towards children already available in the CPI that contain nanosilver (13 if you include archived products), so the public is already being exposed to any potential risks that the study scheduled to be conducted in 2010 may find. Nanosilver is the largest material being utilized in products listed in our CPI (currently found in over 200 products). The CPSC needs to be evaluating how to deal with the products already on the market and any potential regulatory measures that need to be in place.

**Goal:** Beginning in 2010, staff will produce an annual report on the overall use of nanomaterials in the marketplace and the consumer product categories that contain nanomaterials. Staff will also select products for additional review.<sup>7</sup>

**Problem:** There are 613 products listed in our CPI that potentially fall under the purview of the CPSC, over half of all the total number of products (1015). While we are encouraged by the initiative to track the overall use of nanomaterials in the marketplace, by the CPSC's own acknowledgement:

“In March 2006, the Woodrow Wilson International Center for Scholars published an inventory of consumer products found on the Internet which were identified by manufacturers as nanotechnology products; products included aerosol household chemicals, apparel, and sports equipment. A large number of products that are expected to contain nanomaterials will fall under the regulatory authority of the CPSC. Without pre-market notification, the staff is unaware of the products that contain nanomaterials and the specific nanomaterials incorporated in these products. Staff identifies products that claim or are believed to contain nanomaterials and maintains a database with detailed information on these products.”

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<sup>6</sup> U.S. Consumer Products Safety Commission. 2010 Performance Budget Request: Saving Lives and Keeping Families Safe. Page 42, May 2009.

<sup>7</sup> U.S. Consumer Products Safety Commission. 2010 Performance Budget Request: Saving Lives and Keeping Families Safe. Page 55, May 2009.

**The CPSC has had access to our inventory for over three years and, therefore, has had the opportunity to track these products on the market. PEN stands ready to aid the CPSC in anyway we can, and we would be glad to share any relevant emerging data with the Agency that we identify between the time of our scheduled updates.**

According to the overview statement, “The 2009 appropriations allows CPSC to invest in developing agency expertise in emerging nanotechnology applications to consumer products.”<sup>8</sup> This resulted in an increase in \$200,000 for nanotechnology research and 0 full time equivalents (FTEs).

**Problem: There is a lack of human and financial support for the CPSC to evaluate any potential problems associated with nanotechnology in consumer products. An increase of \$200,000 with no one tasked to focus specifically on nanotechnology reflects the lack of any serious priority setting by the CPSC. This \$200,000 investment needs to be put in relation to the over \$1.5 billion the federal government will invest in FY2010 in nanotechnology research and development under the National Nanotechnology Initiative and the planned \$87.7 million being allocated to other agencies for research in environmental health and safety research.**

### **NNI Investment in Environmental Health & Safety Research by Agency<sup>9</sup>**

	<b>FY2008(Actual)</b>	<b>FY2009(estimated)</b>	<b>FY2010(planned)</b>
<b>NSF</b>	<b>29.2</b>	<b>27.9</b>	<b>29.9</b>
<b>DOD</b>	<b>3.8</b>	<b>3.7</b>	<b>1.7</b>
<b>DOE</b>	<b>2.6</b>	<b>3.1</b>	<b>2.9</b>
<b>DHHS(NIH)</b>	<b>11.9</b>	<b>10.2</b>	<b>17.3</b>
<b>DOC(NIST)</b>	<b>1.3</b>	<b>3</b>	<b>6</b>
<b>EPA</b>	<b>11.6</b>	<b>15.8</b>	<b>17.1</b>
<b>NASA</b>			
<b>DHHS(NIOSH)</b>	<b>6.9</b>	<b>7.4</b>	<b>12.4</b>
<b>DHS</b>			
<b>USDA(FS)</b>			
<b>USDA(CSREES)</b>	<b>0.6</b>	<b>0.4</b>	<b>0.4</b>
<b>DOT(FHWA)</b>			
<b>DOJ</b>			
<b>TOTAL</b>	<b>67.9</b>	<b>71.5</b>	<b>87.7</b>

**It is highly unlikely that agencies like NSF or NIH can undertake the types of highly targeted and applied research needed to inform CPSC oversight decisions involving consumer products.**

<sup>8</sup> U.S. Consumer Products Safety Commission. 2010 Performance Budget Request: Saving Lives and Keeping Families Safe. Page vi, May 2009.

<sup>9</sup> Adapted from The National Nanotechnology Initiative: Research and Development Leading to a Revolution in Technology and Industry, Supplement to the President’s 2010 Budget, May 2009. Available at: [http://www.nano.gov/NNI\\_2010\\_budget\\_supplement.pdf](http://www.nano.gov/NNI_2010_budget_supplement.pdf)

## Recommendations

Given the challenges the CPSC faces, it needs immediate resources that go far beyond those allocated in the strategic plan. Our recommendations in the resource area are:

- Immediate dedication of 2-3 internal staff to track emerging technologies in consumer products (focused largely, but not exclusively, on nanotechnology).
- An additional \$5-10 million in CPSC's appropriation to support targeted research on the potential health effects of nanotechnologies in consumer products, in collaboration with other agencies.
- Increased efforts to coordinate with both domestic and international agencies to leverage resources needed to address nanotechnology safety issues in consumer products.

In addition, our August 2008 report by Professor E. Marla Felcher of Harvard University's Kennedy School of Government on *The Consumer Product Safety Commission and Nanotechnology* contained a number of recommendations worth repeating here:<sup>10</sup>

1. Convene a Chronic Hazard Advisory Panel (CHAP) to evaluate the health and safety risks associated with nanoproducts currently on the market that are intended for use by children.
2. Appeal to industry to begin work on voluntary safety standards for the most prevalent nanoproducts currently on the market and those that are intended for use by children.
3. Urge the U.S. Congress to amend the Consumer Product Safety Act to give CPSC the authority to require manufacturers to identify any nanomaterials in their products.
4. Encourage the Congress to adopt Section 11 of the Consumer Product Safety Act bill recommended by the National Commission on Product Safety in its 1970 Final Report, which would give CPSC the authority to promulgate safety

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<sup>10</sup> These recommendations were designed to address a number of weaknesses concerning the CPSC's ability to deal with consumer products containing nanotechnology: (1) CPSC's data collection system is not nano ready; (2) CPSC has limited ability to tell the public about health hazards associated with nanoproducts; (3) CPSC has limited ability to get recalled nanoproducts out of use; (4) CPSC lacks sufficient enforcement staff to identify manufacturers that fail to report nanoproduct hazards to the agency; and, (5) CPSC does not have sufficient authority to promulgate mandatory safety standards for nanoproducts.

standards for “new” consumer products based on new and emerging technologies, including nanotechnology.

Finally, CPSC should be tracking technological advances which may increase their ability to address nanotechnology in consumer products. For instance, recent innovations in radio-frequency and optical identification tags could provide the CPSC (and other regulatory agencies) with new opportunities to tag and track nano-enabled products (see Appendix A).

## **Conclusions**

Let me end by summarizing the challenge for the CPSC. For the commercial success of any emerging technology, we need a better approach to governance that can support strategic risk research, provide adequate oversight, and engage the broader public in our technological future. Nanotechnology is no longer just a large government research project. Products are moving out of the lab, into the market, and onto store shelves at an accelerating rate. This is success, but success is not guaranteed forever. The next two to three years will be critical to ensuring that our investments pay off, public confidence in nanotechnology grows, and commercial markets expand. The structure and functions of the CPSC will play an important role in making sure we can maximize the benefits of nanotechnology while minimizing the risks. The Congress needs to ensure that the CPSC has the regulatory tools it needs and is adequately staffed and funded to meet the challenges posed by nanotechnologies and other emerging technologies in the future. The CPSC is not currently organized for the tasks at hand, and the challenges we face will only become worse as nanotechnology-based products increase in number and complexity.

## APPENDIX A

### A new way to label consumer products

Consumer product labels have always been a point of contention between regulatory agencies, business and the public. How much information should be required on a label, the space needed for such information, and what the public needs to know about a product have all been points of debate regarding labels.

New labeling schemes (the next generation of bar codes) have recently been developed that have the potential to revolutionize how consumers can access information about products (Figure 2). Working with Agency Magma<sup>11</sup>, a company whose mission is to create new and innovative ways for people to interact with information, entertainment, and media, a “nano” consumer product data tag was developed that demonstrates how advances in technology can enable the public to gain access to more product information.



*Figure 2. Example of Next Generation Bar Code*

QR-codes, which can be scanned via any web-enabled camera phone, store information such as basic text, web links, text messages, contact information, etc., all inside of its graphical image. QR-codes have already been used in other countries and are beginning to appear in San Francisco and New York City. Unlike traditional bar codes, QR-codes can be designed for any product, creating a unique label that is recognizable and distinct from other tags. These new ID tags could potentially be linked to all of the information that the CPSC has struggled to disseminate amongst the public (product recalls, safety incidences, etc.) Figure 3 is one example of how the tags could work in relation to nanoproducts.



*Figure 3. Example of QR-Code for Nano Enabled Product.*

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<sup>11</sup> Agency Magma, [www.agencymagma.com](http://www.agencymagma.com) New York, New York.

## **Biography of David Rejeski**

David Rejeski directs the Project on Emerging Nanotechnologies and the Synthetic Biology Project at the Woodrow Wilson International Center for Scholars. For the past eight years, he has also served as the Director of the Foresight and Governance Project at the Wilson Center, an initiative designed to facilitate better long-term thinking and planning in the public sector.

He was recently a Visiting Fellow at Yale University's School of Forestry and Environmental Studies. Before joining the Wilson Center, he served as an agency representative from the Environmental Protection Agency (EPA) to the White House Council on Environmental Quality (CEQ) and, earlier, worked at the White House Office of Science and Technology (OSTP) on a variety of technology and research and development issues, including the development and implementation of the National Environmental Technology Initiative.

Before moving to OSTP, he was head of the Future Studies Unit at the EPA. He spent four years in Hamburg, Germany, working for the Environmental Agency, Department of Public Health, and Department of Urban Renewal and, in the late 1970's, founded and co-directed a non-profit organization involved in energy conservation and renewable energy technologies.

He has written extensively on science, technology, and policy issues, in areas ranging from genetics to electronic commerce and pervasive computing. He is the co-editor of the recent book *Environmentalism and the Technologies of Tomorrow: Shaping the Next Industrial Revolution*, Island Press, 2004.

He sits on the advisory boards of a number of organizations, including the EPA's Science Advisory Board; the National Science Foundation's Advisory Committee on Environmental Research and Education; the Committee on Science, Engineering, and Public Policy of the American Association for the Advancement of Science (AAAS); the National Council of Advisors of the Center for the Study of the Presidency; the *Journal of Industrial Ecology*, the Greening of Industry Network, and the University of Michigan's Corporate Environmental Management Program. He has graduate degrees in public administration and environmental design from Harvard and Yale.