

Dec. 1, 2010

**Dear members of the Special Committee on Nanotechnology:**

We are writing in response to the documents submitted to the committee on Nov. 30, 2010.

Having played critical roles over the last several years in the efforts that led to this committee, it is deeply disappointing to us that within a period of just over two months, the directive of this committee has gone from a mission that included this central goal:

“The Special Committee is directed to examine **the human health and environmental concerns** related to the manufacture, use, and disposal of nanomaterials and **develop legislation to address these concerns**. In particular, the Special Committee shall consider the establishment of methods to **monitor nanomaterials by use of a nanotechnology registry system or the imposition of other disclosure** requirements.”

To this:

The committee’s instruction is “to create an entity to **promote the development of nanotechnology in this state** by serving as a **central information source...**” and “...the University of Wisconsin (UW) Board of Regents to maintain a nanotechnology information hub in the UW-Extension to promote and support the development of safe nanotechnology...” (from the draft ACT submitted on Nov. 30).

Indeed, sadly, this effort, one that began as an attempt to proactively protect public, worker, and environmental health, seems to have come to what is basically a Nanotechnology Promotion Act. Most of the efforts described in the draft Act, moreover, are already being done by many other entities and do not need to be repeated by projects created through the Wisconsin Legislature and funded by the state’s taxpayers. Most problematically, this Act includes nothing as far as meaningful mechanisms to engage active and interested citizens like us. We will outline these problems in a subsequent document that we will submit later this week.

At the same time, we are also not surprised by this outcome. We had originally intended to engage more actively with this committee, and submit recommendations about the need for a registry. **The recommendations we planned to submit, including how the registry idea developed and the rationale for it, are enclosed in this document, just for the record.**

However, we had strong hesitations about spending time and energy advocating for the registry given the odds against it succeeding, for the following reasons:

**1. The special committee is heavily weighted with nano business/research interests.** The majority of the committee members clearly have vested interests in nanotechnology research and development and/or nano business. The purportedly “public” members of the committee include several nano business owners, a university patent lawyer, three university researchers involved in nanotechnology (including one who makes nanomaterials and has a nano company). These members have little reason to support and obvious reasons to oppose a registry. It’s hard to imagine

how a registry would impede jobs or the economy (their argument for opposing it). We think the deeper unspoken reason they oppose it is because it could make them accountable sooner or later.

**2. Given discussions in committee meetings, committee members, most of whom know very little about what has happened as far as nanotechnology environmental health and safety in the last several years, seem to have been convinced by misleading and/or incorrect arguments that disclosure and other reporting requirements will drive industry out of the state, and that the federal government is on top of nanotechnology EHS issues, as suggested in the letter submitted to the committee on Sept. 25.** I outline the incorrect and/or misleading claims made in this letter in a separate attachment.

**3. State policymakers appear to be more concerned about not constraining business/economic development than about protecting public and environmental health.** Republican policymakers on the committee are clearly and unabashedly most interested in protecting and benefitting research, business and industry rather than protecting public or environmental health. Several key Democratic policymakers who have (or might) support the registry and want to protect public and environmental health have told us that they are not going to publicly promote a registry now because they know it will not pass unless business supports it and/or unless it has to do with creating jobs or helping the economy. Of course, we are well aware of the current political climate and priority on boosting the economy/business and creating jobs. Ironically, though, some of these policymakers told us the same thing (they can't promote registry without business support) for years, well before the recent mid-term elections, including in years when Democrats dominated both houses and the governorship. Clearly the "business first" attitude is predominant strategy in both the Republican and Democratic parties.

**4. Government agency scientists who helped develop the registry idea say they lack authority, power, and/or are completely demoralized. Also, some agencies have something to gain by a clearinghouse but not a registry.** Key government agency scientists that have worked with us over the years on the registry idea have told us they will not publicly advocate for a registry for one or more of the following reasons: (1) their superiors and agency leaders said they wouldn't publicly support a registry because they don't want Wisconsin to be "different" by taking the lead in proactively dealing with EHS issues and/or regulations; (2) these scientists have little authority/seniority to speak up in their agency or are afraid of doing so; (3) their agency will get lab funding/business or other benefits from a clearinghouse but not a registry; (4) they have given up hope in the political process, discouraged by the heavy nanotech business promotion and obvious marginalization of environmental health and safety concerns. Regarding this last reason, many agency scientists have clearly become resigned to business/tech interests taking the priority and don't speak up about it because they are worried about their jobs or feel it is futile.

**In this context, spending a lot of our time and energy working to advocate for a registry seemed pointless given that we knew the chance of it going anywhere at the state level was nearly zero.** As volunteer lay citizens without any connections to powerful research, business or government interests, we are obviously not going to change the minds of the key political actors--no matter how many letters we write, no matter how many meetings we have with them (assuming they would give us the time of day), no matter what we do. It would be a waste of our energy to attempt doing so.

**In sum, sadly, the message we have gotten, loud and clear, from our political representatives and government agencies is that protecting business and economic interests is more important than protecting public, worker, and environmental health.** While policymakers and government scientists have admitted to us in private that this isn't right, they claim that they are powerless to question it publicly or to advocate for a strategy on purely public and environmental health grounds. Apparently, however, it is perfectly fine for our policymakers to advocate purely for protecting and boosting business and industry interests without discussing public, worker, or environmental health—as the Republican members of this committee have been doing.

It is a grim day indeed for democracy when our policymakers and government agencies cannot proudly advocate for citizen interests, or for protecting public, worker, and environmental health, without also arguing for the promotion of business and economic interests—or, more commonly, making these interests the priority. This is especially disturbing—and ironic—given that it has historically been the unbalanced prioritizing of business and economic interests that have led to a myriad of significant downstream health consequences for workers, the public, and the environment—e.g., lead, mercury, PCBs, DDT, asbestos, and many, many more. If we are ever going to change this pattern, our policymakers and other decisionmakers must have the courage to put protecting public and environmental health first.

But clearly that is not the case currently. Given this, we will not advocate further for a state-sponsored nanomaterial registry.

**But we are not giving up.** Since neither our federal nor our state government agencies and political representatives are willing to work to create a registry or inventory right now, for fear of offending business interests, **we will do it ourselves. We will work to create a Citizens Nano Registry,** which will use citizen-based participatory research to gather data on nanotechnology industries, research labs that create/handle engineered nanomaterials, and nano-based consumer products in the state. We will collaborate with other citizens and organizations around the state to inform, monitor and interview workers and citizens who are engaged in nanotechnology research and manufacturing about their experiences and exposures. We will work with media and national NGOs to share the information we gather as broadly as possible and we will hold Nano Cafes and public meetings to discuss it with the community.

Sincerely,

Maria Powell, PhD

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November 2010

Dear members of the Special Committee on Nanotechnology:

I'm writing to share my recommendations about how the state of Wisconsin could set a proactive and positive example in the country and world as far as oversight for emerging nanotechnologies, and be a place where citizens are confident in their government and industries and engaged in democratic decisionmaking.

First, I'd like to share a bit about my background and how I got involved in nanotechnology policy and regulatory issues.

My passion for environmental and public health issues has deep roots in Wisconsin. While completing my undergraduate degree in biology, I learned for the first time that the place where I and my seven siblings were born and raised, Green Bay and other parts of the Fox River Valley, are Superfund sites due to heavy contamination with PCBs and a myriad of other toxins, largely emitted over the last several decades from the numerous paper mills in the region. Citizens, government and industry are paying millions of dollars to clean up this pollution to this day and will continue to do so for a long time. Many of the chemicals in the Fox River and lower Green Bay have been associated with neurological and development problems in children, thyroid problems, immune system problems, cancer, and more. The pollution has also had significant effects on wildlife and the broader ecosystem in the region.

Learning about the serious contamination of the place where I grew up inspired me to pursue a graduate degree in aquatic biology at the Center for Great Lakes Studies (now the Great Lakes Water Institute) at the University of Wisconsin-Milwaukee so I could better understand and address freshwater pollution issues—and hopefully be a part of preventing future freshwater pollution problems in Wisconsin and the Midwest.

I later transferred to UW-Madison and received my Masters (2000) and PhD (2004) in environmental studies at from UW-Madison Gaylord Nelson Institute for Environmental Studies. My graduate research focused on health risks and communication related to the consumption of Great Lakes fish, which unfortunately are contaminated with PCBs, mercury, other heavy metals, pesticides, and a number of other toxins. In particular, my work explored heightened health risks and disparities in communication among minorities and lower income anglers.

During graduate school at UW, I took courses in—and taught—numerous biology courses, environmental studies, ecological conservation, communication, and environmental policy. I engaged extensively with community groups and local and state government agencies on a variety of local environmental health issues in the Dane County area. I have served on several non-profit boards working on climate change, ecological conservation, water quality, air quality, and environmental justice.

After finishing my doctorate in 2004, I took a postdoctoral position with the National Science Foundation-funded Nanoscale Science and Engineering Center (NSEC) at the University of Wisconsin Madison. I eventually became the co-leader of the societal implications team for the

center, and worked for the NSEC through 2009. I have published numerous research papers in peer-reviewed journals, including articles about citizen engagement in nanotechnology, nanotechnology environmental health and safety issues, nanotechnology risk policy, and environmental justice.

From 2007-2009, I served on several nanotechnology policy advisory boards and/or working groups. I was on the science advisory panel for the UC-San Francisco's "Nanotechnology Policy Framework for California" and a working group member of the University of Minnesota's "NIRT: Evaluating Oversight Models for Active Nanostructures and Nanosystems: Learning from Past Technologies in a Societal Context." I was recently invited to serve on the science advisory panel for the EPA's Nanoscale Silver Case Study in January 2011.

### **Background of the nanomaterial registry idea**

My NSEC postdoctoral research in 2004 began with a comprehensive review of all of the scientific research and reports on environmental health and safety related to emerging nanotechnologies. While at that time, there were relatively few research papers and reports about the potential environmental and health risks of emerging nanotechnologies,<sup>1</sup> since then thousands of research papers and reports have been published, many of which are listed here: <http://www.nanoceo.net/nanorisks>

I began to develop several projects working collaboratively with citizens, government scientists, policymakers, and nanotech experts to find ways to address potential risks related to nanotechnologies *upstream* so that they do not become *downstream* pollution problems—like PCBs, asbestos, lead, mercury, DDT, and a myriad of other toxins have in the last several decades. Unfortunately, citizens—whose health and livelihoods have been irreversibly and negatively affected by these pollutants—were mostly unaware of and not engaged in decisions about them until they were already in their workplaces, food, products, and environments. Just as problematically, state and local governments, who could have monitored and prevent pollution in water, air, soil, and fish in their jurisdictions, were in most cases not engaged until these contaminants had already become widespread—in other words, they had to react downstream to problems that could have been prevented upstream. To this day, citizens, government agencies, policymakers, and industry are still paying the price in health and dollars for toxins that were created decades ago.

Lessons learned? Preventing potential problems related to emerging technologies, especially in a democracy, should actively and meaningfully engage citizens and government agencies, not just those creating the technologies, in discussions and decisions about them as early as possible.

### ***2005: Citizen Engagement in Nanotechnology Initiated***

In this light, in 2005 I co-organized the Madison Area Citizens Consensus Conference with UW Professor Daniel Kleinman. We invited several state government staff and legislators, including

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<sup>1</sup> However, by that time Swiss Re and Royal Academy of Engineering had already written large reports on emerging nanotechnologies calling for precaution in dealing with the potential public and environmental health consequences of nanomaterials. See:

[http://www.swissre.com/media/media\\_information/swiss\\_re\\_investigates\\_the\\_opportunities\\_and\\_risks\\_of\\_nanotech\\_nology\\_from\\_an\\_insurance\\_perspective.html](http://www.swissre.com/media/media_information/swiss_re_investigates_the_opportunities_and_risks_of_nanotech_nology_from_an_insurance_perspective.html) and <http://www.nanotec.org.uk/finalReport.htm>

Terese Berceau, Mark Pocan, Joe Parisi, Spencer Black, Marlin Schneider, and several other legislators to receive the citizens' report from this conference: [http://www.nanoceo.net/files/consensus\\_conference\\_report.pdf](http://www.nanoceo.net/files/consensus_conference_report.pdf). Several of the people who eventually became involved in my nanotechnology government working group (see below) also received this report.

Citizens involved in this conference expressed concerns about addressing environmental health and safety issues, transparency in government decisionmaking about nanotechnology, and their ability to get information about nanotech developments. Numerous public opinion surveys throughout the world since that time show that, even while excited about the potential benefits of nanotechnologies, most people are also concerned about similar issues as those raised in the consensus conference report. Moreover, not surprisingly, many quantitative and qualitative studies show that people want their government agencies and policymakers to take responsibility for addressing them proactively.

Several citizens involved in the 2005 consensus conference were energized to continue meeting to discuss these issues, and they did so till 2008 with a small amount of NSEC support. In 2008 the group became independent from the UW and changed its name to the Nanotechnology Citizen Engagement Organization (NanoCEO). This group and I co-organized numerous Nano Cafes and other meetings in which we discussed nanotechnology issues with nanotechnology scientists and EHS experts as well as *hundreds of interested Wisconsin citizens*; see [http://www.nanoceo.net/past\\_events](http://www.nanoceo.net/past_events). We surveyed attendees at every Nano Cafe, and talked with them about their concerns and questions. Environmental health and safety issues were always at the top of the lists—in all surveys and discussions. In 2008, I was involved as an external researcher in the National Citizens Technology Forum, organized by Arizona State University (<http://cns.asu.edu/nctf/>). This was a representative sample of U.S. citizens, and both quantitative and qualitative data showed that environmental health and safety were top priorities for these citizens.

### ***2005: Intergovernmental Nanotechnology Working Group formed***

**In 2005**, I organized and began to facilitate a working group of government agency scientists, including some who had received the citizens' consensus conference report. This team, which was called the “**Intergovernmental Nanotechnology Working Group**” (IGNG) eventually grew to include members from the Wisconsin Department of Natural Resources, the Wisconsin Dept. of Health Services, the Wisconsin State Lab of Hygiene, the Dane County Local Emergency Planning Committee, Public Health Madison Dane County, several UW scientists, and external members from the Minnesota Pollution Control Agency, the National Institute of Occupational Safety and Health, and the United States Geological Survey.

This team met monthly from 2005-2009 to discuss nanotechnologies and outline what scientists and staff in their agencies would need to know to prevent potential public and environmental health problems related to emerging nanotechnologies (see: <http://www.nsec.wisc.edu/NS--Nugget.php?ID=42>). In 2007 I co-organized the Midwest NanoSafety Workshop with some members of this group, safety personnel at other Midwest universities, and a leader from NIOSH—see: <http://www2.fpm.wisc.edu/safety/nano/index.htm>.

One issue that repeatedly came to the top of the priority list for members of the IGNG is the need for basic information about where nanomaterials are being created, handled, and/or used in the state. Local and state agencies are charged by the EPA and other federal agencies with monitoring and control of environmental emissions, workplace monitoring and safety controls, and other activities to protect public, worker, and environmental health. In order to do their jobs in this regard, agencies need to know where facilities are that handle these materials and what kind of nanomaterials they are. Government staff cannot know where or what to monitor or control, or who to communicate or work with to develop good emission and/or workplace safety controls, if they do not know where nanotechnology facilities are or what materials they work with (see Powell et al., 2007, attached, for further articulation of this argument). Numerous government bodies around the world, including the EPA and several government entities outside of the U.S., have also come to the conclusion that inventories or registries of engineered nanomaterials are essential to proactive actions regarding environmental health and safety.

Given this, IGNG members agreed that a top priority is getting basic info (where are the engineered nanomaterials, what kinds, how much?) to the appropriate staff at local and state agencies. Even if the EPA develops nano-specific regulations that gather this information, typically this information is not available to state or local agencies. Moreover, in some areas (e.g., waste and sewage treatment, etc) local and state agencies have primary authority, not federal agencies.<sup>2</sup> So, in sum, after years of meetings, the government team agreed that some kind of nanomaterial registry or inventory that could provide their agencies with this information at the minimum would help them in doing their jobs to protect environmental and public health.

Meanwhile, Representative Berceau also proposed a state nanomaterial registry around the same time. The government team began to talk with her to discuss what kind of information a nanomaterial registry or tracking system would include that would be most useful to them.

During the same time period, NanoCEO members and the hundreds of citizens who attended meetings and Nano Cafes came up with many similar questions as the government team. For example, they wanted to know: Where are engineered nanomaterials made and handled in their communities? In consumer products? Will they eventually end up in homes and the environment? Is information about nanomaterial-products available to the public? Do government agencies have the knowledge and resources to make sure these products are safe for people and to monitor and protect the environment? Will citizens have opportunities to engage in these discussions? The group sent numerous letters to government agencies outlining their questions and recommendations about these issues—for example, see:

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<sup>2</sup> In fact at this point the EPA is encouraging state-level attention and action on addressing nanotechnology environmental health and safety issues, as these statements made by Jim Alwood at the Sept. 16 Special Committee on Nanotechnology meeting reflect: "...the fact that many states are considering what to do about nano, what's CA done...if somebody called it a priority chemical. The more of that type of thing that each state does, the better it is for everybody because it puts everyone on alert. It's a lot easier for us to convince people in Washington to do something if 20 or 30 states are interested, they're doing what you're doing, than if nobody says anything in any of the states. Especially from a TSCA point of view, states are allowed to do their own chemical regulation. We think it's a benefit when states go forward and start asking questions, see what kind of authority they can do, because it does, it just raises the interest level for everyone.

<http://www.nanoceo.net/files/NNCO-CCON10.pdf>. Hundreds of citizens attended the Nano Cafes and other events from 2005-2008, and many of these citizens raised similar concerns and questions as the NanoCEO members.

## **BENEFITS of a Wisconsin nanomaterial registry<sup>3</sup>**

While there are numerous red flags about the environmental health and safety risks of certain kinds of engineered nanomaterials, as with all emerging technologies, there are also uncertainties and unknowns. In the past, decisionmakers have used scientific uncertainties as excuses to do nothing until it was too late and harmful substances were already in workplaces and the environment—and the public and workers had already developed diseases or died from exposures to them.

For several types of nanomaterials, there are enough red flags in the toxicological studies that some scientists are explicitly stating the need for strong actions to prevent exposures and environmental emissions regardless of uncertainties. For example, nanosilver, which is being used in countless products as an antimicrobial, releases silver ions, which are 2<sup>nd</sup> most toxic metal after mercury in aquatic systems (<http://www.nanoceo.net/nanorisks/silver-particles>). Quantum dots, being used for surveillance inks and paints, as well as biomedical and research uses, and more, are typically made from cadmium and/or lead—well known toxins. At the nano-size, they are even more toxic than at the bigger sizes—see: <http://www.nanoceo.net/nanorisks/QD-nanocrystals>

Most troublingly, a growing number of studies are showing that some types of carbon nanotubes, already used in numerous industrial materials and consumer products, can have health effects like asbestos in cells and animals—see: <http://www.nanoceo.net/nanorisks/carbon-nanotubes> and <http://www.nanoceo.net/nanorisks/asbestos>. The big reinsurance company, Swiss Re, noted in a 2009 briefing for big insurance companies that “If released to the air and inhaled (mainly by workers), most probably particular carbon nanotubes will have the same effects as asbestos” and are advising their clients to take strong precautions—see: [http://www.swissre.com/rethinking/closing\\_the\\_nanotube\\_knowledge\\_gap.html](http://www.swissre.com/rethinking/closing_the_nanotube_knowledge_gap.html) and the specific briefing for insurance clients: [http://media.swissre.com/documents/carbon\\_nanotubes\\_en.pdf](http://media.swissre.com/documents/carbon_nanotubes_en.pdf).

Consumers and the broader public, meanwhile, are still largely unaware of these issues—and those who are aware and interested, like NanoCEO, cannot find out more about whether consumer products they buy contain any of the engineered nanomaterials thought to be potentially harmful or whether industries or universities in their communities are handling them.

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<sup>3</sup> We realize that the term “nanomaterials” is vague at this point, debates about what it means are ongoing, and governments have yet to agree upon a clear definition for it. Some think the term is so vague as to be meaningless, and should be discarded. Nevertheless, the terms “nanomaterials” and the technologies that produce them, “nanotechnologies,” are widely used throughout the world now. Nanotechnology was in fact coined by high-level scientists and governments a long time ago in order to categorize certain types of high-tech research to receive more funding. Consequently, there are now entire research centers and research funding initiatives (such as the National Nanotechnology Initiative) labeled with these terms and the term “nanomaterials” became attached to the kinds of materials produced in these centers. In other words, “nanotechnology” and “nanomaterials” clearly had very significant meaning for scientific leaders and high-level funders—and now, as a consequence, they are also significant to risk assessors, government agencies, EHS personnel, the public, and many others—regardless of the many debates about their precise meanings. Given this, we think it doesn’t make sense, and would add further confusion, to drop the term “nanomaterial” altogether. This said, we think a nanomaterial registry would not target *all* nanomaterials (which does not make sense), but rather, would begin to gather information on certain types of nanomaterials, with a priority on those that have been shown in scientific studies to cause toxicity and that are likely to involve significant human and environmental exposures (e.g., carbon nanotubes, nanosilver, quantum dots, some metal oxides). The registry would be flexible to change and to add or remove types of materials as scientific studies proceed and nanoscience develops. The CA DTSC for example, began its call-in program with carbon nanotubes and next will ask for information about nanosilver, quantum dots, certain metal oxides, and others that scientific studies have raised red flags about.

Just as problematically, the public has not been meaningfully engaged in discussions or decisions about these important issues by scientists and/or government agencies—with the exception of NanoCEO’s grassroots volunteer projects.

Rather than continuing to let uncertainties be excuses for not taking any preventative actions, or for engaging the public in discussions about them, we propose that an *anticipatory governance* approach be used. An anticipatory governance approach recognizes that “*pivotal actors must make decisions in the absence of scientific certainty, and that such choices are an important element of the governance of emerging technologies*” (Philbrick, 2010, p. 1717).

Again as articulated earlier, an anticipatory approach also involves *meaningful public input and engagement in scientific and policy decisions upstream*. First and foremost, people should be involved in decisions about technological developments that affect their lives and their environments in significant ways—and a growing number of citizens, academics, and government agencies are calling for improved citizen engagement in technological decisionmaking. Analyses of the histories of previous policy approaches to public/worker/environmental risks indicate that the most effective and preventative risk policies included public input and engagement—for example, see:

<http://www.lifesci.consortium.umn.edu/uploads/jc/GF/jcGF4uaTOY18A6MhdRAr8w/nirtjlme688.pdf>

### **Why a Nanomaterial Registry?**

Whether or not uncertainties about the risks of engineered nanomaterials are ever resolved with certainty, or when, there are ways to protect worker, consumer and environmental health *now* with existing knowledge and technologies—but this requires basic information about where these materials are being created and handled, as well as what types they are and what quantities. Many government bodies and NGOs around the world have recognized this, and some are calling for meaningful, accessible registries and/or inventories as first steps in protecting workers, consumers, and the environment.

**Taking actions to prevent exposures to and environmental releases of engineered nanomaterials, such as carbon nanotubes, that growing numbers of studies suggest have the potential to cause significant health and/or environmental harm later, is the right thing to do now. In sum, an effective nanotechnology monitoring and tracking system could:**

- begin to fill some key risk assessment data gaps, help set priorities and resolve uncertainties related to environmental and health risks of engineered nanomaterials:
  - better understanding the scope of nanomaterial production and handling in state—develop appropriate environmental health and safety research and action priorities based on this.
  - obtaining environmental, workplace, and field data to help government and scientists develop more informed and appropriate monitoring, control strategies and overall risk assessments;
  - providing critical data for life cycle assessments of nanotechnologies and other emerging technologies;
  
- facilitate the ability of government agency scientists and EHS personnel to communicate with nanotechnology and other emerging technology researchers and company leaders and

managers and work with them to develop effective safety protocols, monitoring strategies, and develop strategies to prevent harmful emissions of nanomaterials when appropriate;

- data generated could help inform federal risk assessments as well as helping to develop more appropriate and relevant local, state, and federal risk policies;

**Moreover, there are numerous other communication and engagement benefits of a monitoring and tracking system for nanomaterials in Wisconsin. For example, a state registry could:**

- serve as the starting point to facilitate a myriad of positive programs to help nano companies better manage EHS issues related to nanotechnologies—Green Tier, SHARP, information sharing on emerging technology and EHS issues, advice for workplace safety, environmental emissions control, and much more;
- facilitate the creation of innovative and cutting edge research and jobs in environmental monitoring and control, risk assessment, etc. Facilitate the use of nanotechnologies/nanomaterials for environmental monitoring, detection and control, etc.
- build confidence among Wisconsin citizens in state industry and government agencies regarding environmental health and safety;
- facilitate discussions and decisions on many different levels in Wisconsin about nanotechnology & ET developments, appropriate safety controls and regulations, etc.
- be flexible and responsive to interests of citizens, industry, government agencies in Wisconsin and appropriate for Wisconsin’s context;
- serve as a model for other emerging technologies and could establish Wisconsin as a leader in the country in proactive policies towards technology developments as well as in citizen engagement and responsive government;

Ultimately, an effective registry could make Wisconsin a place where citizens, government agencies, businesses, and policymakers can collectively engage in informed communication, decisions, and policymaking about nanotechnologies—and, consequently, a place where citizens and government can feel more confident that potential environmental health and safety risks related to them are being proactively addressed.

**Potential consequences of *not* developing an effective state-level nanotechnology tracking system:**

Without basic information about where nanomaterials are being used and handled in the state, and what kinds of materials they are, those responsible for protecting public health and safety and the environment will continue to be in the dark, trying to make decisions with little or no data--or worse, unable to do anything at all to address potential risk and safety issues.

Meanwhile, aware that engineered nanomaterials are already widespread in the marketplace, and tired of waiting for governments to take meaningful steps to address potential environmental health and safety risks, many non-government organizations around the world and citizen groups have

already started to develop inventories and tracking systems of their own, in attempt to get information about consumer products, industries, and materials incorporating nanomaterials.

Further, NGOs and citizens groups, as well as local/county government bodies and government scientists, frustrated with waiting for national and state governments to act, are already beginning to consider working at the local and county levels to create policies for tracking systems, registries, and/or other types of regulations. In Wisconsin, one Dane County supervisor has already initiated efforts to develop a nanomaterial registry for the county, and city alders have also expressed interest in looking at what could be done at the city level. With much more access to—and responsiveness from—their city and county representatives, citizens are likely to follow up on this if the state doesn't develop something effective and transparent and that truly helps government agencies do their jobs to protect public and environmental health.

In this light, *not* developing a tracking system for nanomaterials raises the following potential consequences and questions:

- Government agencies and others responsible for monitoring and workplace safety will not be able to do much (or anything) to prevent potential public, worker, and/or environmental problems. ***Public, worker, and environmental health cannot—and will not—be protected.*** This is the biggest and most troubling potential consequence of not developing an effective monitoring and tracking system.
- If environmental health and safety problems do develop in the future related to nanotechnologies—who will take the blame? This brings up significant risk, liability, and ethical issues.
- Cleaning up environmental toxin problems, addressing public health problems related to them are extremely expensive. Who will pay the costs?
- Citizens, scientists, governments, and NGOs around the world calling for registries or other tracking systems for nanotechnologies/nanomaterials for years. If governments continue to avoid developing effective ways to track emerging materials/technologies, this will only build distrust and cynicism, creating negative relationships and environment for honest engagement among businesses, industries, governments and citizens.
- Citizen, consumer, NGO protests, boycotts, lawsuits?

**In sum, putting our heads in the sand, not developing meaningful monitoring and tracking systems for emerging nanotechnologies is not the answer.** This will create risk liability issues, build public mistrust, and create worse problems down the line. Most troublingly, it could prevent those in places of responsibility from even beginning to take steps to prevent public, worker, and environmental health problems related to nanotechnologies and nanomaterials.

## **Nano CEO's Recommendations to the Special Committee on Nanotechnology:**

We outline below our perspectives on proposals to date in the Special Committee on Nanotechnology meetings in relation to the committee's mission. In sum, we discuss: (1) the mission of the special committee; (2) limitations of the Nanotechnology Clearinghouse idea; (3) our registry proposal.

### **1. The mission of the committee**

*“The Special Committee is directed to examine the human health and environmental concerns related to the manufacture, use, and disposal of nanomaterials and develop legislation to address these concerns. In particular, the Special Committee **shall consider the establishment of methods to monitor nanomaterials by use of a nanotechnology registry system or the imposition of other disclosure requirements.**”* (see: <http://legis.wisconsin.gov/lc/committees/study/2010/NANO/index.html>)

We are very supportive of this aspect of the mission, which developed as the result of years of the work of our group, other Wisconsin citizens, scientists, government agencies and policymakers (as described above).

The 2<sup>nd</sup> part of the mission relates to creating jobs and supporting nanotechnology research and development in Wisconsin:

*“The Special Committee shall also develop strategies to facilitate the development of nanotechnology to create and retain jobs in Wisconsin, including ways in which government can help nanotechnology researchers, small firms, and start-ups address potential risks and meet regulatory requirements.”*

Of course we are not against creating jobs or supporting nanotechnology research and development in the state per se,<sup>4</sup> and think it is extremely important to find ways to help government assist researchers and companies address potential risks and regulatory requirements. However, given the current context of nanotechnology funding and growth, we find it troubling as Wisconsin citizens and taxpayers that supporting nanotechnology research and development seems to have become the main priority of this special committee in recent meetings.

The federal government has spent nearly \$12 billion in the last decade on nanotechnology research and development. Billions of industry and corporate dollars have also gone into nanotechnology research in the last couple of decades. Every Fortune 500 company is involved in nanotechnology research, and the nanotechnology industry is expected to be worth several trillion dollars by 2015.

In addition to the massive amounts of federal and corporate funding already allotted to nano research and development, other Wisconsin bills have already been proposed to support nanotechnology research and development in the state. The University of Wisconsin-Madison alone houses two enormous nanotechnology research centers that have received, and continue to receive,

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<sup>4</sup> If job creation must be part of this committee's mission, we suggest that the jobs created be in workplace/environmental/health monitoring, control, risk communication, etc.

many millions of dollars in federal funding between them, as well as industry funding for many of the professors and students involved in the centers. Why is it now the mission of this committee to consider how the Wisconsin legislature and Wisconsin taxpayers can provide university and high-tech researchers and companies even more funding?

As far as job creation—again, while we think creating jobs is very important (many of us are under-employed and struggling to get by), it is not at all clear how the ideas discussed in this committee so far will create jobs. If jobs are created, they are not likely to be the kinds of jobs that will help people like us or others who are looking for work in the state. Discussions to date suggest that they are likely to be primarily university and/or high-tech research jobs. We question how appropriate it is for this committee to be focusing on this given the current context of nanotechnology funding and the mission of the committee.

Meanwhile, as Jim Alwood's EPA presentation to the Special Committee on Sept. 16 clearly outlined, the government has allotted only tiny percentages of the overall nanotechnology funding for environmental health and safety-related research on nanomaterials and nanotechnologies—guaranteeing that efforts to understand and prevent environmental health and safety risks related to nanotechnologies will fall far behind rapidly increasing nanotechnology research and developments. Local and state agencies across the United States are under-funded, under-staffed, and lack other resources and capacities to proactively addressing potential risks from nano and other emerging technologies.

**Given this context, and the huge amount of funding already going into boosting nanotechnology research and development in the state, country, and worldwide, fulfilling the monitoring and tracking goals will be much more important than ever.** This ramping up of nanomaterial research and development mean that there will be more and more engineered nanomaterials in the state's workplaces, homes, and the environment—making it even more imperative that such a monitoring and tracking system exists. Monitoring and tracking will require more and more information, resources, technologies, staff, etc for Wisconsin government agencies and health risk scientists to keep up with tracking the materials in consumer products, workplaces, homes, food, fish, and the environment.

As committee meetings have progressed, some members seem to have lost sight of the fact that **this registry effort started as an effort to help Wisconsin government agencies and citizens get the basic information they need to protect public and environmental safety—not as an economic development committee.**

We hope that addressing Wisconsin citizens' questions and recommendations about protecting public and environmental health are as—or more—important to our elected officials and government agencies than supporting already heavily funded high-tech research and industry? **We ask that you please re-focus on the committee's core mission—to “examine the human health and environmental concerns related to the manufacture, use, and disposal of nanomaterials and develop legislation to address these concerns” and to “consider the establishment of methods to monitor nanomaterials by use of a nanotechnology registry system or the imposition of other disclosure requirements.”**

## 2. Limitations of the Nano Clearinghouse:

At this point, the nanotechnology committee appears to be leaning towards some kind of voluntary “clearinghouse” for nanotechnology. A clearinghouse could, if designed well, have some value, such as building relationships among government agencies, researchers and companies and sharing some information about nanotechnology environmental health and safety issues.

**However, we have serious concerns about this clearinghouse, which we outline below.**

**a. Our chief concern is that this “clearinghouse” will not generate the most critical information that the intergovernmental nanotechnology working group, numerous other government entities worldwide, and citizens have deemed important for protecting public, worker, and environmental health.** In other words, it will do little to address the key mission of the special nanotechnology committee.

There is abundant evidence to date to support this concern. Many other entities nationally and worldwide have tried collaborative networks on nanotechnology/nanomaterials over the past decade similar to the clearinghouse being proposed.

For example, one of the biggest efforts, the U.S. EPA’s Nanoscale Materials Stewardship Program (<http://www.epa.gov/opptintr/nano/stewardship.html>) has largely failed to generate enough information to adequately assess and address risks, and consequently the EPA is now moving into imposing mandatory requirements through the Toxic Substances Control Act (TSCA).

The Intergovernmental Nanotechnology Working group I created and facilitated for many years, likewise, included representatives from numerous local and state government agencies, and a co-leader from the UW Advanced Materials Industrial Consortium. While the IGNG had several valuable functions (building capacities, relationships, educating agencies about the issues, sharing research articles, etc.) ultimately the information most needed by the agencies to protect public and environmental health was not made available to them through this process. Further, ultimately IGNG projects were shut down by university researchers and industry when attempts to get the information most needed to adequately assess risks were pursued.

A variety of other competent, professional groups and agencies around the country and world have tried voluntary information sharing programs involving significant sums of money and countless meetings over periods of many years. None of these efforts to date have managed to gather enough information to help agencies and risk assessors adequately assess or manage risks related to nanotechnologies. Few have been transparent or accessible to the public or engaged them beyond token events.

Given experiences like this, NGOs and governments worldwide are beginning to consider and/or propose mandatory nanotechnology registries or inventories that are accessible and accountable to policymakers, the public, and the existing political processes.

Again, the most basic purpose for a nanomaterial monitoring and tracking system would be to get government agency staff, first responders, and others responsible for public, workplace, and environmental safety the most basic information they need to do their jobs effectively in preventing potential risks related to nanotechnologies. ***If the Clearinghouse doesn’t do this, it does not go***

*beyond many other existing programs and therefore is not very useful for protecting worker, public, and/or environmental health.*

**b. The Clearinghouse would serve as yet another Nanotechnology Business Trade Association in the state.**

Wisconsin already has the Wisconsin Technology Council, Wisconsin Manufacturers and Commerce, WiSYS, WARF, and the University of Wisconsin Advanced Materials Industrial Consortium (UWAMIC). All of these entities are closely integrated with nanotechnology research centers throughout the UW system as well as nanotech and other high-tech industries in the state. The UWAMIC includes many nanotechnology companies and research entities: <http://www.uwamic.wisc.edu/>. These organizations are well-funded and supported and serve many of the pro-business development and research/technology support functions that have been proposed as benefits of this clearinghouse. Why do we need the Wisconsin government to create and support yet another effort to help facilitate interactions between researchers and industry? Why do the Wisconsin government and taxpayers need to support another Industry Trade Association? What does this have to do with the core mission of this committee?

We think a Clearinghouse is repeating efforts already done by other entities. It will waste taxpayer money in funding efforts that are already funded and/or being done by others. **Most problematically, we believe that it could be worse than doing nothing** by giving the false impression that the state is being proactive towards nano EHS--preventing other more meaningful actions from being taken to address potential environmental health and safety aspects of nanotechnology.

**c. In sum, we are concerned that a Clearinghouse will not actually generate information needed or engage citizens.** Unfortunately, we live in a world in which citizens and government agencies have far less power (or none at all in some contexts) compared to business and corporate interests. We anticipate that in effect the proposed Clearinghouse will still serve as a Nano Business Trade Association to protect industry from any environmental health and safety regulations rather than a meaningful effort to get information that would help protect public, worker, and/or environmental health. Government agencies scientists would most likely be co-opted or marginalized in such an entity with little power to take meaningful actions to protect worker or public health. Further, even if citizens are engaged, their ability to shape the process will be token at best.

Also, even if the Clearinghouse is set up to focus on environmental, health and safety, it is not clear why/how nanotechnology businesses, industry, and universities doing nanotech research would join or share information needed by government agencies and the public. As described above, past experiences with similar voluntary efforts, such as the EPA reporting program, the IGNG, and others, indicate that few would do so. So, again, this raises important questions:

-Why would nano tech companies join this clearinghouse? If only the “proactive” companies (as far as environmental health and safety) join the clearinghouse and not those who don’t make environmental health and safety a priority, there will be critical holes in the effort.

-Why would nano companies share information about nanomaterials they are creating, etc., with government agencies and/or the public if they don't have to? Would agencies and the public have any ability to obtain this information through this Clearinghouse?

-Why would universities/researchers, in particular, join this clearinghouse and share this information? Their participation is critical, since most of the nanotech research in Wisconsin is likely occurring in universities at this point. If they do not participate or share information, this is another critical hole.

Again, we question the value of a clearinghouse overall as far as getting the information needed to protect worker, public, and/or environmental health or for facilitating meaningful public engagement. How would it do this?

**That said, if a clearinghouse is the only option that can go forward, it should at least include the following components:**

-It should be set up to obtain and make accessible the basic information from nano companies, university research labs, and others creating/handling engineered nanomaterials necessary for a variety of government agency efforts to do their jobs and proactively address risks in our attached registry document (engineered nanomaterials created/used in the state—where, what, how much, etc.?);

-It should be housed in an independent, non-partisan entity (not industry, nanotechnology research centers, or in the University of Wisconsin, because of conflicts of interest); The Dept. of Health Services would be a good option. UW-Extension would be OK.

-It should include an oversight or advisory committee that includes representatives from not only nano industry but also all the key state and local government agencies (DNR, DHS, LEPC, WI OSHA, DATCP, etc.), and representatives from the medical/public health community.

-It should have clear, transparent (to anyone, including the public), do-able goals set by the oversight committee and focused on protecting public, worker and environmental health. Timelines and consequences for not meeting these goals, also set by oversight committee, should be meaningful and clear to all involved, including public and policymakers;

**- The clearinghouse should be set up to engage interested citizens in meaningful (not just token) ways and be transparent and accountable to the broader public, NGOs, government agencies and policymakers—by including the following components:**

- The advisory committee should include at least 1-2 interested lay citizens (ideally from an organized citizens' group if one exists) who are not connected to nanotechnology research and/or companies and not former policymakers or business leaders. Ideally, they would not be from professional environmental organizations, although representatives from these organizations should have representation on the Clearinghouse as well. These citizen and professional environmentalist representatives should have equal standing as the others on the committee and should be involved in establishing the goals, processes, evaluations, etc of the Clearinghouse.

-Clearinghouse discussions, actions, decisions, and information generated should be **openly and easily accessible to the public and the media** (e.g., via public meetings, an open website with documents, meeting minutes, and public databases of information gathered).

-The oversight/advisory committee should hold **public meetings** 2-3 times a year (or more) to allow broader community input and discussion of clearinghouse discussions and actions, information generated, etc.

-The Clearinghouse should be accountable to elected political representatives/the WI Legislature

### **3. A better option: Wisconsin nanomaterial registry through existing government institutions/statutes**

For the reasons outlined extensively above, we propose that an effective and accessible nanomaterial registry<sup>5</sup> be developed for the state of Wisconsin to help provide information about nanomaterial production and use in the state to government agencies, policymakers, the public, industry, researchers, and any others who need it for risk assessment, communication, and taking steps to prevent worker, public, and environmental health and safety problems.

The bottom line goal of such a registry is—we want our government agencies to be able to do their jobs to protect public, worker, and environmental health, and we know they need basic information about nanomaterial production, handling, and use in the state to even begin doing so. We think the public should have access to such information as well. A registry is a first step in this process. There are some challenges to establishing such a registry, of course, but we think they are surmountable if the political will is there.

More specific details about the registry we envision, as well as some challenges in developing it, are outlined at the very end of this document.

### **Conclusions**

Thank you for considering our comments. We have been engaged in learning about and discussing nanotechnology environmental health and safety issues for many years with scientists, government agencies, policymakers, and other citizens. We sincerely hope that democracy is still alive in our state and that our perspectives and recommendations will be taken seriously and will hold as much or more weight as the perspectives of business and industry. If our perspectives and suggestions are ignored, democracy is clearly in bad shape, and this is a sad day for Wisconsin, which has a long history of citizen engagement and responsive policymakers. We hope that is not the case.

We look forward to hearing from you about our questions and recommendations.

Sincerely,

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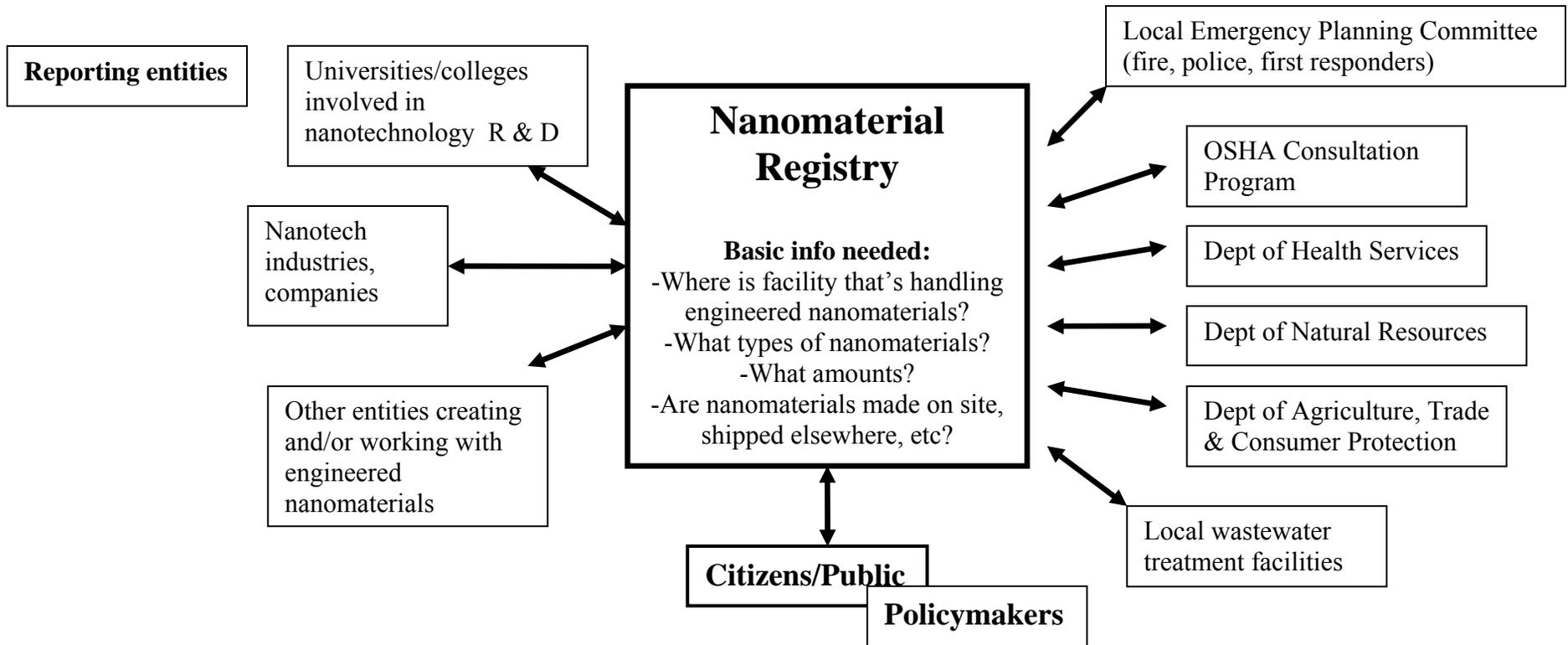
<sup>5</sup> Again, see caveat in footnote 3 above about the term “nanomaterial”

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On behalf of the Nanotechnology Citizen Engagement Organization

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## WHO COULD USE A NANOMATERIAL REGISTRY?



### Components of an effective nanomaterial registry:

- **Must gather basic information about engineered nanomaterials (where, what, how much) that is easily accessible to relevant government agencies** in the forms and at the times they need it to prevent potential environmental, worker, and public health and safety risks;
  - could start with reporting for top 5-10 nanomaterials of most concern currently, based on research (carbon nanotubes, nanosilver, etc).
  - Several government entities have already prioritized nanomaterials of concern and these lists could be used.
- **Universities** (where much of the nano R & D is currently) must report as well as nano companies;
- Registry must be housed in **independent entity** with the least (or no) conflicts of interest (not industry or universities).
- **Registry must be open and transparent** to public, policymakers (like Toxic Release Inventory);
- Reporting **thresholds must not be so high** that most facilities are exempted and risks are not prevented;
- Registry should be **flexible enough** to add new nanomaterials, incorporate new developments in nano science;
  - could start with nanomaterials with highest risk concerns; determined by Oversight Committee (see below)
- Eventually should be **mandatory** (could start as voluntary);
- **Registry oversight committee** made up of representatives from all relevant government agencies, citizens, NGOs, researchers, industry, policymakers would review registry reports regularly and make recommendations on protective actions, monitoring, risk communication to facilities and workers, risk assessments, and future policies related to nanomaterial environmental health & safety issues.

### **How registry could help protect public, worker, environmental health & safety:**

- Knowing where nanomaterial facilities are, agency staff **can communicate** with them and **provide training** on workplace health and safety, proper disposal of nanomaterials, regs, etc;
- **Emergency responders** could be provided info about where particularly hazardous nanomaterials are handled and better plan and train for dealing with those materials in emergencies;
- Agency staff and other risk assessors could fill in **life cycle risk assessment gaps** about nanomaterials—e.g., where they might be emitted from workplaces or other facilities, how much, where they might go into waste, etc.
- Agency staff could better determine which nanomaterials to prioritize for workplace and **environmental monitoring and emissions controls**; could develop effective monitoring methods
  
- **In sum, an effective and accessible registry would help prevent public, worker, environmental health & safety problems upstream rather than reacting downstream!**
  
- **With nanotechnology R & D ramping up dramatically every year, a tracking system is even more important than ever.**

### **Other Important Benefits of Registry:**

- **Build confidence** among Wisconsin citizens that government agencies and industry are being proactive in preventing environmental health and safety risks;
- **Facilitate discussions and engagement** among citizens, scientists, policymakers about nanotechnology and emerging technology developments and policies
- **Transparency**—public can make choices
- Can help DNR identify and outreach to potential candidates for Green Tier, SHARP, and other **green and proactive safety programs**;
- Can help develop **regulations/policies** that are appropriate and relevant to what is happening in state as far as nanotech R & D;
- Information generated by states could **develop more accurate and appropriate risk assessments, regulations and policies at federal level**;
  
- **Registry program could serve as a model for proactively addressing other emerging technologies/materials**

### **KEY QUESTIONS/CHALLENGES:**

- Where would registry be housed/administered? Costs?
- How to mandate? Design registry to work through existing statutes?
- Definitions of engineered nanomaterials? Reportable thresholds?
- What about facilities that do not know they are handling nanomaterials?
- Government agency capacities (resources, staff) to do anything with the information?
- Nanotechnology/nanomaterials are changing fast; new ones emerging every day;
- Registry wouldn't get detailed info about consumer products being used and sold in state;
- Registry may miss critical intermediate, secondary products made along the nanomaterial product chain

**ANOTHER OPTION:** instead of registry, create legislation that gives agencies authority to ask for and get the information they need from entities creating, using engineered nanomaterials? E.G.—like legislation that allowed California Dept. of Toxic Substances Control to create the nanomaterial call-in program.