From:	Murasaki, Seiichi
To:	Smoot, Cameo; Hebert, John
Cc:	Watkins, Elizabeth; Noble, Velma; Shimkin, Martha; Wormell, Lance; Hardy, Jacqueline
Subject:	RE: Help! Looking for a copy of the Copper nano petitions from International Center for Technology Assessment (ICTA)
Date:	Thursday, April 09, 2015 3:19:00 PM
Attachments:	ICTA Nano Copper Petition - Final (3).pdf

I have attached an electronic copy of the letter/request (also, available online – e.g., http://nanotech.lawbc.com/uploads/file/00068945.PDF), and am looping in Lance and Jacquie.

From: Smoot, Cameo
Sent: Thursday, April 09, 2015 2:33 PM
To: Hebert, John
Cc: Watkins, Elizabeth; Murasaki, Seiichi; Noble, Velma; Shimkin, Martha
Subject: Help! Looking for a copy of the Copper nano petitions from International Center for Technology Assessment (ICTA)

John and staff,

FEAD is looking for a copy of the Copper nano petition submitted to OPP by International Center for Technology Assessment (ICTA), Nov. 18, 2010. We need to find a copy of the document to send to OGC. OGC needs to make a legal determination in response to a question from the OIG. Does anyone in AD have a copy of the petition? If so could you send a copy to me today?

We are on a very short time frame to respond to the OIG. Any assistance you can provide would greatly be appreciated.

Thank you.

Cameo Smoot
Office of Pesticide Programs
Environmental Protection Agency
(703) 305-5454 phone
(703) 305-5884 fax
smoot.cameo@epa.gov

International Center for Technology Assessment
660 Pennsylvania Ave., S.E., Suite 302, Washington, DC 20003
Phone: (202) 547-9359 Fax: (202) 547-9429

November 18, 2010

The Honorable Stephen A. Owens
Assistant Administrator
Office of Chemical Safety and Pollution Prevention
Ariel Rios Building
Mail Code 7101M
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Dear Assistant Administrator Owens**:**

The International Center for Technology Assessment (ICTA) submits this formal request calling for you and your office to investigate a significant issue related to your oversight of nanotechnology and pesticides: nano-copper pesticides.

Introduction

The International Center for Technology Assessment (ICTA) is a non-profit, bi-partisan organization committed to providing the public with full assessments and analyses of technological impacts on society. ICTA is devoted to fully exploring the economic, ethical, social, environmental and political impacts that can result from the applications of technology or technological systems. ICTA seeks to ensure that regulatory agencies adopt accurate, scientific and standardized definitions of nanotechnology and to regulate emerging nanotechnologies as they would other materials whose safety has not been determined.

ICTA has worked on issues of nanotechnology oversight for a number of years and has a specific nanotechnology program, NanoAction. As part of that program, ICTA actively works with the public, policymakers, agencies and other non-profits to further improve awareness and oversight. Most relevant here, as you know, in May 2008, the International Center for Technology Assessment (ICTA) and the Center for Food Safety (CFS) filed a legal petition with the EPA on behalf of a coalition of 14 public interest organizations calling on EPA to regulate nano-silver and other nano-pesticide products pursuant to its authority under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).[1] The legal petition called on EPA to, *inter alia*: regulate these nanotechnology products as new pesticides; require labeling of all products; assess health and safety data before permitting marketing; analyze the potential human health effects, particularly on children; and analyze the potential environmental impacts on ecosystems and endangered species.

[1] A full copy of the petition is available at http://www.icta.org/nanoaction/doc/CTA_nano-silver%20petition__final_5_1_08.pdf

This missive concerns a related issue, nano-copper pesticides.

Summary

Here, ICTA writes specifically regarding the submissions made by Osmose, Inc. (Osmose) to obtain its registrations for the following three pesticide products containing "micronized" copper carbonate:

ORD-X372 (Micro Pro 200), EPA Reg. No. 3008-90 (initial registration 5/12/05)
ORD-X370 (Micro Pro 200C), EPA Reg. No. 3008-92 (initial registration 8/30/05)
ORD-X400 (Micro Pro 200C V3), EPA Reg. No. 3008-99 (initial registration 4/7/08)

In each instance, although the active ingredient copper carbonate was purchased from another registrant, the copper carbonate was subsequently milled intentionally to produce very small particles of copper carbonate, including many particles with at least one dimension measuring less than 100 nanometers (the U.S. Environmental Protection Agency (EPA) Office of Pesticide Programs' (OPP) "working definition" of nanoscale material, however other Agency definitions include particle sizes up to 300nm[2] and 1000nm[3]). Based on a review of publicly available records, it does not appear that Osmose advised EPA when it applied for these three registrations that any of these products included intentionally produced nanoscale material, but, as explained below, it clearly knew this was the case.

It has been the announced policy of OPP since 2008 to "presume that any active or inert ingredient that is or contains nanoscale material is a 'new' ingredient for regulatory purposes under FIFRA."[4] EPA confirmed that it intends to continue this policy in a presentation made to the Pesticide Program Dialogue Committee on April 29, 2010.[5] All registrants were also on notice well before 2008 that OPP wanted any applicant requesting registration of a pesticide product containing a nanoscale active ingredient or inert ingredient to disclose that fact during the application process.

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2 United States Department of Agriculture National Organic Standards Board Materials Committee, *Guidance Document -- Engineered Nanomaterials in Organic Production, Processing and Packaging* (Sept. 2, 2010) at 156, *available at* http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5086584#nameddest=nanotech

3 Food and Drug Administration Center for Drug Evaluation and Research, *Reporting Format for Nanotechnology-Related Information in CMC Review* (June 3, 2010) at 3, *available at* http://www.fda.gov/downloads/AboutFDA/CentersOffices/CDER/ManualofPoliciesProcedures/UCM214304.pdf

4 "Nanotechnology and EPA's Office of Pesticide Programs," attachment to e-mail from William Jordan, Senior Policy Advisor, OPP (Nov. 10, 2008) (Exhibit A to this letter).

5 "Nanotechnology and Pesticides," slides of presentation by William Jordan, Senior Policy Advisor, OPP, to Pesticide Program Dialogue Committee (Apr. 29, 2010) (Nanotechnology Slides), at slide 18, *available at* http://www.epa.gov/pesticides/ppdc/2010/april2010/session1-nanotec.pdf.

Osmose appears to have withheld from EPA critical information concerning the presence of nanoscale particles of copper carbonate in the three products ICTA has identified. This has some very significant legal implications. In each instance, it further appears that the company was able to obtain a product registration by claiming the "formulator's exemption." Since EPA would have imposed separate and/or additional data requirements for the "new" active ingredient created when Osmose intentionally modified the structure of the purchased active ingredient to create nanoscale particles, it was clearly improper for Osmose to claim the formulator's exemption for these products. Osmose could not have obtained the registrations in question without generating and submitting data that are different from the data supporting registration of the conventional scale purchased product. Accordingly, ICTA believes that these Osmose nano-copper pesticide registrations should be deemed by EPA to be invalid *ab initio* and subject to immediate cancellation. Moreover, each sale and distribution by Osmose of any version of these three products that contains nanoscale particles should be deemed to be an unlawful act under FIFRA Section 12(a)(1)(C),[6] because the composition of each such product "differs at the time of its distribution or sale from its composition as described in the statement required in connection with its registration under section 136a of this title."

Like the pending petition by ICTA and 13 signatory organizations requesting that EPA further regulate nano-silver pesticide products,[7] ICTA requests that EPA assign a high priority to nanoscale copper compounds in registered pesticides. So have other non-profits that have raised this issue of concern.[8] In fact, EPA itself has recently recognized that, "Nano copper is more acutely toxic than micro copper."[9]

ICTA believes that EPA must act promptly to protect the public from unintended health and environmental hazards resulting from further widespread commercial distribution of Osmose's registered nano-copper wood preservative pesticides. As we will show *infra,* there is substantial scientific evidence that nanoscale copper and copper compounds are highly toxic. And even though EPA has not yet evaluated the safety of the Osmose products containing "micronized" copper carbonate, the company stated over a year ago that: "Over 5 Billion board feet of MicroPro treated wood has been sold since the product

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6 7 U.S.C. § 136j(a)(1)(C).

7 ICTA, Petition for Rulemaking Requesting EPA Regulate Nano-Silver Products as Pesticides (May 1, 2008), *available at* http://icta.org/nanoaction/doc/CTA_nano-silver%20petition__final_5_1_08.pdf.

8 In a submission to a meeting of the FIFRA Scientific Advisory Panel concerning nanosilver and other nanometal pesticides, the Natural Resources Defense Council (NRDC) also requested that EPA take action concerning micronized copper pesticides, stating that "it appears that EPA has never been provided with any safety data for the nano-scale 'micronized' formulation of this wood treatment biocide. Dr. Jennifer Sass, Comments from the Natural Resources Defense Council for the November 3-6, 2009, FIFRA Scientific Advisory Panel (SAP) Session (October 28, 2009), at 2, Docket No. EPA-OPP-009-0683-0076.1, *available at* http://www.regulations.gov/search/Regs/contentStreamer?objectId=0900006480a4be21&disposition=attachment&contentType=pdf.

9 Nanotechnology Slides, at slide 6.

introduction in 2006."[10] EPA has ample legal basis to cancel the registrations, to determine each is void, and/or to take enforcement action concerning the sale and distribution of these products.

A detailed discussion of the materials and evidence that support these factual and legal conclusions concerning the three specified Osmose products follows.

Composition Information in Osmose Registration Applications

The EPA product chemistry review for ORD-X372 states:

> The applicant has provided a justification for not being required to satisfy the requirements of the following Part A product chemistry data requirements: 830.1620 (Description of Production Process), and 830.1700 (Preliminary Analysis). ORD-X372 is an end-use product that is formulated from registered manufacturing use products by simple mixing.[11]

Thus, EPA's approval of ORD-X372 was based on the premise that the active ingredient in the registered manufacturing use product purchased by Osmose *was not modified* prior to incorporation in the Osmose product. Based on that same premise, Osmose applied for and received the formulator's exemption for ORD-X372. That basic premise is false, because the purchased active ingredient is actually modified by milling before incorporation in the registered end use products.

Mr. Jack Housenger, the Associate Director of the Health Effects Division in OPP, asked personnel in the Antimicrobials Division to review the submissions by Osmose concerning these products. EPA analyst A. Najm Shamin replied to Mr. Housenger's request by stating:

> I looked into the jackets for Reg# 3008-90 and 3008-92 and poured over 300 pages, I could not find any reference about the size of the active product which is called copper carbonate.[12]

Mr. Shamin further stated that he conducted a "quick Google search" and found "that by definition a micronized copper is 500 nm and above."

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10 Osmose Press Release, "Consumer Safety and Product Performance of Micronized Copper Technology Confirmed" (Feb. 10, 2009) (Osmose Press Release), *available at* http://www.treatedwoodtruth.com/consumer-safety-and-product-performance-of-micronized-copper-technology-confirmed.php.

11 Subject; Product Chemistry Review of ORD-X372, TO: Wallace Powell, EPA Work Assignment Manager, FROM: Joan Cuddleback, CSC/DynCorp Work Assignment Manager (Feb. 21, 2005), at 2 (Exhibit B).

12 Text of e-mail communication from A. Najm Shamin to Jack Housenger (date unknown).

As late as November 21, 2008, Mr. Housenger stated in an e-mail that he thought EPA had determined for the Osmose products that "the particles were greater than 100 nm" and that the particles in question were not "engineered to have special properties." Unfortunately, neither conclusion is correct. ICTA is uncertain whether the incorrect conclusions by EPA staff concerning the composition of these products were based solely on the failures by Osmose to disclose the inclusion of nanoscale material in its registration submissions for ORD-X372 and ORD-X370, or whether Osmose made affirmative representations on which EPA relied in reaching these incorrect conclusions.

ORD-X400 is a newer formulation designed for use with "refractory" wood species. As we will show below, this product contains smaller and more numerous nanoscale particles than ORD-X372 and ORD-X370. ORD-X400 was registered on April 7, 2008, at about the time when EPA was formalizing its policy position that it would treat intentionally created nanoscale particles of existing active and inert ingredients as "new" ingredients. In the letter transmitting its application for ORD-X400, Osmose stated that ORD-X400 is "substantially similar" to ORD-X370, asserting that: "Both products contain the same active ingredient purchased from the same sources," and "The only difference in the two products is the percentage of copper carbonate."[13] In that same letter, Osmose stated that the decreased percentage of copper carbonate in ORD-X400 would "only improve upon the toxicity characteristics," even though the inclusion of smaller and more numerous nanoscale particles in this product raises significant unresolved concerns regarding the hazards associated with its use. ICTA has not determined whether Osmose provided any information to EPA concerning the reductions in particle size in its product chemistry submission for ORD-X400, but the assertions in this letter suggest it did not. In any case, ICTA believes it is improbable that EPA would have registered this product had it been given accurate information on the inclusion of nanoscale particles in its composition.

Nanoscale Composition of Osmose Products

The manufacturing process for Osmose's "micronized" copper carbonate products is described in a U.S. Patent that Osmose applied for on April 9, 2004,[14] shortly before the registration of ORD-X372 and ORD-X370. This Osmose patent defines "micronized" as "a particle size in the range of 0.001 to 25 microns," which is 1 to 25,000 nanometers. The patent claims include wood preservatives that use micronized particles of an insoluble copper compound (such as copper carbonate) with either a soluble organic biocide or micronized particles of an insoluble organic biocide (such as tebuconazole). The patent explains that these small sizes can be attained by "grinding copper compounds using a commercially available grinding mill."

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13 Letter from Teri Muchow, Manager, Regulatory Administration, Osmose, to Document Processing Desk, OPP, Re: ORD-X400 Application for Product Registration (Dec. 27, 2007), at 2 (Exhibit C).

14 Leach *et al.*, United States Patent No. US 7,674,481 B2, application April 9, 2004, granted March 9, 2010 (Exhibit D). Provisional applications were previously submitted on April 9, 2003, and November 11, 2003.

The first "micronized" copper carbonate product registered by Osmose was ORD-X372, which also contains soluble quaternary ammonium compounds. Osmose subsequently registered ORD-X370, which contains only the "micronized" copper carbonate compound. This second product is labeled for tank mixing with ORD-X300, EPA Reg. No. 3008-97, a tebuconazole product registered by Osmose. Based on the claims in the Osmose patent and the limited solubility of tebuconazole, ICTA believes that it is very likely this product also contains "micronized" particles. Unlike the three "micronized" copper carbonate products, ICTA has not been able to collect sufficient information to confirm that ORD-X300 contains nanoscale particles.

The Osmose patent for "micronized" word preservatives covers a wide range of particle sizes, from sizes that are at the low end of EPA's working definition for nanoscale particles to particles that are much larger than the high end of this definition. Thus, it is critical to determine what particle sizes are actually present in the Osmose "micronized" products.

The first clear evidence that Osmose's "micronized" products contain nanoscale particles of copper carbonate emerged when a group of scientific researchers started evaluating the effects of these products on treated wood. In October 2008, the journal *Nature Nanotechnology* published a letter from several researchers from the Centre for Advanced Wood Processing in Vancouver, Canada, and the Forestry and Forest Products Research Institute in Tsukuba, Japan, describing the "large-scale commercial use of nanoparticles for the biological protection of timber."[15] These researchers described "wood preservatives that consist of copper carbonate particles and an organic co-biocide, both dispersed in water," and referenced the Osmose patent. They also stated unequivocally that, "Nanoparticles, some as small as 20 nm in diameter, are abundant in the aqueous preservative."

This letter followed publication of reports by these same researchers in which they examined wood treated with "micronized" copper carbonate preservatives with a scanning electron microscope and found nanoscale particles of copper carbonate and iron oxide[16] in voids in the structure of the wood.[17] The researchers stated:

> Field Emission Scanning Electron Microscopy (FE-SEM) in combination with x-ray microanalysis (EDX) revealed the presence of nano-sized copper and iron particles in treated

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15 Evans, P., Matsunaga, H., and Kiguchi, M. (2008), "Large-scale application of nanotechnology for wood protection," *Nature Nanotech.* 3:577 (October 2008) (Exhibit E).

16 ICTA does not know the source of the nanoscale iron oxide particles, or whether iron oxide particles were reported by Osmose as an inert ingredient for any of the "micronized" copper carbonate products. In any case, EPA's policy concerning nanoscale inert ingredients is the same as EPA's policy concerning nanoscale active ingredients.

17 Matsunaga, H., Kiguchi, M., and Evans, P. (2007), "Micro-Distribution of Metals in Wood Treated with a Nano-Copper Wood Preservative," Paper Prepared for the 38th Annual Meeting of the International Research Group on Wood Protection (May 20-24, 2007) (Exhibit F); Matsunaga, H., Kiguchi, M., and Evans, P. (2008), "Microdistribution of copper-carbonate and iron oxide nanoparticles in treated wood," *J. Nanopart. Res.* 11(5):1087-1098 (Exhibit G).

> wood. These particles ranged in size from 10 to 700 nm and were abundantly present in pit chambers and on tertiary wall layers adjacent to the lumens of tracheids and ray parenchyma cells.[18]

The same group of researchers recently presented another paper at a meeting of the International Research Group on Wood Protection. The researchers reported finding even smaller copper carbonate nanoparticles (about 2.5 nm) in the ray parenchyma cell walls of wood treated with a "micronized" copper carbonate product.[19]

At this same meeting of the International Research Group on Wood Protection, Osmose consultant Dr. Craig McIntyre presented a paper that compared particle sizes in several formulations of "micronized" copper carbonate with particles actually deposited in treated wood.[20] In this paper, Dr. McIntyre stated:

> Basically, all of the micronized copper was <1000 nm and roughly the ranges corresponded to:
>
> Formulation 1: mean = 200 to 500 nm
> Formulation 2: mean = 100 to 200 nm
> Formulation 3: mean = 50 to 95 nm[21]

The three formulations described by Dr. McIntyre generally correspond to the Osmose specifications for several formulations containing "micronized" copper carbonate particles that Osmose has marketed pursuant to its FIFRA registrations. Further, testimony given in 2009 by the Osmose Director of Research in a hearing in Federal District Court indicates that the mean particle size specifications for three "micronized" copper carbonate formulations marketed by Osmose are 0.25 to 0.3 microns (250-300 nm), $\leq$ 0.12 microns (120 nm), and $\leq$ 0.08 microns (80 nm).[22] The third Osmose formulation is ORD-X400 (also marketed as Micro Pro 200C V3), a product that is intended for treatment of "refractory" wood species like Douglas fir and hem fir that have an internal structure that resists impregnation with wood preservatives.

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18 Matsunaga, *et al.* (2007), at 2.

19 Matsunaga, H., Kataoka, Y., Kiguchi, M., and Evans, P. (2010), "Copper nanoparticles in southern pine wood treated with a micronized preservative: Can nanoparticles penetrate the cell walls of tracheids and ray parenchyma?", Paper Prepared for the 41st Annual Meeting of the International Research Group on Wood Protection (May 9-13, 2010) (Exhibit H).

20 McIntyre, C.R. (2010), "Comparison of Micronized Copper Particle Sizes," Paper Prepared for the 41st Annual Meeting of the International Research Group on Wood Protection (May 9-13, 2010) (Exhibit I).

21 McIntyre, C.R. (2010), at 4.

22 Transcript of Preliminary Injunction Hearing, Testimony of Dr. Jun Zhang, Director of Research, Osmose (June 25, 2009), at 288-290, 328-329, Document 200 in *Osmose, Inc. v. Viance, LLC*, No-3:09-CV-23-JTC (N.D.Ga. Nov. 5, 2009), *available at* http://www.pacer.gov/ (Exhibit J).

Although it may initially appear that the first two of the three Osmose formulations have a particle size specification that falls outside of the range specified in OPP's "working definition" for nanoscale material, there is substantial scientific evidence that nanoscale particles of copper carbonate are abundant in all of the Osmose formulations. This is demonstrated both by the data collected in the various studies by Matsunaga, *et al.*, as well as by a study by MVA Scientific Consultants[23] that is included in the public record of a court proceeding. This study shows that the Osmose specifications for particle size are based on a weighted mean that reflects the higher mass of the larger particles, rather than on a mean determined from the numerical abundance of particles of each size in the formulation.

MVA Scientific Consultants is a firm that has conducted many forensic studies of particle size, and thus has considerable expertise in this area. In this study, MVA scientists analyzed a sample of ORD-X372 to determine the particle size distribution by direct visualization using transmission electron microscopy. MVA determined that 188 out of 260 discreet particles (72.3%) in this sample had an equivalent spherical diameter of less than 100 nm.[24] This study demonstrates that a specification based on the mean particle size determined by mass can be misleading because there are actually a much greater number of particles in the range below 100 nm. Because the shape of the visualized particles was irregular, and MVA reported the results by equivalent spherical diameter, the numerical prevalence of particles with at least one dimension smaller than 100 nm would likely be even greater.

The newest Osmose "micronized" copper carbonate formulation for "refractory" wood (ORD-X400) has a mean particle size that is clearly nanoscale under the EPA definition based on Osmose's own specification. In addition, it is clear from the published literature and from the MVA study that each of Osmose's "micronized" copper carbonate products has a composition that meets the EPA definition for a nanoscale active ingredient. Each product contains numerous particles that have been intentionally produced by milling to achieve a particular functionality and that have at least one dimension that measures less than 100 nm. Under EPA policy, the active ingredient in these products is "new." In each instance, it was improper for Osmose to fail to inform EPA that the product contains nanoscale particles, for Osmose to claim the "formulator's exemption" based on its purchase of a conventional sized active ingredient, and for Osmose not to support its application with additional data submissions based on the actual composition of the product.

Potential Risks from Nanoscale Copper Carbonate

Wood products treated with the Osmose "micronized" copper carbonate formulations are used for a variety of consumer applications that may involve direct dermal contact with the treated wood. In addition, copper nanoparticles could be released from the

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23 Cavaliere, M.R., and Miller, M.A. (2009), MVA Scientific Consultants, "Report of Results: MVA7912, Particle Sizing of Micronized Copper Preservative" (June 19, 2009) , listed as Defense Exhibit 1022 in Appendix A to Defendants and Counter-Plaintiff's Second Revised Amended List of Documents to be Presented at Preliminary Injunction Hearing, Document 157-2 in *Osmose, Inc. v. Viance, LLC*, No-3:09-CV-23-JTC (N.D.Ga. June 30, 2009), *available at* http://www.pacer.gov/ (Exhibit K).

24 Cavaliere and Miller (2009), at 3

treated wood during sawing or machining, during cleaning, through normal wear and tear, or from product decomposition, and then become available for potential inhalation or ingestion. As noted above, Osmose stated in early 2009 that over five billion board feet of wood have been treated with its "micronized" copper products, so the potential for consumer exposure to nanoscale copper particles could be quite large.

Copper is known to be extremely soluble and can leach into the surrounding environment and bind very quickly to both organic and inorganic matter.[25] Copper has detrimental effects on most aquatic species, but especially algae, which in turn can affect entire ecosystems.[26] Studies of the acute toxicity of elemental copper nanoparticles (23.5 nm) in mice found "gravely toxicological effects and heavy injuries on kidney, liver, and spleen."[27] In a study comparing the toxicity of various metal oxide nanoparticles and carbon nanotubes, copper oxide nanoparticles (averaging 43 nm) were the most potent of all the nanoparticles tested at causing cytotoxicity and DNA damage.[28] Although the potential toxicity of nanoscale particles of copper carbonate has not been equally well characterized, the results of the study with copper oxide nanoparticles are of particular concern because both copper oxide and copper carbonate include a bivalent copper ion. Additional, nano-copper particles lead to the accumulation of excessive alkalescent substance and heavy metal ions (copper ions) in mice culminating in metabolic alkalosis and copper ion overload.[29]

To our knowledge, EPA has never evaluated the potential hazards associated with the nanoscale particles of copper carbonate in Osmose products. Yet Osmose issued a press release in 2009 in which it claimed that the "consumer safety" of its products has been "confirmed."[30] In addition to severely misrepresenting the actual degree to which the safety of the Osmose products has been evaluated, this press release clearly violates FIFRA based on applicable EPA policy. EPA construes FIFRA Sections 3(c)(1)(C) and 12(a)(1)(B)[31] to prohibit any claims concerning "safety" of a product in advertising because such claims would not be permissible if they were included in proposed product labeling.[32] EPA

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25 NOAA (2009) The Use of Treated Wood Products in Aquatic Environments.

26 EPA Office of Pesticide Programs (2008) Copper Facts – Pesticide Reregistration, EPA 738-F-06-014 .

27 Chen, Z., Meng, H., Xing, G., Chen, C., Zhao, Y. Jia, G., Wang, T., Yuan, H., Ye, C., Zhao, F., Chai, Z., Zhu, C., Fang, X., Ma, B. and Wan, L. (2006), "Acute toxicological effects of copper nanoparticles in vivo," *Toxicol. Let.* 163:109-120 (Exhibit L); Meng, H., Chen, Z. Xing., G. Yuan, H., Chen, C., Zhao, F. Zhang, C. Wang, Y., and Zhao, Y. (2007), "Ultrahigh reactivity and grave nanotoxicity of copper nanoparticles," *J. Radioanalyt. Nuc. Chem.* 272:595-598 (Exhibit M).

28 Karlsson, H. l., Cronholm, P., Gustafsson, J., and Möller, L. (2008); "Copper Oxide Nanoparticles are Highly Toxic; A Comparison between Metal Oxide Nanoparticles and Carbon Nanotubes," *Chem Res. Toxicol.* 21:1726-1732 (Exhibit N).

29 "Ultrahigh reactivity provokes nanotoxicity: Explanation of oral toxicity of nano-copper particles" **Toxicology Letters** Volume 175, Issues 1-3, 10 December 2007, Pages 102-110.

30 Osmose Press Release, note 7 *supra*.

31 7 U.S.C. §§ 136a(c)(1)(C) and 135j(a)(1)(B).

32 *see* EPA, "Pesticide Labeling Questions and Answers," at Section 1 ("Advertising Claims"), *available at* http://www.epa.gov/pesticides/regulating/labels/label_review_faq.htm.

regulations expressly prohibit any labeling that includes "claims as to the safety of the pesticide or its ingredients."[33] Accordingly, it appears that distribution and sale of the three Osmose products following issuance of this Osmose press release was also a violation of FIFRA.

Osmose's MicroPro "ORD-X372" was the first wood preservative to be certified an Environmentally Preferable Product (EPP) by Scientific Certification Systems, a certification based on guidelines developed by EPA. Additionally, Osmose's MicroPro recently earned GREENGUARD Children and Schools Certification from the GREENGUARD Environmental Institute (GEI) and has also earned Green Approved Product Certification from the National Association of Home Builders (NAHB) Research Center under the National Green Building Standard program.

Notwithstanding the evidence that exposure to nanoscale copper carbonate may pose very serious toxicological concerns, Osmose has introduced nanoscale copper carbonate into commerce on a very large scale in wood preservative products registered by EPA. Osmose has not been required to produce any data addressing the potential risks associated with this nanoscale active ingredient, nor has EPA evaluated the risks that may be associated with occupational and consumer exposure to nanoscale copper carbonate resulting from use of these products. EPA may conclude that it was not previously aware of these potential hazards because of the failure of Osmose to disclose information on the composition of these products, but EPA must not neglect this matter now that it is aware of the presence of nanoscale material in these products.

Conclusion and Requests

For all of the above reasons, ICTA requests that EPA immediately investigate the composition of ORD-X372, ORD-X370, and ORD-X400, and take appropriate administrative action. If EPA determines that these products were registered on the basis of an invalid claim of the formulator's exemption, EPA should immediately revoke the registrations for these products. If EPA determines that it must afford the registrant Osmose an opportunity for a hearing prior to cancelling these products, notwithstanding the failure of Osmose to include critical information in its applications, the sole issues in that hearing should be whether Osmose accurately characterized the composition of its products, and whether Osmose was legally eligible to claim the formulator's exemption.

We further request that EPA thoroughly investigate other possible nanoscale copper products, which should include but not be limited to copper-based wood treatment products currently available on the market, as similar actions under FIFRA may be necessary.

If EPA determines that Osmose, or any other manufacturer of copper-based pesticide products, has distributed or sold any product that has a composition that differs from the composition described in the statement Osmose submitted as part of the registration of the product, EPA should take enforcement action under FIFRA Section 12(a)(1)(C).

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[33] 40 C.F.R. § 156.10(a)(5)(ix).

Finally, EPA should publish its long-awaited industry guidance on nano-scale pesticides (Docket No. EPA-HQ-OPP-2008-0650). A notice on pesticide products containing nanoscale materials was submitted to the US Office of Management and Budget on July 30, 2010; however, no further action has been taken. Industry will have less incentive and ability to violate the law if EPA makes clear its policy regarding nano-pesticides like nano-silver and nano-copper. ICTA assumes that part and parcel of that awaited guidance will be the answer to ICTA's nano-silver petition, discussed *supra*.

Again, clarification and certainty from the agency would lessen the likelihood of future companies failing to divulge new nano-pesticides. The requirement of new data from the prospective registrants would further illuminate the safety and risks of these materials. And programmatic and individual impact assessments, under FIFRA, NEPA and other applicable laws, will further build that needed body of study. Finally, the requirement of labeling any nano-pesticide will provide transparency and causation data for any potential future negative impacts.

ICTA appreciates your prompt consideration of the matters described in this letter and the attached exhibits. Please contact me if you have any questions concerning any matter discussed in this letter.

Sincerely,

Jaydee Hansen
Policy Director

George A. Kimbrell
Staff Attorney

International Center for Technology Assessment

Attachments

cc: James J. Jones, Deputy Assistant Administrator (w/attachments)
Steven P. Bradbury, Ph.D., Director, Office of Pesticide Programs (w/attachments)
Lois Rossi, Director, Registration Division (w/attachments)
Leslye M. Fraser, Esquire, Office of General Counsel (w/attachments)
William Jordan (w/attachments)