

OSHA Advisory Committee for Construction Safety and Health (ACCSH)

Health Hazards, Emerging Issues & PtD Workgroup Meeting

November 27, 2012

12:00pm – 2:00pm

42 Attendees (See attached list)

Co-Chairs: Walter Jones, Matt Gillen, and Donald Pratt presided

1) Nanotechnology in Construction: Health and Safety Risks

Two speakers were scheduled to provide background information on this emerging health hazard issue. Kristen Kulinowski, Institute for Defense Analyses (IDA) Science and Technology Policy Institute, and Bruce Lippy, CPWR - Center for Construction Research and Training, were scheduled to speak. Kristen began by giving the workgroup introductory information on the description, scale, and classes of nanoparticles. Kristen started by discussing the structure of differing materials and how a fibrous shape is more hazardous to health than spherical. The important feature of nano particles is the fact that a substance's property changes at the nano scale. For example, gold- which is yellow, conductive, non magnetic and inert but at the nano level it becomes red, loses conductivity, becomes magnetic, explosive and catalytic. Nano particles are theorized to be able to help with cancer therapy, environmental clean up, and clean energy. Kristen went through an demonstration on how adding titanium dioxide to glass gives it self-cleaning properties.

Researchers are now asking what the environmental health and safety impacts of engineered nano particles. Human health concerns from Inhalation has been a major focus. It has been determined in animal studies that certain nano materials induce cancer, pulmonary fibrosis, cardiovascular dysfunction and can migrate along the olfactory nerve into the brain. Because nanoparticles can translocate throughout the body after exposure via inhalation, contact with skin, or ingestion or contact with the skin and cause induce health effects in animals or culture, exposure must be controlled.

Globally, nano materials are loosely regulated with most governments providing limited guidance on safety assessments. EPA has PPE requirements for using certain multi-wall carbon nanotubes - gloves impervious to nanoscale particles and chemical protective clothing, NIOSH-approved full-face respirator with an N -100 cartridge. Kristen suggested the International Council on Nanotechnology (ICON) and NIOSH nanotechnology website as great resources for more information.

Bruce Lippy began by discussing what nano materials are found in construction. It was pointed out that airborne carbon nanotubes were found at ground zero and that nanoparticles are commonly found in the air. What we are focused on when we discuss

nanoparticles, materials or technology are engineered nanoparticles. In construction there are many promising applications - the use of nanoparticles in concrete to enhance durability, strength, hydration, compressive strength and biocidal activity. However, there is limited commercialization due to cost. In Europe, there is more activity with 94 available products mostly in coating, cement and concrete. Bruce went on to discuss smog eating (NO₂) roof tiles and asphalt.

In terms of worker exposure to engineered particles and human health risks, we do not know much. Studies have shown that inhalation of engineered nanomaterials during coatings, compounding and molding can pose respiratory health risk in workers. Corroborating sampling from 2009 of workers mixing nanocrete and applying spray on TiO₂ on glass suggested modest exposure. In terms of industrial hygiene, sampling counting protocols have not been developed and we are relying on NIOSH Method 5040. The problem is that one 100µm particle weighs the same as one billion nanoparticles, thus skewing the data. Bruce referred to this as, if you carry a bag of cantaloupes, you're not going to notice the a handful of grapes.

How are the hazards communicated to workers? According to Bruce, surveys indicate that vast majorities of workers were unaware they were using material that contained engineered nanoparticles. Literature reviews and studies of MSDS have shown that their accuracy is relatively poor and not comprehensible to literate workers. MSDS do not always identify the engineered nano component and less than half provide any cautionary handling language. Most MSDS reference the PELs for the macro sized particle and only 6% used cautionary language about using PELs. Thirty-two percent of MSDS reviewed indicated nothing about nanoparticles.

Because of the lack of information, Bruce is leading an CPWR initiative to identify specific construction-related products and create a registry. They are also identifying applicable control technologies and measuring their effectiveness with nanoparticles.

2) Thermal Degradation of Organic Coatings

Speakers – Opeyemi Farquah and Jonathan Berr with Directorate of Technical Support and Emergency Management (DTSEM)

The speakers informed the workgroup that the Office of Science and Technology Assessment is investigating worker exposure to the thermal decomposition of organic compounds such as organic coatings on steel or other structures when extreme heat is applied. They indicated that workers may be exposed to degradation of these coatings by inhalation and dermal exposure when extreme heat or flame from a torch is used for cutting or welding. Much of the initial work looking at the potential hazards from these coatings has come from unique workplaces such as oil or gas rigs in very cold climates when the steel is coated for protection. When exposed to flames, these organic coatings or polymers, can give off fumes, or may breakdown into their respective components, and/or form other by-products which could be harmful if inhaled.

Areas of potential concern for the construction industry are: Welding and cutting of heating pipes during installation or repairs; Joint welding and heat-flexing of PUR floor covering, especially in small rooms with limited ventilation; Steel framing in building construction; and Reclaiming of scrap metal and other work in demolition sites.

This subject obviously needs to have more study and research before any recommendation can be made by the workgroup. DTSEM will keep us informed of any further advances in their research.

3) Federal Communications Commission (FCC) & Radiofrequency (RF) Exposure

Martin Doczkat of the FCC, accompanied by agency colleagues Ed Mantiply and Robert Weller, provided an overview of how FCC exposure limits work. FCC has two exposure limits: one for "Maximum Permissible Exposure"(MPE) for whole body exposures at greater than 20 centimeters in distance; and one for "Specific Absorption Rate" (SAR) for near field localized exposures at less than 20 centimeters in distance. Each of these in turn has two limits – one for Occupational/Controlled exposure, and a lower exposure limit for the general population/uncontrolled conditions. Interestingly, the occupational/controlled limits only apply when 1) a person is fully aware of their exposure, and 2) when the person has knowledge and ability to control their exposure.

The FCC licenses fixed RF sources such as 1) broadcast antennas (higher power AM, FM, TV); 2) radar, and 3) wireless base stations (lower power, traffic dependent). It also licenses portable sources such as two way radios, cell phones, laptops, etc. FCC requires a variety of control approaches to limit exposures. It requires placement of warning signs- and sign wording ranges from NOTICE for exposures between the general population and occupational limit, CAUTION for exposures from 1-10X the occupational limit, and WARNING for exposures 10X over the occupational exposure limit. Exposures fall off with distance and well defined markings can be used to help create exclusion zones. However, some antennas are concealed for aesthetic purposes or are disguised as trees, flagpoles, steeples, and other structures. Signs and instructions might be less clear in such cases.

FCC holds its licensees accountable for exposure compliance. FCC has technical standards on how to measure, assess, and avoid exposure in excess of FCC limits. FCC does collect complaint information and is not aware of anyone injured from wireless base stations. They are aware of injuries related to broadcast antennas.

In response to a follow-up question about this from ACCSH member Walter Jones, the FCC representatives stated that FCC does not have a systematic surveillance program to identify overexposures.

ACCSH member Bill Hering shared his experience as a member of his town zoning board reviewing applications by carriers for placement of cell phone antennas. He stated that potential occupational exposures are not mentioned. He gave the example of

antennas inside a billboard structure as an example where workers might have exposures while changing signs.

Robert Weller provided additional detail about how FCC enforcement works. He indicated that FCC authority is limited to the licensees. Licensees must certify that they are in compliance. In response to questions about how building owners could override access controls, he indicated that FCC has had discussions with OSHA Solicitors about how this could be addressed. In addition, if signs were not present, FCC would use general population/uncontrolled limits instead of occupational/controlled limits.

Greg Lotz of NIOSH mentioned that FCC has worked closely with NIOSH and other agencies. He suggested that the dilemma for potential construction exposures might be dealing with notification and exposure issues beyond direct control of FCC jurisdiction.

Drew Fountain of RF Check described inadvertent RF exposures as a "hazard in plain sight" and suggested that signs can be misplaced or be ambiguous for workers. He said that the time-weighted averaging used for the exposure limits are great for employers and workers who have instruments and knowledge about RF but that this is not often the case.

In response to a question from ACCSH member Letitia Davis, the FCC representatives indicated they can do complaint-based enforcement -for example if they find absence of notification or signage.

ACCSH Chair Pete Stafford stated that his impression from the discussion was that a regulatory gap might exist for inadvertent RF exposures to construction and maintenance workers and that some type of ACCSH recommendation might be in order.

The co-chairs thanked the speakers for their excellent presentations and the meeting was adjourned at 2:00pm.