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Attached are the comments of the American College of Occupational and Environmental Medicine in response to the **Draft Current Intelligence Bulletin "Occupational Exposure to Carbon Nanotubes and Nanofibers."**

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AMERICAN COLLEGE OF
OCCUPATIONAL AND
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Comments of the American College of Occupational and Environmental Medicine

National Institute of Occupational Safety and Health

Draft Current Intelligence Bulletin "Occupational Exposure to Carbon Nanotubes and Nanofibers"

Submitted February 18, 2011

"Occupational Exposure to Carbon Nanotubes and Nanofibers"

The NIOSH Current Intelligence Bulletin ("Occupational Exposure to Carbon Nanotubes and Nanofibers") provides some initial guidance to the potential health risks for workers who may be exposed to these nano-substances. The concern for potential adverse health effects is solely based on animal studies as there has been no report in the literature of human health effects in workers or others exposed to carbon nanotubes or carbon nanofibers.

When animals (mostly rodents) have been exposed to these materials, the findings have ranged from acute inflammatory changes in the lungs to interstitial fibrosis to mesothelial tumors. Because some of the nano-materials may have durability/persistence and aspect ratios similar to asbestos fibers, there have been findings similar to "asbestos-type pathology". However, there have also been acute inflammatory changes. As is stated in this report, "differences in results from animal studies have been attributed to differences in physicochemical properties, surface area, the degree of agglomeration of the test material, and differences in the observation period following termination of exposure". The differences in biological effect may also depend upon the presence or absence of residual metal catalysts used in the preparation of these substances.

Comments regarding medical surveillance (As listed in Sections 1.1, 6.6, and in Appendix B):

1. General Comment: The recommended medical screening and surveillance recommendations are not specific for possible pulmonary injuries that may occur from inhalation of carbon nanotubes or nanofibers. The recommendations appear to be generic. .
2. Radiographic screening and surveillance: At this time, it is uncertain which specific patterns of pulmonary injury may occur and when they may appear. As

3. a result, it is prudent to recommend that some form of radiologic medical screening and surveillance be performed. However, there is no justification that a NIOSH-certified B-reader must interpret or review the chest radiographs. The presence of acute inflammatory changes (as noted in the aforementioned animal studies) may be seen as different radiographic patterns such as consolidation, ground-glass opacifications, interstitial edema, etc. These are not patterns that would be best reviewed by comparison to the standard ILO films. Instead, the finding of any unexplained abnormality on a chest radiograph as interpreted by a radiologist or pulmonologist should prompt further evaluation that might include the use of a high-resolution CT scan of the thorax.
4. Respiratory Symptom Questionnaires: The presence or development of respiratory symptoms may also be critical to the identification of possible pulmonary injury from exposure to nano-materials. We recommend that a standardized respiratory symptom questionnaire should be used as part of the initial screening and follow-up surveillance examinations; e.g., ATS-DLD-78 or Medical Research Council Questionnaire, etc.
5. Spirometry testing: It is recommended that spirometry testing be administered by an individual who has completed a NIOSH-approved training course in spirometry or other equivalent training. It should also be mentioned that the qualified health professional who is overseeing the screening and surveillance program should be expert in the interpretation of spirometry testing results, enabling them to recommend further medical evaluation if abnormal test results occur; e.g., more complete pulmonary function testing including lung volumes and diffusing capacity measurements.
6. Research needs; we urge NIOSH to initiate at least one prospective cohort study with close follow-up of exposed individuals in order to determine as soon as possible whether occupational exposures are associated with adverse health effects and if so, what effects occur. If such a study is also undertaken in order to detect or characterize exposures, in addition to determining adverse health effects, then it is critical that the validity of monitoring methods be separately demonstrated.