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DIRECTOR'S OFFICE
DEPT OF TOXIC SUBSTANCES CONTROL
JAN 13 2010
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Career and Protective Services

Environmental Health and Safety

January 6, 2010

Via: Certified Mail

Jeffrey Wong, Ph.D.
Department of Toxic Substances Control
101 "I" Street
P.O. Box 806
Sacramento, California 95812-0806

Re: DTSC Chemical Call-In – Carbon Nanotubes

Dear Dr. Wong,

In response to the January 22, 2009 call-in letter from the Department of Toxic Substances Control (DTSC), the University of Southern California submits the following information regarding carbon nanotubes (CNTs) {California Health and Safety Code §57018-57020}.

What is the value chain for your company? For example, in what products are your carbon nanotubes used by others? In what quantities? Who are your major customers?

USC CNT researchers manufacture and use carbon nanotubes within USC facilities solely for research and instructional purposes. Currently, CNTs are not produced at USC for commercial sale or distribution.

What sampling, detection and measurement methods are you using to monitor (detect and measure) the presence of your chemical in the workplace and environment? Provide a full description of all required sampling, detection, measurement and verification methodologies. If used, provide full QA/QC protocol.

Researchers utilize various methods to analyze and substantiate CNT production in their research work, e.g., mass-spectroscopy, X-ray photoelectron spectroscopy, gas chromatography, and chemical reactions.

What is your knowledge about the current and projected presence of your chemical in the environment that results from manufacturing, distribution, use and end-of-life disposal?

Limited CNT volumes are used in our facilities, ranging in weight from a few femtograms to one gram. One milligram is the most prevalent quantity

University of
Southern California
1540 Alcazar Street
CHP 148
Los Angeles,
California 90033-9005
Tel: 323 442 2200
Fax: 323 442 2201
web page:
http://capsnet.usc.edu

used for any single project. Any amount released through these research activities would be negligible, given the minute quantities used, along with engineering controls and work practices.

What is your knowledge about the safety of your chemical in terms of occupational safety, public health and the environment?

Health and safety information provided by NIOSH and other resources is referenced for best practices. Given that exposure to these materials during use may occur through inhalation, dermal contact, and ingestion, USC researchers minimize potential human exposure when working with CNTs through engineering / administrative controls and volume minimization.

Most CNTs in use at USC are permanently attached to the substrate surface, preventing airborne release.

What methods are you using to protect workers in the research, development and manufacturing environment?

USC safety practices for engineered nanomaterial research operations are based on the NIOSH document, *Approaches to Safe Nanotechnology*.

Laboratory personnel attend an initial Laboratory Safety Training course, and supervisor-provided laboratory specific training initially and annually. EHS conducts safety audits of all USC laboratories on a regular basis to ensure safe practices.

Engineering controls and work practices are factored into research procedures to minimize CNT exposure and contain emissions. CNT production in USC laboratories usually occurs in sealed enclosures. Subsequent research activities involve no cutting, grinding or other aerosol-producing manipulation. Powdered CNT materials are quickly placed into liquid medium or permanently attached on substrate to minimize aerosolization.

Laboratory personnel who handle CNTs wear personal protective equipment, including safety glasses, lab coat and gloves.

Beginning 2010, individuals identified as working with nanoparticles will be enrolled in USC's Medical Surveillance Program. Program participation includes the offer of a physician consultation and an annual physician-reviewed questionnaire to discover changes in health status.

When released, does your material constitute a hazardous waste under California Health and Safety code provisions? Are discarded off-spec materials a hazardous waste? Once discarded, are the carbon nanotubes you produce a hazardous waste? What are your waste handling practices for carbon nanotubes?

CNT waste is handled and reported as regulated hazardous laboratory waste {CA Waste Code 551} under California Health and Safety Code provisions. Liquid CNT waste is separated from other hazardous waste types at the generation site, and labeled as CNT-aqueous or -organic

waste, depending on the liquid component. Solid/dry CNTs waste is separated from other waste, labeled "CNT waste," and collected by authorized personnel for disposal.

CNT materials are transported to permitted TSDFs by hazardous waste disposal contractors.

Respectfully submitted,

Jane Bartlett, Associate Director of Laboratory Safety and Industrial Hygiene
University of Southern California
1540 Alcazar Street, CHP 148
Los Angeles, California 90033-9005