Nanowaste Scenarios

- Scenario 1: How to respond to a spill of nanoscale materials?
- Scenario 2: How does a RCRA TSDF permit reflect management of nanoscale wastes?

Scenario 1: Big Spill of Little Stuff

- The scene: an overturned truck spills several drums into a ditch at the entrance to the facility.
- Potential materials: nano-aluminum or carbon nanotubes.

Scenario 1: Big Spill of Little Stuff

- Reporting the spill
- Determining what emergency actions to undertake
- Disposing of the wastes from the response action

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Scenario 1: Big Spill of Little Stuff

Emergency Response Information

- Spill containment and response notification to NRC and LEPC
  - Reporting under CERCLA: which “hazardous substance” is it?
  - If it is one, what RQ does it have?
  - Is it reportable under EPCRA or state law?
- MSDS – describes bulk or nanoscale materials?

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RAW SINGLE-WALL CARBON NANOTUBES (SWNT)
Material Safety Data Sheet

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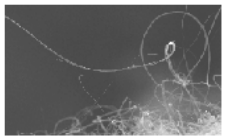
1. Product Composition and Specifications

Raw SWNTs		Characterization method
Production method	CCVD	
Available form	Black powder	
Diameter	0.8-1.2 nm	TEM, Raman
Length	≥ 5 μm	SEM, TEM
Bundles	15-30 nm	SEM, TEM
Nanotubes purity	<70%	TGA, SEM
Metal particles	>30%	TGA
Amorphous carbon (in the predetermined Nanotubes purity)	< 5 %	TGA, Raman
Odor	Odorless	



2. Hazards Identification

Indications of Hazards to Humans and the Environment Irritating to eyes and respiratory system.

Date Created: 23/03/2005 Date Revised: 03/05/2006

Scenario 1: Big Spill of Little Stuff

Handling the spilled materials

- Designating nanoscale materials as "discarded"
- Waste coding
- Spill removal standards

Scenario 1: Big Spill of Little Stuff

Follow-up, if any, for nanomaterial spills

- Notice to exposed workers
- TSCA notifications

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TSCA Reporting

8EHQ-0403-15319

DUPONT

DuPont Haskell Laboratory
for Health and Environmental Sciences
Elkton Road, P.O. Box 50
Newark, DE 19714-0050

April 10, 2003

Via Federal Express

Document Processing Center (Mail Code 7407M)
Room 6428
Attention 8(e) Coordinator
Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency, ICC Building
1201 Constitution Ave., NW
Washington, D.C. 20460

8EHQ-03-15319

Contain NO CBI

Dear 8(e) Coordinator:

Carbon Nanotubes

This letter is to inform you of the results of a recently completed pulmonary bioassay screening study in rats with the above referenced test material.

A pulmonary bioassay screening study was conducted in which the lung toxicity of the test substance, single wall carbon nanotube (CNT) soot was compared with phosphate buffered saline (PBS), quartz particles, carbonyl iron particles and graphite particles. The material instilled was in the form of carbon soot which contained ropes of nanotubes (weight fraction ~30-40%) as

TSCA 8(e) Notice for CNT health Effects, Du Pont, April 10, 2003

Scenario 2: Nano-Permitting

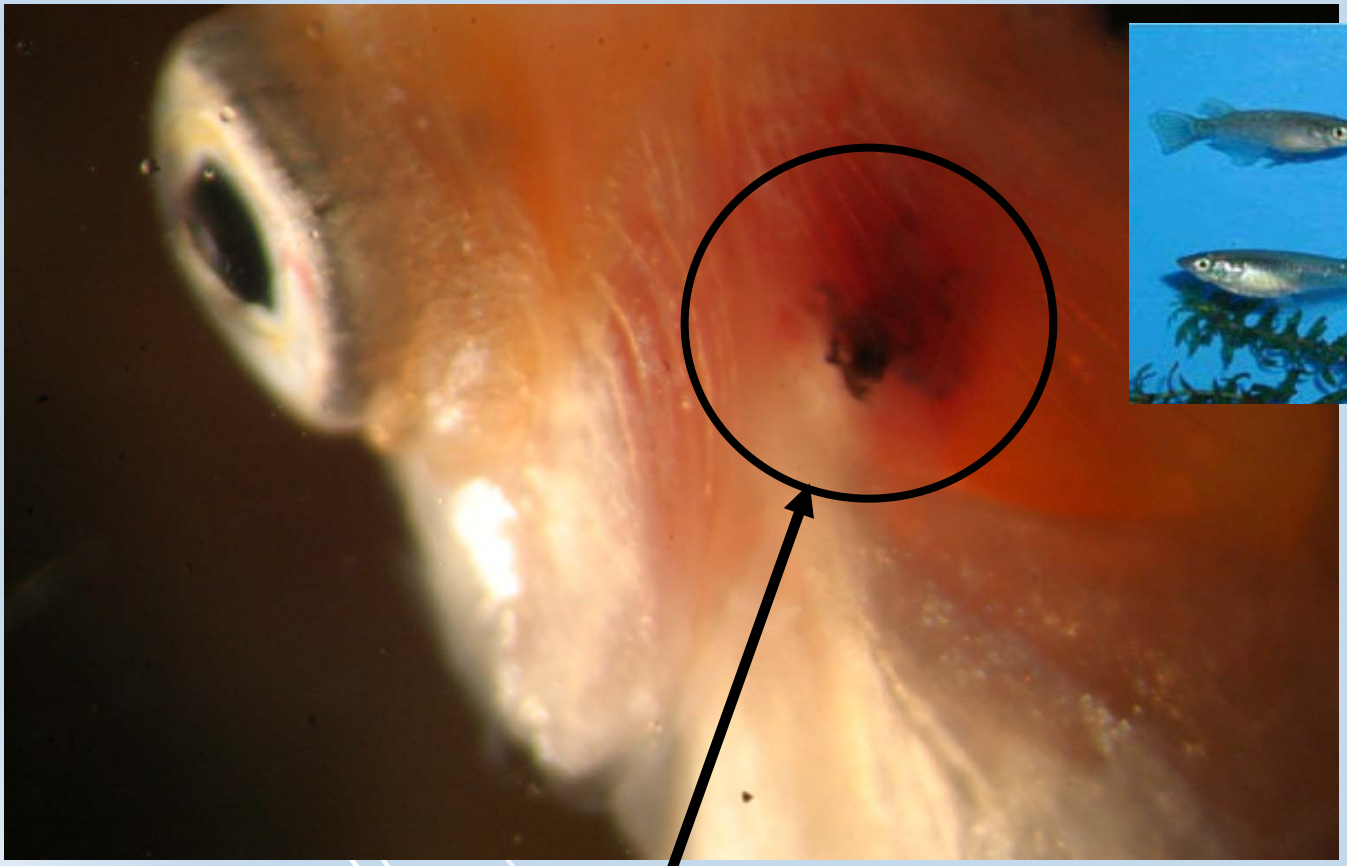
- An existing facility begins to produce a product that incorporates nanoscale silver

- The production process will generate off-specification nanosilver product and solid wastes

Scenario 2: Nano-Permitting

- Wastewater permitting:
  - Aquatic toxicity of nanoscale silver
  - Pending TriTAC petition on nanoscale silver discharges to water

Nanoiron on Medaka Fish Gils



Nanoiron aggregates accumulate on Medaka fish gills-(Richard Winn UGA)

Scenario 2: Nano-Permitting

- Solid wastes containing nanoscale silver
  - Production wastes
    - D011 (silver)
    - Effect of nanoscale on Method 1311
  - Off-specification products – waste?
    - Precious metals recovery and recycling
    - Speculative accumulation
    - Potential RCRA exemptions (in-process reuse, closed-loop recycling, etc)

Scenario 2: Nano-Permitting

- Management of nanoscale wastes in RCRA units
  - 90-day storage tanks and containers
  - Exempt units and wastes – TETFs, WWTUs, ENUs, product tank bottoms
  - Satellite accumulation areas
  - Small quantity generators/CESQGs

Scenario 2: Nano-Permitting

- Hazardous wastes and nanomaterials
  - Corrective action
  - Land ban treatment standards
  - Omnibus permitting authority
  - Imminent hazard abatement authority

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Scenario 2: Nano-Permitting

Public participation and notice for permit issuance and modifications

Berkeley Daily Planet

Bus Lane Plans Provoke Telegraph Neighborhood

Telegraph Avenue neighbors and merchants packed a Planning Commission meeting Wednesday to protest proposals to speed up buses from downtown Berkeley all the way to San Leandro by eliminating some traffic lanes for motorists on Telegraph Avenue and turning the three northernmost blocks of the street into a car-free, bus-only pedestrian mall.

"This would be the end of the world as we know it. Telegraph would look like a Greyhound Station," said Ken Sarachan, owner of Rasputin Music, who along with other leading Telegraph merchants—including the owners of Cody's Books, Moe's Books and Amoeba Music—opposed banishing cars from Telegraph north of Haste Street.

Matthew Artz: Protestors gathered at the entrance to the Lawrence Berkeley Naitonal Laboratory Thursday to protest today's planned groundbreaking for the Molecular Foundry.

Molecular Foundry Foes Protest Groundbreaking

About 30 protesters withstood steady drizzle early Thursday morning, worried that once Lawrence Berkeley National Laboratory (LBNL) completes its newest laboratory complex, far smaller, more dangerous particles could rain down on them. FULL STORY