RCRA and CERCLA in the New World of Nanoscale Materials

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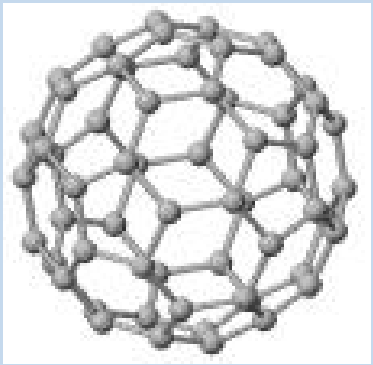

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Small Stuff, Big Challenges

Berkeley Daily Planet

Bus Lane Plans Provoke Telegraph Neighborhood

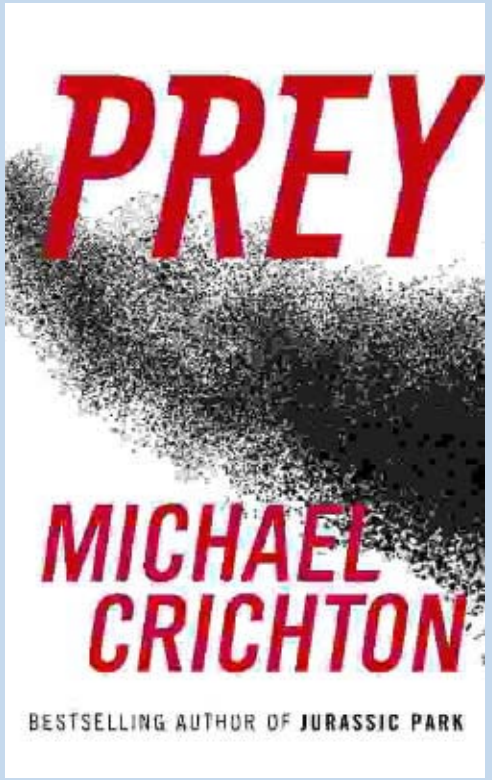
Telegraph Avenue neighbors and merchants packed a Planning Commission meeting Wednesday to protest proposals to speed up buses from downtown Berkeley all the way to San Leandro by eliminating some traffic lanes for motorists on Telegraph Avenue and turning the three northernmost blocks of the street 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



Focusing on the Near-Term

- Nanoscale materials have already arrived in the market
- Their use will grow substantially in the near future
- The expanding nanoscale industry will raise novel environmental legal issues, including liability for waste management and disposal
- Disposal issues only just now surfacing

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Nanoscale Materials

- Nanoscale products currently on market:
  - novel plastics
  - cosmetics
  - sunscreen
  - stain-resistant fabrics
  - scratch-resistant glass
  - cancer treatments
  - catalysts
  - military propellants
  - enhanced antibiotics
  - batteries and fuel cells
- Projected market of nearly $5 billion for carbon nanotubes alone within five years
- Notably, environmental applications could be extremely important

Growing Concerns About Nanotech

- Concerns emerging about unintended effects
  - Environmental fate and transport
  - Toxicological effects
  - Bioaccumulation

- Result: Growing opposition
  - Environmental Defense request
  - Call for moratorium by Etc Group
  - NIMBY opposition to Nanoforge facility
  - Fears of repeating GMO experience

Initial Questions

- Are my employees safe?
- Do I have to notify anyone about possible risks from my nanoscale materials?
- Do I need a permit to make, use or sell nanoscale materials?
- Will I be liable for damage caused by disposal of products containing my nanoscale materials?

Nanoscale Regulation: Recurring Themes

- Classifying materials: size not determining characteristic for regulation
- The larger the amount generated, the greater the risk needing regulation
  - Nanoscale may pose greater risk in smaller amounts
- Focus on specific media (air, water, waste)
  - Nanomaterials will likely pose multimedia challenges

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RCRA and Nanowaste

- General Framework for Waste Management
  - Is it a solid waste?
  - Is it a hazardous waste?
  - Are you a generator, transporter, or operator of a treatment/storage/disposal facility?
  - How can you handle or dispose of nanoscale waste?

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RCRA and Nanowaste

- "Is it a solid waste?"
  - Regulatory definition of "solid waste" is extraordinarily complex, subject to court challenge and undergoing revision
  - Exemptions (e.g., CWA discharge)
  - Likely initial area for nanoscale materials questions: recycling through reuse (e.g., use as fuel)

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RCRA and Nanowaste

- "Is it a hazardous waste?"
  - Characteristic or listed?
  - Characteristic:
    - ICR or Toxicity Characteristic
    - ICR characteristics offer straightforward application
    - Toxicity Characteristic more problematic:
      - 1st question: does it contain a TC constituent?
      - If so, TC assumes improper co-disposal at MSWF affecting groundwater – relevant?
      - Groundwater impact – 100x drinking water standard

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RCRA and Nanowaste

- Listed hazardous waste
  - F Listings
    - Solvent use in manufacturing (F001-F005)
    - Plating operations (F006)
  - K Listings
  - U and P Listings
    - "Acutely toxic"
  - Consequences: Mixture/derived from rule; contained-in principle

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RCRA and Nanowaste

- Exemptions
  - Products/Co-products
  - Wastewater treatment units, TETFs, MPU
  - Household hazardous wastes
  - Energy exploration and production wastes
  - Reuse and recycling
    - Reuse in similar fashion (use as solvent)
    - Reuse constituting disposal (fuel, placement onto land)

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RCRA and Nanowaste

- "Am I a generator, transporter or TSDF operator?"
  - Generator issues for nanowaste
    - Small quantity generator
    - Satellite accumulation
    - 90-day accumulation in tanks or containers
  - TSDF
    - Treatment technologies for nanoscale materials?
    - Nanoscale materials as treatment technology

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RCRA and Nanowaste

- "How can I handle or dispose of nanoscale wastes?"
  - Once hazardous, must meet treatment standards for disposal
  - Land disposal treatment standards
  - BIF/Incinerator requirements
- State standards may vary from federal RCRA requirements

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RCRA and Nanowaste

- Tools in the regulatory chest
  - Section 7003 imminent and substantial endangerment authority
    - "any solid waste or hazardous waste"
    - "an imminent and substantial endangerment to health or the environment"
    - "contributed or contributing to"
  - Omnibus authority (40 C.F.R. 270.32(b)(2))
    - "Each permit…shall contain terms and conditions as the Administrator or State director determines necessary to protect human health and the environment"

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CERCLA and Nanowaste

- Much newer area of concern, and legal issues largely untested
- Corollary to Life Cycle Analysis efforts
- Tort liability analysis

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CERCLA and Nanowaste

- Framework for analysis:
  - "Release"
  - "Hazardous substance"
  - "Response Costs"
  - "Consistent with National Contingency Plan"
  - "Potentially responsible person"
    - Owner/Operator
    - Past Owner/Operator
    - Transporter
    - Arranger for treatment or disposal

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CERCLA and Nanowaste

- Was there a "release"?
  - Federally permitted release exemption
- Did the release cause the incurral of response costs?
  - No threshold determinations
- Was the harm indivisible, and therefore joint and several?
- “Pollutant” vs. “Hazardous Substance”

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CERCLA and Nanowaste

- Release reporting – RQ?
- Nanomaterials and environmental remediation
  - Nanoscale iron for groundwater remediation
  - Filtering technology
  - Difficulties in establishing test projects on state level

Thoughts for the Future

- Not all nanoscale materials are the same
- International and state laws will also play a major role
- Expect the unexpected: nanotech will likely be disruptive