

National Cancer Advisory Board

The Impact of Occupational and Environmental Epidemiology on Public Policy: Introduction

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**Division of Cancer Epidemiology and Genetics
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President's Cancer Panel

Series on Environmental Factors in Cancer



DCEG Speakers: Jay Lubin, Mary Ward, Kenneth Cantor, Martha Linet, Laura Beane Freeman, Michael Alavanja

Methodological Challenges in Occupational and Environmental Studies

- **Exposure assessment**
 - Often retrospective with indirect measures
 - Low levels of exposure and risk may be difficult to detect
 - Need for biomarkers of exposure, early effects
- **Interactions**
 - Genetic, epigenetic, lifestyle
 - Metabolic, immunologic
- **Risk assessment and regulatory implications**

Why Study Occupational Cancer?

- Exposures usually greater, more frequent, and longer duration than general population
- Has uncovered many of the established or probable human carcinogens (IARC: group 1 - 54%; group 2A - 61%)
- Opportunities for primary prevention
- Opportunities to discover mechanisms through integration of epidemiology, toxicology, and genetics
- Sentinel for risks in general population

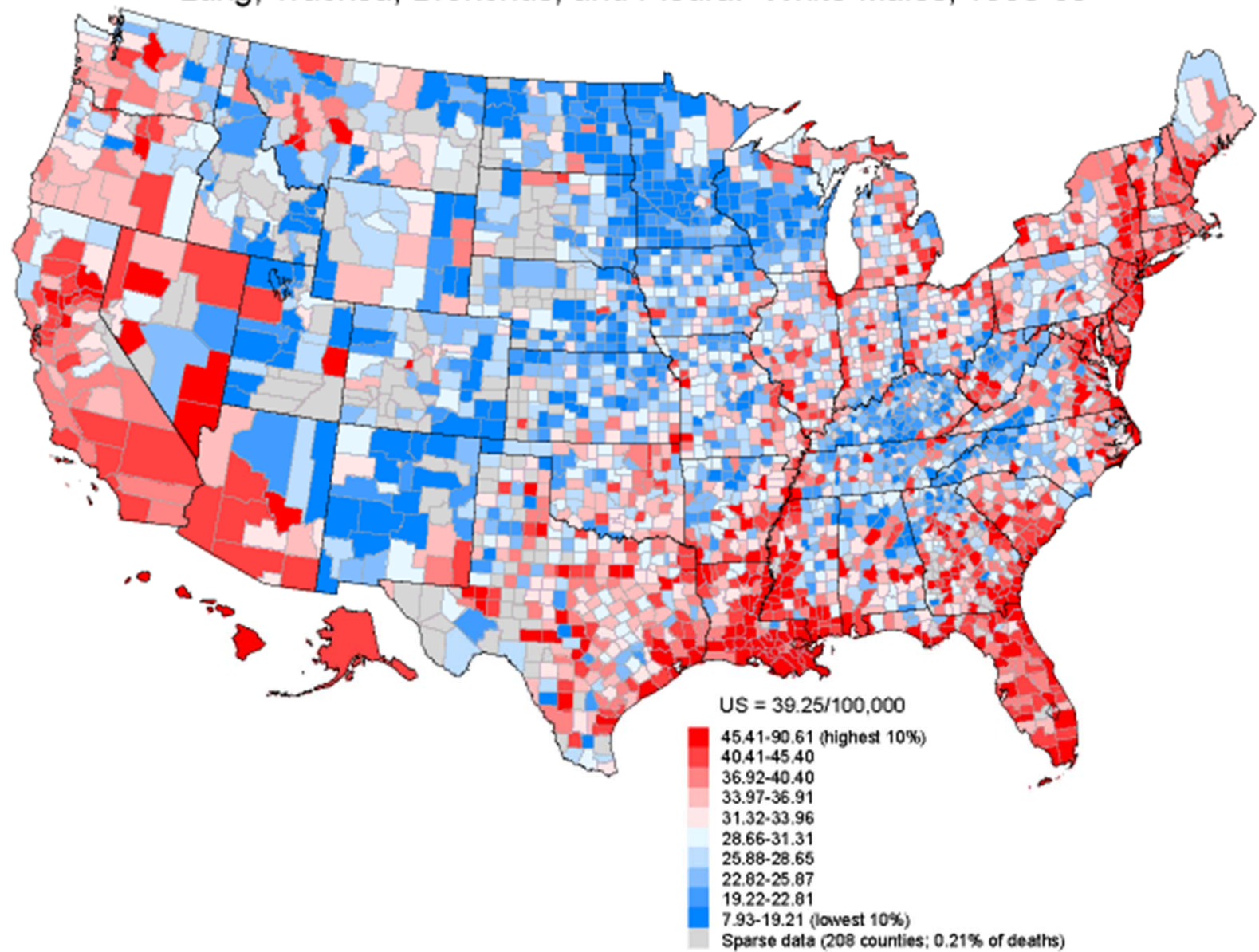


Arsenical Emissions from Copper Smelter (Montana)

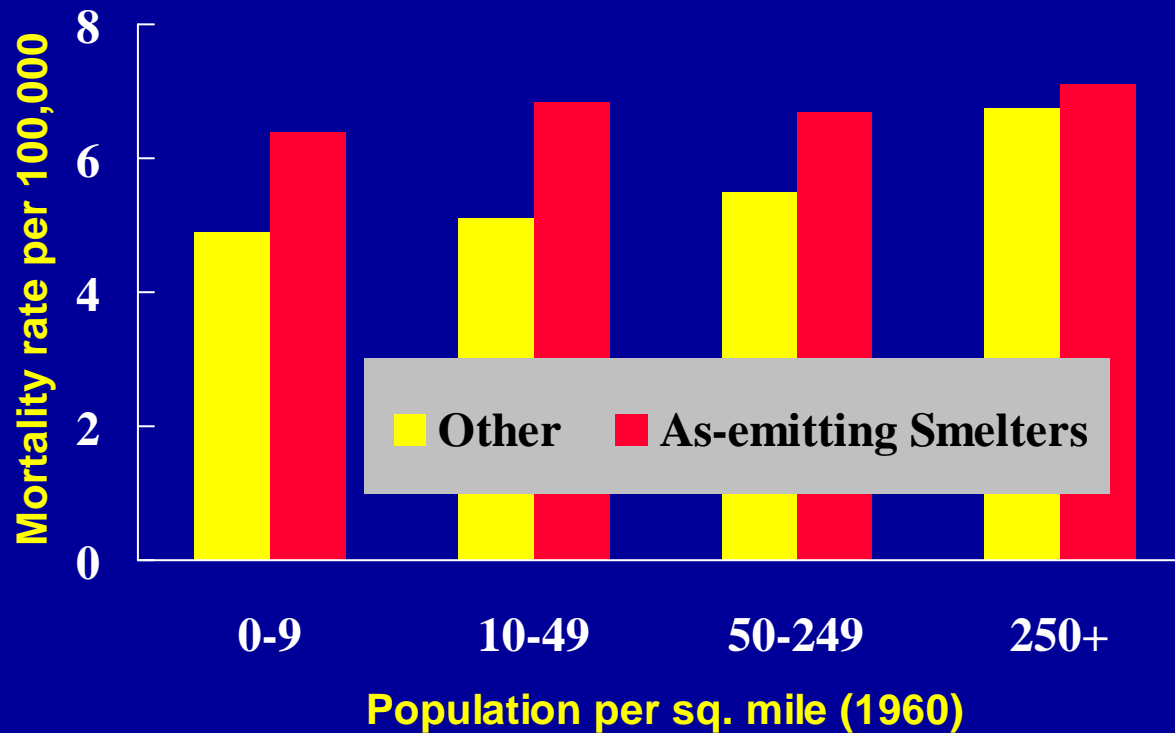


Lee and Fraumeni. JNCI 1969; 42: 1045-1052

Cancer Mortality Rates by County (Age-adjusted 1970 US Population)
Lung, Trachea, Bronchus, and Pleura: White Males, 1950-69

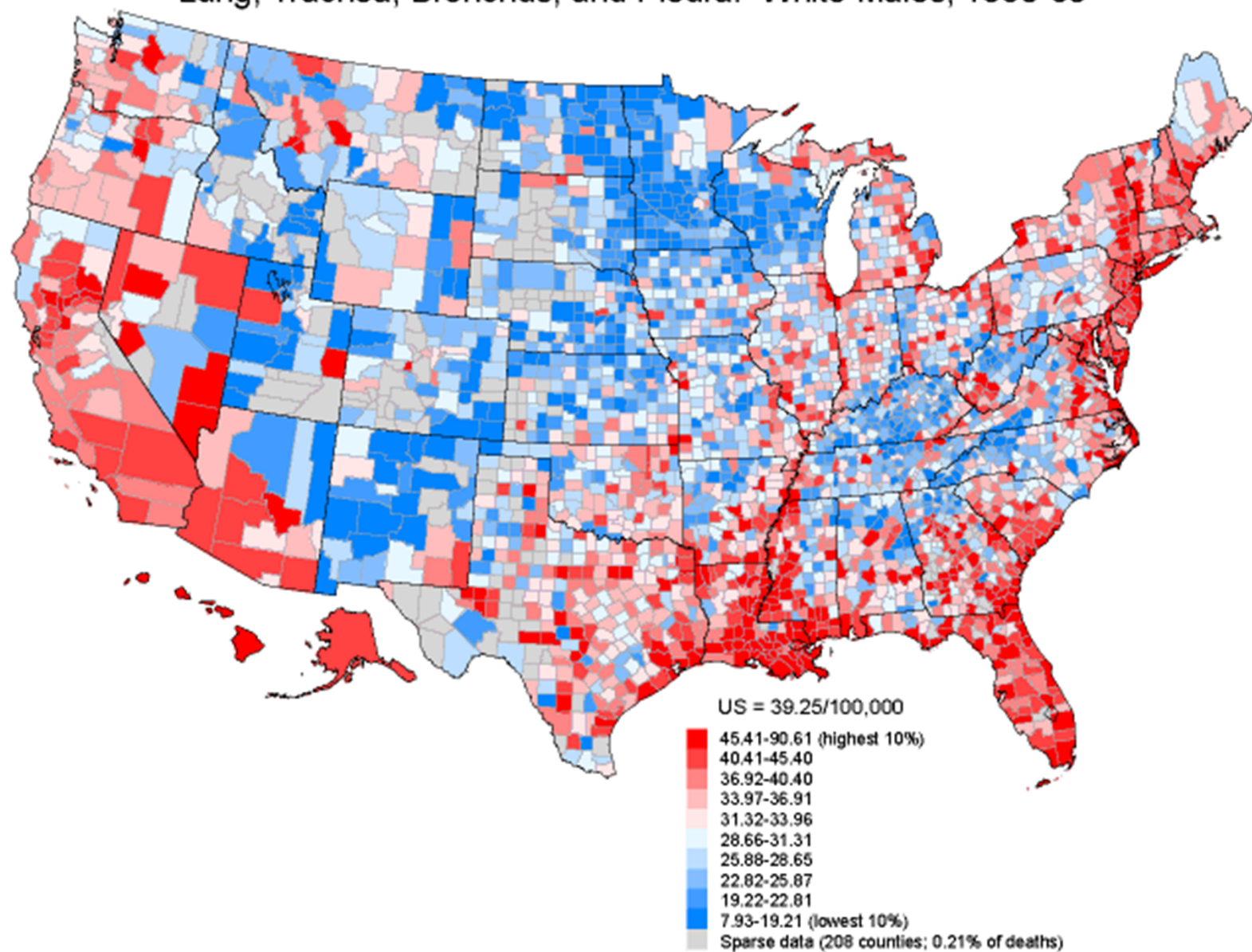


Elevated Mortality from Lung Cancer among Women in U.S. Counties with Arsenic-emitting Smelters



Blot and Fraumeni. Lancet 1975; 2: 429-431

Cancer Mortality Rates by County (Age-adjusted 1970 US Population)
Lung, Trachea, Bronchus, and Pleura: White Males, 1950-69



Shipbuilding in 1943
Working under a cloud of asbestos



NCI Studies of Occupational Exposures

- Benzene
- Formaldehyde
- Diesel exhausts
- Pesticides (Agricultural Health Study)
- Radiological technologists

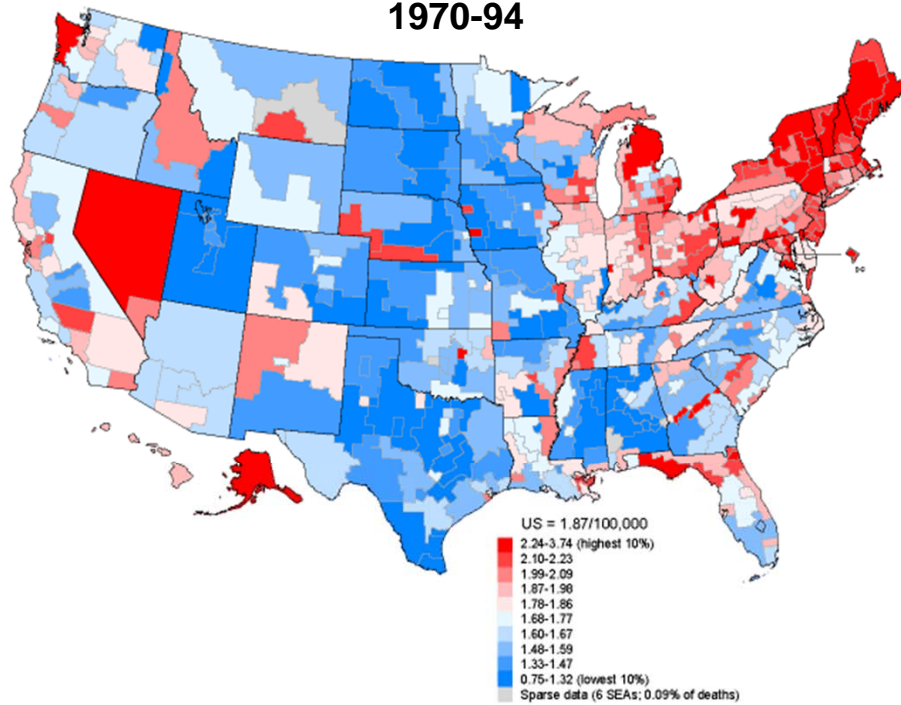
NCI Studies of Environmental Exposures

- **Indoor air pollution**
 - Coal combustion products
 - Environmental tobacco smoke
 - Radon
- **Radiation (UV, EMF, ionizing including medical)**
- **Water pollution**
 - Disinfection byproducts
 - Nitrates
 - Pesticides
 - Bisphenol A
 - Arsenic

Does arsenic in drinking water explain the New England bladder cancer excess?

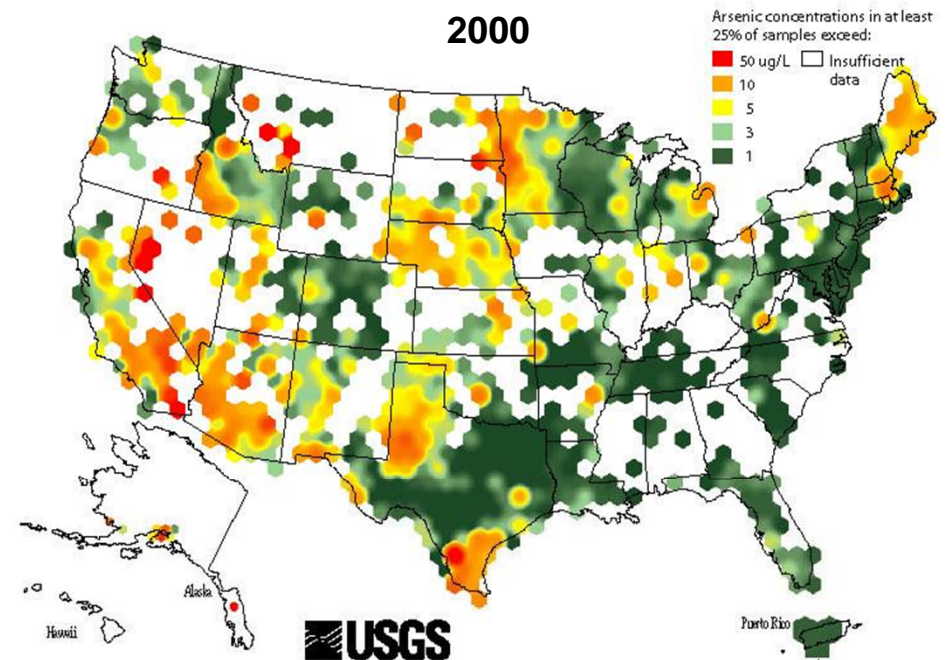
Bladder Cancer Mortality, White Women

1970-94



Arsenic in Groundwater

2000



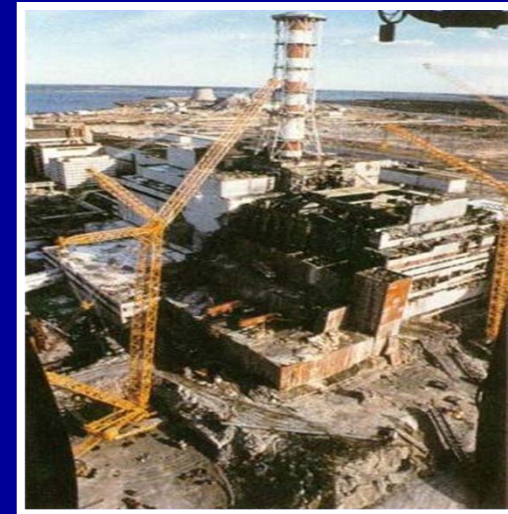
Preparing for Radiation Disasters

- Develop rapid response dosimetry
- Monitor for late effects
- Train dosimetry experts, teach radiation epidemiology

Nuclear bomb



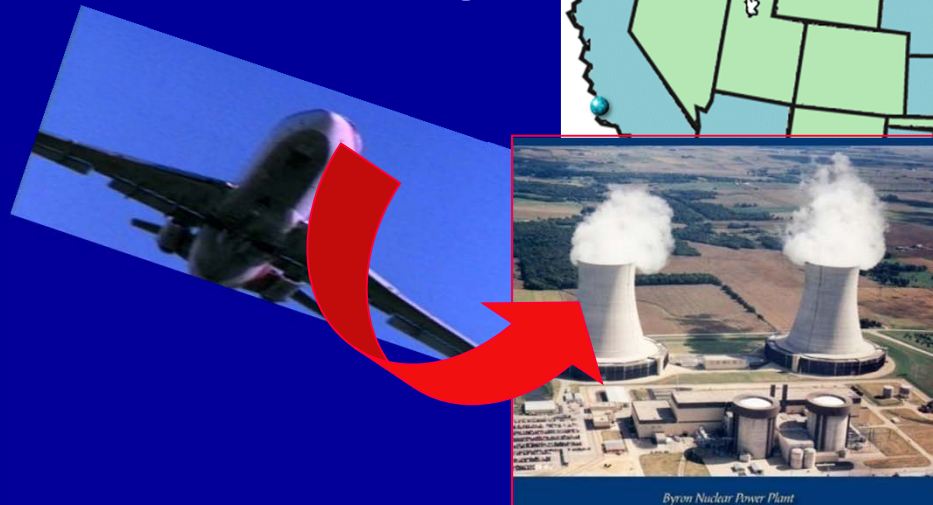
Chernobyl reactor



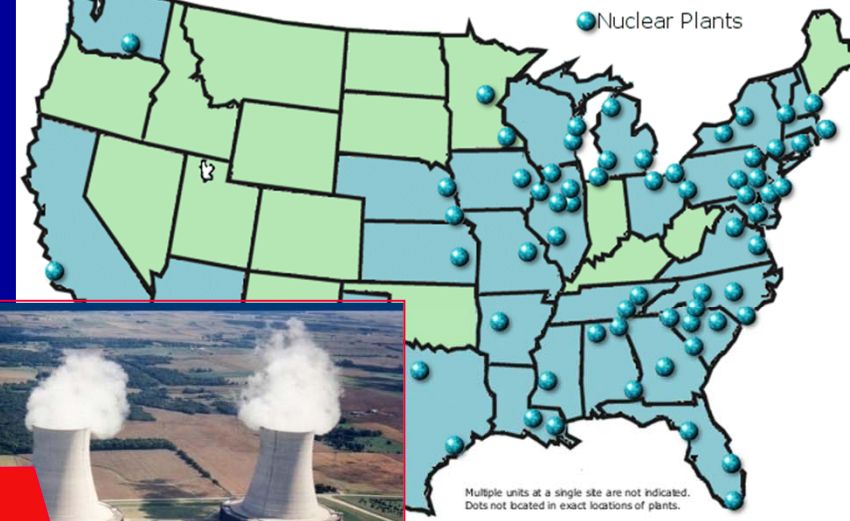
Dirty bomb



Targeted attack on nuclear facility



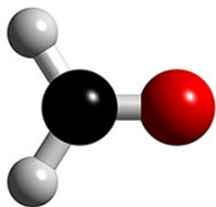
Currently Operating U.S. Nuclear Plants



Occupational Benzene Exposure in China



Formaldehyde

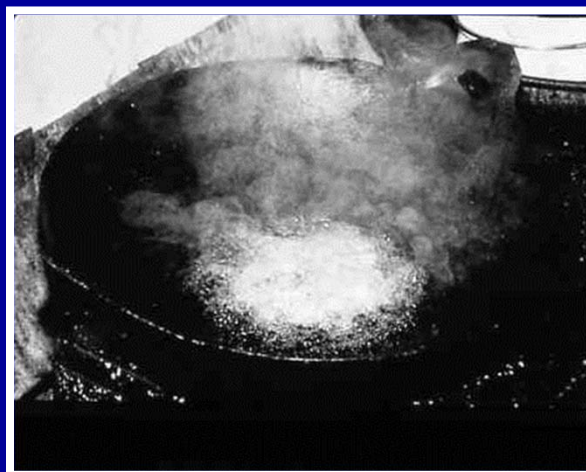


- Effect of low-level population exposures?
- Cohort study of manufacturers/users of formaldehyde
- Cohort study of embalmers
- Biomarker study in China



FEMA Trailer

Indoor Air Pollution China



Some Questions for NCAB

In occupational and environmental epidemiology, what should be the role of NCI in:

- **Responding to Congressional and other mandates, and in tackling controversial issues?**
- **Launching international studies that provide unique opportunities for research (natural experiments)?**
- **The risk assessment process vis-à-vis other federal agencies?**