The Coming Wave of Benzene Litigation

Andrew Schirrmeister
Bob Flora

National Association of Railroad Trial Counsel
Special Litigation Conference XVIII
February 7-8, 2008
Lake Tahoe, California
The Coming Wave of Benzene Litigation

Aggressive Benzene Advertising

Benzene AML Leukemia Lawsuits
Lawyers Handling Claims Nationwide

Benzene is a dangerous environmental toxin used in the manufacture of plastics, detergents, pesticides and other chemicals. Exposure to benzene has been linked to cancer.

To Talk Directly To A Qualified Attorney
Please Call Our

Benzene Hotline
1-800-722-0765

THE BENZENE TEAM™
Benzene-Leukemia.com
Know Your Rights!

The BENZENE Law.com
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Railroads Are Being Targeted

- Attorney advertisements directed at the railroad industry
- “If you are a railroad worker who has suffered the effects of benzene through solvent or other exposure, you may be entitled to compensation”
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Railroads Are Being Targeted

- Attorney advertisements directed at the railroad industry
- “Certain industry workers, especially railroad workers, may be exposed to high levels of benzene and benzene-containing products”
Benzene and Hydrocarbons: The Basics
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Benzene and Hydrocarbons: The Basics

- ~2-3 billion gallons of isolated or pure benzene is produced yearly in the United States: this pure benzene is consumed as a chemical feedstock for the production of
  - cumene,
  - cyclohexane,
  - ethylbenzene,
  - nitrobenzenes, and
  - other chemical intermediates.
- Modern Product Uses: Benzene has not been used as an industrial solvent for decades, and it is not used as an ingredient in consumer products
  - Minor constituent in some petroleum fuels
  - Unleaded automobile gasoline generally has a benzene content of about 1%
  - Heavier fuels such as jet fuel, kerosene, and diesel fuel have much less benzene content, generally less than 0.02%
- Since the “benzene rule” has been applied, consumer product raw materials are limited to less than 0.01% benzene: even this “trace” amount of benzene is unlikely to be present

Benzene and Hydrocarbons: The Basics

- Benzene is ubiquitous in urban areas
- Benzene relationship to other aromatic hydrocarbons
- Processes used to make benzene are shown below:

<table>
<thead>
<tr>
<th>Industry</th>
<th>Process</th>
<th>Inputs</th>
<th>Percentage of U.S. benzene production (ATSDR, 2005)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum</td>
<td>Catalytic reforming</td>
<td>Straight-run gasoline ($C_9-C_{11}$) or cycloparaffins (e.g., cyclohexane)</td>
<td>45%</td>
</tr>
<tr>
<td>Petroleum</td>
<td>Catalytic dealkylation</td>
<td>Toluene or toluene/xylene mixture</td>
<td>30%</td>
</tr>
<tr>
<td>Petroleum</td>
<td>Steam cracking / distillation</td>
<td>Pyrolysis gasoline (unsaturated aliphatic hydrocarbons produced by steam cracking of gas oil or heavy naphtha)</td>
<td>23%</td>
</tr>
<tr>
<td>Steel</td>
<td>Destructive distillation</td>
<td>Coal</td>
<td>&lt; 2%</td>
</tr>
</tbody>
</table>

From: [www.epa.gov/airs/trade/toxic.html](http://www.epa.gov/airs/trade/toxic.html) (accessed 7/1/03)

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Benzene is Found Everywhere

- Solvents
- Industrial emissions
- Automotive exhaust
- Gasoline
- Household cleaners
- Drinking water
- Food
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Region 9 Human Exposure

- EPA Region 9 – 1996 Estimated County Median Exposure Concentration of Benzene

Source: US EPA/QAQPS
NATA National-Scale Air Toxics Assessment
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Railroad Benzene Exposure
Railroad Worker Potential Exposure

- Transportation of benzene and aromatic hydrocarbon solvents
  - Vapors from leaks and leaking valves
  - Loading/unloading
- Use of solvents and degreasers, including benzene
- Painting
- Vapors from gasoline, diesel, and other fuels
- Accidents and spills
- Vapors emanating from past spills in the yard
- Vapors permeating the yard
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Others With Potential Exposure

❖ Workers in Plants and Refineries
  ▪ Exposure from rail cars being transported to the plant
  ▪ Loading/unloading

❖ Residents Living Adjacent to Yards
  ▪ Vapors migrating into homes
  ▪ Ground contamination migration

❖ Residents Affected by Accidents and Spills
  ▪ Train accident spilling benzene
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The Diseases
The Diseases

- Acute Myelogenous Leukemia
- Chronic Myelogenous Leukemia
- Acute Lymphocytic Leukemia
- Chronic Lymphocytic Leukemia
- Non-Hodgkin’s Lymphoma
- Multiple Myeloma
- Aplastic Anemia
- Myelodysplastic Syndromes
- Other leukemias, other blood diseases, other cancers
## Disease Comparison

<table>
<thead>
<tr>
<th></th>
<th>AML</th>
<th>NHL</th>
<th>MM</th>
<th>CLL</th>
<th>ALL</th>
<th>CML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated new cases 2007</td>
<td>13,410</td>
<td>63,190</td>
<td>19,900</td>
<td>15,340</td>
<td>5,200</td>
<td>4,570</td>
</tr>
<tr>
<td>Estimated deaths 2007</td>
<td>8,990</td>
<td>18,660</td>
<td>10,790</td>
<td>4,500</td>
<td>1,420</td>
<td>490</td>
</tr>
<tr>
<td>Age-adjusted incidence rate</td>
<td>3.6 per 100,000</td>
<td>19.3 per 100,000</td>
<td>5.6 per 100,000</td>
<td>3.9 per 100,000</td>
<td>1.6 per 100,000</td>
<td>1.5 per 100,000</td>
</tr>
<tr>
<td>Age-adjusted death rate</td>
<td>2.7 per 100,000</td>
<td>7.6 per 100,000</td>
<td>3.7 per 100,000</td>
<td>1.5 per 100,000</td>
<td>0.5 per 100,000</td>
<td>0.5 per 100,000</td>
</tr>
<tr>
<td>Five-year survival rate</td>
<td>21.2%</td>
<td>63.4%</td>
<td>33.7%</td>
<td>74.2%</td>
<td>64.0%</td>
<td>47.5%</td>
</tr>
<tr>
<td>Lifetime risk</td>
<td>0.37% (1 in 272)</td>
<td>2.02% (1 in 50)</td>
<td>0.61% (1 in 165)</td>
<td>0.45% (1 in 221)</td>
<td>0.12% (1 in 838)</td>
<td>0.15% (1 in 668)</td>
</tr>
</tbody>
</table>

Source: National Cancer Institute

SEER Cancer Statistics
## Leukemia/Lymphoma Comparison

<table>
<thead>
<tr>
<th></th>
<th>All Leukemia</th>
<th>All Lymphoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated new cases 2007</td>
<td>44,240</td>
<td>71,380</td>
</tr>
<tr>
<td>Estimated deaths 2007</td>
<td>21,790</td>
<td>19,730</td>
</tr>
<tr>
<td>Age-adjusted incidence rate</td>
<td>12.3 per 100,000</td>
<td>22.0 per 100,000</td>
</tr>
<tr>
<td>Age-adjusted death rate</td>
<td>7.5 per 100,000</td>
<td>8.1 per 100,000</td>
</tr>
<tr>
<td>Five-year survival rate</td>
<td>49.6%</td>
<td>66.8%</td>
</tr>
<tr>
<td>Lifetime risk</td>
<td>1.26% (1 in 79)</td>
<td>2.24% (1 in 45)</td>
</tr>
</tbody>
</table>

Source: National Cancer Institute
SEER Cancer Statistics
Proliferation of Benzene Lawsuits
Driving Forces Behind Benzene Cases

- The asbestos well is drying up
  - Bankruptcies
  - Tort Reform
- Early knowledge of benzene toxicity
- Blood diseases are abundant
- Endless number of potential defendants
- Endless number of potential products
- Well developed body of plaintiffs’ experts and literature
- Significant economic damages
- Past lucrative verdicts and settlements
Benzene Cases Increasing

- Tort reform is limiting asbestos cases
  - Most benzene lawyers are former asbestos lawyers
- Attempts to fit benzene into asbestos model
  - Generic product identification
  - Shallow expert testimony
  - Expensive discovery
  - Settlement
- Broad range of disease
  - All leukemias, non-Hodgkin’s Lymphoma, Multiple Myeloma
  - Other diseases such as MDS and aplastic anemia
- Broad range of potential products and defendants
  - Aromatic hydrocarbon solvents in widespread usage
Any Exposure Can Cause Disease
No Safe Level Theory

- Based on Theory That Any Benzene Causes Cancer
  - No safe level
  - One molecule theory

- Hydrocarbon solvents allegedly contaminated with trace benzene
  - Refining technology cannot ensure 100% benzene free solvents
  - Federal government permits up to 0.1% benzene

- Potentially Unlimited Number of Products
  - Any product that has a hydrocarbon solvent
No Safe Level

❖ Peter Infante, Dr.P.H., D.D.S.
  - George Washington University
  - 25 years with OSHA, 3 years with NIOSH
  - Author of Pliofilm studies, on which OSHA Benzene Standard was based

❖ No safe level
  - Q Every level above zero contributes to the development of AML?
  - A Yes.
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No Safe Level

Myron Mehlman, Ph.D.
- Former Head of Toxicology at Mobil
- Adjunct Professor of Environmental and Community Medicine at UMDNJ-Robert Wood Johnson Medical School
- Adjunct Professor of Medicine at the Mt. Sinai School of Medicine in New York
- Adjunct Professor of Environmental Toxicology – PCMH at University of Texas Medical Branch in Galveston

No Safe Level
- Q. And you believe there’s no safe level of exposure to benzene?
  A. Yes.
Martyn Smith, PhD
- University of California at Berkeley
  - Professor of Toxicology
  - Deputy Head, Division of Environmental Science

No Safe Level
- Q. With regard to exposure of one part benzene in the air for 12 hours, can it cause AML?
  A. It’s likely to be a significant contributor to the AML.
- A. We see hematological changes in people at less than one part per million
- Q. And not all doses can cause an injury?
  A. That assumes there is a safe dose. For benzene I’ve stated I don’t think there is a safe dose.
  Q. Under any circumstances?
  A. Under any circumstances.
Bernie Goldstein, M.D.
- University of Pittsburgh School of Public Health
- Board certified in hematology, toxicology, internal medicine

One molecule theory
- Q: At what level of benzene exposure do you believe increases one's risk of acquiring AML?
- A: Again, I mean, if it's just a question of is there any risk at 1 molecule, you know, you could argue that theoretically there's a risk of 1 molecule.
Trends in Benzene Epidemiology
Lower Doses
Current Trends in Epidemiology

Current Trends Toward Low Dose Toxicity

- Benzene toxicity well recognized at high doses
- Trend in science has shown toxicity at lower levels
  - Exposure limits have been lowered over time
  - Supported by studies showing lower levels of toxicity
  - ACGIH proposes even lower exposure limits
- Recent studies show toxicity at doses lower than anticipated
  - Australian Health Watch
  - Chinese studies
Current Trends in Epidemiology

Dose is the Cornerstone of Causation

- PPM-years is the metric used by courts
  - Instantaneous measurement is ppm
  - Average over working day is 8 hour TWA
    - E.g., 1 ppm for 8 hours = 1.0 ppm TWA
  - Average of 8 hour TWA over year is ppm-years
    - E.g., 1 ppm TWA x 250 days = 1 ppm-year

- Cumulative exposure is total of all years over lifetime
  - E.g., 1 ppm-years for 5 years = 5 ppm-years
Current Trends in Epidemiology

Australian Health Watch


- Leukemia risk increase at 2 ppm-years and with exposure levels of 0.8 ppm
- With greater than 8 ppm-years, OR = 11.3
- Risk of leukemia not associated with start date or duration of employment
- Limited evidence short-term high exposures more risk than same exposure over longer duration
- No association between benzene and NHL/MM
- No association between tobacco or alcohol and any lymphohematopoietic cancers

Background: Men who were part of an Australian petroleum industry cohort had previously been found to have an excess of lymphohematopoietic cancer. Occupational benzene exposure is a possible cause of this excess.

Purpose: The cross-sectional study of workers employed in the petroleum industry in the 1960s and 1970s was conducted. Leukemia risk associated with low-level benzene exposure was calculated.

Methods: The study included 9,671 workers. Leukemia risk increase at 2 ppm-years and with exposure levels of 0.8 ppm. With greater than 8 ppm-years, OR = 11.3. Risk of leukemia not associated with start date or duration of employment. Limited evidence short-term high exposures more risk than same exposure over longer duration. No association between benzene and NHL/MM. No association between tobacco or alcohol and any lymphohematopoietic cancers.

Leukemia Risk Associated With Low-Level Benzene Exposure

Deborah C. Glass, Christopher N. Gray, Jamal J. Alnajmi, Malcolm R. Sim, Lin Firth, Geoffrey G. Adams, John A. Boyle, and Richard Mantel

Benzene is present in crude oil, at most stages of petroleum production and distribution, and in a component of gasoline fuel. Occupational exposure is considered to be a significant risk factor for hematopoietic malignancies.

Benzene is classified as a group 1 human carcinogen by the International Agency for Research on Cancer (IARC). The cancer risk associated with benzene exposure is thought to increase with duration of exposure.

In addition, there is evidence that exposure to benzene is associated with an increased risk of leukemia.
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Current Trends in Epidemiology

Chinese Studies

  - Study of toxic effect on the bone marrow
  - "hematotoxicity from exposure to benzene occurred at air levels of 1 ppm or less and may be particularly evident among genetically susceptible subpopulations"
  - White blood cells and platelets significantly lower for exposure below 1 ppm
  - Progenitor cell colony formation significantly declined with increasing benzene exposure
Current Trends in Epidemiology

**Multiple Myeloma & Non-Hodgkin’s Lymphoma**

- Scientific literature taken as a whole shows no association
- Several studies, although a minority, show statistically significant risk
  - Lamm, et al, Non-Hodgkin lymphoma and benzene exposure: A systematic literature review (2005) - 2 studies out of 18 show statistically significant risk
- Health Watch originally reported risk for MM, later changed upon update
- Plaintiffs’ bar argues that insufficient work has been done and that future studies will show an association
Current Trends in Epidemiology

Conclusion

- Although the literature does not yet support an association between benzene and AML at low cumulative doses, there is sufficient debate such that most judges will submit the issue to a jury.

- Although the literature does not support an association between benzene and MM or NHL, there are a few positive studies such that most judges will submit the issue to a jury.
Seeding the Literature
Plaintiffs Experts Articles

- Experts for Plaintiffs are writing peer-reviewed articles
  - Articles are advocacy pieces designed to support litigation efforts
  - Articles are not based on sound science or solid factual basis
- Peer-review process is controlled by plaintiffs experts
- Editorial board consists of plaintiffs experts or those sympathetic toward plaintiffs
- Peer-reviewed articles lends credibility to poor science
  - Important in defending admissibility challenge (e.g. Daubert challenge)
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2004 Myron Mehlman – Expert for the Plaintiff Bar

- Former Head of Toxicology at Mobil
- “There is no debate that benzene causes all haematopoietic and lymphoreticular cancers including aplastic anemia, multiple myeloma, and all types of leukaemias and lymphomas. We now have sufficient evidence that benzene causes cancer in a variety of organs including kidney, stomach, colon and other organs. Recent data demonstrate that humans develop significant increases in cancer at levels of 16 ppb or lower. Thus we can conclude, with a great degree of scientific certainty, that there is no safe level for benzene above zero.”
- Recommends exposure limit of 0.004 to 0.1 ppm
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Plaintiffs Literature

2006 Melvyn Kopstein – Expert for the Plaintiff Bar

- Amount of benzene in commonly used solvents has remained unchanged since 1955
- Provides benzene content of petrochemicals, most range from 0.1% to 7%
- Peer-reviewed article provides basis for greatly exaggerated exposure assessments in benzene litigation
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2006 Peter Infante – Expert for the Plaintiff Bar

- Claims industry suppressed evidence of benzene toxicity and influenced studies to misrepresent results
  - Levels in OSHA standards are unsafe
  - Industry conspiracy
  - Pre-emptive strike against ongoing Chinese studies
- Editorial board includes Infante and several other prominent plaintiff experts

The Past Suppression of Industry Knowledge of the Toxicity of Benzene to Humans and Potential Bias in Future Benzene Research

PETER F. INFANTE, DDS, DMRH

Parochial interests of industry representatives often withheld information and maintained positive evidence of toxicity from the public. Even from their own research, the industry suppressed evidence of benzene toxicity and influenced studies to misrepresent results. They argued that levels in OSHA standards are unsafe and that industry conspiracy is at play. The industry financial gains derived from the OSHA standards would impact their bottom line and industry profits. Consequently, the industry engaged in a preemptive strike against ongoing Chinese studies.

The editorial board includes Infante and several other prominent plaintiff experts.
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2007 Martyn Smith – Expert for the Plaintiff Bar

- Benzene Exposure and Risk of Non-Hodgkin Lymphoma; Cancer Epidemiology, Biomarkers & Prevention, 16: 385-91
- A review of literature supports association between occupational benzene exposure and non-Hodgkin’s Lymphoma
- Published as part of “Focus: Update on Lymphoma”
- Martyn Smith is on the Editorial Board
- Peer-reviewed article provides basis for opinions that non-Hodgkin’s Lymphoma is caused by benzene, even though an association is not generally accepted
LET’S SKI!!