PIPLINES AND PUBLIC HEALTH: LESSONS FROM THE DEEPWATER HORIZON AND UNCONVENTIONAL SHALE GAS

Bernard D. Goldstein, MD
University of Pittsburgh
Overview of presentation

• Benzene is a common concern after pipeline releases of petroleum related liquids or gases
• Safety is no incident
• Public health is not just the absence of disease
• The social amplification of risk
Benzene

- Allowable workplace standard of 1ppm (8 hr time weighted average). Personal protective equipment required for higher level short term exposures
- Mutation of stem cells of human bone marrow leading to an increased risk of various hematological cancers including leukemias and lymphomas. No apparent threshold
- Anesthetic-like central nervous system effects at levels of perhaps 100ppm or more.
Definition of Health

“Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”

– World Health Organization
Gov. Robert Bentley of Alabama, who repeatedly praised Colonial’s response after he visited a command center on Monday, expressed concern about the spill and its effects, but he also acknowledged the frailty of pipelines like the one that leaked in his state.

“We don’t know that it won’t happen again,” Mr. Bentley said. “That’s like saying is there a tornado going to happen again.”

*The New York Times*: Gas Prices Surge in South after Pipeline Leak

*SEPT. 19, 2016*
Five Elements of a Complete Exposure Pathway

• Sources of contaminants,
• Environmental media,
• Points of exposure,
• Routes of exposure,
• Receptor population
<table>
<thead>
<tr>
<th>State</th>
<th>Poor or fair health</th>
<th>Low birthweight</th>
<th>Adult smoking</th>
<th>Adult obesity</th>
<th>Uninsured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>47</td>
<td>48</td>
<td>43</td>
<td>49</td>
<td>29</td>
</tr>
<tr>
<td>Florida</td>
<td>31</td>
<td>36</td>
<td>27</td>
<td>18</td>
<td>49</td>
</tr>
<tr>
<td>Louisiana</td>
<td>46</td>
<td>49</td>
<td>40</td>
<td>49</td>
<td>41</td>
</tr>
<tr>
<td>Mississippi</td>
<td>50</td>
<td>50</td>
<td>47</td>
<td>50</td>
<td>44</td>
</tr>
</tbody>
</table>

Gulf State Health Indicator Rankings
Bay County, FL

The following Summary Comparison Report provides an “at a glance” summary of how the selected county compares with peer counties on the full set of Primary Indicators. Peer county values for each indicator were ranked and then divided into quartiles.

**Better**
- (most favorable quartile)
  - Stroke deaths

**Moderate**
- (middle two quartiles)
  - Alzheimer’s disease deaths
  - Chronic kidney disease deaths

**Worse**
- (least favorable quartile)
  - Cancer deaths
  - Chronic lower respiratory disease (CLRD) deaths
  - Coronary heart disease deaths
  - Diabetes deaths
  - Female life expectancy
  - Male life expectancy
  - Motor vehicle deaths
  - Unintentional injury (including motor vehicle)
• The literature is inadequate to respond to the many questions asked by clinicians and the public about this spill or the risk of future spills.

• Potential health consequences of oil spills fall into four categories:
  – worker safety;
  – toxicologic effects in workers, visitors, and community members;
  – mental health effects from social and economic disruption;
  – ecosystem effects that have consequences for human health.
IOM Report: Assessing the Human Health Effects of the Gulf Oil Spill
Margaret McCoy and Judith Salerno

• Take home points
  – **The Deepwater Horizon represents a failure of safety culture**
  – **Exposure assessment is central to linking chemical toxicity and effect**
  – **Psychosocial impacts may predominate**
  – **Lack of trust or transparency has psychosocial impacts**
  – Risk communication must be tailored to community understanding
  – **Seafood safety is a central short term and long term issue**
Assessing the Human Health Effects of the Gulf Oil Spill
Margaret McCoy and Judith Salerno

“In addition to the physical stressors, the Deepwater Horizon oil disaster has disrupted delicate social, economic, and psychological balances in communities across the Gulf region. Local fishermen and women . . . are grappling with possibly permanent disruptions to their long-standing livelihoods. Communities question the safety of their most vulnerable populations and worry about the effects that the Gulf oil disaster will have on their immediate and long-term health. The resulting uncertainty about physical, social, and economic health has profound implications for the psychological well-being of individuals in affected communities.”

(emphasis added)
2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous:

<table>
<thead>
<tr>
<th>Hazardous Substance(s)</th>
<th>(w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distillates, petroleum, hydrotreated light</td>
<td>10.0 - 30.0%</td>
</tr>
<tr>
<td>Propylene Glycol</td>
<td>1.0 - 5.0%</td>
</tr>
<tr>
<td>Organic sulfonic acid salt (Proprietary)</td>
<td>10.0 - 30.0%</td>
</tr>
</tbody>
</table>
Congressional Testimony of Michael L. Krancer, Secretary of the Department of Environmental Protection, Commonwealth of Pennsylvania

“There has been a misconception that the hydraulic fracturing of wells can or has caused contamination of water wells. This is false.

...hydraulic fracturing is only a temporary feature of natural gas development, which only lasts a few weeks.

“Hydraulic fracturing of wells is not new in Pennsylvania, it has been going on here since about the 1950s and has been standard practice since about the 1980s.”

From Nov. 16, 2011 testimony to the Congressional Subcommittee on Water Resources and Environment
Social Amplification of Risk

• **Major Determinants**
  – Familiarity
  – Trust
Top 6 stressors in PA residents who believe their health has been affected by shale gas activities.

<table>
<thead>
<tr>
<th>Stressor</th>
<th>Session 1 (n=33)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denied or provided false information</td>
<td>79%</td>
</tr>
<tr>
<td>Corruption</td>
<td>61%</td>
</tr>
<tr>
<td>Concerns/complaints ignored</td>
<td>58%</td>
</tr>
<tr>
<td>Being taken advantage of</td>
<td>52%</td>
</tr>
<tr>
<td>Financial damages</td>
<td>45%</td>
</tr>
<tr>
<td>Noise pollution</td>
<td>45%</td>
</tr>
</tbody>
</table>

Gulf Region Health Outreach Program

Mental & Behavioral Health
Primary Care
Environmental Health

Enhanced Frontline Heath Services

A Healthier Resilient Community Through Regional Partnerships
Research Needs Related to Pregnant Women

• What are the reproductive and developmental risks of exposure to crude oil, “weathered” crude oil, dispersants and mixtures?

• How do these compare with the risks of evacuating pregnant women from their community, including living elsewhere?

• Should pregnant women be advised against working on oil spill cleanups?
Language of the Executive Orders Creating Unconventional Natural Gas Drilling Advisory Committees

(Goldstein et al, Env Hlth Persp 120:483-486, 2012)

“...task the Secretary of Energy Advisory Board (SEAB) with establishing a subcommittee...to develop, within six months, consensus recommended advice to the agencies on practices for shale extraction to ensure the protection of public health and the environment” (emphasis added)

-President Barak Obama in Blueprint for a Secure Energy Future (March 2011)

The Marcellus Shale Safe Drilling Initiative will assist State policymakers and regulators in determining how gas production from the Marcellus shale in Maryland can be accomplished without unacceptable risks of adverse impacts to public health, safety, the environment and natural resources” (emphasis added)

-Maryland Governor Martin O’Malley in Executive Order 01.01.2011.11: The Marcellus Shale Safe Drilling Initiative (June 2011)

“WHEREAS, the Commonwealth takes seriously its responsibility to ensure the development of natural gas in a manner that protects the environment and safeguards the health and welfare of its citizens” (emphasis added)

-Pennsylvania Governor Tom Corbett in Executive Order 2011-011: Creation of Governor’s Marcellus Shale Advisory Commission (March 2011)
The Role of the Lack of Independent Scientific Study in Overturning ACT 13

“It is worth noting that the Commonwealth does not specify whether any independent scientific study has been commissioned or what data will be used to assess the impact ...

“... the absence of data also suggests that the Commonwealth has FAILED TO DISCHARGE ITS TRUSTEE DUTY of gathering and making available to the beneficiaries complete and accurate information”

Justice Ronald D. Castille, Robinson Township, etc. v. Commonwealth (Supreme Court of Pennsylvania Middle District ed., 2013). Footnote 60.
New York State Governor Cuomo’s Decision not to Approve Drilling in the Marcellus Shale
December, 2014

• “Until the science provides sufficient information to determine the level of risk to public health from HVHF to all New Yorkers and whether the risks can be adequately managed, DOH recommends that HVHF should not proceed in NYS.” (Acting Health Commissioner Zucker, 2014)

• The New York Times, in its editorial on the matter, noted that the Governor’s “choice is a measured one that protects New Yorkers until the science of hydraulic fracturing can catch up” (New York Times, Dec 18, 2014)
Applying the Four Models for the Social License to Operate

<table>
<thead>
<tr>
<th>LEVEL OF SOCIAL LICENSE</th>
<th>SYMPTOMS/INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>WITHHELD / WITHDRAWN</td>
<td>Shutdowns, blockades, boycotts, violence / sabotage, legal challenges</td>
</tr>
<tr>
<td>ACCEPTANCE / TOLERANCE</td>
<td>Lingering/recurring issues &amp; threats, presence of outside NGOs, watchful monitoring</td>
</tr>
<tr>
<td>APPROVAL / SUPPORT</td>
<td>Company seen as good neighbour, pride in collaborative achievements</td>
</tr>
<tr>
<td>PSYCHOLOGICAL IDENTIFICATION</td>
<td>Political support, co-management of projects, united front against critics</td>
</tr>
</tbody>
</table>
NEWS DESK

STANDING ROCK: A NEW MOMENT FOR NATIVE-AMERICAN RIGHTS

By Sierra Crane-Murdoch, OCTOBER 12, 2016

Members of the Anishinabe Nation sing as they enter the Standing Rock Sioux tribe’s protest encampment.

PHOTOGRAPH BY ALYSSA SCHUKAR / THE NEW YORK TIMES / Redux