Environmental Health in Washington State

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Early Water Supply Engineering

- Filtration techniques 3000 BC.
- Specific source selection criteria — Sushruta (300-500 BC).
- Boiling, storage in silver jars — ancient Persian kings.
- Natural coagulants (seeds, clays) used in India, Middle East, South America.
- Aqueducts and lead pipes to supply Rome.
Broad Street Pump

• Summer cholera epidemics.
• In 1849, over 500 deaths in 10 days.
• All deaths within a 250-yard radius.
• Common factor: water from the Broad Street well.
• Handle removed, # of deaths subsided.
• Contamination traced to privy vaults.
Water Supply in the US

• 1650 first waterworks, Boston
  – used logs with center bored out

• 1900 over 3,000 water supplies
  – Diarrhea and Enteritis 10% of all deaths
    (3rd leading cause)

• 1910s filtration and chlorination
  – 65% reduction in deaths due to Typhoid
Early Env Health Issues in WA

• 1906 - Watershed Protection: “If it is possible to have both the railroad and pure water, that is what the people here want; if it is not possible to have both, we want pure water.”

• 1908 – Vector Control: Seattle Dept. of Health formed with 80 men employed as rat trappers.

• 1909 – Code violations: the Yukon Expedition organizers pumped water from Lake Washington causing 200 cases of Typhoid.

• 1911 – Yakima forms the first county health department in the nation.
Historical Context for Chlorination

“The filtration of drinking water (plus the use of chlorine) is probably the most significant public health advance of the millennium.”

--Life Magazine describing their opinion of the 46th most significant event of the millennium.

Death Rate for Typhoid Fever
United States, 1900-1960

A Less Sophisticated Approach in Centralia

• 1914 Typhoid outbreak:
  – 334 people ill
  – 22 deaths

• The source of the outbreak – the polluted city water supply.

• The Environmental Health solution: pipe, empty whiskey barrels, and hypochlorite of lime.
Water Regulation in WA

• As early as 1917 there were very basic rules regarding drinking water.

• The first set of rules were very limited in scope and were only 3 pages in length.
The 1930s

• New Deal projects brought significant improvements to rural WA:
  – Electrification
  – Communications
  – Water & sewer projects
  – Drilled wells & septic systems

• Kellogg Foundation grant to WA Dept of Public Health sent 5 from WA to Univ of Michigan to study environmental health – 1st such class in US.
The 1940s

• 1943 – Hayes Evans was the 1st sanitarian to be President of the WSPHA.

• 1946 – Washington State Association of Sanitarians formed (Ed Hochsprung first President).

• 1949 – Jack Hatlen graduates from UW’s first class of Sanitary Science majors. Joins John Fish to do the initial inspections of food establishments in King County.
Modern Times

- 1966 – Air Section in Seattle Dept. of Health became PSAPCA.
- 1969 – Rock festivals were an emerging Env Health issue in WA.
- 1970 – Seattle water was fluoridated.
- 1989 - Washington Dept. of Health established.
E. COLI 0157:H7 OUTBREAK WASHINGTON STATE 1993

Accumulated Number of Cases

Source Confirmed and Corrective Action Taken

Illness Cases That Were Prevented From Occurring

Illness Cases Acquired From Eating Fast Food

Accumulated Number of Illness Cases (483 Cases)
Milwaukee, WI – A wake up call...

• 1993 – The year that made Milwaukee infamous.

• Outbreak of Cryptosporidium.

• The largest waterborne disease outbreak documented in US history.

• 104 deaths.

• 400,000 illnesses.
Unfiltered Surface Water Sources in Washington

Number of Sources

Dec 1989: 77
Jan 1993: 68
June 1995: 54
Jan 2000: 29
Jan 2001: 19
Jan 2002: 18
Jan 2003: 13
Jan 2004: 7
Jan 2005: 4
Jan 2006: 0
Jan 2007: 0
North Battleford, Saskatchewan (March-April 2001)

• Outbreak of *Cryptosporidium*.

• 5,800 – 7,100 ill.

• No known deaths.

• “The report concludes that the city lacked an appreciation that safe drinking water is a public health priority…”

• “…he did not regard himself as a regulator of safe water but a regulator of bacteriological sampling only.”
A Key Challenge for the Future: State Population Growth

- 20% growth per decade since 1960s
- 5.9 million in 2000
- Approach 7.6 million by 2020
Discussing Water Rights, A Western Pastime
Sustainable Water Management

- Water use efficiency
- Regional planning & growth
- Infrastructure needs
Management of Wastewater in Puget Sound

Population served

- Sewers: 2.85 million (71%)
- Septics: 1.15 million (29%)

Total volume

- Sewers: 400 million GPD
- Septics: 175 million GPD

Operation & maintenance

- Sewers: Daily
- Septics: Limited and highly variable
Insight from a Notable American Philosopher

“The future ain't what it used to be.”
-- Yogi Berra
Environmental Health Perspectives
Volume 114, Number 2, February 2006
Focus - New Thinking on Neurodevelopment
Toxics in the Environment

• Exposure occurs everywhere to everyone.

• Both new and old contaminants.

• Cumulative dose
  – Body burden increases with age.

• Developmental toxicity.

• Chemicals are used without adequate health information (no data on 75%)
  – 80,000 chemicals in commerce.
Toxics in the Environment

• Particulates in the air
  – Aggravates and possibly causes asthma.
  – Sources include: cars, trucks, off-road diesel, wood stoves, ships.

• Increased exposure in urban/industrial areas.
Toxics in the Environment

Opportunities

• Address toxics in products
  – Testing
  – Lead in consumer products

• Lunchboxes, candy, jewelry, pottery
  – Green chemistry

• Increase monitoring
  – Good data is essential
The Outrage

• Parent:
  - “This jar contains the water that has been poisoning our children for over a decade. We’re seeing red over lead.”

• Parent:
  - “It’s bone-chilling. It’s a failure of our core values of society.”

• State Representative:
  - “These actions are scandalous and unforgivable.”
The Other Side of the Story

• **Director, Public Health Seattle-King County:**
  - “The nature and duration of these exposures is highly unlikely to create any lead poisoning of a clinical nature.”

• **Director, Pediatric Env Health Specialty Unit, UW:**
  - “The chances of neurological damage are extremely, extremely low.”

• **Director, WA State Poison Control Network:**
  - “Just because there was a small amount of lead in the water doesn’t necessarily mean any children are being harmed. I think it was premature to conclude, in this case, that there was any health risk.”
A Convergence of Priorities

Public Health

Community Planning and Design

Physically Active Communities
Engineering Physical Activity
Out of Our Daily Lives
Engineering Physical Activity Out of Our Daily Lives

A brisk walk in the park keeps Marcy II in shape between dog shows. Her owner, Columbus resident Cathy Stumbo, got up early to give her 3-year-old Doberman his regular workout. They typically log 18 miles in Berliner Park.
## Physical Activity in King and Pierce

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<tr>
<th></th>
<th>King County</th>
<th>Pierce County</th>
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<tr>
<td>Adults who report engaging in no PA in past month (BRFS).</td>
<td>14.5%</td>
<td>20%</td>
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<tr>
<td>High school students who exercise daily (Healthy Youth).</td>
<td>32.2%</td>
<td>25%</td>
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Climate Refugees and Social Disparities
Predicted Changes in NW Climate

• Increased average winter and summer temperatures (~ 1 degree F / decade).

• Precipitation pattern changes
  – Increased precipitation
  – Reduced spring snow pack
  – Increased storm intensities
  – Increased flooding and drought
  – Increased surface water temperatures
  – Reduced predictability
Wildfires release fine particulate matter, CO, acrolien, benzene and formaldehyde.

- Higher summer temperatures
- Earlier snow melt
- Longer fire season
- Expanded vulnerable area of high elevation forests
Western Wildfires

• Since 1986 longer warmer summers resulted in*
  – 4-fold increase in major wildfires.
  – 6-fold increase in area burned.
  – Active wildfire season increased 78 days.
  – Average burn duration of large fires increased from 8 to 37 days.

• Washington State summer 2006 wildfires in
  – Chelan, Columbia, Kittitas, Mason, Okanogan, and Yakima Counties.

*Westerling, A.L., et al., 2006. Warming and Earlier Spring Increases Western U.S. Forest Wildfire Activity. Scienceexpress, July 6, 2006. (Based on 1166 fires)
Health Implications of Climate Change

- Health effects of excessive heat.
- Health effects of air pollution.
- Health effects associated with infectious diseases.
- Health effects of extreme weather events & rising sea levels.
- Psychological and social disruption effects.
Flooding, Extreme Weather, Sea-Level Rise
Public Water System Status Report
“We can’t solve problems by using the same kind of thinking we used when we created them.”

- Albert Einstein