Celebrate Drinking Water Week!
Michigan 100 years ago....

Brutal times

Great storm of 1913

Italian Hall Disaster in Calumet

Christmas Eve
Need for Safe Water

– Waterborne typhoid fever and dysentery outbreaks were common
– Average life expectancy in USA 1910
  • 48 for men & 52 for women
  • As compared to 75 & 80 in 2000
– Over 200 common and fatal diseases
Typhoid Fever

Miasma Theory – believed that one contracted typhoid by breathing swamp or sewer air, or by inhaling odors of rotting vegetables!

~10% death rate - A lucky survivor to typhoid could then become a carrier, infecting other people

Typhoid Mary
Cholera

Bacterial *Vibrio cholerae*

50-60% mortality rate

Nicknamed the “blue death”

Death was often swift – within 1-3 days.
Dysentery

- Usually bacterial; *Shigella & Salmonella sp*
- Symptoms severe diarrhea and rectal bleeding
- Waterborne, usually due to poor sanitation

- Sewer / water death spiral!
Escanaba in 1907

The Journal of the Michigan State Medical Society Vol. VI No. 11 November 1907; O.C. Breitenbach, M.D.

### TABLE “A.”

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated Population</th>
<th>Cases</th>
<th>Death-rate per Deaths. 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1898</td>
<td>10,500</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>1899</td>
<td>10,500</td>
<td>60</td>
<td>6</td>
</tr>
<tr>
<td>1900</td>
<td>10,093</td>
<td>140</td>
<td>14</td>
</tr>
<tr>
<td>1901</td>
<td>10,444</td>
<td>50</td>
<td>5</td>
</tr>
<tr>
<td>1902</td>
<td>10,795</td>
<td>70</td>
<td>7</td>
</tr>
<tr>
<td>1903</td>
<td>11,146</td>
<td>40</td>
<td>4</td>
</tr>
<tr>
<td>1904</td>
<td>11,500</td>
<td>300</td>
<td>30</td>
</tr>
<tr>
<td>1905</td>
<td>11,500</td>
<td>210</td>
<td>21</td>
</tr>
<tr>
<td>1906</td>
<td>11,500</td>
<td>120</td>
<td>12</td>
</tr>
<tr>
<td>1907</td>
<td>11,500</td>
<td>270</td>
<td>22</td>
</tr>
</tbody>
</table>

Death-rate of 1907, up to and including May 11, 1907.

### TABLE “B.”

<table>
<thead>
<tr>
<th>Location</th>
<th>Rate per 100,000</th>
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</thead>
<tbody>
<tr>
<td>Escanaba</td>
<td>260.0</td>
</tr>
<tr>
<td>Pittsburgh, Pa.</td>
<td>124.7</td>
</tr>
<tr>
<td>Allegheny, Pa.</td>
<td>100.8</td>
</tr>
<tr>
<td>New Haven, Conn.</td>
<td>92.0</td>
</tr>
</tbody>
</table>

Sewage outfall

Water intake

Sewage outfall

ACT 98


40th Anniversary SDWA
Water Supply

- Municipal
- Untreated surface water or groundwater wells
- Wells often shallow
- Coagulation and sedimentation
- Rapid sand and slow sand filtration
History of Treatment

• Philadelphia, Pa 1799 – first US water main
• Massachusetts 1870’s first slow sand filters
• Cholera epidemic - Hamburg, Ger. 1892
  – organisms found in river
  – slow sand filtration as preventative measure
• Jersey City, New Jersey 1909 – first to chlorinate a public supply.
  – Cities desire to chlorinate upheld in court
• Adrian, Michigan – continuous use in 1915
Fire Protection

• Great Chicago Fire in 1871
• Numerous large fires in Michigan destroyed towns
Waterworks and Sewerage Systems
Act 98, P.A. 1913

• Promulgated August 15, 1913
• Department of Health authority
• Included water supply
• General plan
• Operation Reports
• Sanitary surveys
Colonel Edward Dunbar Rich

- Performed sanitary surveys and approved construction permitting.
- Responded to waterborne disease outbreaks in a prompt fashion.
- Gave municipalities sound engineering guidance.
Chlorine and the Decline of Disease Rates

Death Rate for Typhoid Fever
United States, 1900-1960

Chlorination Begun

Construction Permitting
Operator Certification

- 1941 PA 138 required certification of operators

- By 1942 Classifications of F1, F2, F3, D1, D2 & T (for lab) and M (for miscellaneous) were being used

- In 1978, F-4 classification was included in Act 399 along with the requirement for mandatory shift operator certification.

- Lowest number on file – possibly first certified operator?
  - #101 Harry W. Ward, 1942 of Wyandotte

- Lowest current number
  - Gerald Goshorn #1018
In 1941, Mrs. H.E. Simmons of Munising was listed as the only woman to operate a water treatment plant.
Cross Connection Rule

• Early regulations adopted in 1938 by the Advisory Council of Health
• In 1972 cross connection rules were added to Act 98, P.A. of 1913
• These rules were incorporated into the administrative rules of Act 399, P.A. 1976
Well Drilling

- 1949 MDH bulletin: “Ground Water Supplies for Homes and Small Institutions”
  - Health aspects
  - GW pollution
  - GW flow direction
  - Isolation distances
  - Water analyses
  - Frost Pits
  - Well Depths
  - Types of Wells
  - Springs
  - Pumps
  - Well Seals

ACT 98

40th Anniversary SDWA
Public Health Code
1966 and 1967

Private Water Supplies


History of Drinking Water Standards

-1914 Federal Standards place limit of 2 coliforms per 100 mls on interstate carriers.

-1925 limit changed to 1 count per 100 mls

-1942 established standards for sample collection, lead, fluoride, arsenic and selenium

-1962 standards included recommended maximum limits for synthetic detergents and radioactivity
1976 PA 399
Michigan Safe Drinking Water Act

• Source Identification
• Source Protection
• Treatment
• Distribution
Water Industry Historical Structures...

...and Historical Events
Water Works Park
Grand Rapids Monroe Avenue WTP

ACT 98
1913


40th Anniversary SDWA
Fluoride a first in Michigan!

• In 1945 controlled fluoridation studies started in Grand Rapids, Michigan and Newburgh, New York.

• Results indicated a 60% reduction in dental cavities in children.

• These results led to the promotion and widespread use of water fluoridation.
Fluoridation

• Today, 70% of the US population on CWSs receive fluoridated water.

• 90% of population served by Michigan CWSs receive fluoridated water.
City of Monroe Filtration Plant
Zebra Mussels Invade the Monroe Plant
Saginaw Constructs Huron Pipeline
Bury the Pump
Lansing’s Dye Water Conditioning Plant

Filter Gallery

“Aquarius”

Mural

ACT 98

40th Anniversary SDWA
City of Grand Haven’s buried intake c1950
Courtesy of Joe Vanderstel and the City of Grand Haven

City of Bridgman intake construction 1958
Courtesy of Tim Kading and the City of Bridgman

ACT 98

40th Anniversary SDWA
City of Marquette – first to employ membrane filtration

Courtesy of Roger Olson and the City of Marquette
Kalamazoo Water Tower Landmark
Safe Drinking Water
Happy Drinking Water Week!