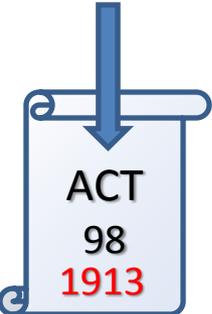


Celebrate Drinking Water Week!



1923

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Michigan 100 years ago....

Brutal times

Great storm of 1913

Italian Hall Disaster in Calumet

Christmas Eve



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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



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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



1939 - Public Domain – copyright expired

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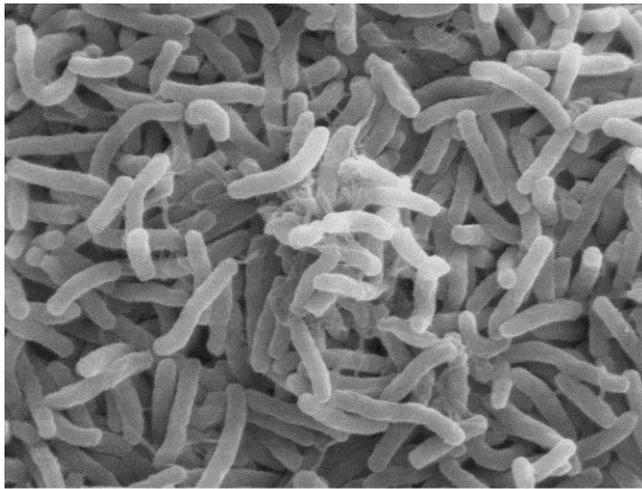
Cholera

Bacterial *Vibrio cholerea*

50-60% mortality rate

Nicknamed the “blue death”

Death was often swift – within 1-3 days.



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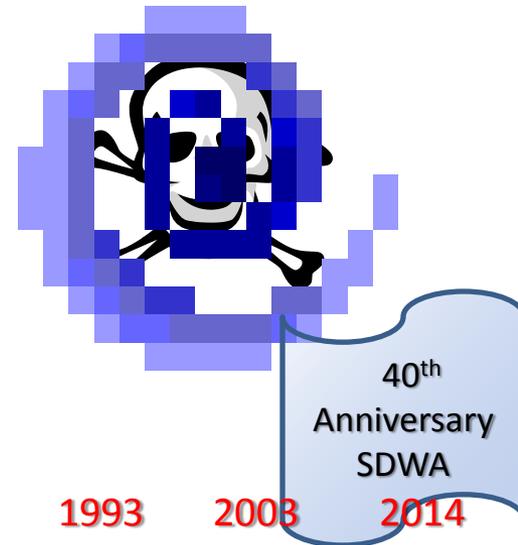
1993

2003

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Anniversary
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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

Sewage outfall

TABLE "A."

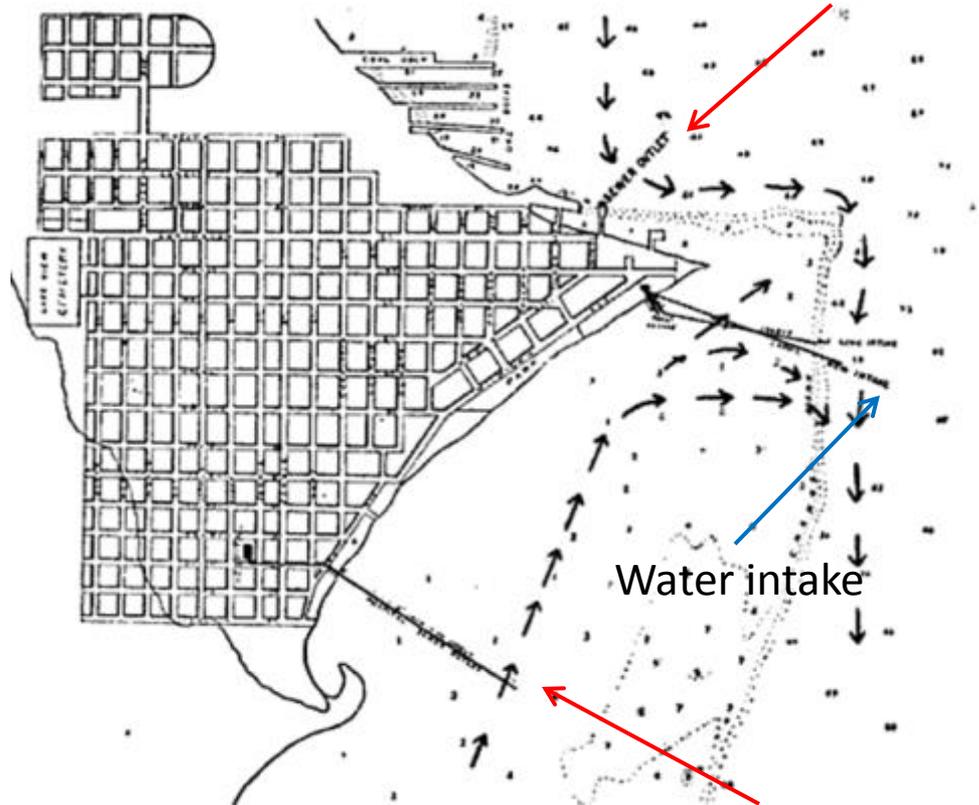
Cases and Death-rate of Typhoid in *Escanaba*.

Year.	Estimated Population.	Cases.	Deaths.	Death-rate per 100,000.
1898	10,500	20	2	19
1899	10,500	60	6	57
1900	10,093	140	14	138
1901	10,444	50	5	47
1902	10,795	70	7	64
1903	11,146	40	4	35
1904	11,500	300	30	260
1905	11,500	210	21	181
1906	11,500	120	12	104
1907	11,500	270	22	191

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

TABLE "B."

<i>Escanaba</i>	260.0
Pittsburg, Pa.	124.7
Allegheny, Pa.	100.8
New Haven, Conn.	92.0



Water intake

Sewage outfall

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

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Water Supply

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



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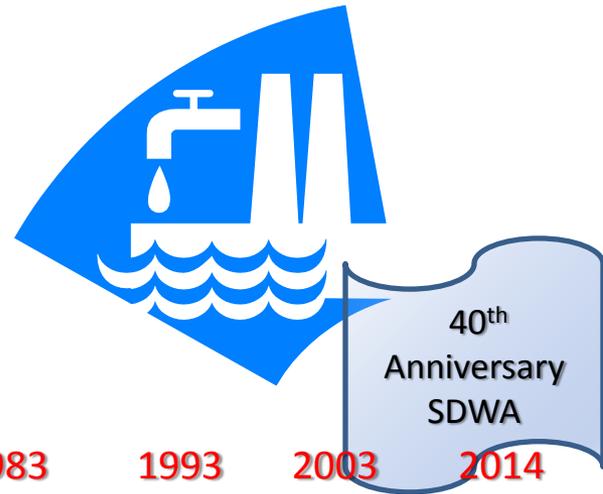
2003



2014

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



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Fire Protection

- Great Chicago Fire in 1871
- Numerous large fires in Michigan destroyed towns



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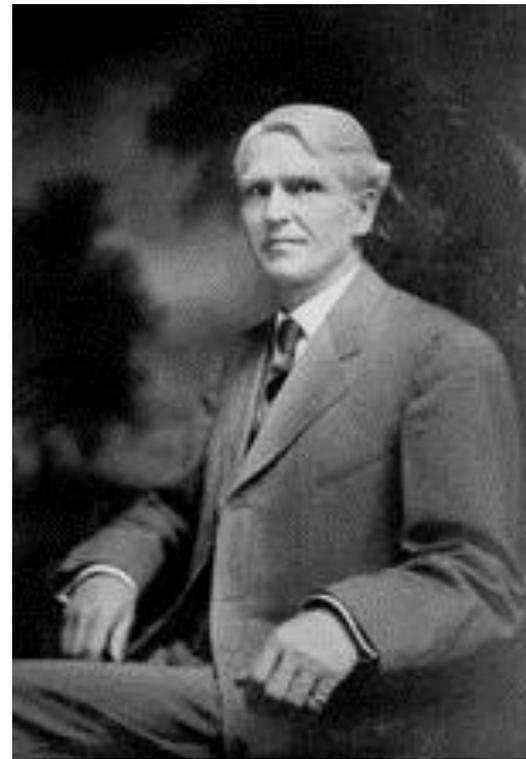
1993

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Anniversary
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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



ACT
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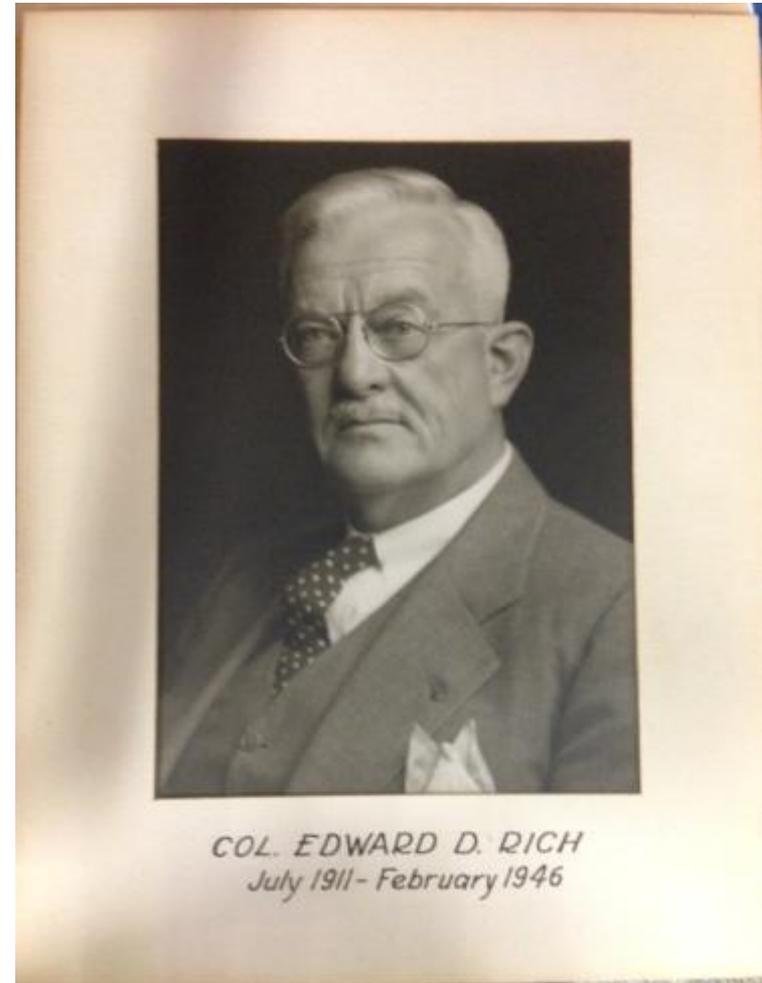
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Colonel Edward Dunbar Rich

- Performed sanitary surveys and approved construction permitting.
- Responded to waterborne disease outbreaks in a prompt fashion
- Gave municipalities sound engineering guidance



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STATE OF MICHIGAN
 DEPARTMENT OF THE STATE BOARD OF HEALTH.
 DIVISION OF SANITARY ENGINEERING.
 Mich. Dept. of Health
 Received
 DEC 21 1926
 Lansing
 Bureau of Engineering

ACCEPTED FOR FILING
 DEC 23 1926
 Edward H. Hill
 BUREAU OF SANITARY ENGINEERING

PUBLIC WATER SUPPLY.

LOCATION.

Buchanan Village Berrien
 (Name of city or village.) (County.)

To the Secretary of the State Board of Health,
 Lansing, Mich.

Dear Sir—In conformity with Art No. 98, Public Acts 1913, the undersigned, representing,

Municipal
 (Name of department, institution, corporation or person owning or controlling the water supply.)

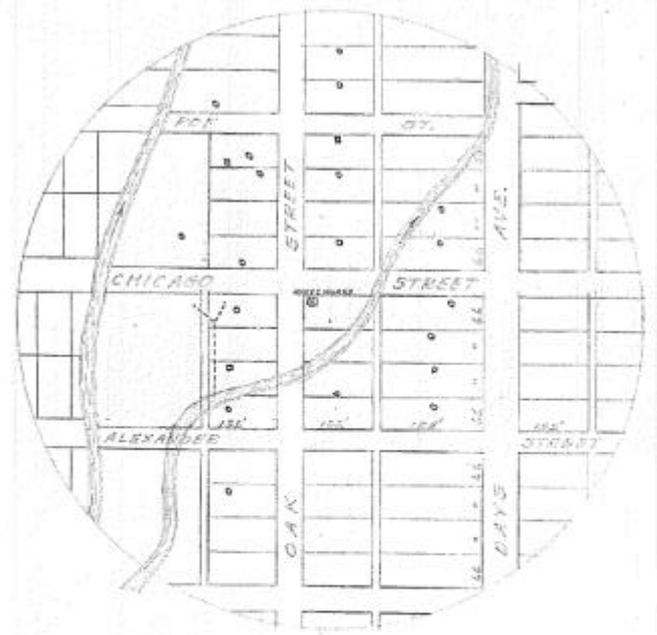
In the location above named, hereby submit the following information and description of the said supply, the same being explanatory and supplementary of plans now submitted, heretofore forwarded or about to be filed in the office of the Secretary of the State Board of Health.

Note:—The following questions are so framed as to meet the requirements of widely varying conditions. In case any of the questions do not apply to your water supply, the answer in such questions may be omitted; except that answers to all questions are desired whenever possible. Where the term "city" is used the term "institution," "company," etc., may be substituted.

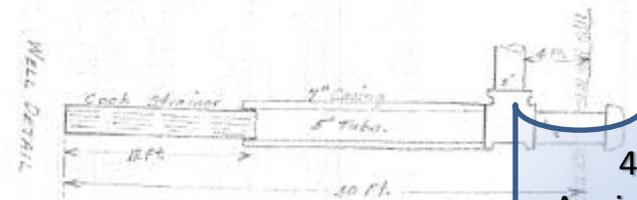
GENERAL.

- Does the supply constitute:
 - (a) A complete and distinct system in itself? yes
 - (b) Are extensions or additions contemplated? yes
 If so, give a description of what is proposed, including the probable location of the same, referring to the map, as well as an estimate of the date when such extensions will become necessary. Good sh. from Chicago sh. to Phillips sh. 1550 ft. of 6" Chicago sh. from Detroit sh. to Iron Works sh. + on level pipe sh. from Chicago sh. to Village Lewis 5000 ft. of 6" Pipe sh. from Well sh. to Butler sh. 1750 ft. of 6" Maple sh. from Detroit sh. to Waterloo sh. 500 ft. of 6" Chicago sh. from Detroit sh. to 1050 ft. of 6" Butler sh. from Postage sh. each 1750 ft. of 6". Butler sh. from Smith sh. to North sh. from Chicago sh. north 600 ft. of 6".
- Give the population of the city at the present time 3600
- Give the date when the supply was originally installed. 1893
- Give dates and descriptions of subsequent extensions, if any.
 - 1916 Liberty Heights Addition.
 - 1923 Chicago sh.
 - 1925 Good sh. from Liberty sh. to Detroit.

PLAN
 SHOWING
 POSSIBLE SOURCES OF POLLUTION
 WITHIN 500 FEET OF
 SOURCE OF SUPPLY.
 BUCHANAN, MICH.
 DEC. 11, 1926.



LEGEND
 CESSPOOLS ○
 PRIVIES □
 HOUSE DRAINS ----



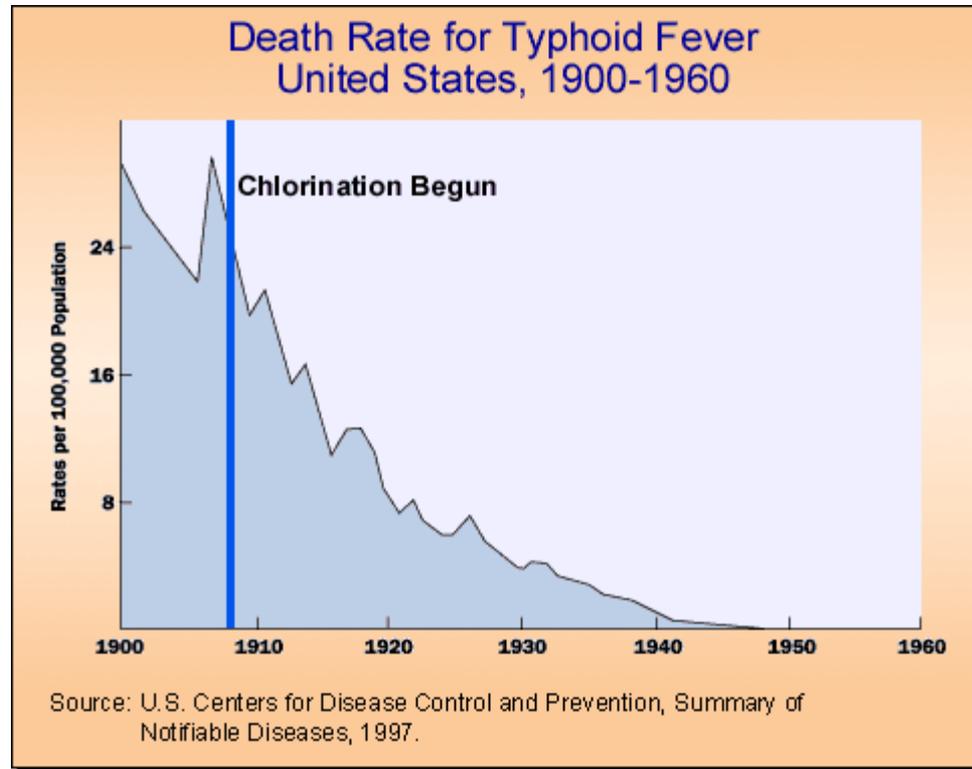
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 SDWA
 2014

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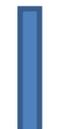
1973
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Chlorine and the Decline of Disease Rates



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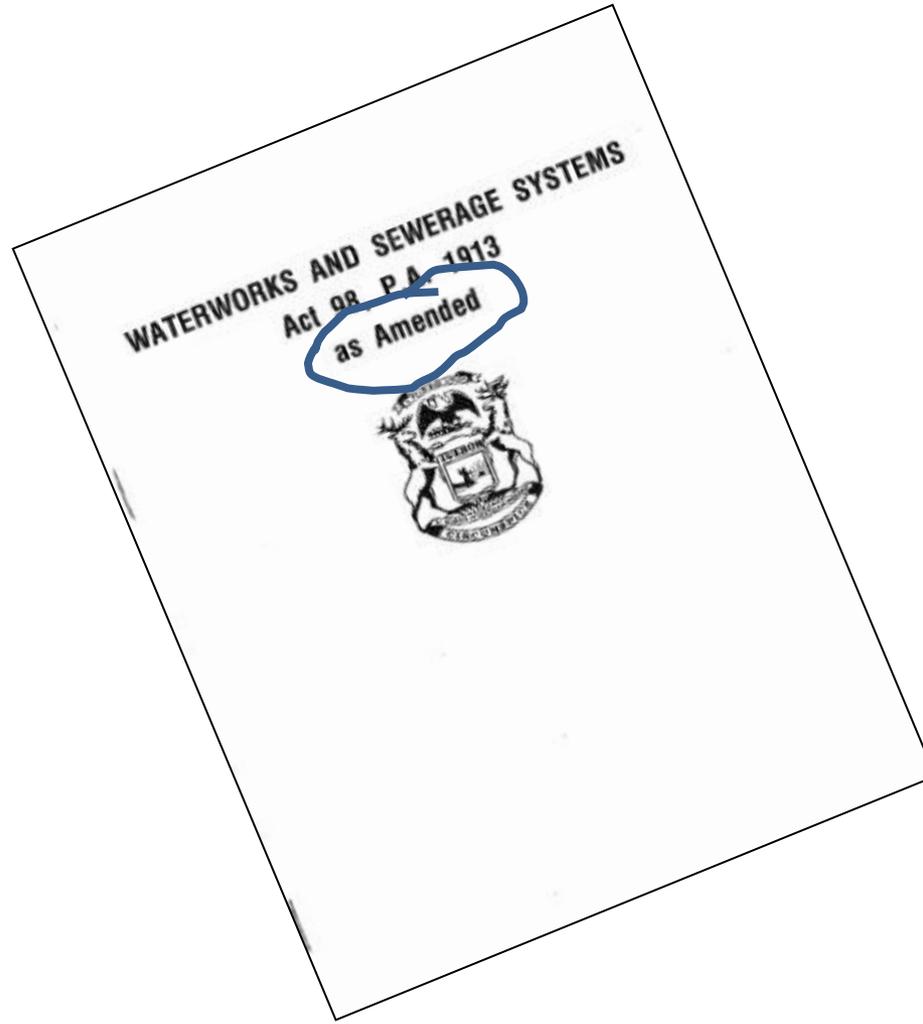
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Construction Permitting



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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



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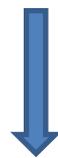
Inclusion...

In 1941, Mrs. H.E. Simmons of Munising was listed as the only woman to operate a water treatment plant.



1923

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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



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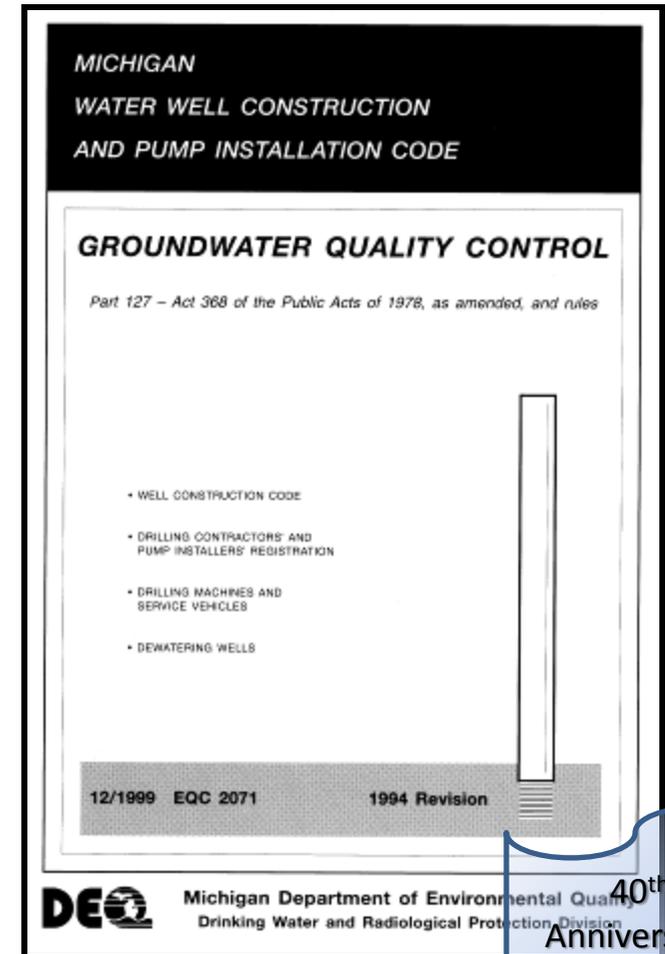
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Public Health Code 1966 and 1967

Private Water Supplies

- Ground Water Quality Control Act passed in 1966.
- Ground Water Quality Control Rules effective on February 14, 1967.



1923 1933 1943 1953 1963 1973 1983 1993 2003 2014



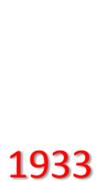
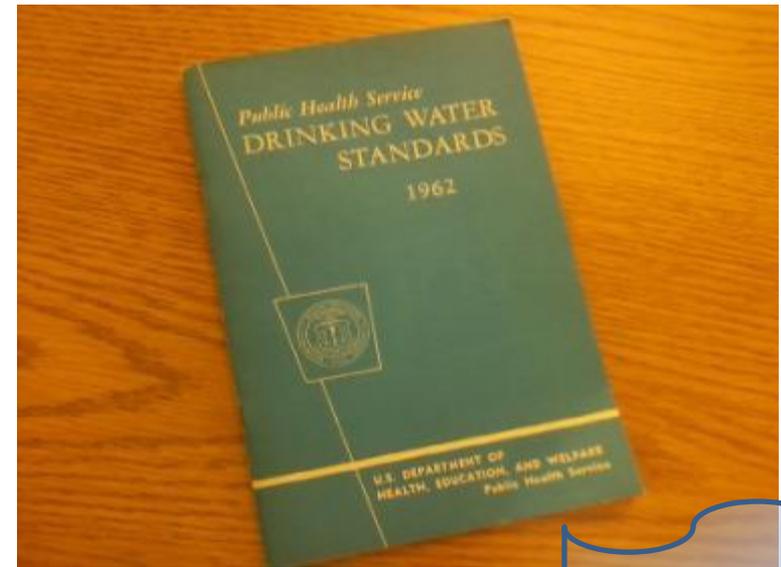
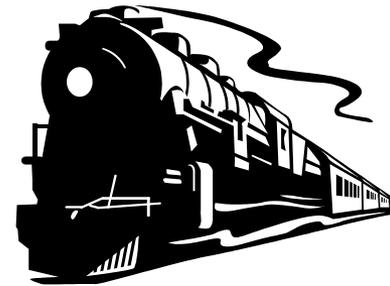
History of Drinking Water Standards

-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



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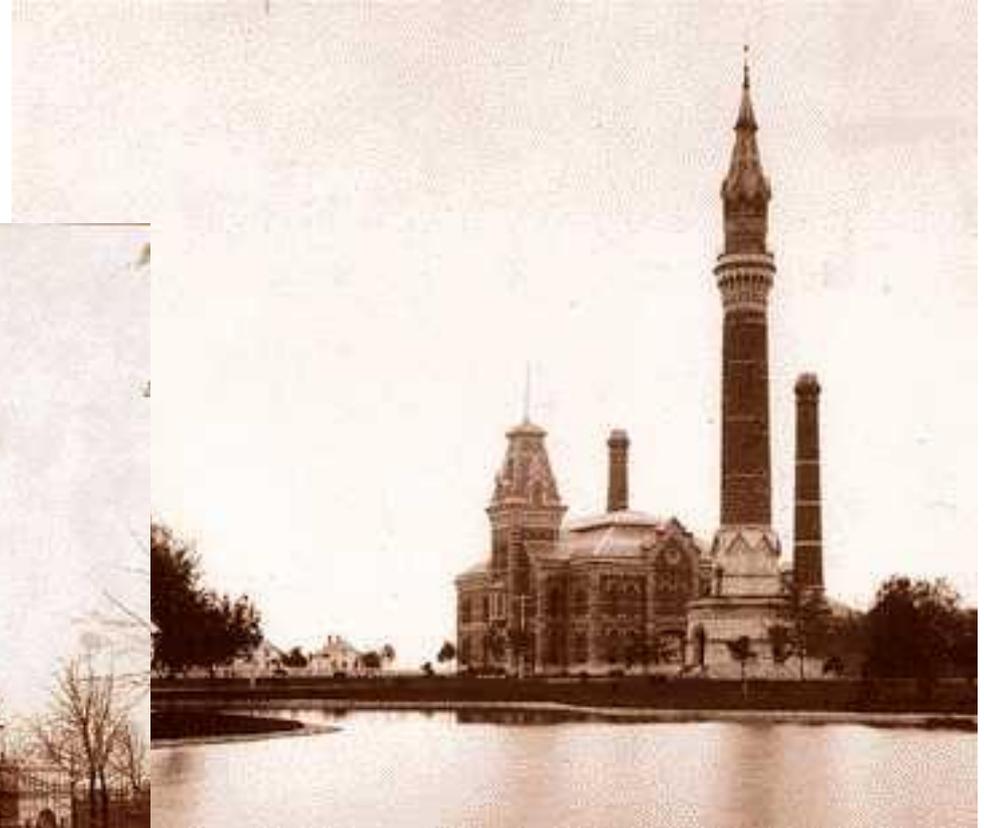


Water Industry Historical Structures...

...and Historical Events



Water Works Park



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Grand Rapids Monroe Avenue WTP



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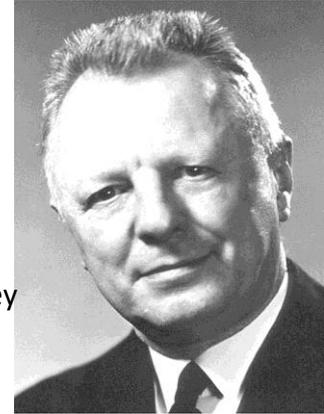
2003

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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.



Dr. H. Trendley
Dean



NIDR dentists examined these Grand Rapids schoolchildren once a year to document the effects of fluoridation



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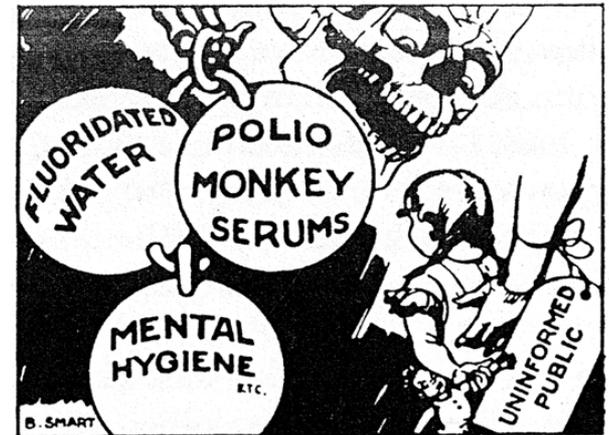
2014



Fluoridation

- Today, 70% of the US population on CWSs receive fluoridated water.
- 90% of population served by Michigan CWSs receive fluoridated water

At the Sign of THE UNHOLY THREE



Are you willing to PUT IN PAWN to the UNHOLY THREE all of the material, mental and spiritual resources of this GREAT REPUBLIC?

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City of Monroe Filtration Plant



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Zebra Mussels Invade the Monroe Plant



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Anniversary
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Saginaw Constructs Huron Pipeline



ACT
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40th
Anniversary
SDWA
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Bury the Pump



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Anniversary
SDWA

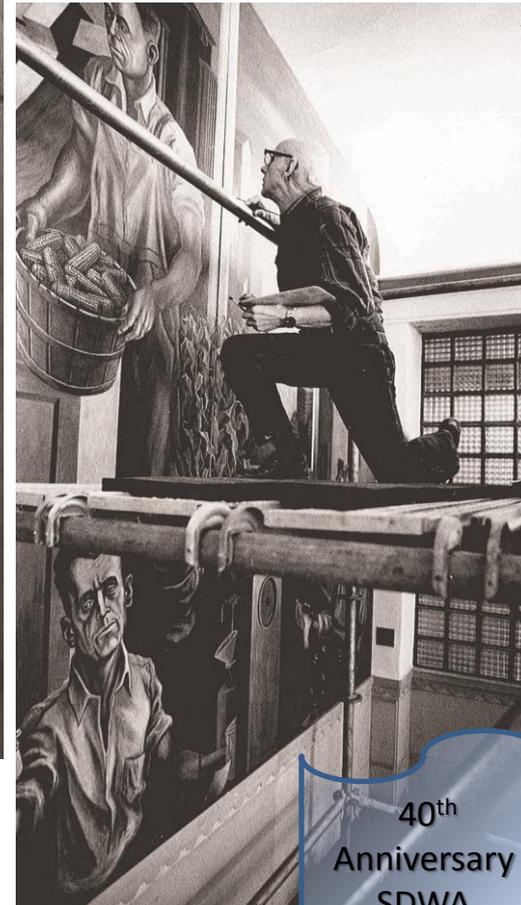
Lansing's Dye Water Conditioning Plant



Filter Gallery



"Aquarius"



Mural

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Anniversary
SDWA

ACT
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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



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City of Marquette – first to employ membrane filtration



City of Marquette water pumping station 1890

Courtesy of Roger Olson and the City of Marquette



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Kalamazoo Water Tower Landmark



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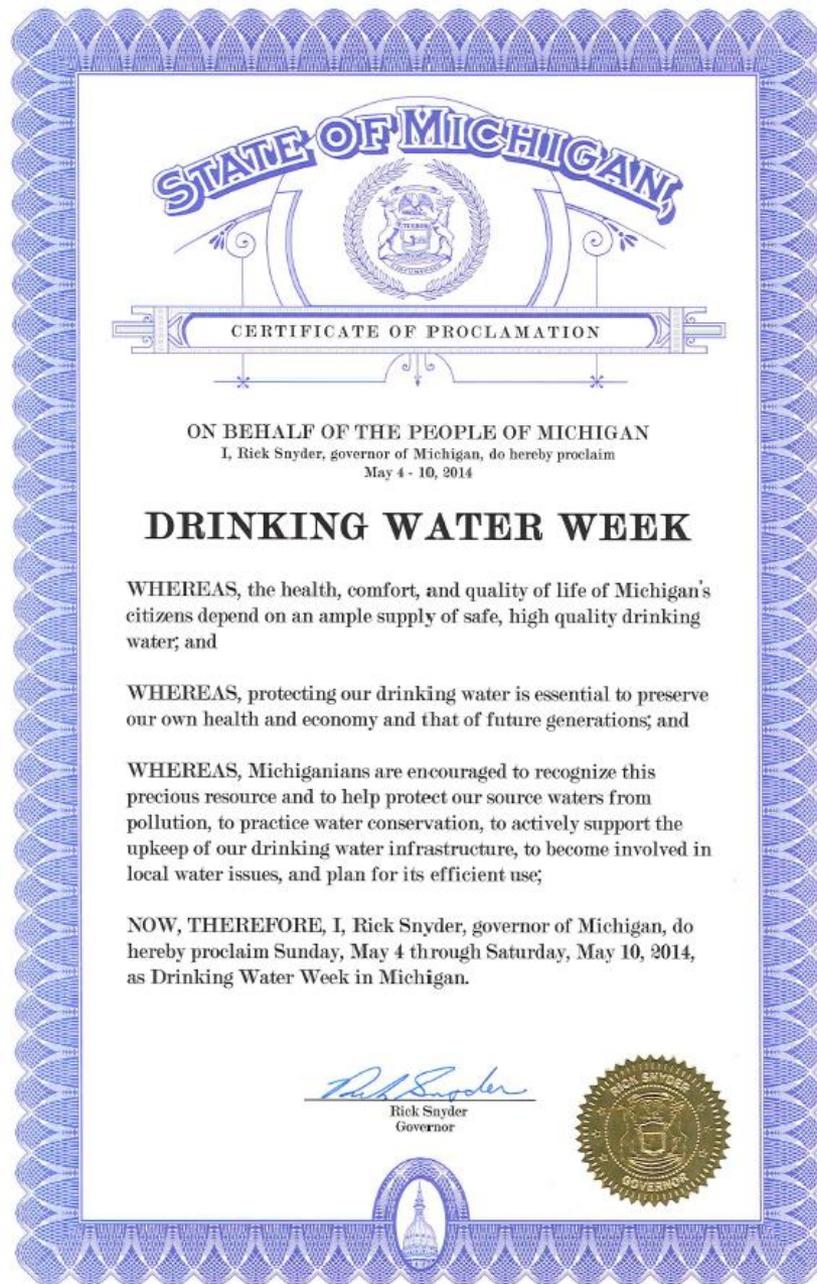
2003

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SDWA
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Safe Drinking Water



Happy Drinking Water Week!



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Anniversary
SDWA

MI-AWWA
75th
2013

2023

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2043

2053

2063

2073

2083

2093

2103

2114