



Engineering Ethics – Ethical Decisions

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DC-10 jumbo jet



1986 – Challenger disaster



Flint, Michigan – more later



Number one priority!!!

Hold paramount the
**safety, health and
welfare of the public**



Licensing

- Licensing provides the right to practice
- Minimum level of competence and ethical practice
- Legal protections from recrimination when ethical choices are made



Ethical decisions

Ask yourself . . .

- Is it legal?

Ethical decisions

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- Is it legal?
- Does this harm anyone?

Ethical decisions

Ask yourself . . .

- Is it legal?
- Does this harm anyone?
- How would the stakeholders view it?

Ethical decisions

Ask yourself . . .

- Is it legal?
- Does this harm anyone?
- How would the stakeholders view it?
- How would it look on the front page?

Ethical decisions

Ask yourself . . .

- Is it legal?
- Does this harm anyone?
- How would the stakeholders view it?
- How would it look on the front page?
- **Have I discussed it with others?**

Ethical approaches

Situational ethics

- Depends on the situation

Utilitarian ethics

- Provides the most benefit

Consequential ethics

- Depends on the consequences

Situational ethics



Utilitarian ethics



Utilitarian ethics



Consequential ethics

UNDER PENALTY OF LAW THIS
TAG NOT TO BE REMOVED
EXCEPT BY THE CONSUMER

ALL NEW MATERIAL

Consisting of
INNER CHAMBER 86%:
POLYESTER FIBERS
OUTER CHAMBER 14%:
POLYESTER FIBER BATTING

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Consequences

- Loss of employment
- Suspension or revocation of PE license
- Suspension or revocation of business license
- Fines
- Imprisonment
- Civil suits



Flint, Michigan



Hard times in Flint, Michigan

- Population dropped by 50%
- Lost industry
- 100 mgd to 16 mgd
- 40% below poverty level
- Buying water from Detroit

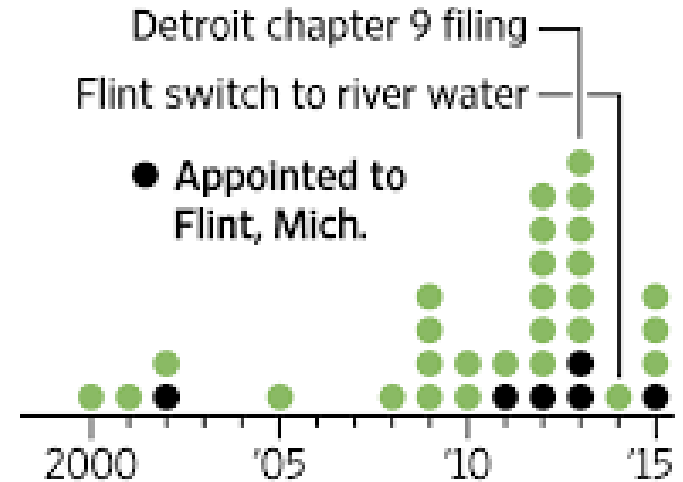


Emergency managers

- City in receivership – no money
- Emergency managers placed in charge
- Authority to make decisions
- Primary goal = solvency

Cities in Crisis

Number of emergency manager appointments in Michigan



Source: Michigan Treasury Department

THE WALL STREET JOURNAL.

FLINT WATER BILLS: HIGHEST OF 500 LARGEST U.S. WATER SYSTEMS

How the city of Flint compares to other water systems in Michigan and averages of public and private systems in the U.S. These are annual water bills for households using 60,000 gallons a year, using figures compiled in January 2015.



SOURCE: Food and Water Watch

MARTHA THIERRY/DETROIT FREE PRESS

Flint water supply

- Detroit Water supply (Lake Huron) since 1967
 - Treated water
 - Higher cost
- Keregnondi Water Authority (KWA)
 - Untreated supply
 - Flint WTP improvements (\$ 4 million)
- Flint River water supply – backup supply
 - More acidic, higher chlorides
 - Consultant recommended WTP improvements

Water supply sources

- 2013: City Council voted to join KWA
 - Need new pipeline to connect
 - Connect in 2016 -3 years away
 - Save \$19 million over 8 years
- Emergency manager approved the change
- Detroit Water gave 12 months' notice (contract)

Ethical decision

Was the City Council justified in switching water suppliers?

1. Is it legal?
2. Does this harm anyone?
3. How would the stakeholders view it?
4. How would it look on the front page?

2014

- 2014 Detroit Water contract ended
- City Council approved temporary water supply
- April 2014 –Changed to Flint River water
 - High chlorides – no corrosion control treatment
 - Leached lead from service connections





Engineering Ethics – Ethical Decisions

Response to complaints

- Taste , odor, color, bac-t complaints
 - Increased chlorination
- GM stopped using water
- August 2014 samples
 - High THMs



Home sampling : 2014 - 2015

- EPA recommends action if 10% >15 ppb
 - Flint selected locations from “homes with lead service lines” – locations not completely documented
 - Flushed samples?
 - MDEQ withdrew two samples
 - >90% of samples acceptable (<15 ppb)
 - Reported “no problems” to public

Early 2015

- Detroit offered to supply water– no reconnection charge
- City Council voted to accept Detroit water
- MDEQ rejected request
 - Consultant tests meet standards (90% <15 ppb)
 - “no imminent threat to public health”
- Emergency manager rejected request
 - “Flint water today is safe”
- State blocked Flint from connecting to Detroit
 - Based on earlier \$7 million grant to Flint

Ethical decision

Were the emergency manager and the State justified in recommending against connecting to Detroit Water?

1. Is it legal?
2. Does this harm anyone?
3. How would the stakeholders view it?
4. How would it look on the front page?

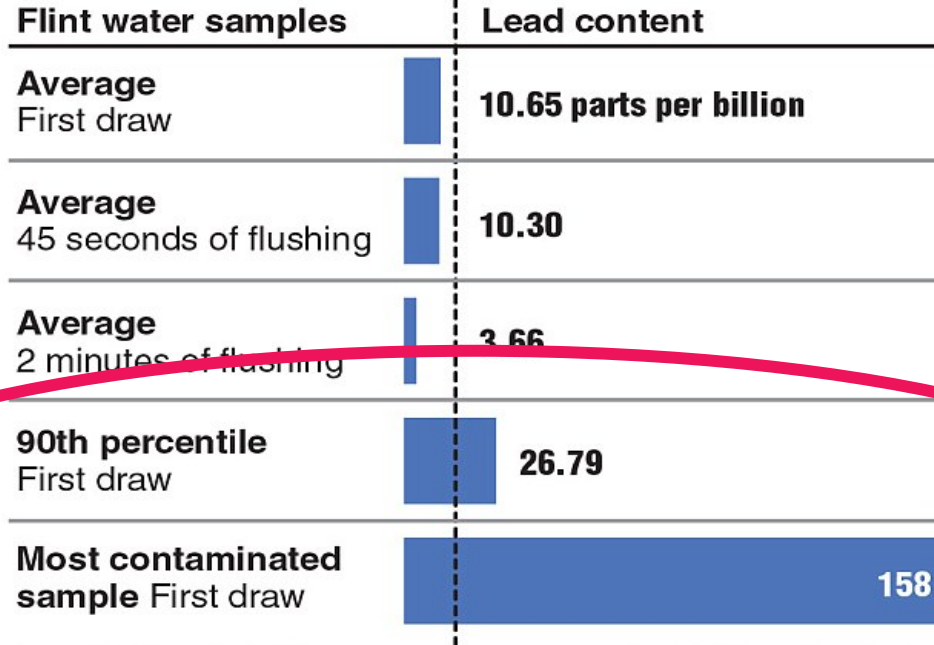
Home sampling – 2015

- August 2015
 - Virginia Tech students home sampling program
 - No flushing
 - 37 of 423 homes exceeded 15 ppb Pb limit
 - 8 homes exceeded 100 ppb
 - One home – 158 ppb

Lead in Flint's water

A research team from Virginia Tech tested 252 samples of water from homes in Flint, Michigan, for lead content. The Environmental Protection Agency requires action if more than 10 percent of tap water exceeds 15 parts lead per billion parts water.

EPA benchmark: 15 ppb



Source: Flint Water Study, EPA

Graphic: Tribune News Service

No flush

September 2015 – Blood Lead Testing

- August 2015
 - Petition with 26,000 signatures
- September 2015
 - Higher blood lead levels



Response

- October 2015
 - Switched back to Detroit water
 - \$ 10 million State funds
 - \$ 12 million cost
- MDEQ stood by test results
- MDEQ defended corrosion control
- January 2016 – State of Emergency



Hey Flint! It is safe to wash!

Lead in bath water will not soak into your skin fast or at high levels.

Just don't let kids drink the bath water when they play in the tub...yuck!

Unfiltered warm tap water is OK for showers & baths.

For you AND your kids!

If you want to get your water tested, please call the City of Flint Water Plant at 810-787-6537.
If you have questions about Flint water and your health, please call MDHHS at 1-800-648-6942.

Ethical decision

Should the Michigan DEQ and the Governor have acted earlier, based on what they knew at the time?

1. Is it legal?
2. Does this harm anyone?
3. How would the stakeholders view it?
4. How would it look on the front page?

FEBRUARY 1

TIME

**The
Poisoning
Of An
American City**



Consequences

- **6,000 – 12,000 children exposed to lead**
- Cause of Legionnaire's Disease??
- Four officials resigned (MDEQ, EPA Region 5)
- Two officials terminated
- Nine criminal indictments
- Call for Governor's resignation
- Class action lawsuits
- Individual lawsuits

Resolution???

- \$28 million \$50 million for direct costs & water bill credits
- \$ 175 million pledged for improvements
- Lower lead levels
- Independent Commission Report (March 2016)
 - MDEQ
 - Emergency managers
 - Flint officials
 - EPA
 - “Environmental injustice”

October 20, 2016

- EPA Inspector General blames EPA
 - Should have acted in June 2015
 - Resulted in seven month delay



Thank You



www.ghd.com

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