# Preventing Microbial Contamination of Water

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# Outline

- 7 Short Tales (Past projects)
  - Livestock, Humans, Wildlife
  - Sources
  - Pathways
  - Management Practices (BMP's)
- Summary – What have we learned?

*A Neopolitan Story-Teller* – Pierre Bonirote - 1840

# 1. The Tile Tale

# Parkhill Creek

- 14 tile drains, 6 stream sites
- 1986 to 1989 – weekly samples
- Fecal coliform
  - Stream sites: 217 /100 mL
  - Tiles: 78/100 mL

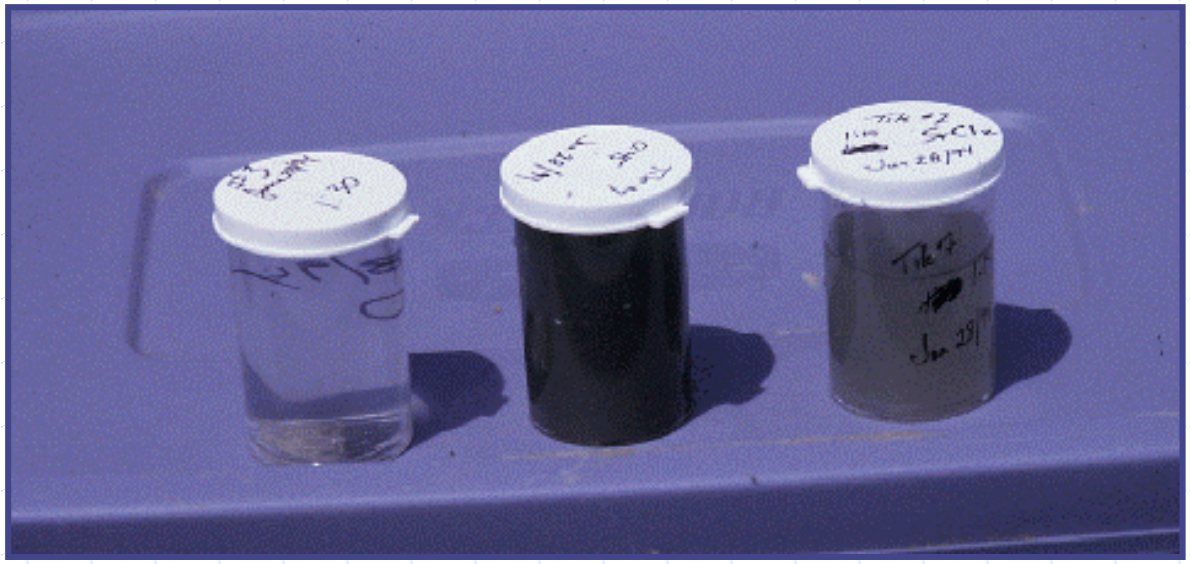
# Parkhill Creek (cont.)

- Lots of variation site to site
- 2 most important risk factors:
  - Tiles around farmstead
  - Milkhouse washwater connection

# Chatham-Kent & Essex

- 20 farms 1995 to 1998
- Weekly samples
- Focus: N and P (some bacteria)
- Negligible *E. coli* in shallow groundwater – no pattern emerged

# 2. Macropore Flow



# Prevention

- Pre-tillage
- Spread when no tile flow
- Check tile outlets - detection
- Plug outlets

# Questions remaining:

- How much tillage?
- Minimum spreading rate?
- Liquid manure and no-till?
- End of pipe treatment?

# Appearance of water

Manure/water solutions at varying ratios – (left to right) 0:1, 1:5000, 1:1000, 1:500, 1:100, 1:50, 1:10, 1:1

Appearance of flowing water - containing manure at a ratio of 1 part manure to 500 parts water

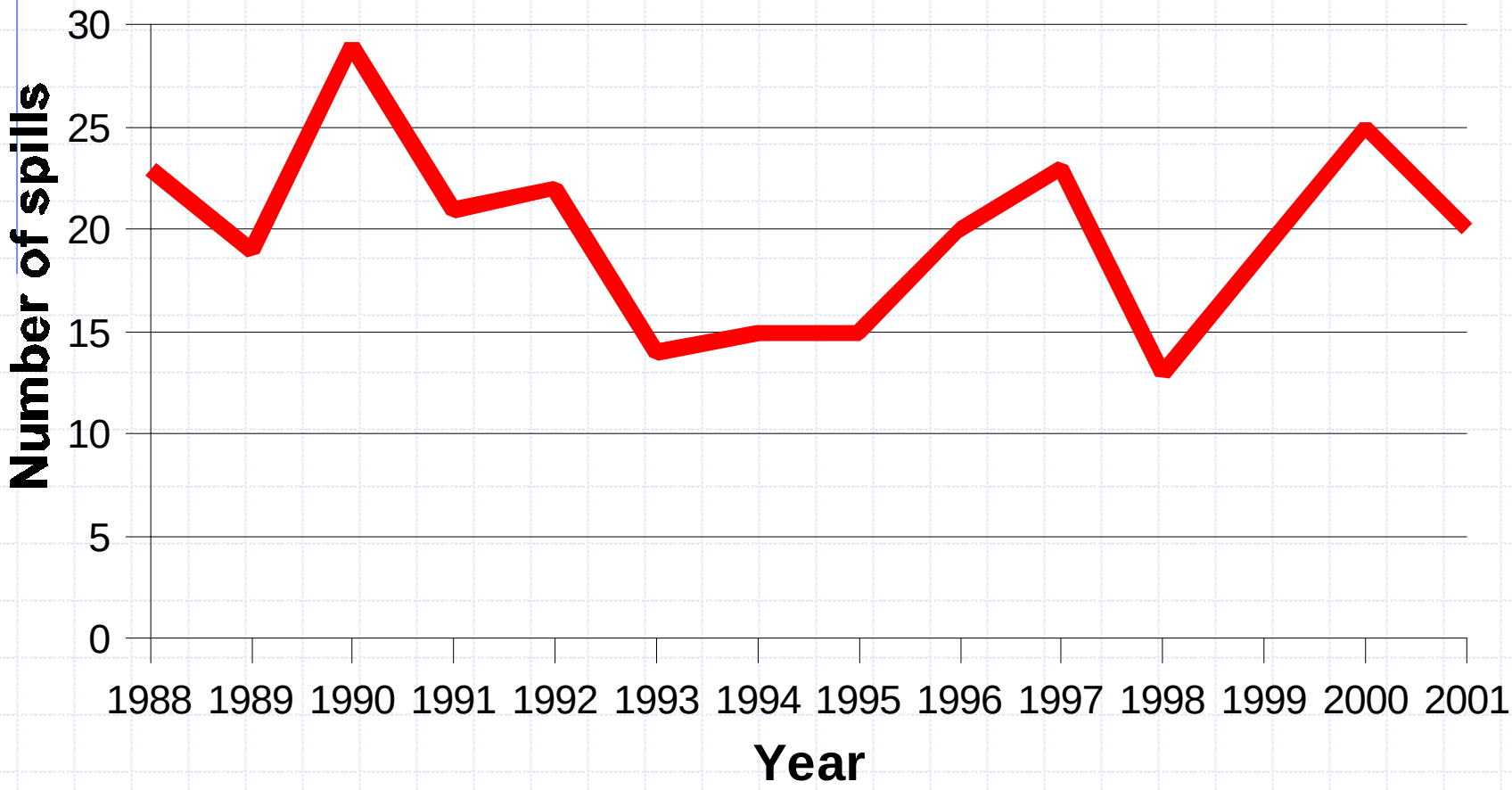
# 3. Manure Runoff

# Winter spreading

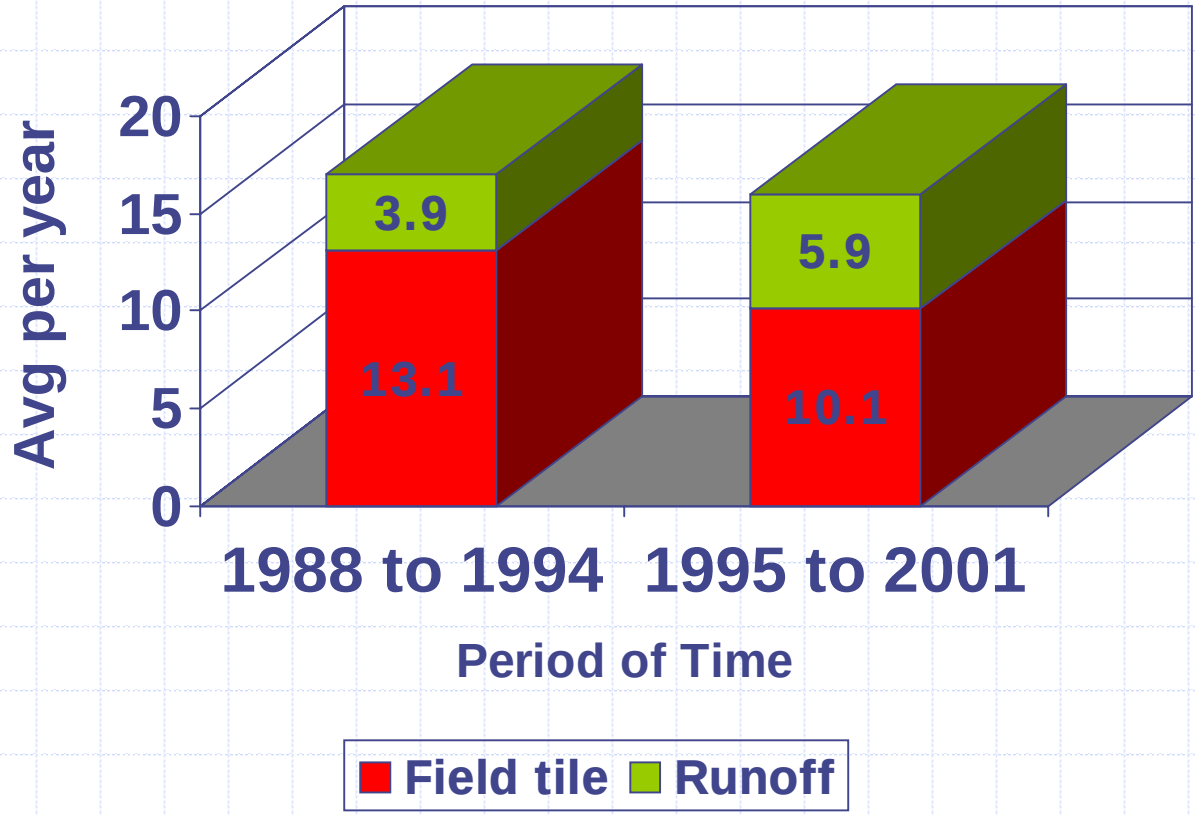
- Solid or liquid
- Greater risk of runoff
- Fate of first melt-water
- Runoff from frozen ground
- Avoid winter spreading

# 4. Manure Spills

# Reported manure spills (by year) in SW Ontario - 1988 to 2001



# Route to surface water of manure spills in SW Ontario 1998 to 2001



# Preventing Spills - Due Diligence - Top 6 Reasons for spills 2000/2001

- check tile outlets when spreading (13)
- create a NMP (7)
- ensure storage built properly (7)
- avoid winter spreading (4)
- setbacks to surface water (4)
- store runoff from solid manure (4)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# 5. Manure Treatment

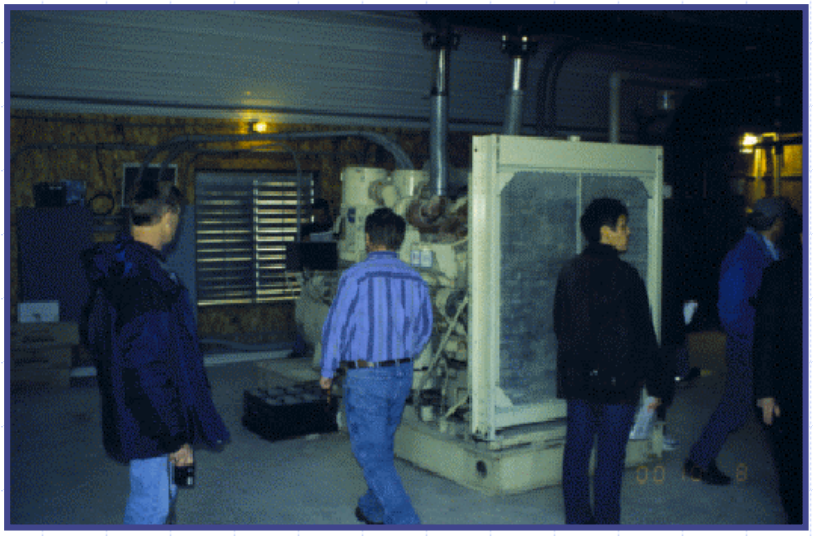
- Why?
  - Odour reduction
  - Reduce volume
  - Generate energy
  - Kill pathogens

# Manure Treatment

- Composting
  - Liquid manure
  - Odours
  - Pathogens

# Manure Treatment

- Anaerobic Digestion
  - GHG
  - Power
  - Odour
  - Pathogens



# Manure Treatment

- 2-storey barn
  - Slatted floors
  - Manure stored as solid
  - No pathogen kill
  - No macropore flow risk

# Manure Treatment

- Membrane Filtration
  - Concentration
  - Pathogens

# 6. Wildlife

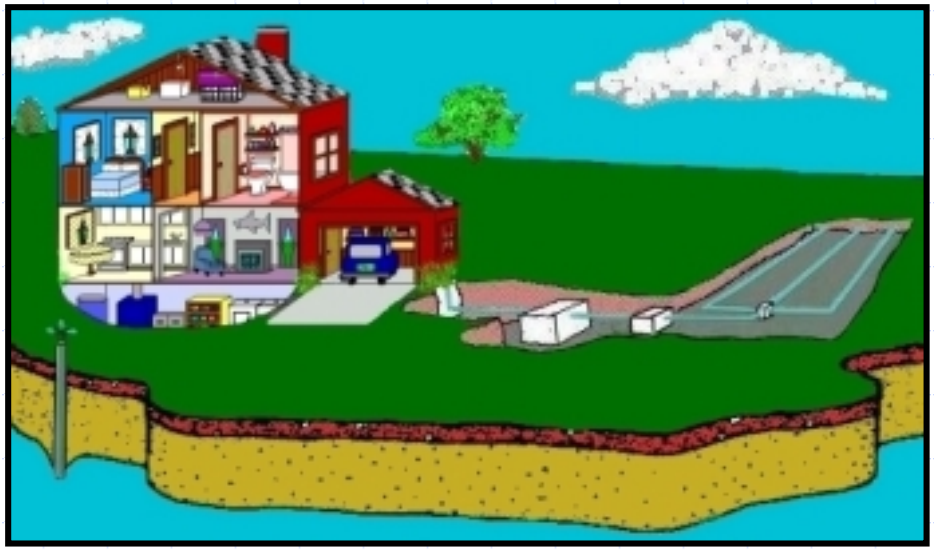
- Waterfowl – lit. review
  - Bird feces can contain pathogens
  - Time of year important
  - Density important
  - Dilution potential important

# *Cryptosporidium*

- Wildlife are contributors – surface water
- Also livestock, humans

# 7. Humans

- *Cryptosporidium* to tile drains
- Septic systems



# Summary

- Micro-organisms from variety of sources
- Lots of variability in water samples
- Disconnect any tile connections – milkhouse wastewater, septic systems

# Summary (cont.)

- Need to prevent macropore flow of manure
  - Pre-tillage most effective
- Check tile outlets after spreading liquid manure
- No winter spreading

# Summary (cont.)

- Store runoff from solid manure & yards
- Meet storage construction standards
- Observe setbacks to surface water when spreading manure

# Summary (cont.)

- Treatment options available to kill pathogens – economics?

# Web site:

- http://www.ridgetownc.com

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