Statutory Standard of Care - Safe Drinking Water Act (SDWA)

Training for Municipal Drinking Water System Owners and Decision Makers

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WCWC Walkerton Clean Water Centre
An agency of the Government of Ontario
CWAE Centre de Walkerton pour l'assainissement de l'eau
Un organisme du gouvernement de l'Ontario

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Training Materials

1) Presentation manual including supplementary and reference material
2) Guide - Taking Care of your Drinking Water - A Guide for members of Municipal Councils

- Both were developed by Advisory Group/MOE/WCWC

Course Outline

Section 1 - Introduction

- Legislation, Responsibilities and Liabilities
- Multi-Barrier Approach to DW Treatment

Section 2 - Risk Management

- Contextual Risk Management Principles
- Common Risks Facing Drinking Water Systems

Section 3 - Case Studies

- Walkerton, North Battleford, Milwaukee

Section 4 - What Do I Do Now?

- Achieving a Culture of Prevention
- Training and succession planning

Introduction

- Some of the material for this course is from a book authoured by Dr. Steve Hrudey, MD, PhD, P.Eng.

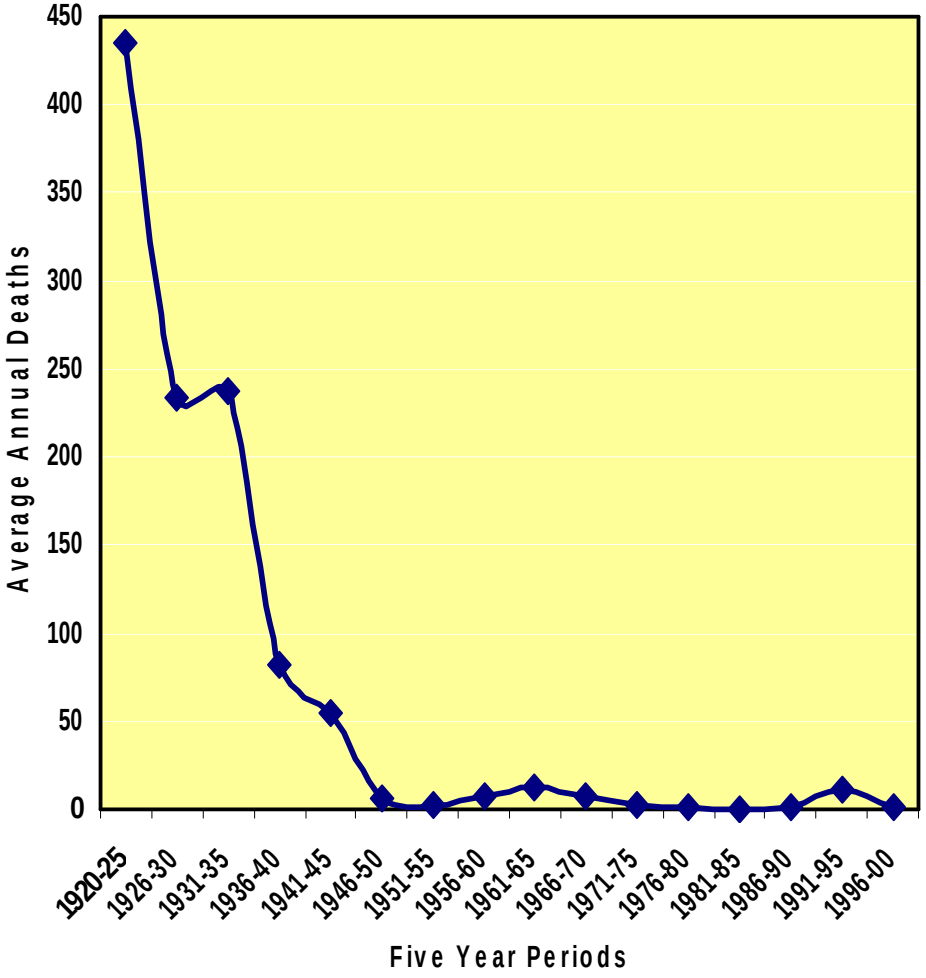
- Certificates for CEUs available - short test required

- Questions? - brian.jobb@wcwc.ca

Introduction

- Ontarians expect and are entitled to safe, high quality drinking water
- Safe drinking water is vital to public health
- Municipal officials and councillors have an important role in ensuring safe, high quality drinking water

Converting Hindsight into Foresight



- Major progress in reducing risks from waterborne disease over the past 150 years
- Society has come to take clean, safe water for granted

Three Things to Remember

1. It's Your Duty

   The Safe Drinking Water Act includes a statutory standard of care for individuals who have oversight responsibilities for municipal drinking water systems

   – Includes municipal councillors, mayors, municipal officials
   – Legal consequences for negligence, including possible fines or imprisonment
   – In-force date: December 31, 2012

Three Things to Remember

2. Be Informed - ask questions, get answers
   - – You don’t have to be an expert in drinking water operations, but you do need to be informed
   - – Your decisions can have an impact on public health
   - – Seek advice from those with expertise and act prudently on their advice

Three Things to Remember

3. Be Vigilant
   - Complacency can pose one of the greatest risks to drinking water systems
   - It is critical that you never take for granted or assume all is well with the drinking water systems under your care
   - The health of your community depends on your diligent and prudent oversight of its drinking water

Question 1

1. Do owners <u>currently</u> have an oversight duty related to their water systems?

   - ❑ Yes
   - ❑ No
   - ❑ Discuss

Section 11:
Duties of Owners & Operating Authorities

- Section 11 of the *Safe Drinking Water Act, 2002* (SDWA) describes the legal responsibilities of owners and operating authorities of municipal drinking water systems

Section 11: Duties of Owners & Operating Authorities

Owners and operating authorities are responsible for ensuring their drinking water systems:

- provide water that meets drinking water quality standards
- operate in accordance with the Act and its regulations
- are kept in a fit state of repair
- are staffed and supervised by qualified persons
- comply with:
  - sampling
  - testing
  - monitoring
  - notification
  - reporting requirements

Section 19: Your Duty and Liability – Statutory Standard of Care

- Section 19 of the SDWA extends specific legal responsibility to people with decision-making authority over municipal drinking water systems (or who oversee the accredited operating authority)
- It requires the level of care, diligence and skill that a reasonably prudent person would be expected to exercise in a similar situation
- These responsibilities should be exercised honestly, competently and with integrity with a view to ensuring the protection and safety of the public

Who does the Statutory Standard of Care apply to?

- The owner of the municipal drinking water system.
- If the municipal drinking water system is owned by a corporation (other than a municipality) every officer and director of the corporation.
- If the system is owned by a municipality:
  - every person who oversees the operating authority or makes decisions concerning the system

Enforcing the Statutory Standard of Care

- A provincial officer has the authority to lay a charge against a person to whom the standard applies and fails to carry out that duty
- Maximum penalties - $4 million fine and possible imprisonment for up to five years
- No minimum penalties established - actual penalties would be decided by the courts depending of the severity and consequences of the offence
- See pages 7 – 10 in the Guide

Safety Through the Multi-Barrier Approach

1. Source water protection
2. Effective treatment
3. Secure distribution
4. Effective monitoring
5. Effective management

- Developed for use across Canada by the Canadian Council of Ministers of Environment
- Failure in one barrier alone may not lead to an outbreak - Ontario's Drinking Water Safety Net

1. Source Water Protection

- Source protection focuses on preventing contamination of drinking water sources; achieves multiple goals
- Looks at watershed as the basic unit of planning
- Is a locally driven multi-stakeholder process
- To date, the Province has invested $190 million to build a community based program
- Current activity of local source protection committees: submission of the first source protection plans, due by August 2012

2. Treatment

- Treatment processes range from simple disinfection (secure groundwater) to highly specialized, complex technologies
- Critical role of treatment is removal and inactivation of pathogens
- Disinfection requirements are specified for each facility

3. Water Distribution & Storage

- Water will only be safe if quality is maintained to the consumer's tap
- Utilities are generally responsible for safety to the consumer's property line
- Old infrastructure increases risks; leaks can be an entry point for pathogens.
- 18% of waterborne disease outbreaks in the US were caused by distribution system deficiencies
- Critical to maintain a chlorine residual

4. Effective Monitoring

- Requirements for treated water quality compliance monitoring have increased significantly
  - Monitoring alone does not improve safety
- Continuous monitoring of chlorine and often turbidity is now required for most systems
- Alarms and automatic shut-down devices are also part of this barrier

5. Effective Management Systems

- Regulatory framework must be effective
  - Ontario takes swift, strong action on adverse water quality incidents
- Owner and management of the water system must provide effective oversight

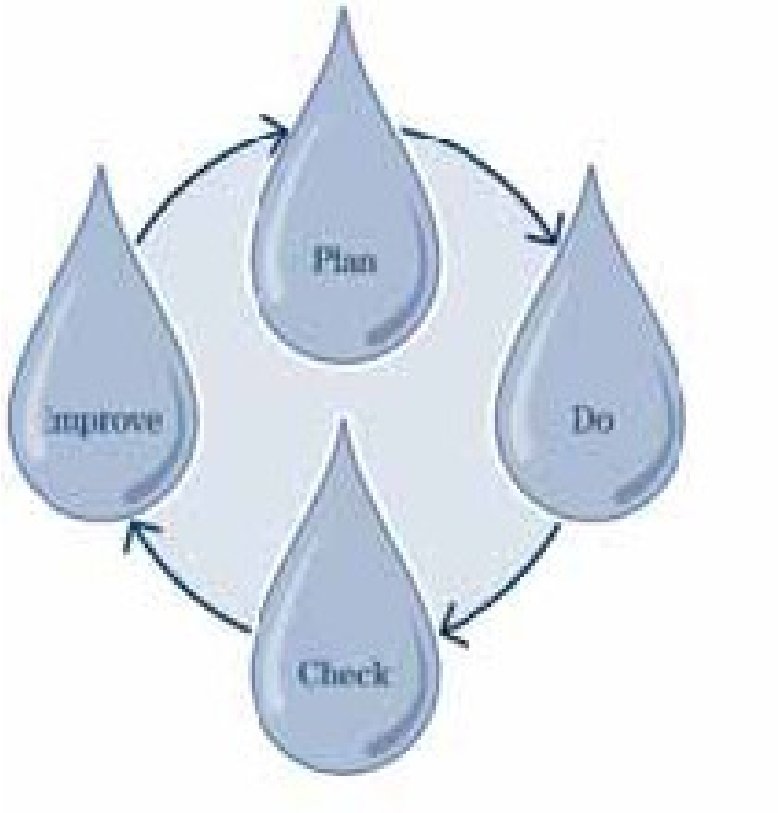
Section 2 - Risk Management

- Basic Risk Management Principles
- Common risks

Drinking Water Quality Management Standard – Your Operational Plan

The Operational Plan for your water system includes:

- Source water
- System description
- Risk assessment



What is Safe Drinking Water?

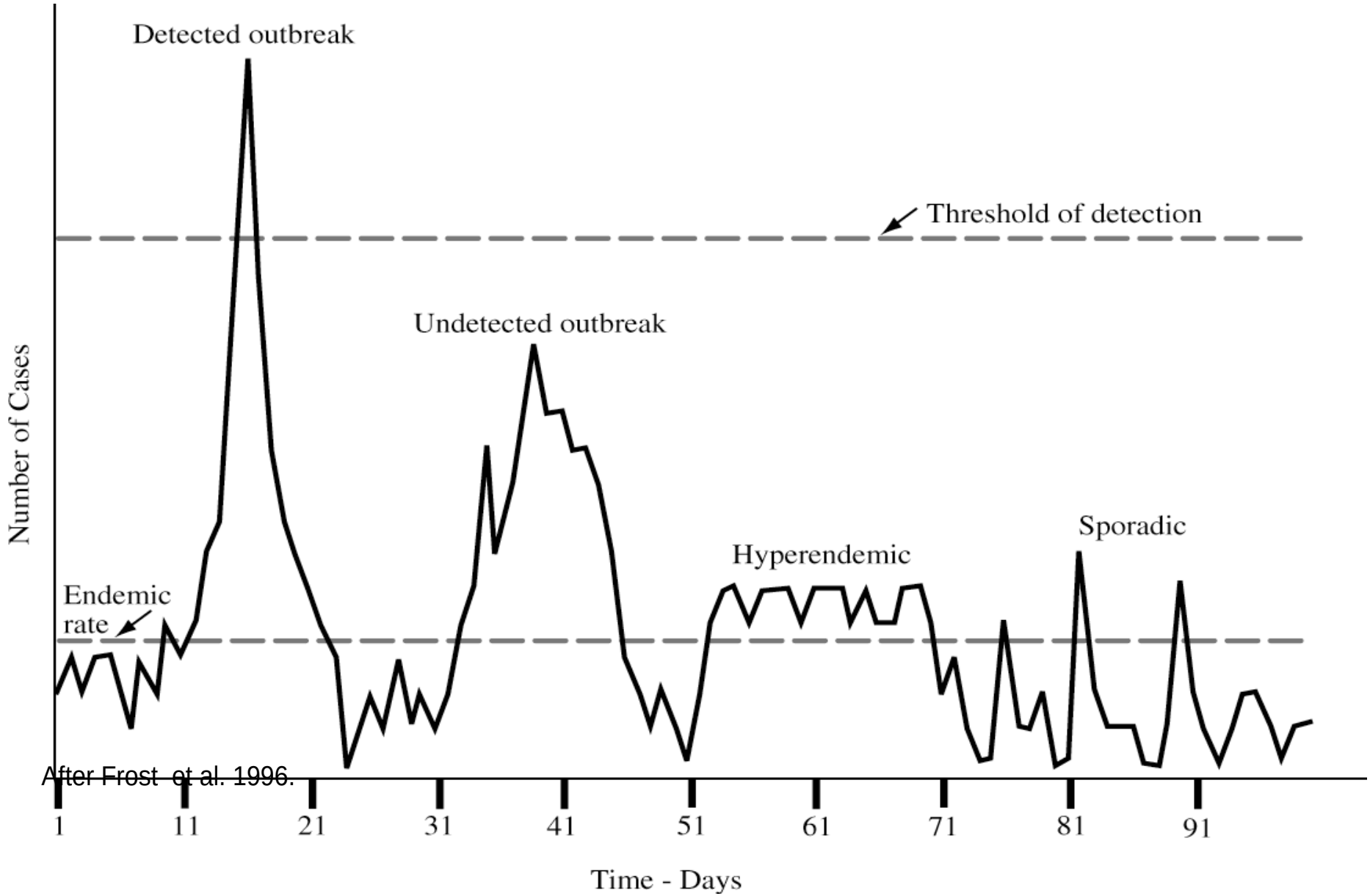
- Safety requires reduction of health risk to "*negligible*" levels

- A pragmatic concept (Hrudey & Krewski 1995):
  - "*a safe level is one that you do not need to worry about*"

Question 2

2. Has the drinking water in my municipality ever made anyone sick?

- ❑ Yes
- ❑ No
- ❑ Don’t know
- ❑ Discuss



After Frost et al. 1996.

Hazards, Hazardous Events & Risk

- Hazard: agent that can cause harm to public health (physical, chemical, biological or radiological)
- Hazardous Event**:** event that introduces a hazard, or fails to remove them from the water supply
  - Heavy rainfall (hazardous event) may introduce a pathogen (hazard) into source water
- Risk: The likelihood of a hazardous event allowing a hazard to cause adverse consequences
  - Risk includes the probability of occurrence and severity of consequences

Guiding Principles in Reducing Risk

The following must be recognized:

I. Pathogens pose the greatest risk
II. Robust multiple barriers are essential
III. Trouble is usually preceded by change
IV. Operators must be capable and responsive
V. DW professionals must be accountable to consumers
VI. Risk management = sound decision-making

Question 3

3. Are there pathogens in my drinking water source?

- ❑ Yes
- ❑ No
- ❑ Don’t know
- ❑ Discuss

I. Pathogens Pose the Greatest Risk

- Pathogens cause human disease; with most other contaminants the outcome is less certain
- Pathogens are everywhere humans and animals are found
- Pathogen sources never far from water sources
- Pathogens can be removed or inactivated

Pathogen Summary (WHO 2004)

Pathogen	Health Significance	Persistence in water	Resistance to chlorine	Relative infectivity	Important animal source
Norovirus	**High**	**Long**	Moderate	**High**	Potentially
Campylobacter	**High**	Moderate	Low	Moderate	Yes
E.H. *E.coli*	**High**	Moderate	Low	**High**	Yes
Giardia	**High**	Moderate	Moderate	**High**	Yes
Cryptosporidium	**High**	**Long**	**High**	**High**	Yes

I. Pathogens Pose the Greatest Risk

- Lesser Risks
  - High level of arsenic, fluoride, selenium, nitrate and lead pose a risk to human health
  - Many toxic chemicals (pesticides) can pose site-specific problems, but
    - they are not common
    - health risks are unclear; standards are precautionary
  - High degree of uncertainty concerning health effects of disinfection (chlorination) by-products
  - Regulations must be met!

II. Robust Multiple Barriers Are Essential

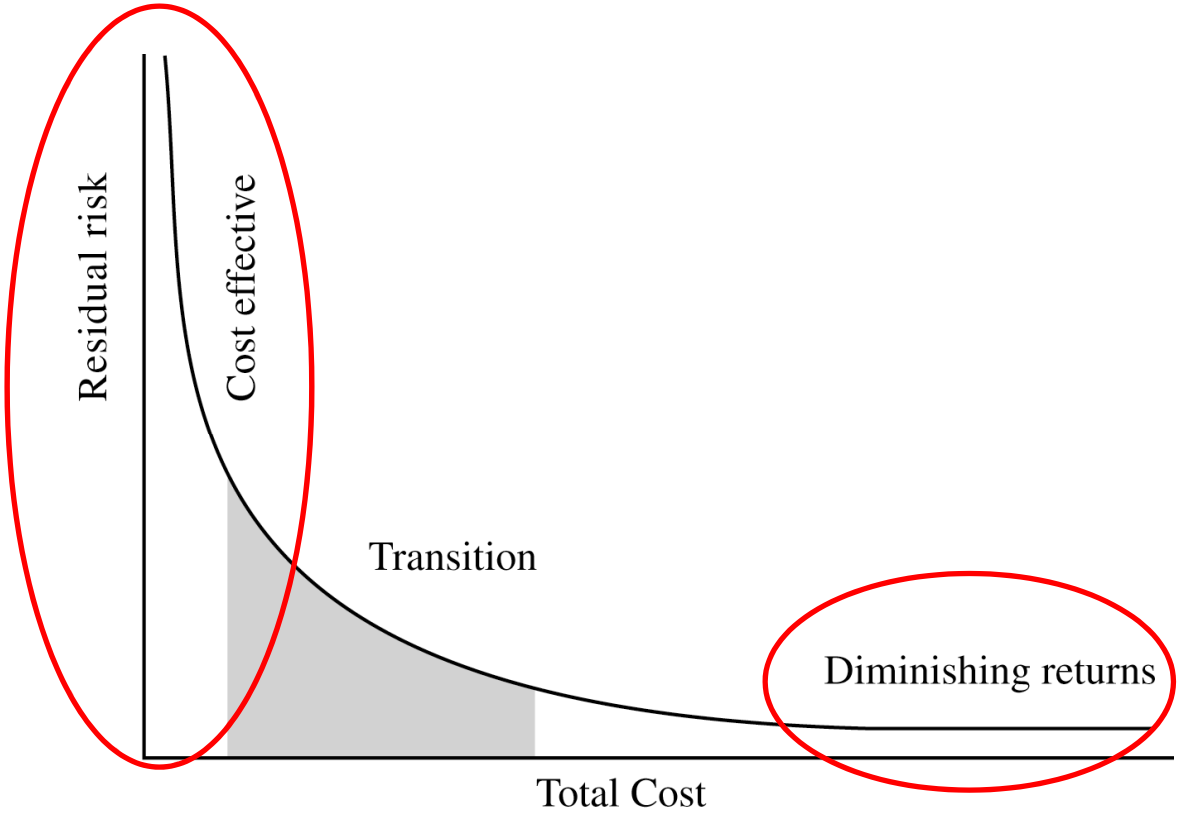
- Human error is inevitable and nature can be unpredictable
- Multiple barriers help to reduce risks of contamination to negligible levels
- Multiple barrier concept has been advocated for many decades
- Focus on barrier performance, not just compliance

II. Robust Multiple Barriers Are Essential

- Multiple barriers may seem redundant
- Politicians and senior managers are always sensitive to costs
- Multiple barriers are cost-effective if negligible risk (i.e. safe drinking water) is the goal
- Risk reduction is always linked to cost

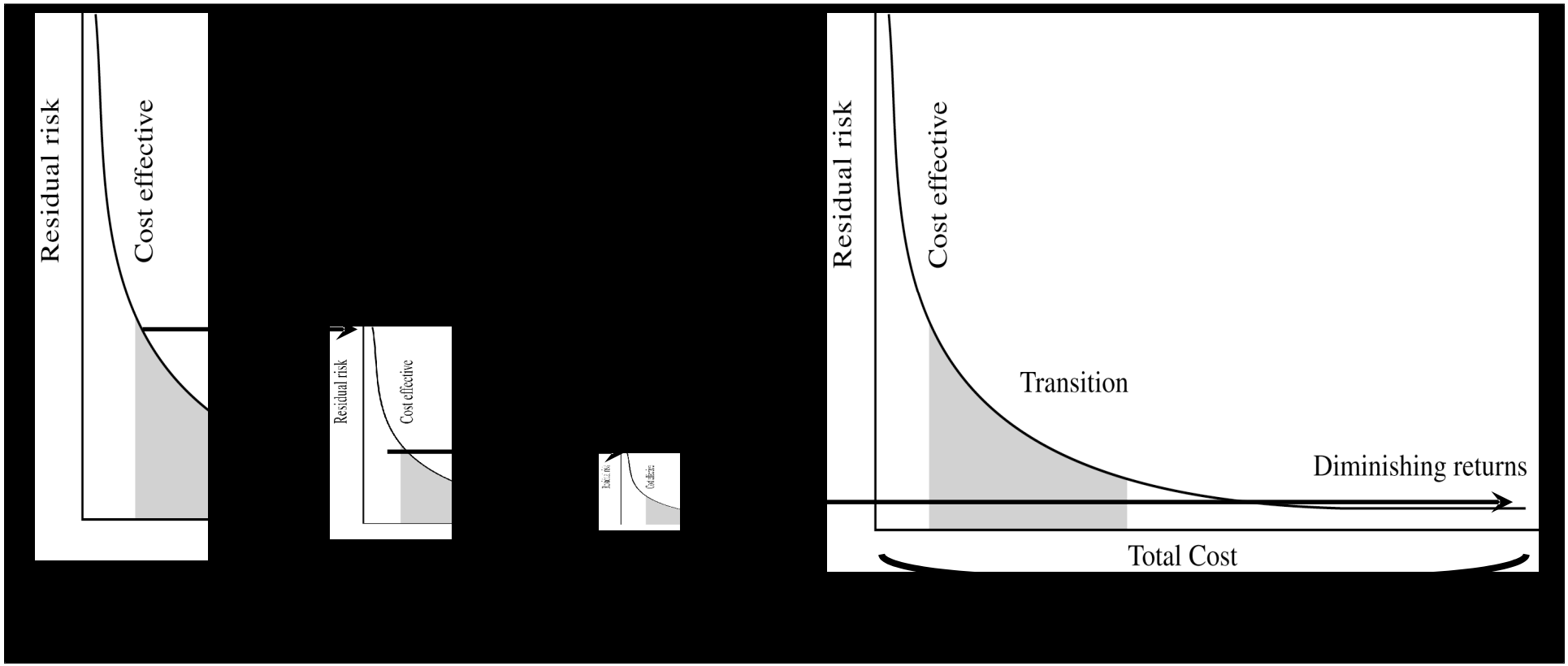
II. Robust Multiple Barriers Are Essential

- Greatest risk reduction per unit cost occurs with initial risk reduction, followed by diminishing returns



II. Robust Multiple Barriers Are Essential

- More effective to place multiple barriers in series than try to achieve all risk reduction with one barrier



III. Trouble Usually Preceded by Change

- Treatment processes function best under constant conditions; do poorly with rapid or extreme change
- 70% of outbreaks occur after extreme weather (heavy rain, severe storms, unusual conditions)
- Also be wary of changes in process or operations
- Operators must know how to respond and be able to predict problems - generally accomplished through training

IV. Operators Must be Capable & Responsive

- Blaming human error is as helpful as blaming a fall on gravity
- People make mistakes; systems must be made resilient
- Competent, well-informed and dedicated operators are the best guarantee of water safety
- Best operator is one who admits that failure could happen
- All parties need to learn from past mistakes and failures elsewhere

IV. Operators Must be Capable & Responsive

- Ontario's operator certification regulation has dramatically improved competency of operators
- Ineffective training and support will prove to be a mistake if disaster strikes
- Small systems present special challenges
- Programs to provide support for isolated small system operators are critical
- Systems without full-time operators need to establish contact with external resources

V. Drinking Water Professionals Must be Accountable

- Promote a culture of identifying trouble, not hiding or avoiding it
- Listen to consumer complaints (many outbreaks were signaled by consumer complaints)
- Management must document incidents to maximize opportunities to learn from the past
- Management must support operators and inform the owner

VI. Risk Management = Sensible Decision-Making

- Effective risk management requires:
  - being preventive rather than just reactive
  - distinguishing greater risks from lesser ones
  - deal first with greater risks
  - learn from experience

- Sensible decisions depend on a commitment to understanding your system

Risk Management Summary

- Your Operational Plan has an assessment of the risks to public health
- Understand the basics of risk assessment
- Understand the risks for your utility and the actions that are being taken

Section 3 - Case Studies

Waterborne Disease Outbreaks in:

- Walkerton, ON
- North Battleford, SK
- Milwaukee, WI

Analysis of failures of the multi-barriers

Case Study 1

Walkerton May 2000

Scope of Outbreak

Walkerton, 2000

- A shallow groundwater well was heavily contaminated by bacteria from cattle manure from a local farm
- More than 2300 individuals were estimated to have illness, caused by the bacteria *E. coli* O157:H7 (60%) and *Campylobacter* spp. (40%)
- 65 were hospitalized, 27 developed hemolytic uremic syndrome (HUS) and 7 died
- A $9 million public inquiry led by Justice Dennis O'Connor was called to:
  - Determine the causes
  - Recommend actions

The Events of May 2000, Walkerton

- Walkerton experienced heavy rains during the 2nd week of May 2000
- Lab called the General Manager (GM) to advise that water samples failed and faxed the results
- On three occasions, GM assured Health Unit that the water test results were OK
- The first (of 7) victim died the 3rd week of May 2000

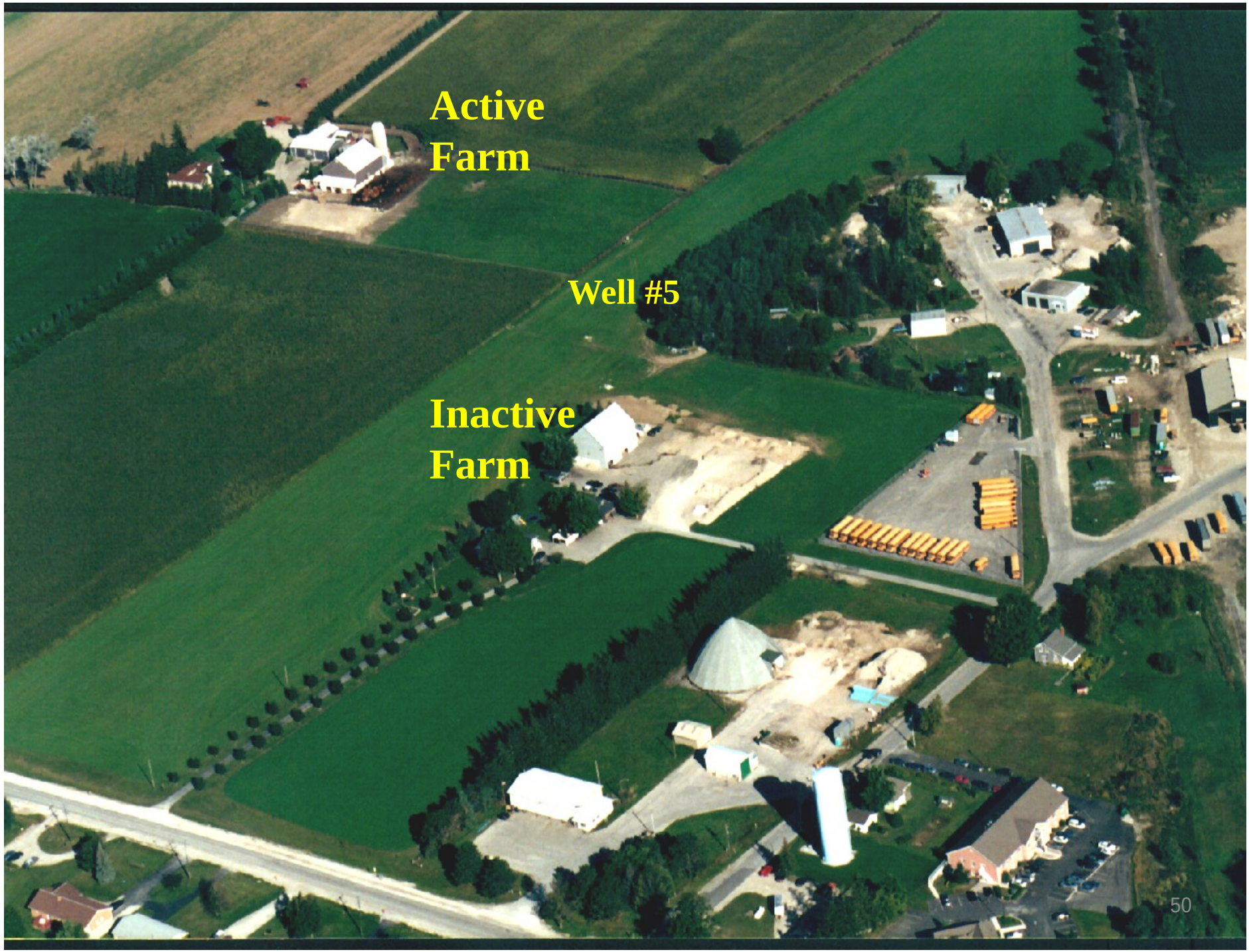
Saugeen River, Walkerton before & during storm

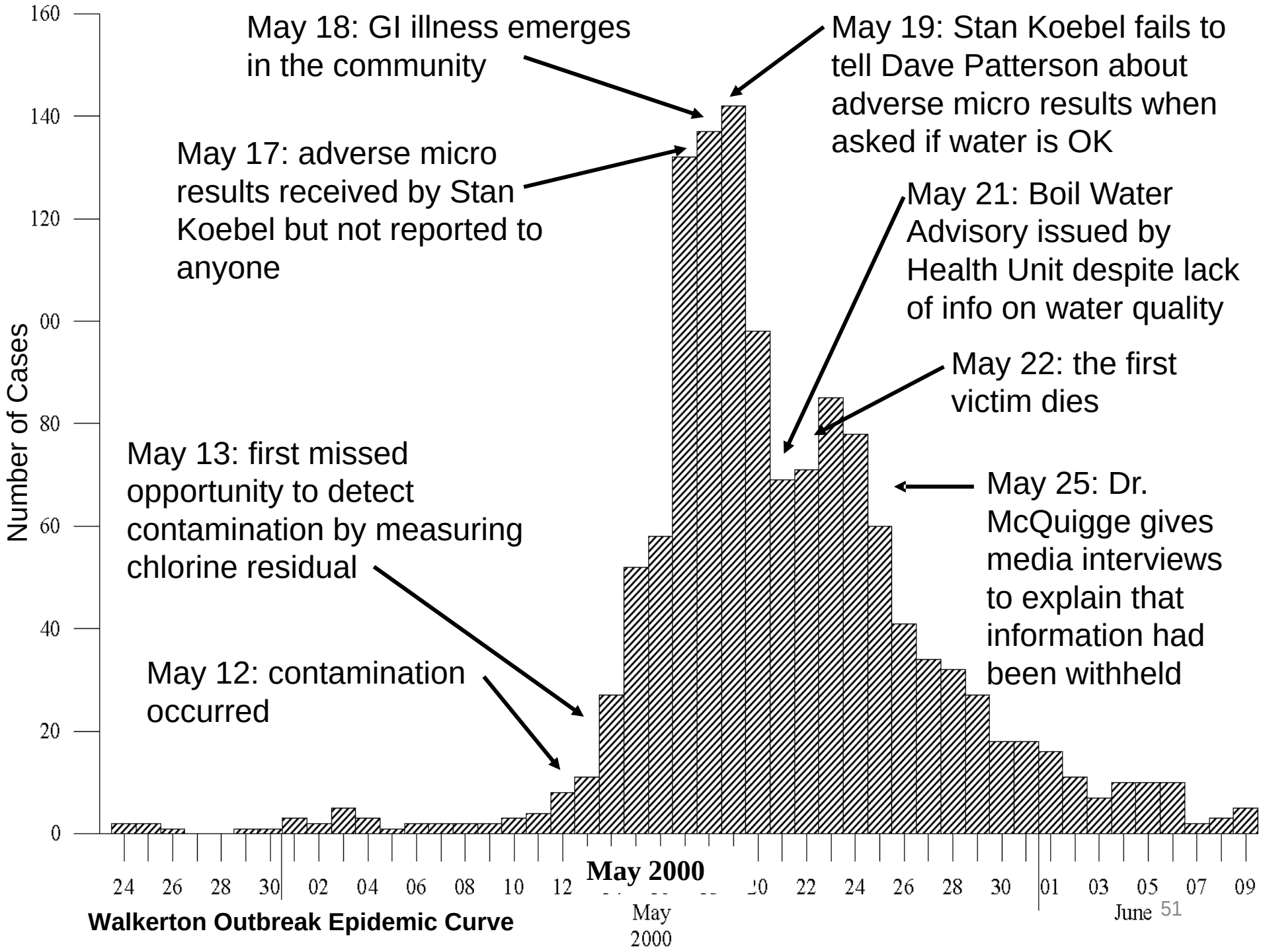
Photos by George & Susan Magwood, Walkerton

Causes of the Outbreak

Walkerton, 2000

- Well 5 (1978) was contaminated during the initial and subsequent testing
- Despite problems, no MOE inspections in the 1980s
- DNA analysis of bacteria from human victims matched with manure samples from the farm
- Chlorine (disinfection) was not being applied properly
- Investigation showed that water levels in nearby surface ponds dropped when Well 5 was operating
- Well 5 was used to obtain soft water at low cost


Active
Farm
Well #5
Inactive
Farm



Walkerton Outbreak Epidemic Curve

Summary Analysis of Failures
Walkerton, 2000

1. Source Water Protection
   - Well 5 was known to be contaminated 22 years before the outbreak
   - Geology of Well 5 made it highly vulnerable to surface contamination:
     - Clear indicators of vulnerability were ignored

Summary Analysis of Failures

Walkerton, 2000

2. Treatment
   - Chlorine is needed for disinfection – only treatment step for this system
   - Operators did not measure chlorine residual properly
   - Chlorine dosing was inconsistent and less than required

Summary Analysis of Failures

Walkerton, 2000

3. Distribution & Storage

   – Many distribution and storage vulnerabilities found but none were significant contributors to outbreak

Summary Analysis of Failures

Walkerton, 2000

4. Monitoring

   – Daily chlorine residual was not done or was done improperly (always 0.5 or 0.75 mg/L)

   – Monthly samples were often intentionally mislabelled

   – Laboratory reported microbiological contamination to GM only (not to the Health Unit)

Summary Analysis of Failures

Walkerton, 2000

5. Management
   - Owner (Council/PUC) did not provide sufficient oversight – previous bad samples and issues raised by MOE
   - Falsified data and lack of staff training
   - System not maintained
   - Regulator also partly failed in its oversight role in terms of Inspections/approval of well 5

Concluding Thoughts

Walkerton, 2000

- O’Connor Inquiry - “failure at all levels”
- Complacency was evident at most levels
- Multiple factors came together to cause disaster
- Well 5 had been vulnerable for 22 years
- Outbreak could have been reduced or prevented by measuring chlorine residual and responding

Concluding Thoughts

Walkerton, 2000

- Microbiological contamination should have been reported to the Health Unit and the Ministry of the Environment (now required)
- Estimated cost of outbreak - $72 million
- Approximate cost of system upgrades - $10 million

Question 4

4. How would you have acted differently than the council in Walkerton?

- ❑ Discuss

Case Study 2

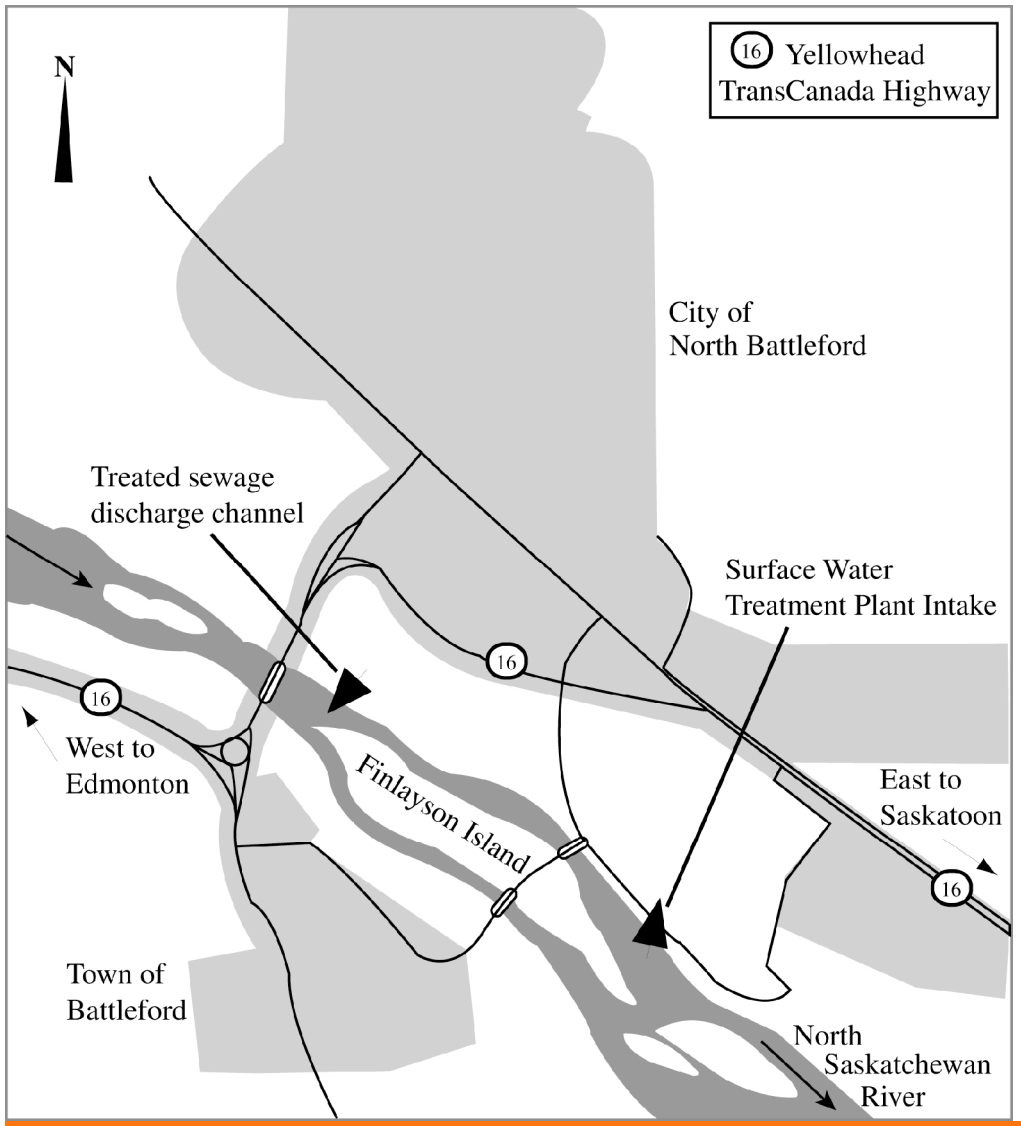
North Battleford March/April 2001

Scope of Outbreak

North Battleford, 2001

- In spring 2001, the raw water serving the City of North Battleford (pop. ~15,000) was contaminated by the protozoan parasite *Cryptosporidium*
- *Cryptosporidium* originated in the City's sewage outfall ~3.5 km upstream of the intake
- An estimated 5,800 to 7,100 in the region experienced illness
- A public inquiry by the Honourable Robert Laing was called to investigate the causes of this outbreak

The North Battleford Water System



- N. Saskatchewan River source known to have high levels of *Cryptosporidium* in spring thaw (manure from cattle operations)
- The water intake was ~3.5km downstream from the City's sewage outfall


sewage outfall
North Saskatchewan River
drinking water intake

Events in North Battleford

- History of sewage treatment problems and influence of sewage on water treatment plant
- Plants foreman takes stress leave then announces early retirement prior to outbreak
- Boil water advisory called in September 2000 due to coliform bacteria and low chlorine residual
- After foreman retires, inexperienced operators performed poorly-timed maintenance in March 2001

Direct Causes of the Outbreak

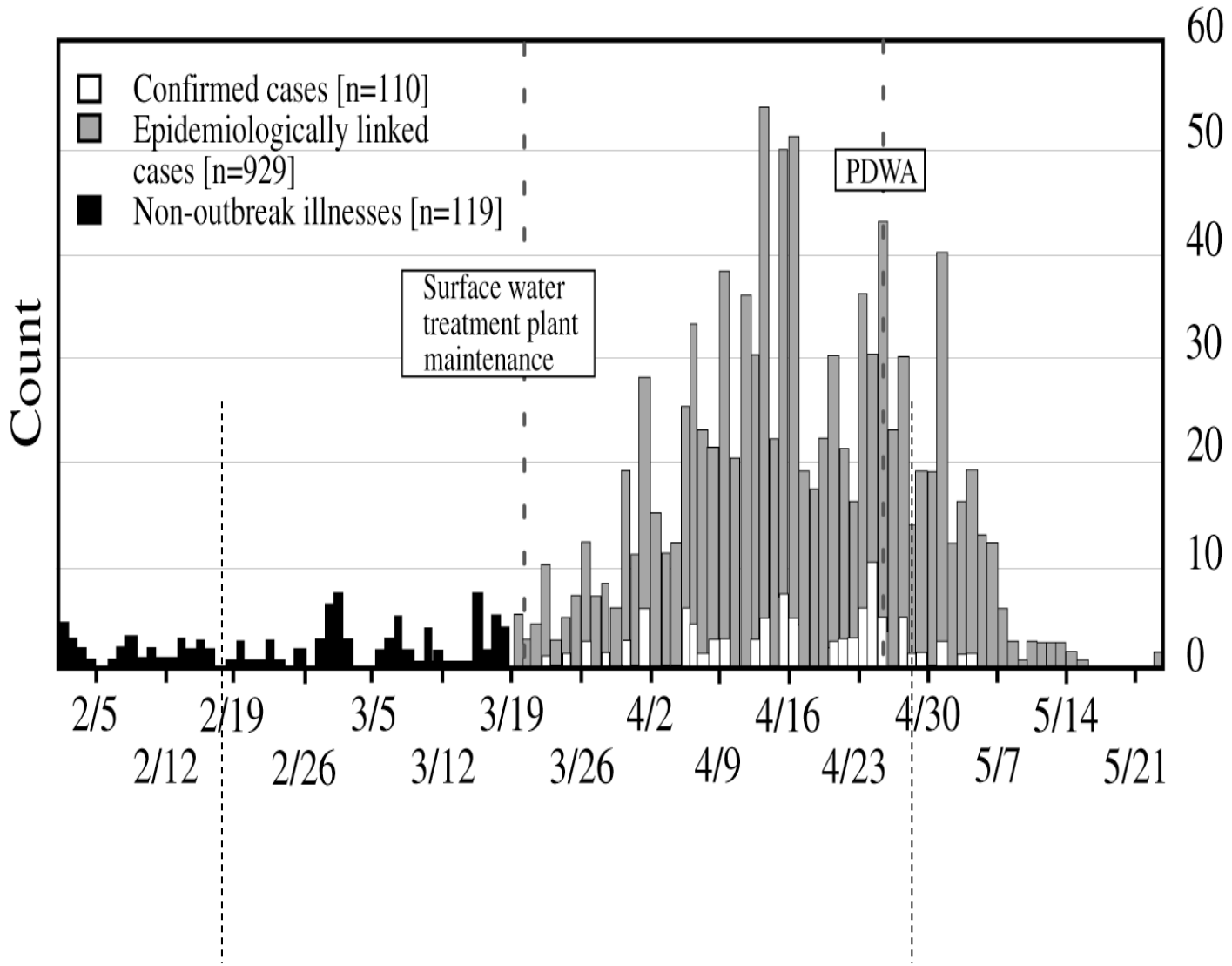
North Battleford, 2001

- The plant supervisor retired in December 2000, after a previous stress leave
  - Unable to convince management to invest in sewage and water treatment upgrades

- The water treatment plant used chlorination (ineffective for *Cryptosporidium)* so particle removal the only potential safety barrier

- Improper repair by junior staff compromised particle removal

North Battleford Outbreak, 2001



Direct Causes of the Outbreak

North Battleford, 2001

- Direct cause was sewage contamination of raw water
- *Cryptosporidium* in sewage increased as outbreak emerged, further contaminating the source
- Operations at the plant were inadequate but operators were trying to improve practice and reduce risks
  - Politicians and senior managers rejected attempts at improvement
- Regulatory neglect by the province

Summary Analysis of Failures

North Battleford, 2001

1. Source Water Protection
   - No watershed protection program
   - Long history of poor sewage treatment practice (warnings dating back to 1963)
   - No action taken on past problems
   - The city continued to dispute the sewage theory even after it was essentially proven

Summary Analysis of Failures
North Battleford, 2001

2. Treatment
   - Chlorination alone not adequate for a raw water contaminated by *Cryptosporidium*
   - Timing of equipment repair was poor
   - Poor particle removal (for weeks) should not have been tolerated
   - Inexperienced operators did not understand:
     - Risks and limitations of their treatment system

Summary Analysis of Failures

North Battleford, 2001

3. Distribution and Storage

   - No deficiencies noted

4. Monitoring

   – Operators did not perform tests required to optimize treatment processes
   – Not equipped to measure particle removal (turbidity) from individual filters
   – Operating procedures were outdated

Summary Analysis of Failures

North Battleford, 2001

5. Management

   – Owner failed to provide sufficient resources to run the system

   – Regulatory neglect

   – The communications between public health, the city and the province were not effective.

     • This delayed identification of outbreak and the issuing of a boil water order

Concluding Thoughts

North Battleford, 2001

- As with the Walkerton case study, the inquiry revealed failure at all levels
- Unlike Walkerton, there was evidence that operators were trying to improve water safety but were frustrated by management and politicians
- There was little evidence that lessons had been learned from previous failures
- This case is a clear demonstration of the need for the multi-barrier approach

The Environmental Law Association:

- *"… what became clear was that the people of North Battleford were let down…"*
- *Refusal to spend money on the system, despite large contingency fund*
- *Provincial government was aware of problems, but hadn't inspected the plant in ten years*
- *Inexperienced operators were unable to heed the warning signs*
- Out-of court settlements totaling $3.2 million
- Improvements to the water system cost $600,000

Question 5

5. As a councillor in North Battleford, is there anything I could have done to prevent the outbreak?

- ❑ Discuss

Case Study 3

Milwaukee March/April 1993

Scope of Outbreak

Milwaukee, 1993

- In March & April 1993, Milwaukee, Wisconsin experienced a massive waterborne disease outbreak
- Two modern plants with full conventional treatment
- More than 400,000 cases of *Cryptosporidium*, 4,400 hospitalizations and 50 deaths
- The threat to conventional water treatment plants posed by *Cryptosporidium* was not recognized
- This disaster led to new requirements for drinking water treatment
  - Raised awareness of *Cryptosporidium*
  - Forced the re-evaluation of conventional treatment

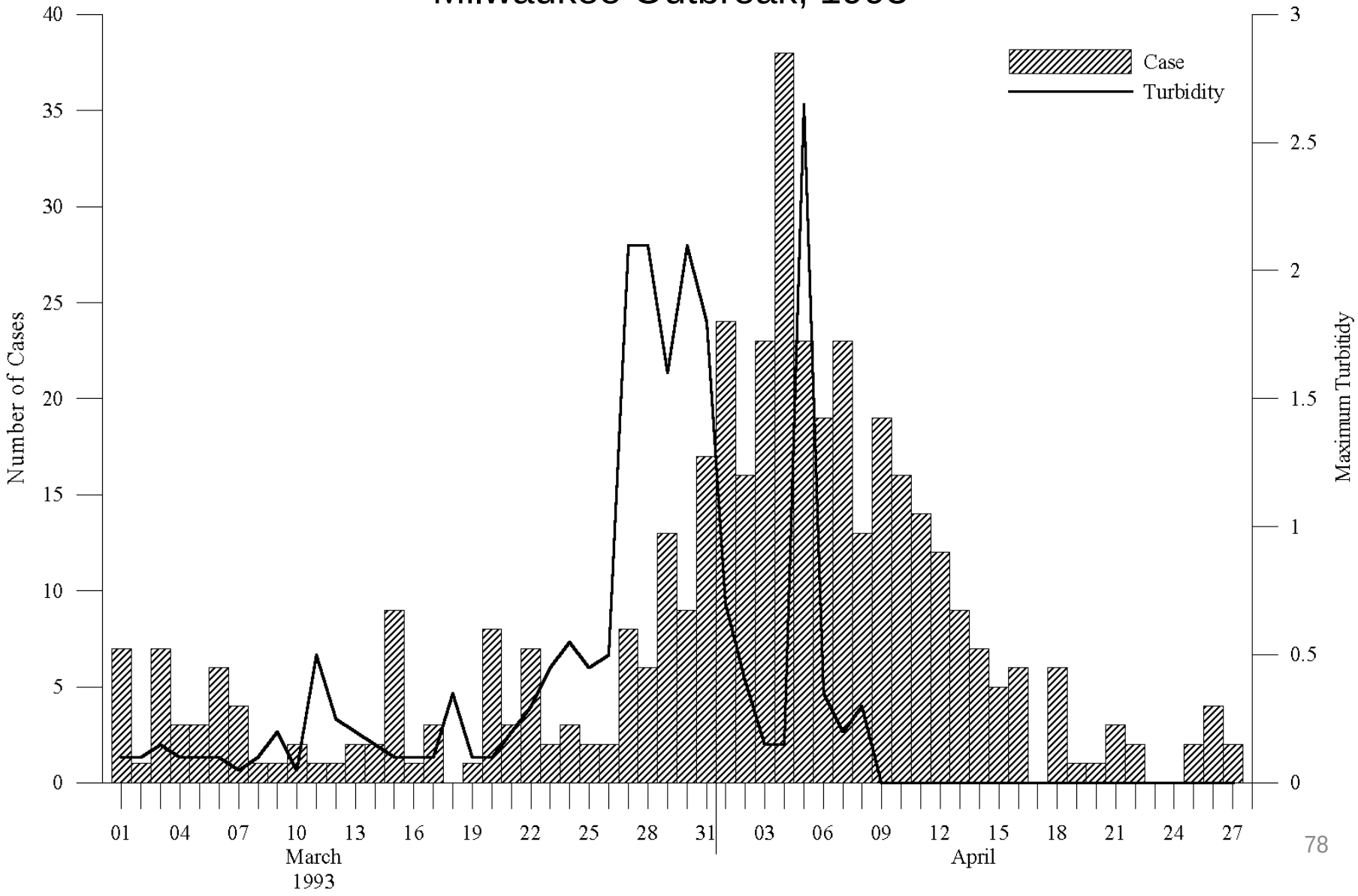
Causes of the Outbreak

Milwaukee, 1993

- Poor treatment system performance (coagulation and clarification) during a winter storm
- Switching coagulation chemicals contributed to poor clarification performance
- A spike in consumer complaints was recorded, but not acted on
- Milwaukee had long history of pollution, including 3 previous documented outbreaks
- Best practices for filtration not followed; high finished water turbidity recorded

Epidemiological Evidence

Milwaukee Outbreak, 1993



Summary Analysis of Failures

Milwaukee, 1993

1. Source Water Protection

   – Pollution of Milwaukee Harbour by sewage and agricultural waste had been a controversial issue since the early 1900s

   – Construction delayed in the 1930s due to a court challenge from large industrial water users concerned about cost

   – Previous disease outbreaks in Milwaukee occurred during severe winter storms

Summary Analysis of Failures

Milwaukee, 1993

2. Treatment
   - No specific treatment for *Cryptosporidium*, just chlorination
   - Warnings about backwash recycle had not been recognized or followed
   - New coagulation chemical introduced months earlier - cold water performance was not adequate

Summary Analysis of Failures

Milwaukee, 1993

3. Distribution & Storage
   - No treated water distribution or storage deficiencies were identified

4. Monitoring
   - Raw water monitoring for only total coliforms did not detect outbreak = inadequate
   - Finished water turbidity monitoring was not being performed on individual filters

Summary Analysis of Failures

Milwaukee, 1993

5. Management
   - Both owner and regulator failed in their oversight roles (e.g. Lack of recognition of resistance of *Cryptosporidium* to chlorine and little recognition of past events)
   - But public health officials did identify the outbreak just before the peak in diarrhea cases, issued a boil water advisory and temporarily shut down the plant

Concluding Thoughts

Milwaukee, 1993

- Water industry failed to pay attention to expert advice (from the UK) concerning *Cryptosporidium*
- Milwaukee had lost sight of its long history of drinking water outbreaks
- Failure to investigate the cause of a spike of customer complaints = lost valuable time
- Process change must always be piloted and operators properly trained on procedures
- Estimated cost of outbreak > $100 million

Summary - Case Studies

- Fecal contamination and pathogens are everywhere
- Some pathogens are difficult to treat - *Cryptosporidium* seemed like an obscure risk until the 1993 Milwaukee outbreak
- There may be long periods of apparent safety followed by "*surprising*" disaster - Complacency can arise because waterborne outbreaks are relatively rare
- Relaxation of vigilance can lead to disaster
- Multiple factors must usually align to cause an outbreak - Effective multiple barriers are critical

Section 4 - What Next?

Practical steps to become more informed about drinking water and the systems you oversee.

Achieving a Culture of Prevention

- Actively promote informed vigilance
- Ensure good internal and external communications
- Promote a mentality of continuous improvement
- Promote the understanding of the entire system
  - Challenges and limitations
- Always maintain robust multiple barriers

Achieving a Culture of Prevention

- Commitment to turning hindsight into foresight (Learn from the past)
- Must also recognize new risks and threats (training)
- Ensure that all staff understand that they are entrusted with protecting public health
- Operational personnel should be given the status, training and compensation comparable with their responsibilities as guardians of the public's health
- Provide sufficient resources

Question 6

6. If we have a modern drinking water plant do I have to worry about the safety of our drinking water?

- ❑ Yes
- ❑ No
- ❑ Don’t know
- ❑ Discuss

MOE Inspections

- Municipal residential drinking water systems inspected annually by MOE
- Inspection includes:
  - Source water
  - Treatment processes
  - Distribution components
  - Water quality monitoring procedures and practices

MOE Inspections

- An inspection report will highlight areas of non-compliance and required corrective actions
- The report includes an inspection rating to compare current and past performance and areas for improvement
- Review this report and the actions being taken to respond

Training and Succession Planning

- Ensure that operational staff receive meaningful training - confirm that you have a training plan
- Training may need to go beyond regulated CEU requirements to address operator needs
- A significant number of licensed operators in Ontario will be eligible to retire over the next 5 years
- It will take several years to train a new operator - you may need a succession plan

Summary - What Should You Do?

- Foster Competence
- Eliminate Complacency
- Instil a Culture of Prevention
- Learn from Past Mistakes
- Emphasize Good Practice
- Promote Continuous Improvement
- Provide Sufficient Resources

3 Things to Remember

- It’s your duty
- Be informed
- Be vigilant

Thank You!

Questions? - brian.jobb@wcwc.ca

Additional Reference Materials

- MOE Drinking Water Ontario
- Health Canada
- Walkerton Clean Water Centre Courses www.wcwc.ca
- USEPA
- AWWA
- WHO
- New Zealand Ministry of Health
- Australian Drinking Water Guidelines

Questions you should be able to answer

- Do you know when to call for help?
- Do you know who to call for help?
- Do you and/or your operational personnel fully understand your system?
- Is there any historic evidence of waterborne disease outbreaks?
- Have you ever had any adverse results and if so have corrective actions been taken?
- Do you have a process for responding to and following up on consumer complaints?

Questions you should be able to answer

- Is your treatment process effectiveness affected by heavy rainfall and/or snowmelt?
- Do you talk/meet regularly with the local health unit?
- Is your source water susceptible to contamination?
- Do your operators have trouble with the treatment process in the spring and/or fall?
- Am I acquainted with the drinking water legislation and regulations?
- Do I know the minimum standards for drinking water?

Questions you Should be Able to Answer

- Do I know basic information about drinking water safety and the operation of water works facilities?
- Am I familiar with our municipal drinking water systems - have I had a tour?
- Do I know how to set the overall policy direction for the municipal drinking water system?
- Do I understand the different roles and responsibilities of decision-makers:?
  - Mayors and municipal councilors
  - Senior management
  - Other municipal officials?

Questions you Should be Able to Answer

- Am I assured of competent operators and senior management?
- Are regular performance appraisals conducted?
- Do I ask for periodic annual reports on the drinking water system from senior management?
- What should I look for in the annual report; what questions must it answer?
- Are our drinking water systems periodically audited?
- What should I do when I receive audit results for consideration?

Questions you Should be Able to Answer

- What should I do if a report identifies a problem?
- How do I determine that appropriate steps are being taken; when outside expertise is needed?
- What are the risks currently facing our drinking water facilities and infrastructure? What are the plans to address these risks?
- Are our drinking water systems financially sustainable for the future? Are there financial plans in place?
- Are there procedures in place for an emergency?

Risk Management Checklist

1. Determine required support/guidance
2. Identify barriers to contamination
3. Identify events that may introduce problems
4. Identify causes, preventive measures, checks and corrective actions
5. Decide on where improvements are needed

Risk Management Checklist

6. Decide on the order of improvements
7. Develop a timetable for improvements
8. Identify links to other quality systems
9. Prepare contingency plans
10. Determine method of performance assessment
11. Decide on communication policy and needs

WHO Water Safety Plans (WHO 2008)

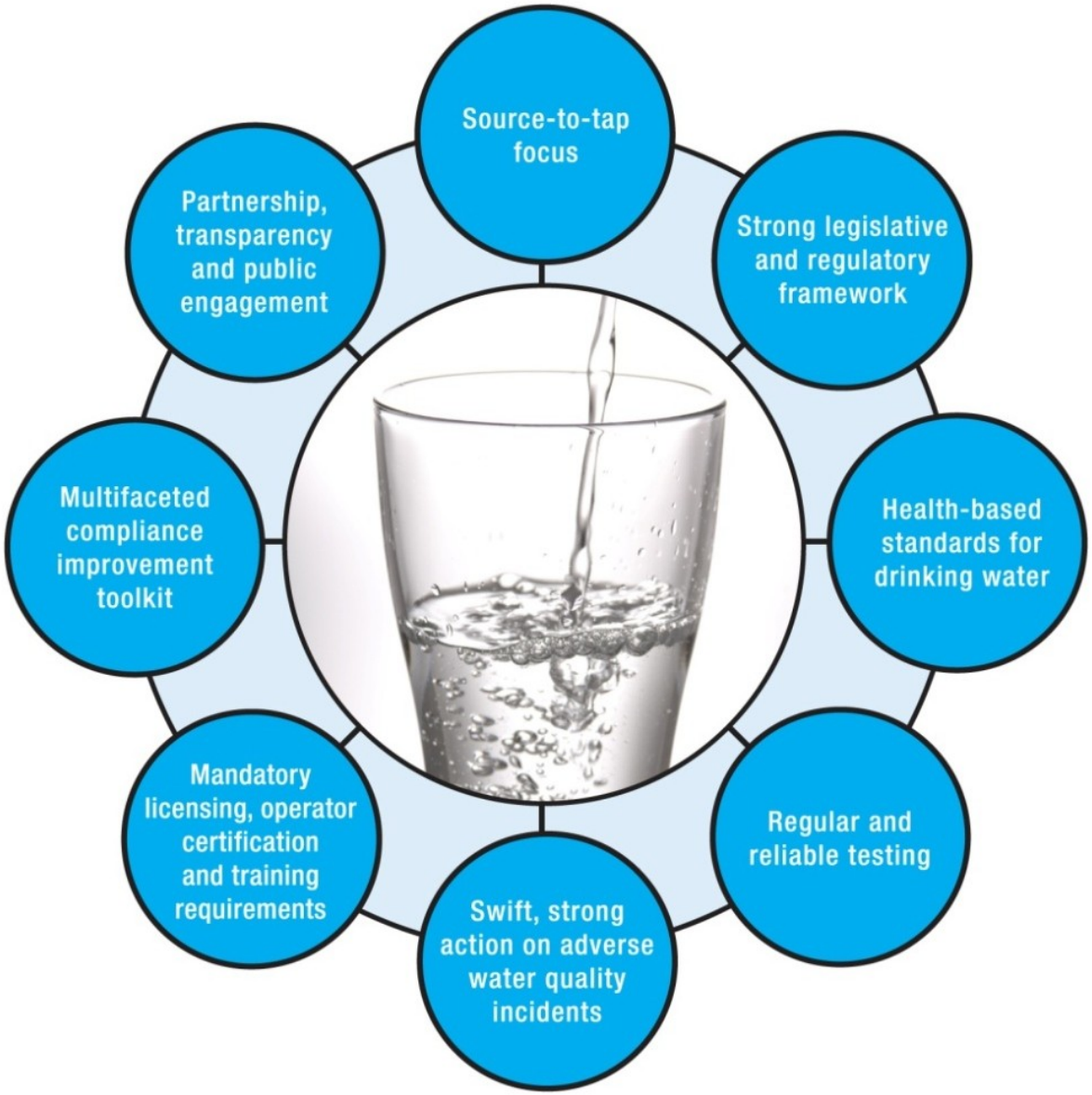
www.who.int/water_sanitation_health/publication_9789241562638/en/index.html

1. Assemble WSP team
2. Describe the water supply system
3. Identify hazards, hazardous events & assess risks
4. Determine control measures, reassess & prioritize risks
5. Develop, implement and maintain an upgrade plan
6. Define monitoring of control measures
7. Prepare management procedures
8. Develop supporting programs
9. Periodic planned review
10. Revise WSP following an incident

Ontario's Drinking Water Protection Safety Net

- A source-to-tap focus
- A strong legislative and regulatory framework
- Regulated health-based standards for drinking water
- Regular and reliable testing
- Swift, strong action on adverse water quality incidents
- Mandatory licensing, operator certification and training requirements
- A multi-faceted compliance improvement tool kit
- Partnership, transparency and public engagement.

Ontario's Drinking Water Protection Safety Net



Municipal Drinking Water Licensing Program

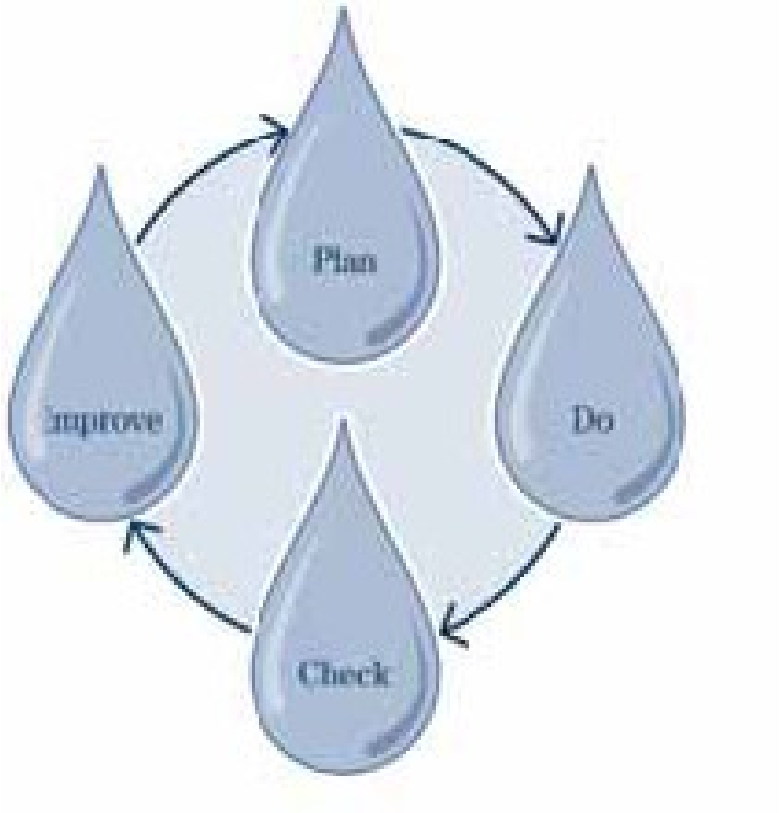
- Encourages owners and operators to incorporate “quality” into operation and management

- In order receive a licence the owner and operator must have in place:
  - a drinking waterworks permit
  - an accepted operational plan
  - an accredited operating authority
  - a financial plan, and
  - a permit to take water.

DWQMS - Part of Operational Plan

What is already being done (Under DWQMS)

- Water Quality Reporting
- Infrastructure Planning
- Emergency Planning
- Financial Planning
- Water Conservation



Source Water Protection

- Source protection under the *Clean Water Act* (CWA), proclaimed in 2007, is the first step in Ontario's multi-barrier approach to safeguarding drinking water for our communities and our health

- The CWA program delivery model is based on a strong community role (Provincially financed) for planning and a private property owner, municipal and crown role for implementation:
  - The program is delivered through collaboration between the Province and local communities

- The Province has invested over $190 million building a community based program to meet Justice O'Connor's recommendations to protect drinking water at the source

- The CWA enables communities to protect their drinking water supplies through the development of collaborative, locally driven, science based assessment reports and source protection plans

- The preparation of source protection plans builds on the work that many municipalities, conservation authorities and stakeholders are already doing in the watershed - leveraging local knowledge, expertise and authority

Source Water Protection..cont'd

- This has been achieved through innovative partnerships between >450 local participants in source protection committees (SPCs), conservation authorities and municipalities
- There are 38 source protection areas across the province delineated on a watershed basis - generally based on existing conservation authority boundaries
- The 38 areas are divided into 19 source protection areas or regions, each with a locally-based SPC comprised of **1/3 municipal representatives**; 1/3 industrial, agricultural and business; and 1/3 health, environment, and public interests
- Each SPC is tasked with developing a terms of reference, assessment report and a source protection plan for each source protection area, in consultation with local stakeholders and municipalities
- SPCs are on track to ensure that substantive measures to protect **municipal drinking water supplies** serving 80% of Ontario's population can be implemented in 2013
- Municipalities can play a key role in setting these measuresby participating in policy drafting and will likely play a leadership role in their implementation