

Responsibilities Under the Statutory Standard of Care – Safe Drinking Water Act

**Training for Municipal Drinking Water System
Owners and Decision Makers**

Training Materials

Developed by Advisory Group of
Mayors, Councillors and stakeholders

- 1) Presentation manual
- 2) Guidebook for elected officials
(hardcopy or online)



Course Outline

Introduction

- Legislation, Responsibilities and Liabilities
- Multi-Barrier Approach

Risk Management

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

Case Studies

- Walkerton, North Battleford, Flint, Stratford

What Do I Do Now?

- Achieving a Culture of Prevention
- Training and succession planning

Section 1 - Introduction

- Safe drinking water is vital to the health and economy of the community
- Ontario residents expect and are entitled to safe, high quality drinking water
- Municipal officials, councillors and managers have a direct legal responsibility for ensuring safe, high quality drinking water

Three Things to Remember

1. **It's your duty** to ensure safe drinking water
 - The Statutory Standard of Care is part of the Safe Drinking Water Act, 2002
 - It applies to those with decision-making responsibility for a municipal drinking water system or those who oversee the system's operating authority:
 - Councillors, mayors, senior municipal officials
 - Legal consequences for failing to carry out the duty, including possible fines or imprisonment

Three Things to Remember

2. Be Informed

- You don't have to be an expert, but you need to be informed
- You should be asking questions and getting answers
- 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
- Never simply assume that all is well with the drinking water systems under your care
- The health of your community depends on diligent and prudent oversight

Question 1

- Aside from the Standard of Care, do owners have any oversight responsibilities 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
- This has been in effect since 2002



Section 11: Duties of Owners & Operating Authorities

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

- meet drinking water quality standards and are operated in accordance with the SDWA and its regulations
- are properly maintained
- are staffed and supervised by qualified, trained persons
- comply with requirements for:
 - sampling, monitoring & testing, notification & reporting

SDWA Section 19: Your Duty and Liability

- Specific legal responsibility for decision-makers that oversee municipal drinking water systems or operating authorities
- In-Force date: December 31, 2012
- It requires the level of care, diligence and skill that a reasonably prudent person would be expected to exercise in a similar situation
- Honesty, competence and integrity required

Who does the Statutory Standard of Care apply to?

- The owner of the municipal drinking water system (typically the municipal corporation)
- If the municipal system is owned by a corporation other than a municipal corporation, every officer and director of that corporation
- If the municipal system uses an operating authority, anyone who oversees or makes decisions concerning the operating authority

Enforcing the Statutory Standard of Care

- A provincial officer can lay a charge against a person to whom the standard applies
- Maximum penalties - \$4 million fine and possible imprisonment for up to five years
- Actual penalties would be decided by the courts depending of the severity and consequences of the offence

Safety Through the Multi-Barrier Approach

1. Source water protection
 2. Treatment
 3. Distribution
 4. Monitoring
 5. Management
- Failure of a single barrier alone may not lead to a disaster
 - Historically, disease outbreaks have occurred when two or more barriers fail

1. Source Water Protection

- Source protection plans are mandatory for municipal residential drinking water systems within Ontario's source protection areas
- Plans are being implemented to manage the risks to quality and quantity of municipal drinking water sources
- Municipalities are responsible for implementing many of the policies in these plans
- Failure to implement these policies could put your drinking water systems at risk

1. Source Water Protection

- Any new or expanded municipal drinking water system in a source protection area is subject to Regulation 205/18, under the Safe Drinking Water Act, 2002
 - Owners must ensure these new systems are included in the local source protection plan before providing drinking water to the public

Source Water Protection cont'd.

- Source Protection Information Atlas – available through Ontario.ca:
 - Interactive mapping tool
 - Shows areas that are vulnerable to contamination
 - Indicates where local source protection plan policies apply
- Materials available through Conservation Ontario to help implement education and outreach policies
- Legislated training is provided by the Province for appointing Risk Management Officials and Inspectors

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 specified for each facility
 - one of numerous SDWA requirements



3. Distribution

- Water will only be safe if quality is maintained to the consumer's tap However,
- Utilities are generally responsible for safety to the consumer's property line / plumbing system
- 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

4. Monitoring

- Requirements for treated water compliance monitoring have increased significantly
- The Safe Drinking Water Act, 2002, includes some “failsafe” actions for everyone’s protection:
 - Continuous monitoring of critical parameters (chlorine and often turbidity) now required for most systems
 - Alarms and automatic shut-down devices are also part of this barrier

5. Management

- Regulatory framework must be effective
 - Ontario takes swift, strong action on adverse water quality incidents
- Owner and management staff of the water system must provide effective oversight
 - A Drinking Water Quality Management System must be in place for all municipal residential systems

Drinking Water Quality Management Standard

- Requirement of all Ontario municipal residential drinking water systems
- WCWC offers training on DWQMS
- Owners are ultimately responsible
- Requires written endorsement and commitment from top management and the system owner

Drinking Water Quality Management Standard

Requires evidence of commitment by:

- Ensuring that the quality management system meets the requirements of the standard
- Ensuring that the operating authority is aware of all requirements
- Communicating details of the quality management system
- Providing resources to maintain and continually improve the system

Section 2 - Risk Management



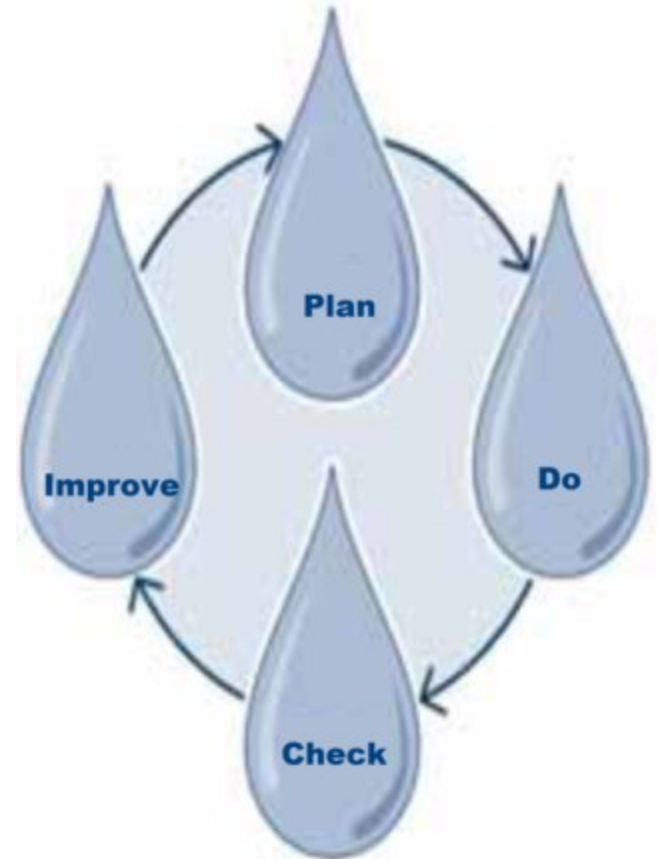
- Common risks for drinking water systems
- Reducing risk

Risk Assessment

Your Operational Plan is part of your Drinking Water Quality Management System

The Operational Plan includes:

- Source water
- System description
- Risk assessment



What is Safe Drinking Water?

- We cannot achieve “zero” risk, despite consumers desire for zero risk
- Safety requires reduction of health risk to “*negligible*” levels

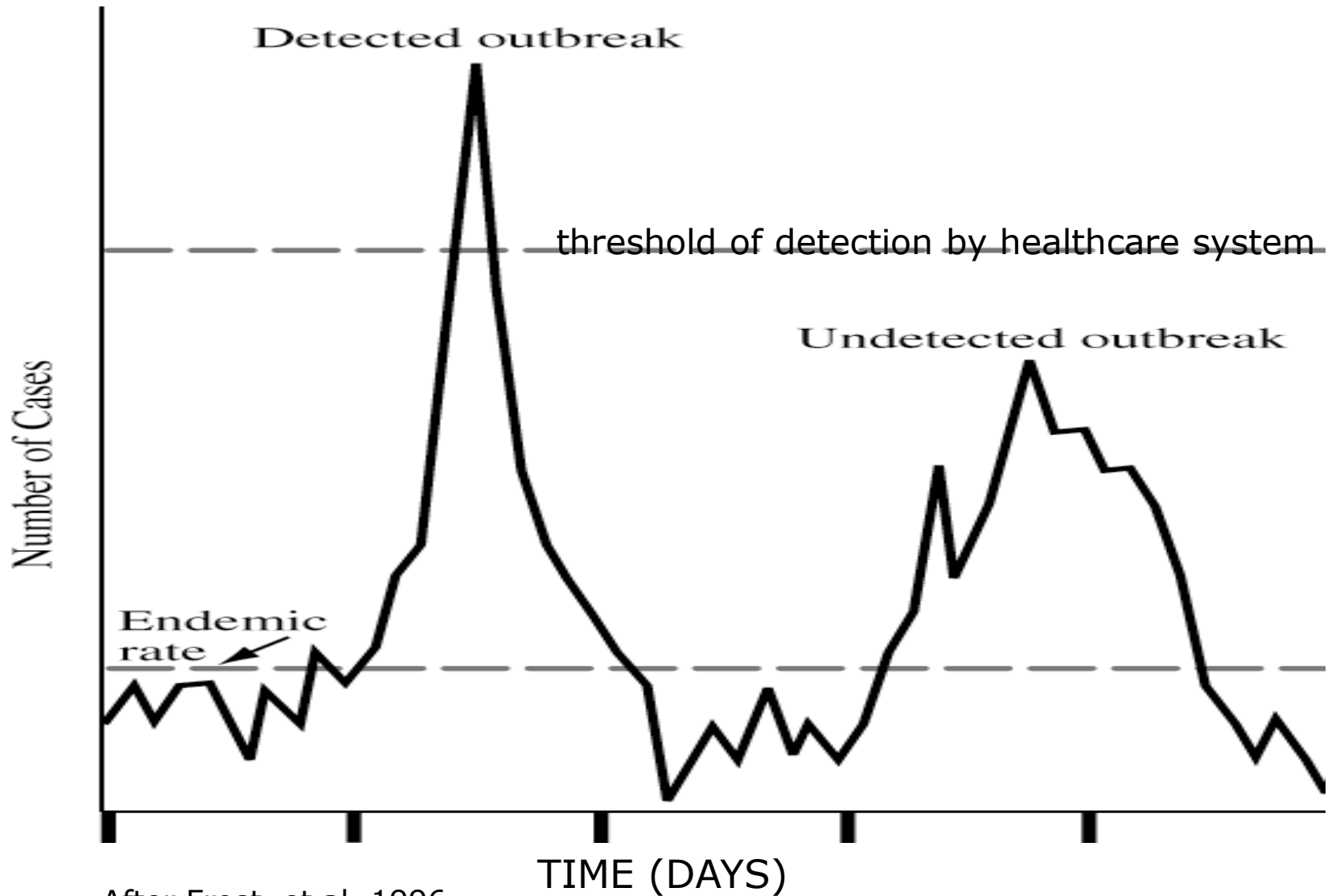


Question 2

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

- ☐ Yes
- ☐ No
- ☐ Don't know
- ☐ Discuss

Most Waterborne Disease Outbreaks go Undetected



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
 - 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. Good risk management requires informed decision-making

Question 3

3. Are there pathogens in the untreated source water for my drinking water system?

- ☐ 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 are never far from water sources
- Pathogens can be removed or inactivated

Pathogen Summary (WHO 2004)

Pathogen	Type	Persistence in water	Resistance to chlorine
Norovirus	virus	Long	Moderate
<i>Campylobacter</i>	bacteria	Moderate	Low
E.H. <i>E. coli</i>		Moderate	Low
<i>Giardia</i>	protozoa	Moderate	Moderate
<i>Cryptosporidium</i>		Long	High

I. Pathogens Pose the Greatest Risk

- Lesser Risks
 - High levels of arsenic, fluoride, selenium, nitrate and lead pose a risk to human health
 - Lead will be discussed in the Flint case study
 - Many toxic chemicals (pesticides) can pose site-specific problems, but
 - they are not common
 - health risks are often unclear; standards are very conservative and precautionary
 - 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 optimizing barrier performance, not just compliance

II. Robust Multiple Barriers Are Essential

- Multiple barriers may seem redundant and may be perceived as an unnecessary cost
- However, optimized multiple barriers are cost-effective in achieving negligible risk and safe drinking water

III. Trouble Usually Preceded by Change

- Treatment processes generally function best under constant conditions
- ~70% of outbreaks have occurred after extreme weather (heavy rainfall, unusual conditions)
- More frequent extreme weather events are forecast for the future
- Extra vigilance required when changes in process or operations occur
- Operators must predict and react to problems through experience and 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 staff are the best insurance for water safety
- The 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 drinking water system operators are often supported by larger neighbouring municipalities



V. Drinking Water Professionals Must be Accountable

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

VI. Effective Risk Management Requires Informed 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
- Risks must be reviewed every two or three years
- Understand the risks for your utility and the actions that are being taken to address them



Section 3 - Case Studies

Water-related Disasters:

- Disease outbreak in Walkerton, ON
- Disease outbreak in North Battleford, SK
- Lead contamination in Flint, MI
- Distribution system contamination in Stratford, ON

Analysis of failures of the multiple 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

Key Events of May 2000

- Walkerton experienced heavy rains during the 2nd week of May 2000
- Lab spoke to the General Manager (GM) to advise that water samples failed
- 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

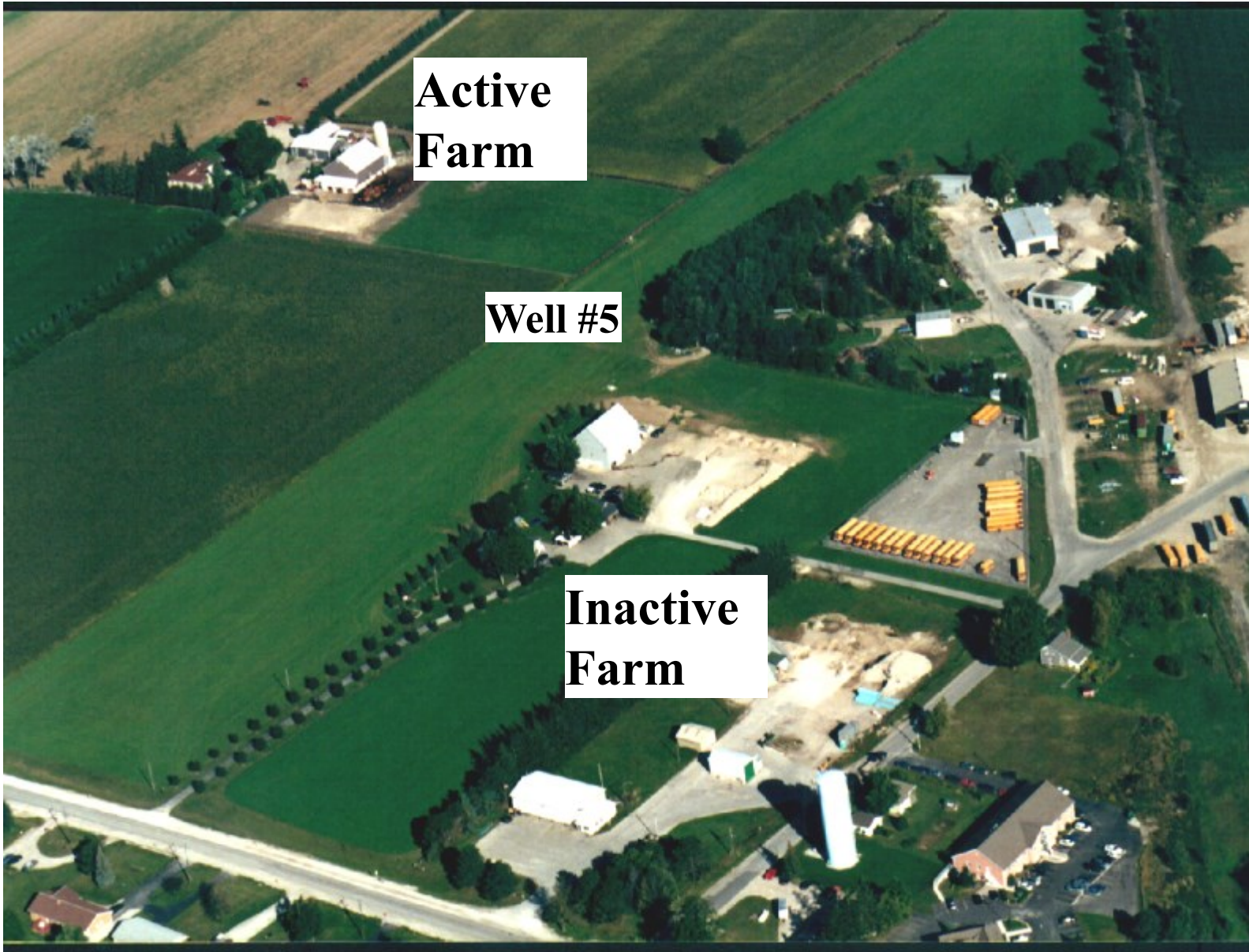


Photos by George & Susan Magwood, Walkerton

Causes of the Outbreak

Walkerton, 2000

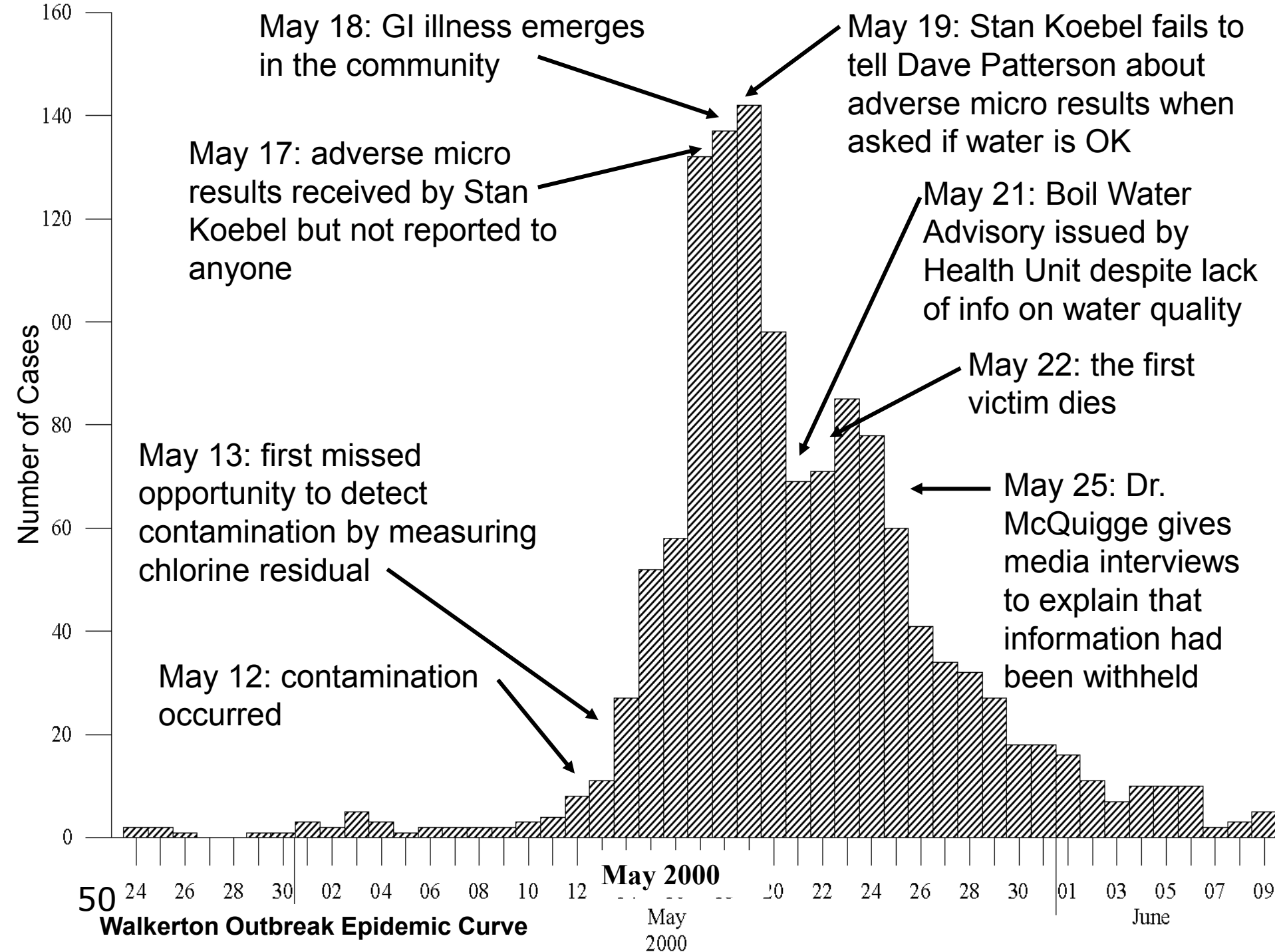
- Well 5 (commissioned in 1978) was contaminated during the initial and subsequent testing
- Despite problems, no MOE inspections in the 1980s
- DNA analysis of bacteria from human victims matched with manure samples from the farm
- Chlorine (disinfection) was not being applied properly
- Investigation 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**



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 testing was not done or was done improperly
- Monthly samples were often intentionally mislabelled
- Laboratory reported microbiological contamination to the client municipality only (not to the Health Unit or MOE)

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 failed in oversight role in terms of inspections/approval of Well 5 and not following up on identified problems

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 appropriately

Concluding Thoughts

Walkerton, 2000

- Microbiological contamination should have been reported to the Health Unit and the Ministry of the Environment (now required)
- Estimated economic cost of outbreak - \$72M
- Social and personal costs incalculable
- Approximate cost of system upgrades - \$10M

Case Study 2

North Battleford SK, March/April 2001

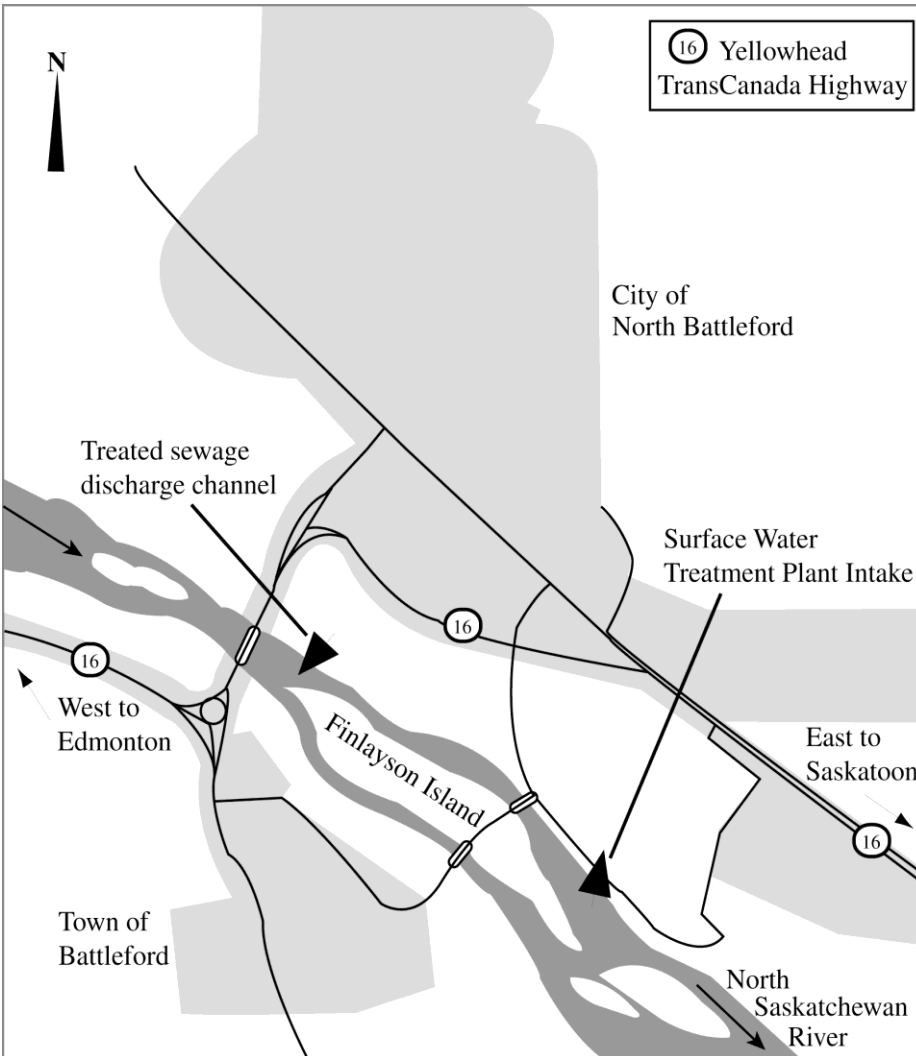


Scope of Outbreak

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

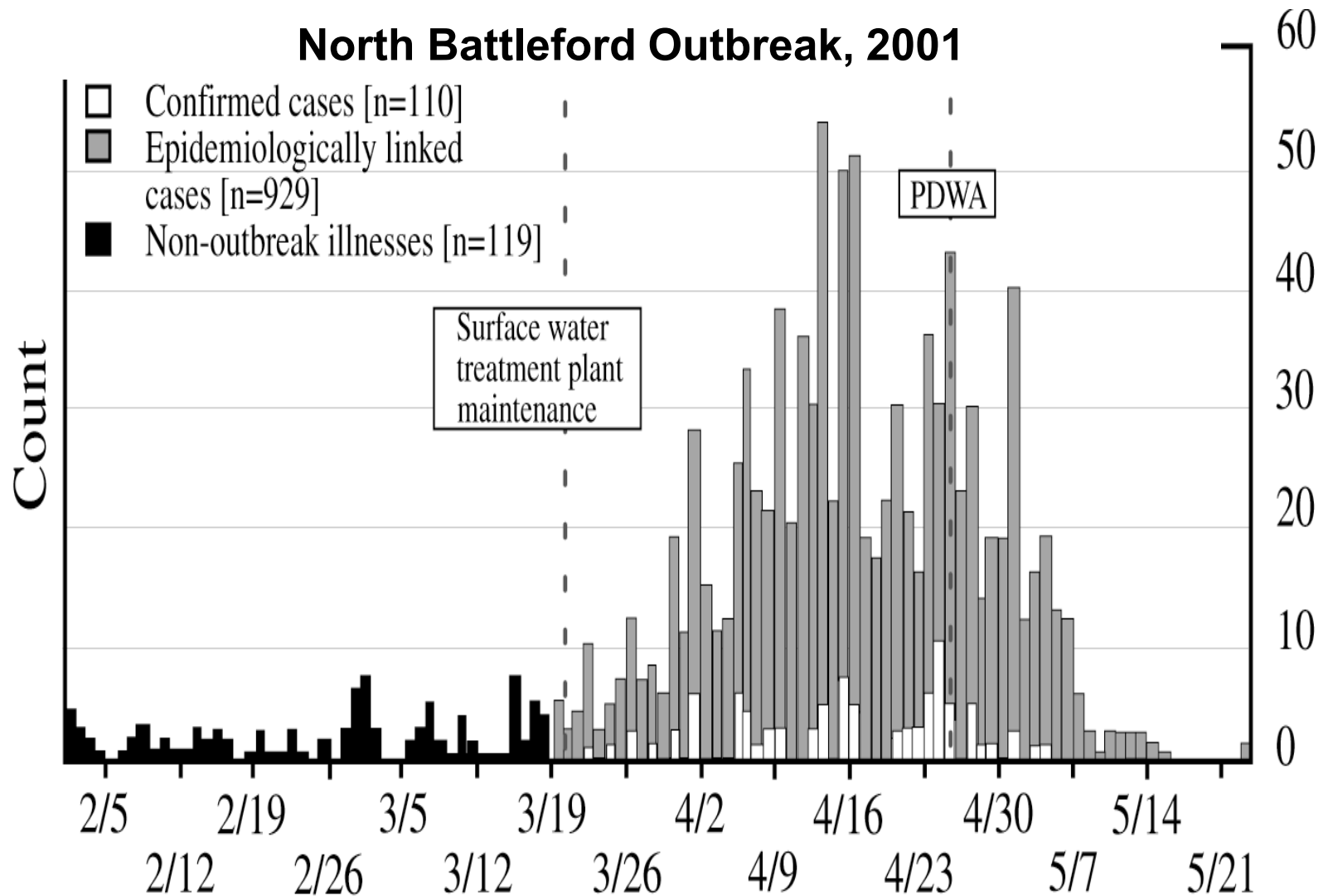
Key Events in North Battleford

- History of sewage treatment problems and influence of sewage on water treatment plant
- Boil water advisory called in September 2000 due to coliform bacteria and low chlorine residual
- Inexperienced operators performed poorly-timed maintenance in March 2001

Direct Causes of the Outbreak North Battleford, 2001

- Foreman retired in December 2000 after a previous stress leave because he was 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 - sewage contamination of raw water
- *Cryptosporidium* in sewage increased as outbreak emerged, further contaminating the source
- Problem was allowed to persist for 6 weeks
- Operators were trying to improve operations and reduce risks
 - Council and senior management rejected attempts at improvement

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 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 the 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
- Operating procedures were outdated
- Lack of experience and training!

Summary Analysis of Failures

North Battleford, 2001

5. Management

- Owner failed to provide sufficient resources to run the system
- Regulatory neglect
- Poor communications between public health, the city and the province
 - Caused a six-week delay in identifying the outbreak and issuance of a drinking water advisory

Concluding Thoughts

North Battleford, 2001

- As with the Walkerton case study, the inquiry revealed failure at all levels
- Unlike the Walkerton tragedy, evidence that operators were trying to make improvements but were frustrated by management and council
- There was little evidence that lessons had been learned from previous failures

Concluding Thoughts - North Battleford, 2001

- The Canadian Environmental Law Association:
“...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 4

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

☐ Discuss

Flint, Michigan



Key Events in Flint

- Flint went bankrupt due to shrinking population from the declining auto industry
- Flint switched from the City of Detroit water supply (treated) to the untreated Flint River source for financial reasons
- State-appointed Emergency Managers made the decisions, **not locally elected officials**.
- Water chemistry differed significantly between these two sources

Key Events in Flint

- The Flint drinking water treatment plant was put into service before it was ready
- Drinking water was sent to consumers without appropriate treatment
- Municipal bankruptcy seems unlikely in Canada according to economists, political pundits and former mayors
- However, financial pressures may impact decisions made by municipal councils

Summary Analysis of Failures Flint MI, 2015

1. Source Protection

- Flint River received unregulated discharges from industries and municipalities for decades
- This contamination was not the main cause of the problems
- The naturally softer water from the Flint River was more chemically aggressive to the pipes in Flint's distribution system

Summary Analysis of Failures Flint MI, 2015

2. Treatment

- Treatment process very poorly controlled - trial and error used extensively
- No corrosion control, despite strong indications that it was necessary
- Inadequate equipment and ineffective operation
- Contamination with *E. coli*, THMs, bromate
- Provided favourable conditions for *Legionella*

Summary Analysis of Failures Flint MI, 2015

“If water is distributed from this plant in the next couple weeks, it will be against my direction.”

Mike Glasgow, Plant Supervisor

Summary Analysis of Failures Flint MI, 2015

3. Distribution System

- Switch to a more chemically aggressive water caused increased leaching of lead from distribution system
- Attempts to flush system were unsuccessful
- Large percentage of homes had lead service lines

Summary Analysis of Failures

Flint MI, 2015

4. Monitoring

- Test results were intentionally omitted to reduce the average lead levels
- Test results by experts were dismissed as inaccurate
- Monitoring equipment had not yet been installed
- Poor record-keeping
- Treated water quality varied widely, suggesting poor operation

Summary Analysis of Failures

Flint MI, 2015

5. Management

- All levels of regulatory management failed:
 - MI Dept. of Environmental Quality (MDEQ)
 - MI Dept. of Health and Human Services
 - Genesee County Health Dept.
 - USEPA
- Emergency Managers made all decisions involving financial matters (not council)

Concluding Thoughts

Flint MI, 2015

- All of the barriers failed!
- 15 individuals criminally charged:
 - Involuntary manslaughter
 - Conspiracy
 - Misconduct in office
 - Willful neglect of duty
 - Obstruction of justice
 - Tampering with evidence

Task Force Report

“...Flint Public Works role in the crisis appears attributable to an inexperienced and poorly resourced organization struggling to take on enormous, untenable responsibilities.”

“MDEQ caused this crisis to happen. Moreover, when confronted with evidence of its failures, MDEQ responded publicly through formal communications with a degree of intransigence and belligerence that has no place in government.”

- Flint Water Advisory Task Force Final Report

Concluding Thoughts

Flint MI, 2015

- March 2017 – Canadian (federal) government proposed a reduction in the lead guideline from 10µ/L to 5µg/L in drinking water
- If Ontario were to reduce the regulated lead level from 10µ/L to 5µg/L in the future would your municipality be able to meet 5µg/L?

Case Study 3

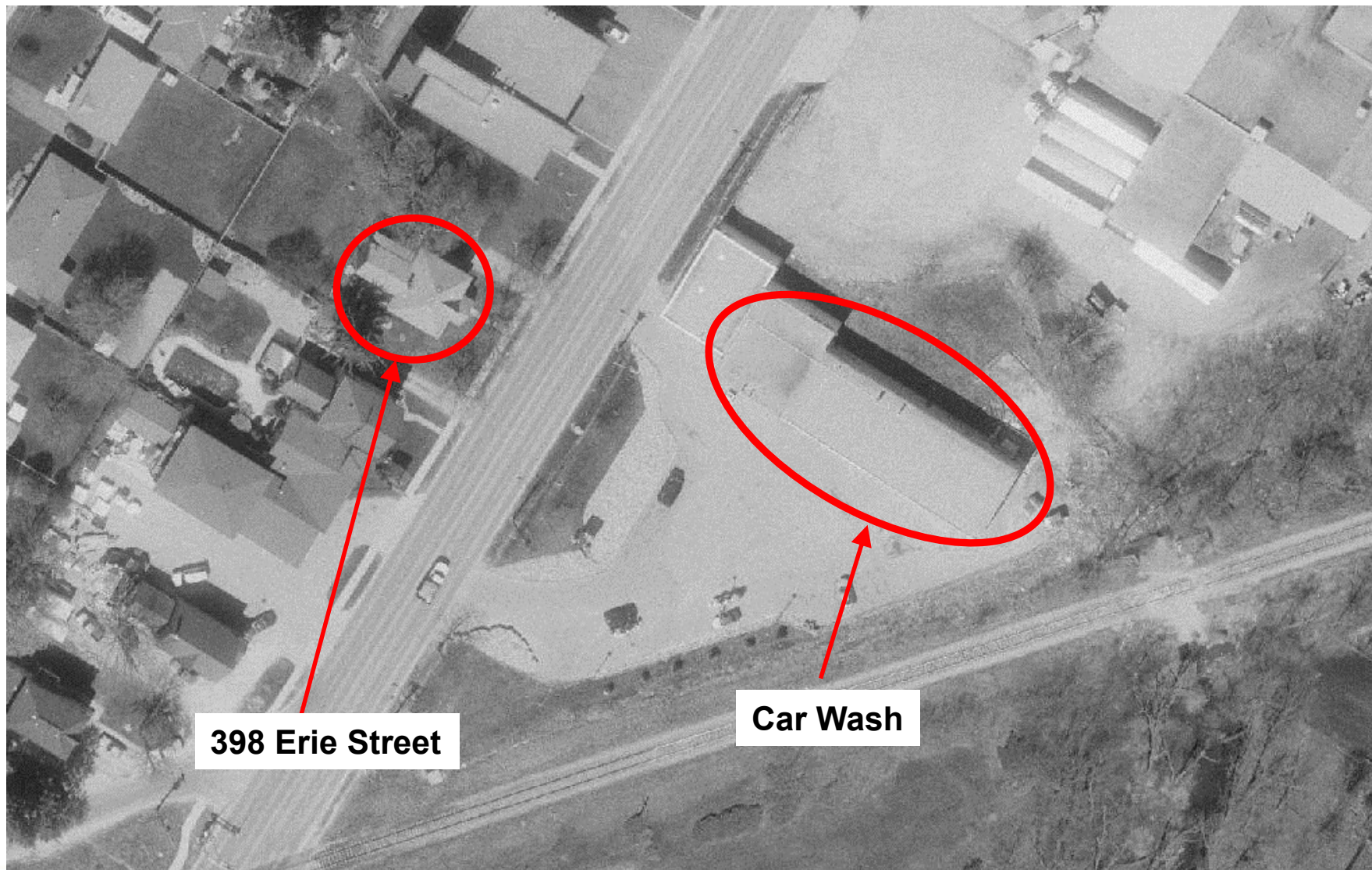
Stratford ON, March 2005

Cross-Connection Event



Key Events – The First 70 Minutes

- *10:20 a.m.* – Call into City Water division “Pink foaming water from tap”
- *10:30 a.m.* – Water supervisor confirms
- *11:00 a.m.* – Visit adjacent car wash and shut off water
- *11:07 a.m.* – Call Health Unit and MOE
- *11:30 a.m.* – Commence flushing hydrants



398 Erie Street

Car Wash

Key Events – The Next 90 Minutes

- *11:40 a.m.* – Meeting with City, Health Unit, MOE
- *12:00 noon* – Drinking Water Advisory issued
- *12:00 noon* – Emergency Plan called out
- *1:00 p.m.* – Emergency Control Group convenes
- *1:00 p.m.* – Call Stratford restaurants
- *1:00 p.m.* – Call to arrange alternative water supply



MEDIA RELEASE

OFFICE OF THE MAYOR

THE CORPORATION OF THE CITY OF STRATFORD
CITY HALL, 1 WELLINGTON STREET, P.O. Box 818
STRATFORD, ONTARIO N5A 6W1
Tel: [519-271-0250 (ext. 267)] Fax: [519-271-2783]

FOR IMMEDIATE RELEASE: March 7, 2005, 12:00pm

DRINKING WATER ADVISORY FOR CITY OF STRATFORD

Stratford-A Drinking Water Advisory is in effect for the City of Stratford. The Ministry of Environment and public utilities are working on the problem. The Advisory is due to a spill into the system.

Until further notification, all residents of Stratford are urged NOT TO CONSUME THE WATER. As well, residents should not feed the water to pets, or use the water for bathing or washing.

Residents will be told when the problem is solved. The Medical Officer of Health, or a Public Health Inspector, is the only person who can lift this advisory.

If you are sick, seek medical assistance by going to Stratford General Hospital.

The City of Stratford will be supplying drinking water to residents. More information will be released as it becomes available.

Water Emergency Statistics

Duration of water emergency: **56 hours**

Number of volunteers (not staff): **80 (640 hours)**

Number of flyers delivered: **(13,161 addresses x 4)**

Number of home water deliveries to residents: **391**

Bottled water: **24,192 cases**

Bulk water: **199,584 liters**

Staff hours at water depots: **825**

Cost to the City after 56 hours: **\$188,000**

Web-site hits during Advisory: **4506 (usually 500/mo)**

Summary Analysis of Failures

1. Source Water Protection

- Stratford's drinking water supply consists of 11 groundwater wells
- Samples from all wells were routinely tested and met all MOE requirements
- This contamination was not the result of a problem with source water contamination

Summary Analysis of Failures

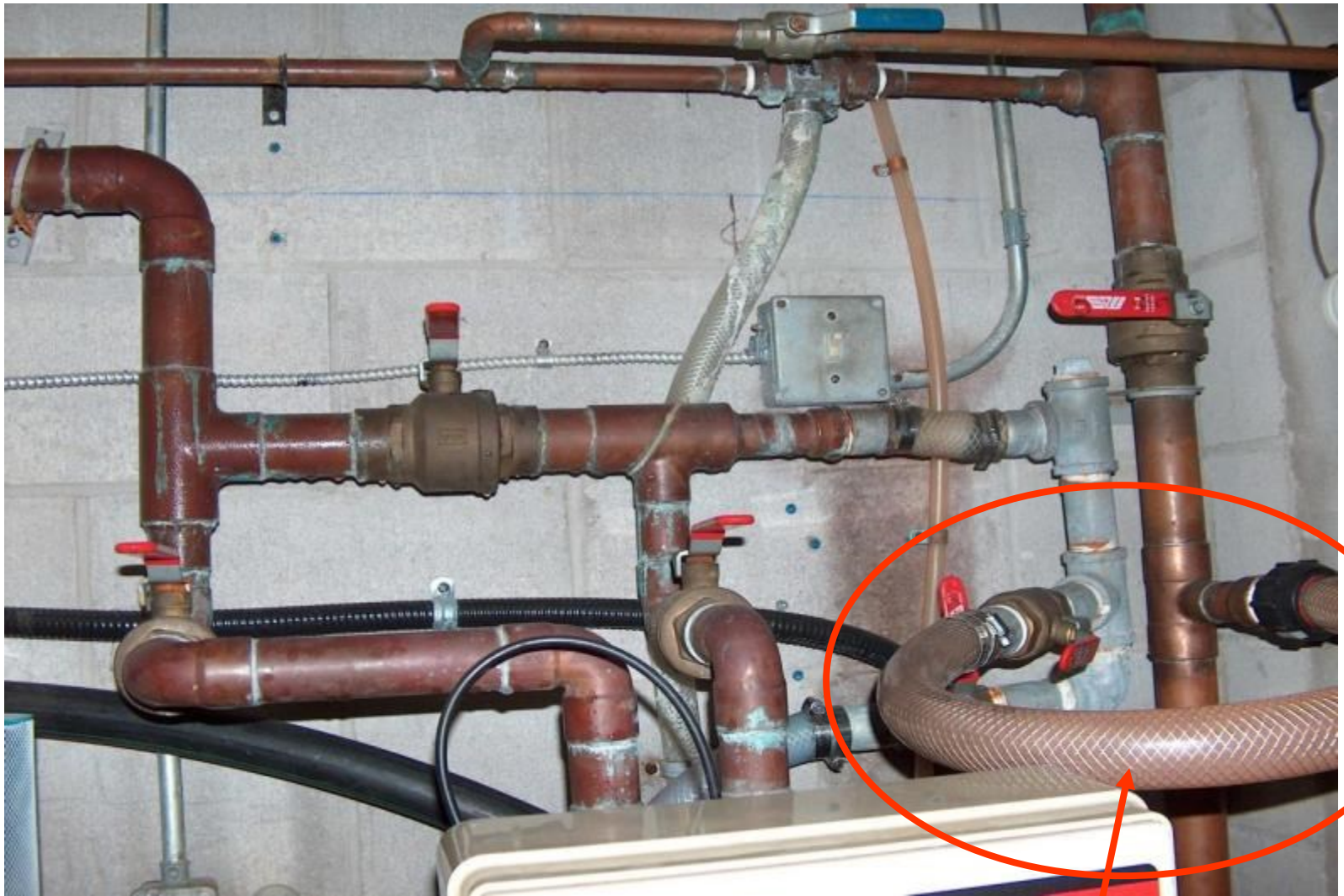
2. Treatment

- Stratford uses chlorination for disinfection
- No other treatment is required due to high quality groundwater
- This contamination was not the result of a problem with the treatment process

Summary Analysis of Failures

3. Distribution & Storage

- This contamination was the direct result of an illegal cross connection at a car wash facility
- Detergent was inadvertently pumped into the municipal water supply because backflow prevention equipment was not installed
- The City of Stratford had a backflow prevention by-law in place that required backflow prevention equipment



Booster Pump 80 PSI
City Pressure 65 PSI

Cross Connection

Summary Analysis of Failures

4. Monitoring

- Monitoring activities were not implicated in this contamination event
- The monitoring program was utilized to help determine when the drinking water was once again safe for consumption

Summary Analysis of Failures

5. Management

- Backflow prevention devices are “plumbing” devices and are not regulated under the Safe Drinking Water Act, 2002
- City Council had implemented a backflow prevention by-law in 2004
- Enforcement of backflow prevention by-laws is challenging but critically important

Concluding Thoughts – Stratford 2005

- Guidance Document available:

**A Guide for Drinking Water System Owners
Seeking To Undertake a Backflow Prevention
Program PIBS #9676e**

Summary - Case Studies

- Fecal contamination, pathogens and potential contaminants are everywhere
- Some pathogens are difficult to treat - *Cryptosporidium* seemed like an obscure risk until the 1993 Milwaukee outbreak
- Complacency can arise because waterborne outbreaks are relatively rare
- Relaxation of vigilance can lead to disaster

Summary - Case Studies

- Distribution systems are vulnerable because:
 - They are generally not visible
 - Leaks in pipes can allow contaminants and pathogens to enter the system
 - Cross connections can pose a risk, even if backflow prevention by-laws are in place
- Issues that initially appeared to be of little concern come under intense scrutiny if something goes wrong

Section 4 - What Next?

Practical steps you can take to help ensure effective oversight



Achieving a Culture of Prevention

- Ensure good internal and external communications
- Promote a mentality of continuous improvement
- Promote the understanding of the entire system
 - Challenges and especially limitations
- Always maintain robust multiple barriers from source to tap
- Commitment to learning from past mistakes

Achieving a Culture of Prevention

- Enable recognition of new risks and threats by operational staff (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” (Justice O’Connor)
- Provide sufficient resources

Waterborne Disease Outbreaks

- Milwaukee Wisconsin experienced a massive waterborne disease outbreak in March & April 1993
- Two modern plants with full conventional treatment
- More than 400,000 cases of *Cryptosporidium*, 4,400 hospitalizations and 50 deaths
- Waterloo, Ontario also experienced a *Cryptosporidium* outbreak at the same time
- Numerous disease outbreaks reported in Canada over the past 25 years

Ministry of the Environment, Conservation and Parks (MECP) Inspections

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



MECP 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
- Summary reports and annual reports are also required for municipal systems

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 requirements to address operator needs
- It will take several years for a new operator to progress to a Class III or Class IV certification

Course Summary

We need to:

- 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





WCWC is committed to supporting the owners, operators and operating authorities of Ontario's drinking water systems

- Hands-on training
- Helpline
- Drinking Water Resource Library
- Public & on-site courses
- Pilot testing

Visit wcwc.ca for more information!



Questions you should be able to answer

- Are you confident that your operational personnel fully understands your drinking water 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?
- Do you know basic information about drinking water safety and the operation of water works facilities?



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?
- Are you acquainted with the drinking water legislation and regulations?
- Do you know the minimum standards for drinking water?

Questions you should be able to answer

- Are you confident that you have competent operators and management?
- Are regular performance appraisals conducted?
- Do you ask for periodic reports on the drinking water system from senior management?
- Do you know what to look for in the annual report? What questions must it answer?
- Are your drinking water systems periodically audited?
- What should you do when you receive audit results for consideration?

Questions you should be able to answer

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

Additional Reference Materials

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



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

- Source-to-tap focus
- Strong legislative and regulatory framework
- 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 Framework

