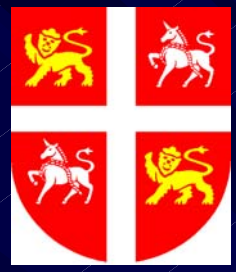


Permits to Operate

municipal water and wastewater systems

Herbert Card
Water and Wastewater Specialist

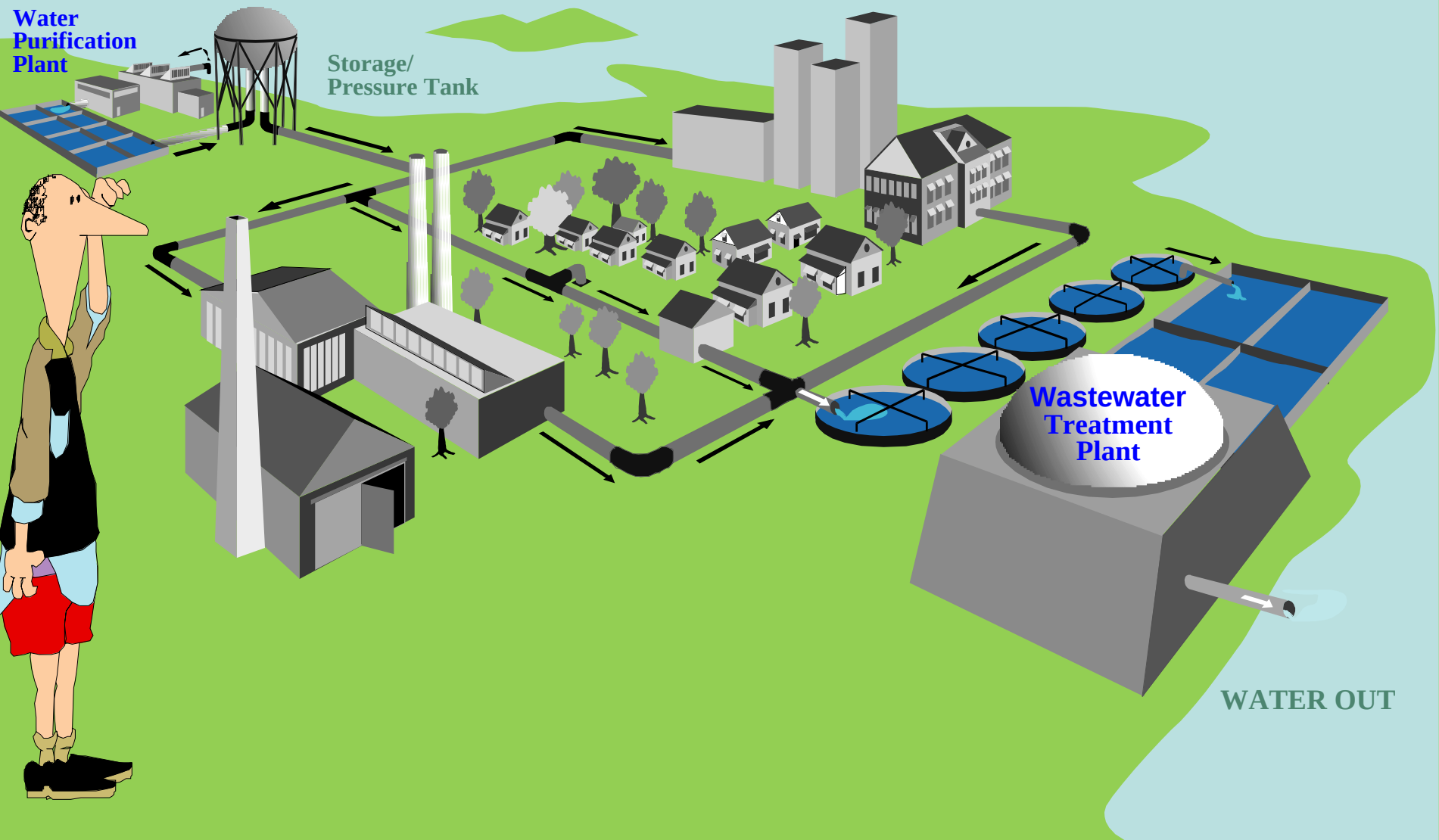
Department of Environment and Conservation

Government of Newfoundland and Labrador

Permits to Operate

- Introduction
- Legislation
- Background
- What is a Permit to Operate
- Why a Permit to Operate
- Development Process
- Other Jurisdictions
- System Classifications
- Proactive vs Reactive Operation & Maintenance
- Summary and Recommendations
- Questions

Municipal Water and Sewer System



Introduction

3 Goals

1. Satisfactory water quality at the consumer's tap consistently and/or acceptable wastewater effluent quality at discharge to receiving waters
2. Operational – maximize efficiency, minimize operational cost
3. Maximize life of system – minimize capital life cost

Small System Challenges

Technical

- Inadequate & deteriorated infrastructure
- Limited/poor source quality/quantity
- Lack of operations & maintenance expertise/certified operator

Financial

- Diseconomies of scale (few households = high costs)
- History of low rates = resistance to full-cost pricing
- Limited knowledge of financing options
- Small systems are often in economically disadvantaged areas

Managerial

- "No time" or limited part time management attention
- Lack of expertise in long-term water system planning/ operations
- Lack of focus - providing water is not the system's primary purpose

Introduction

Four Sectors of Municipal Servicing include:

- ✓ Water Supply & Treatment
- ✓ Water Distribution
- ✓ Wastewater Collection
- ✓ Wastewater Treatment & Disposal

Legislation

Water Resources Act

SNL2002 CHAPTER W-4.01

Section **38.**

(1) All waterworks in the province shall at all times be maintained, kept in repair and operated in a manner and with those facilities that the minister may direct.

(2) All sewage works in the province shall at all times be maintained, kept in repair and operated in a manner and with those facilities that may be directed by the minister.

Background

In the past , Environmental Approvals were issued under Sections 6 & 8 of the Environment Act (now repealed). Stipulated conditions that covered both construction issues and operation and maintenance concerns.

These Approvals were issued for only two years from time of issuance

This Approval is valid for two years from the date of issue. Installation must be completed by that date or the application and approval procedure must be repeated.

What is a Permit to Operate?

A regulatory process that focuses the owner/operator of a municipal water and/or sewer system on essential activities related to preventative maintenance, ongoing operational requirements, and best industry practices for the efficient operation, improved and reliable delivery, improved quality, and extended life of water and sewer systems.

Why a Permit to Operate? (c)

Approvals usually filed away when received or when project was completed

Operational and maintenance requirements of the Approval related to the infrastructure installation were usually overlooked after construction was complete.

Walkerton, Ont.

Seven people died and more than 2,000 were sickened by E. coli contamination in May 2000.

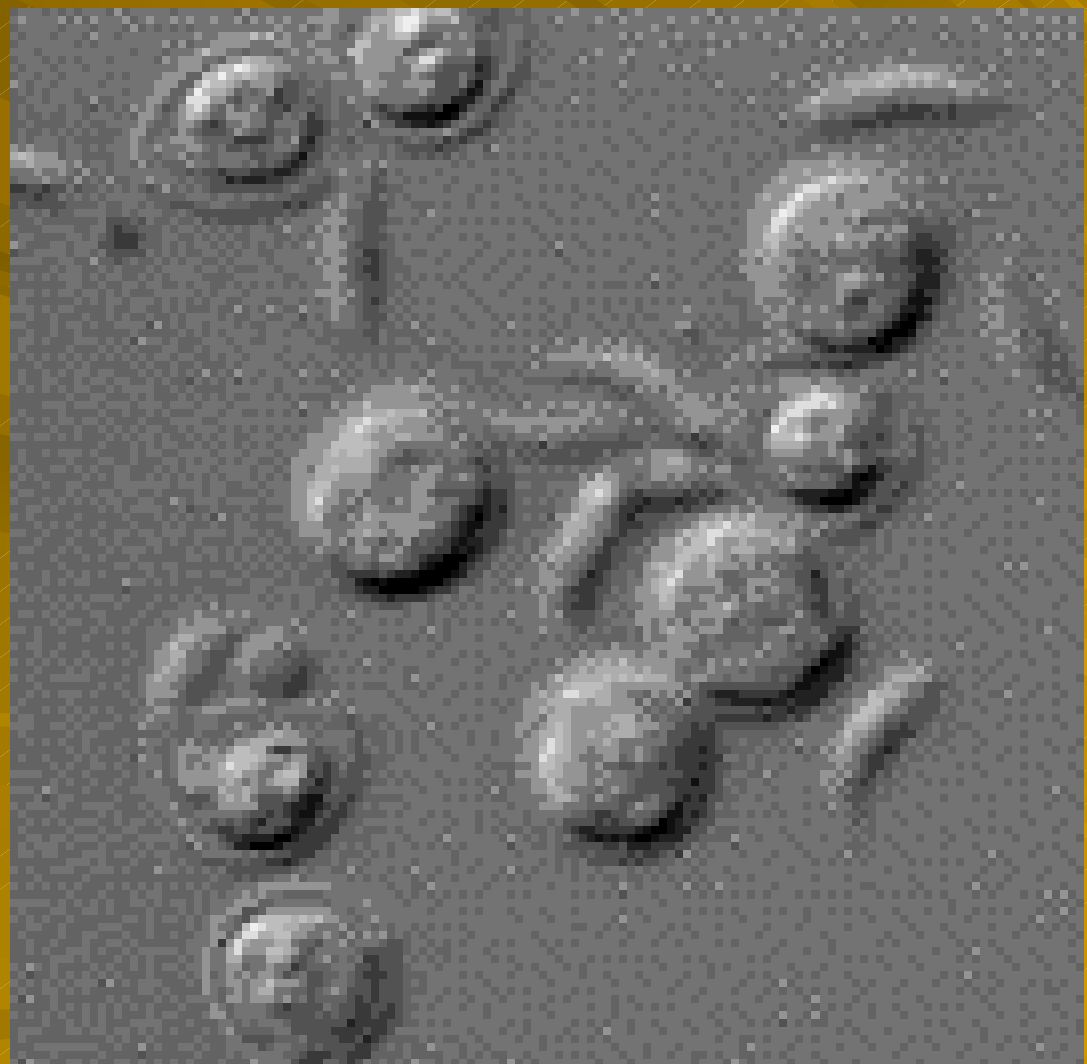
The one-time cost of steps taken by the provincial government since the Walkerton tragedy are between $100 million and $520 million. The ongoing annual cost of those steps is between $41 million and $200 million.

The economic impact of the Walkerton tragedy is estimated at more than $64.5 million

North Battleford, Sask.

The Battlefords area of Saskatchewan experienced an outbreak of gastroenteritis between late March and early May 2001. An estimated 5,800 to 7,100 people from the Battlefords were affected along with hundreds of visitors from other parts of Saskatchewan, Alberta, Manitoba, and British Columbia. By May 2001, *C. parvum* infection was confirmed in 275 people. No other pathogens were identified.

Cryptosporidium parvum (4-6μm)



Why a Permit to Operate?

Environmental Permitting Process is one aspect of the multiple barrier strategic action plan to provide and maintain consistently the safest water of the highest quality at the consumer's tap.

On the wastewater side, Permits focus on proactive maintenance to minimize unwarranted overflows, property damage, and environmental issues related to the collection system, treatment facilities, and discharge outfalls.

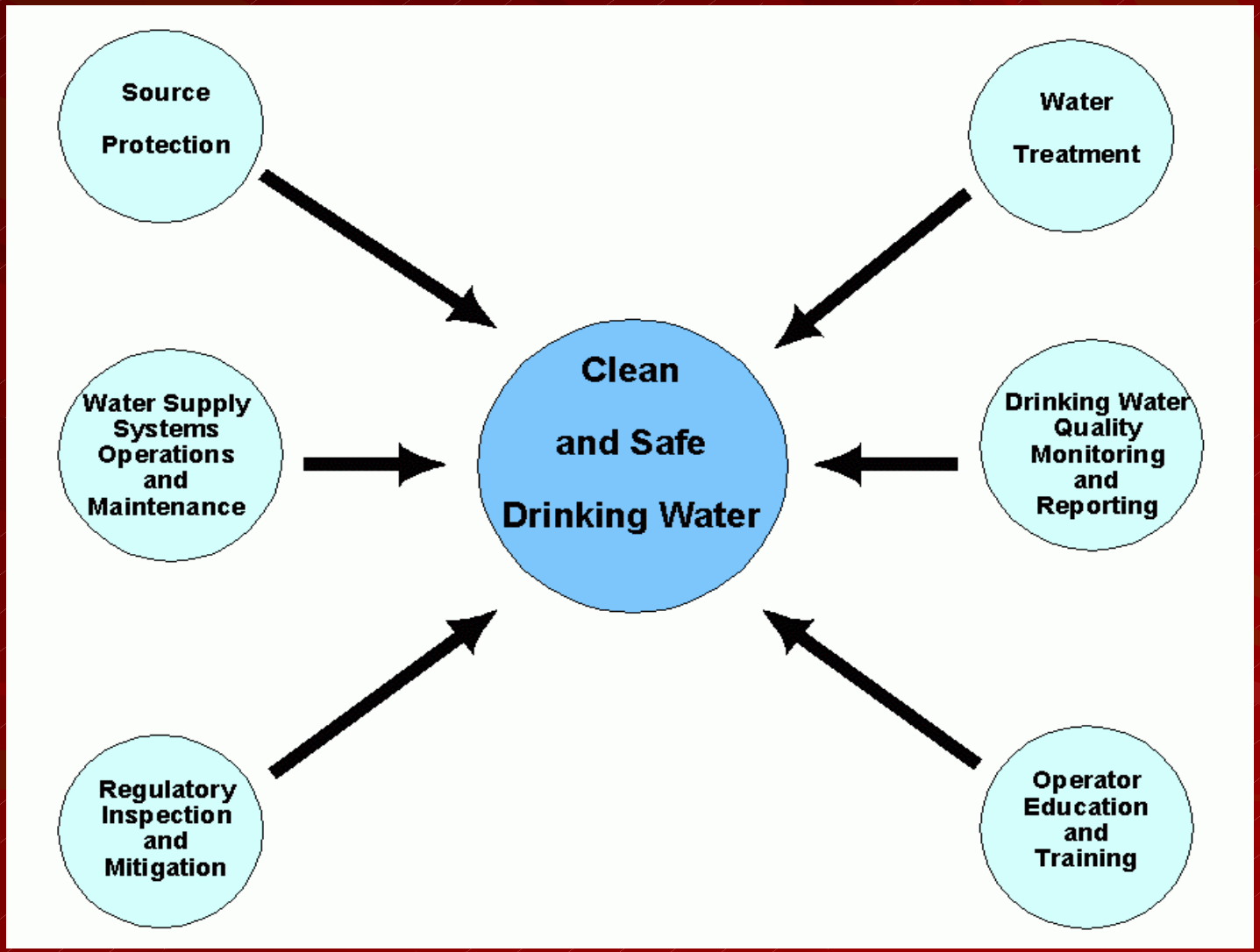
Why a Permit to Operate?

Status of water systems in this province were reviewed after the Walkerton & North Battleford situations.

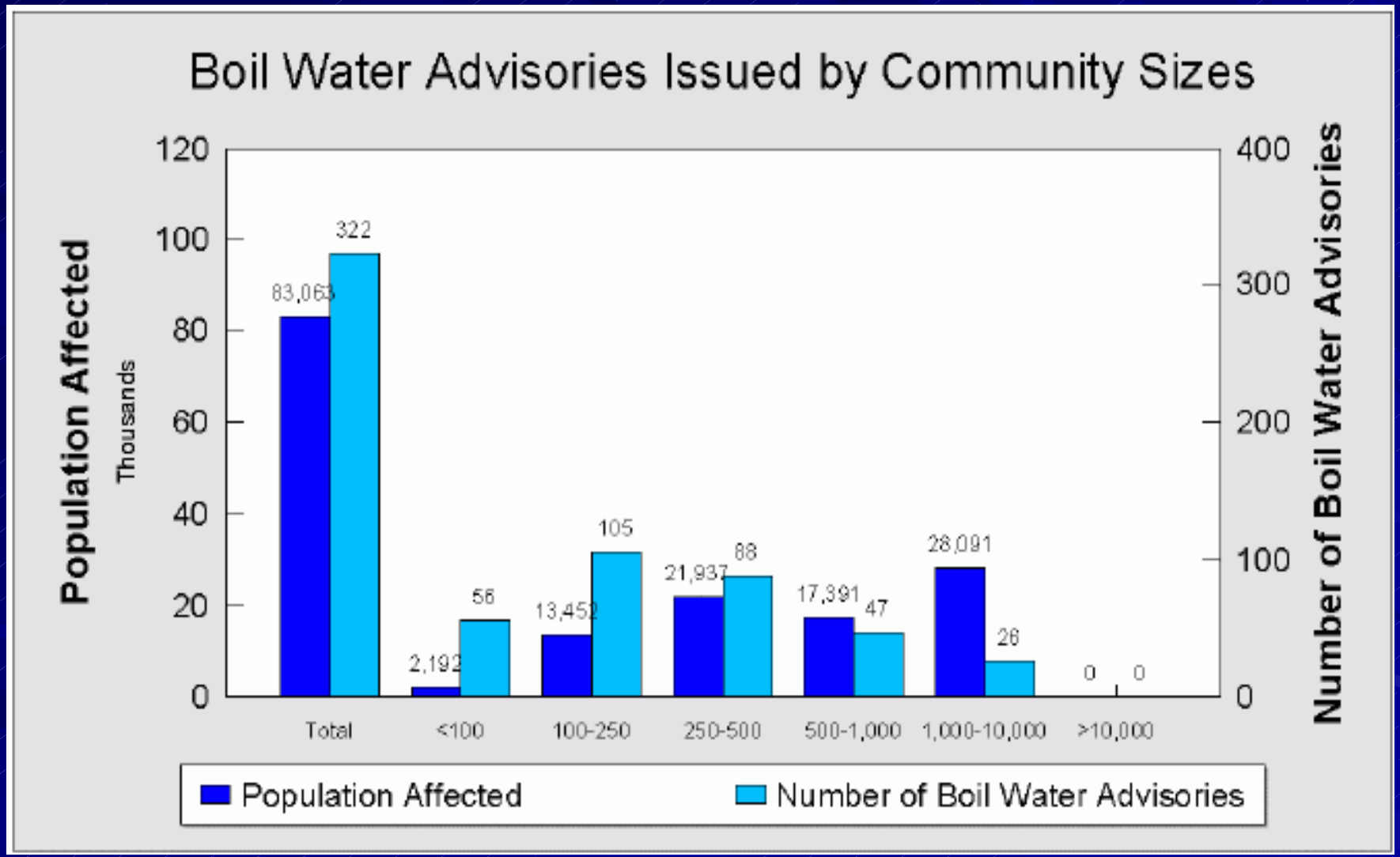
"…a total of 322 boil water advisories in place in 223 communities throughout Newfoundland and Labrador. The population base affected by the boil water advisories was 83,063 (18% of the serviced population)".

On May 28, 2001, the Department introduced a Multi-Barrier Strategic Action Plan for drinking water safety.

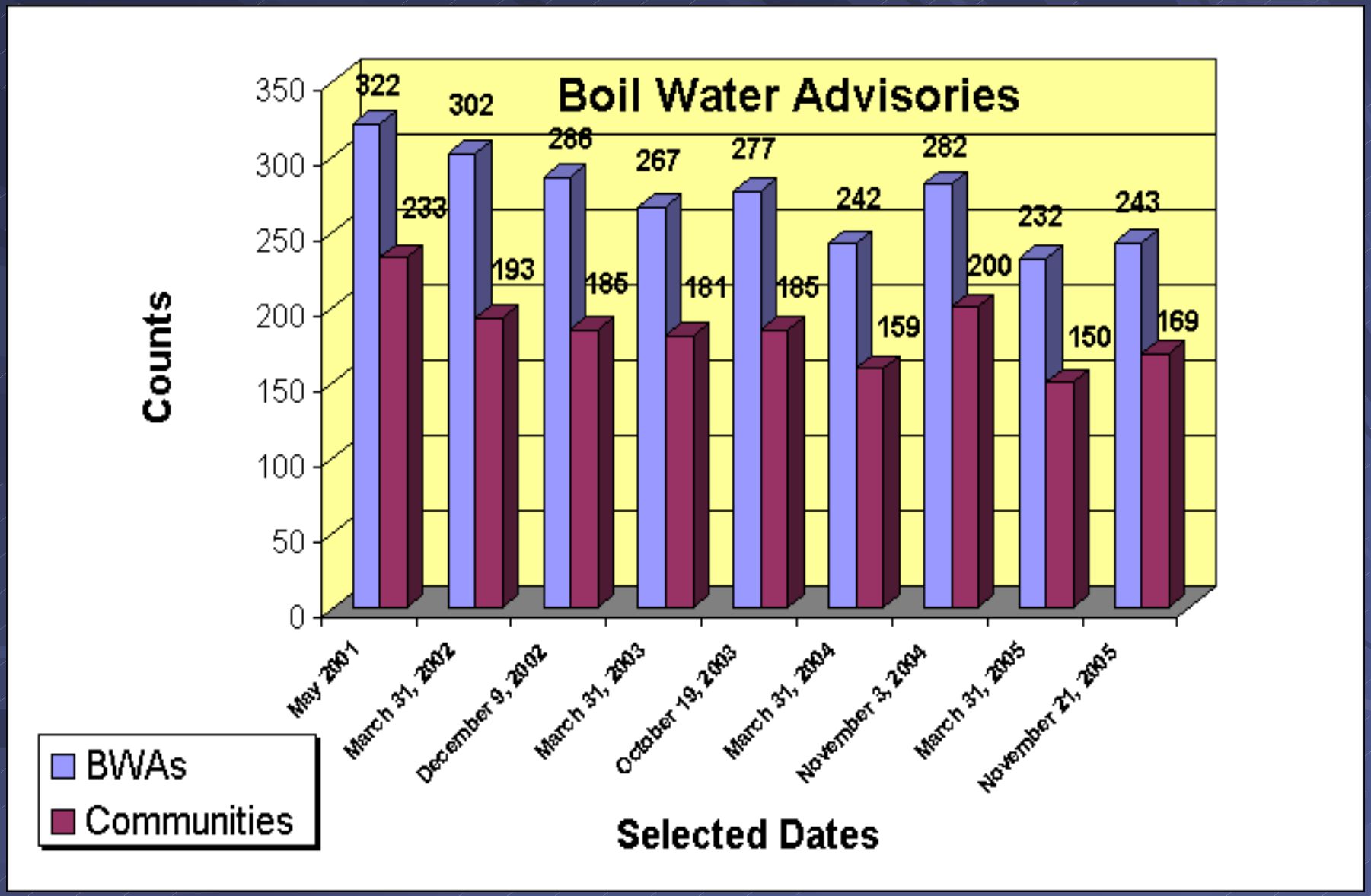
The Multi-Barrier Approach to Safe Drinking Water



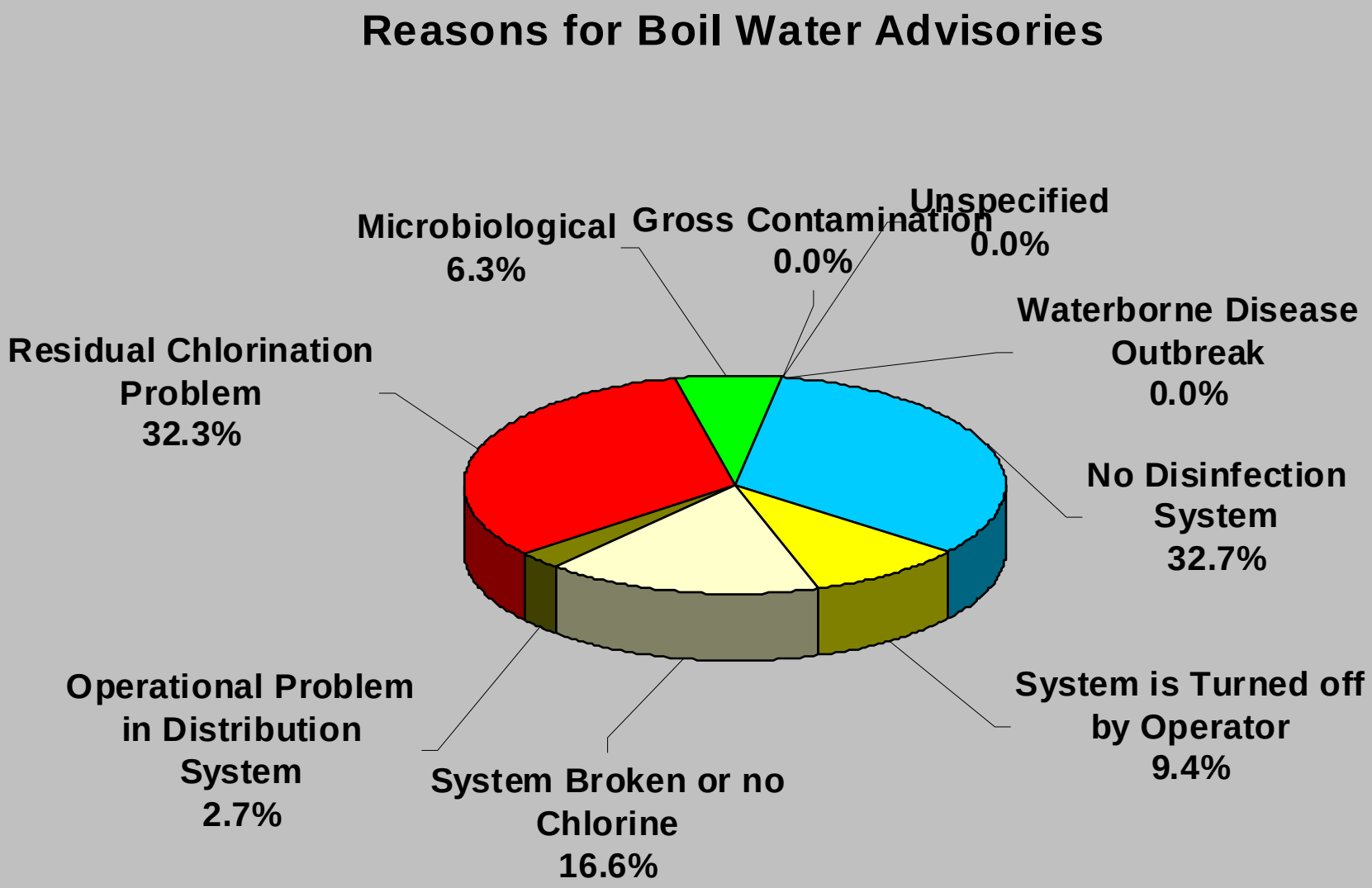
Source to Tap Report, 2001



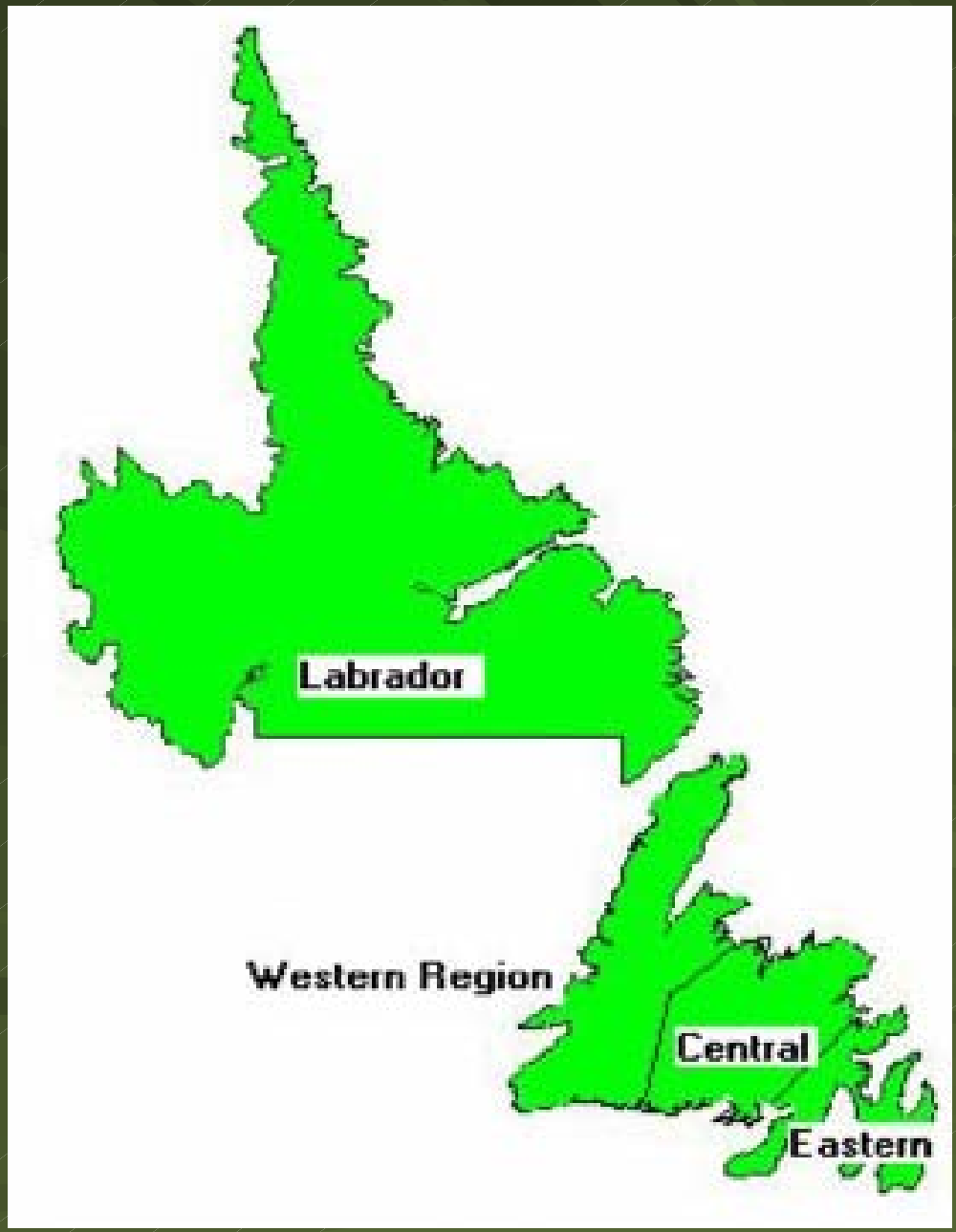
Public Water Systems Database



Public Water Systems Database



Regions



Boil Water Advisory Summary	Eastern	Central	Western	Labrador	Total
Boil Water Advisories for GW systems	64	10	31	0	105
Boil Water Advisories for SW systems	38	19	54	3	114
Boil Water Advisories for other systems	0	1	3	0	4
# of boil advisories in place by regions	102	30	88	3	223
Population under boil advisory (estimated)	23,581	4,308	17,759	559	46,207
No Disinfection System	43	18	12	0	73
System is Turned off by Operator	10	0	10	1	21
System Broken or no Chlorine	21	3	13	0	37
Operational Problem in Distribution Sys	3	1	2	0	6
Residual Chlorination Problem	23	5	43	1	72
Microbiological	2	3	8	1	14
Gross Contamination	0	0	0	0	0
Waterborne Disease Outbreak	0	0	0	0	0
Unspecified	0	0	0	1	1
Totals	102	30	88	3	223

Regional Water Supply Summary	Eastern	Central	Western	Labrador	Total
Number of communities in each region	248	136	181	34	599
2001 Census Population in each region	289,599	92,870	100,013	28,019	510,501
Population serviced in each region (estimated)	223,844	82,290	92,230	26,664	425,028
Number of surface water (SW) supply systems	104	84	101	19	308
# of groundwater water (GW) supply systems	123	24	61	6	214
Total # of Public water sources (GW+SW)	227	108	162	25	522
Total # of Public water systems (GW+SW+shared)	240	117	169	25	551
# of protected water supply areas or wellheads	115	87	104	14	320
# of identified wells	152	36	80	16	284
# of public distribution systems	222	95	161	24	502
# of proposed public water systems	2	4	0	0	6
# communities with no system	112	39	62	10	223
# of systems with a shared water supply source	13	9	7	0	29
Number of communal well systems	3	9	1	1	14
Subtotal (of Supply Status)	352	156	231	35	774

Permit Development

- Reviewed current Approval stipulations
- Reviewed other provincial jurisdictions
- Drafted Permit
- Departmental Review
- Issued memo to municipalities advising of new permitting process well in advance
- Sequential approach.

Permit Development

- Met with Municipalities >10,000 population
- Requested comment on faxed copy to municipalities >1000<10,000
- Responded to concerns, made revisions
- Developed generic maintenance and monitoring log forms
- Status of Compliance Meetings
- Request Monitoring Data Submissions

Other Jurisdictions

- All 10 provinces and 3 territories were researched for their operation and maintenance requirements
- A selection of requirements most suited for this province were included.
- A starting point, not too stringent, yet, not too lenient. A work in progress.

Free Chlorine Residual Monitoring

Newfoundland & Labrador

- daily near first consumer and ends of system

Best Practice

– treatment plant: continuous

– distribution: every day

Ontario

- **O'Connor Report Part I - Recommendation 11**
  - The MOE should require continuous chlorine and turbidity monitors for all groundwater sources that are under the direct influence of surface water or that serve municipal populations greater than a size prescribed by the MOE.

British Columbia

Drinking Water Protection Act
section 8 (1)(a) states:
In the case of a prescribed water supply system, the water supplier must not operate the water supply system unless the water supplier holds a valid operating permit issued in accordance with the regulations…”

Saskatchewan

- By 2005 all waterworks licensed by Saskatchewan Environment will require to have at least one operator certified to operate the class of facility being operated.

Permit Sections

- General
  - Operate in such a manner and with such facilities that water supplied meets requirements as directed by Department….
  - Proper operation and maintenance includes….
  - Water distribution system must be operated continuously and consistently deliver highest quality water possible
  - All chemicals must be of food grade quality and satisfy AWWA/ANSI standards NSF/60 and NSF/61.
  - Practice multi barrier approach
  - Protect the water supply

Permit Sections

- Operations
  - Details of system infrastructure and components including as-built or digitized drawings.
  - Provide copies to operators, ensure familiarity, and post.
  - Maintain liaison with Department.
  - Establish a maintenance and operation program.
  - Establish maintenance schedule.
  - Operator to have thorough understanding of system.
  - Establish regular inspection routines.

Permit Sections

- Operations (c)
  - Thorough training of operators and provide with O&M manuals. Minimum of 24 hours of related training per year.
  - Flushing
  - Corrosion control
  - Cross connection control
  - Maintenance schedule to include basic annual items such as flushing, hydrant maintenance, valve exercising, leak detection, reporting.
  - Adequate inventory of spare parts

Regulatory Matters - 2/15/2006

OTTAWA — The daily leakage from the city of Ottawa's water system could fill 1,000 regular-sized swimming pools and represents about 18.6 percent of the city's water, according to a city staff report obtained by *The Ottawa Citizen*.

The system wastes 63 million liters (16.6 million gallons) a day due to leakage from its 2,700 kilometers (1,700 miles) of pipes, the newspaper article said.

Leaks & Breaks

BUFFALO, NY — A recent study has revealed that nearly 41 percent of Buffalo's drinking water is leaking out of the city's water system every day, according to a March 1 article in the *Buffalo News*.

The city pumps 29.6 billion gallons of water each year, and nearly 12 billion gallons is lost through leaks and bursts in the city's 900 miles of water pipeline, the article said.

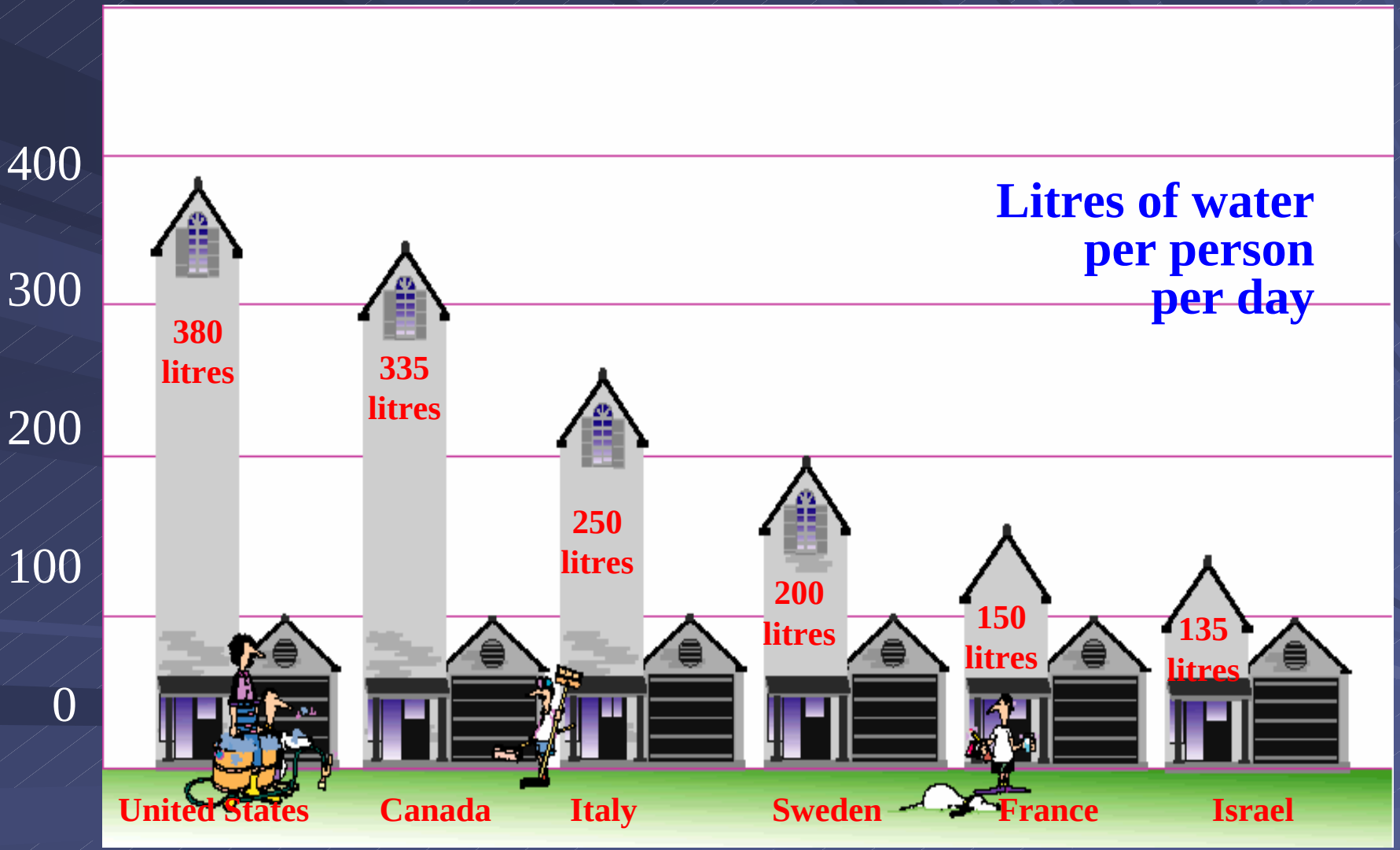
Maintenance Plan

The plan is best organized in two ways. First, list all the equipment, the required maintenance tasks and their frequency, and decide on a means of recording the completion of the maintenance (along with any observations made during maintenance) for each piece of equipment.

Maintenance Plan

Second, develop a schedule of tasks that allows you to check off each item when completed. The schedule can also have an area where reminders and other "to-do" items can be recorded and readily observed - for example, "Order more chlorine solution tubing," or "Water pump is making noise - check every day instead of weekly".

Domestic Water Use by Country



Permit Sections

- Operations (c)
  - Notification of malfunctions in system
  - SCBA
  - Eye wash stations
  - Proper maintenance of monitoring equipment
  - Leak repair process including disinfection
  - Requirements for dealing with AC pipe
  - Portable test equipment
  - Leak detection and repair

Permit Sections

- Operational Monitoring
  - Minimum of two (2) sites to be checked for chlorine residual and logged daily
- Emergency Situations
  - Establish contingency and emergency response plan
    - Extensive fire demand
    - Main line breaks
    - Contamination problems
  - Adequate equipment materials to deal with emergencies
  - Who to contact
  - Keep prepardness plan up to date
  - When drinking water quality is compromised, issue boil advisory immediately upon discovery

Digital Chlorine Residual Meter

Permit Sections

- Record Keeping and Reporting
  - Owners manual
  - Report major problems to Department
  - Maintain chlorine consumption log
  - Complaints
  - Annual system audit
  - Exercise emergency warning devises and log
  - Records to be submitted or made available to Department upon request.
  - Records to be kept a minimum of 5 years

Typical Form to Record Chlorine Residual Readings

RECORD OF CHLORINE READINGS

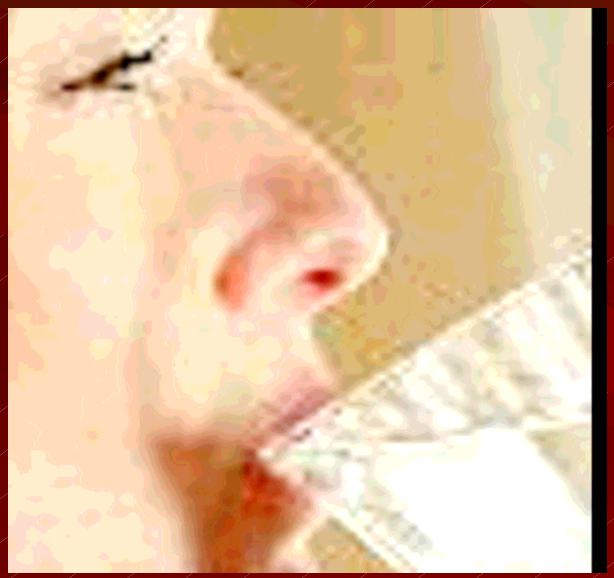
TOWN OF_____

DATE	TIME	CHLORINE READING	LOCATION

Permit Sections

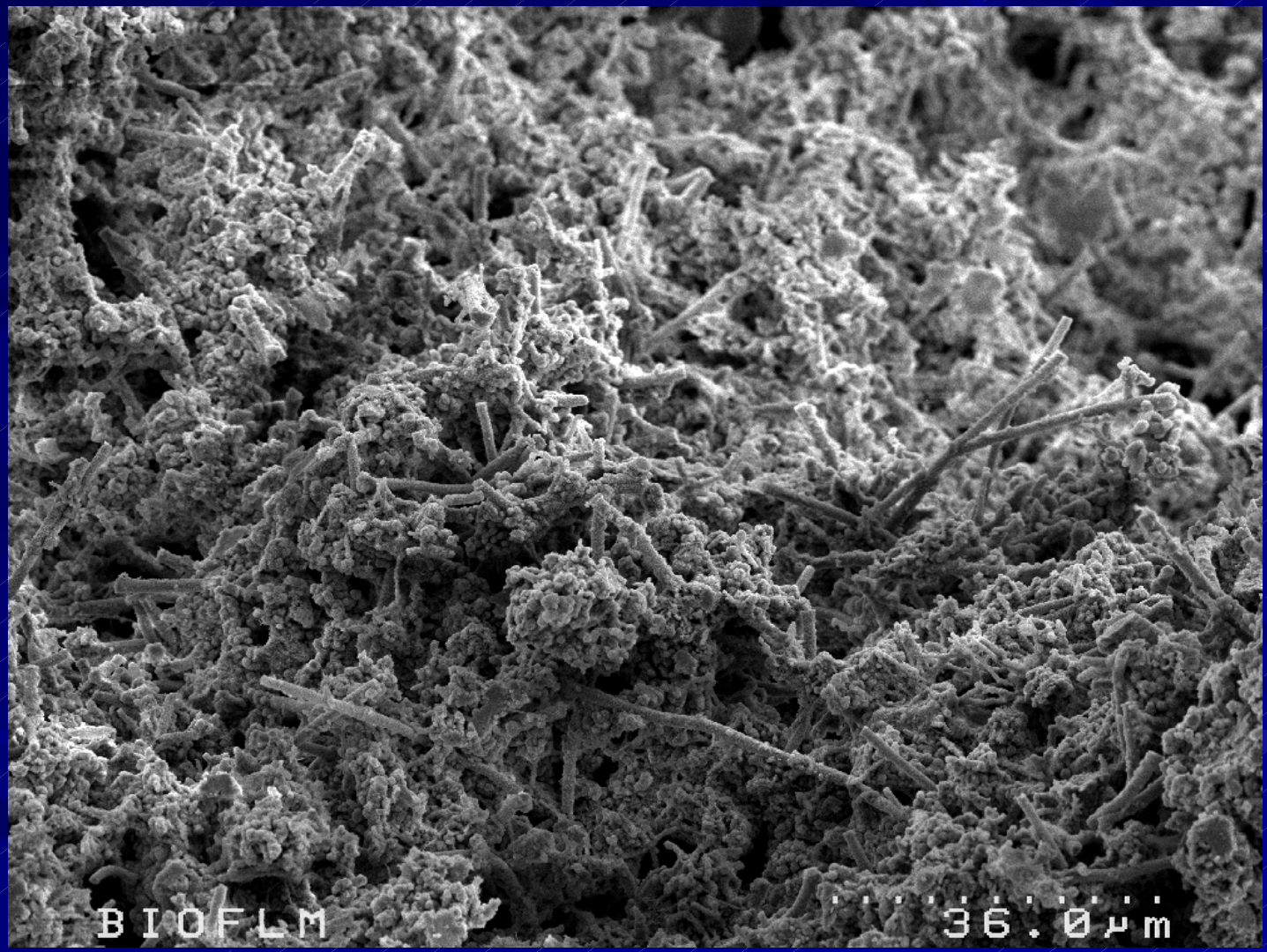
- Planning
  - Establish short and long term plans
    - System operations
    - Improvements, retrofits, replacement
    - Fiscal projections
    - General maintenance and operation
    - Emergencies
    - Operator training and continuing education

Permit Sections

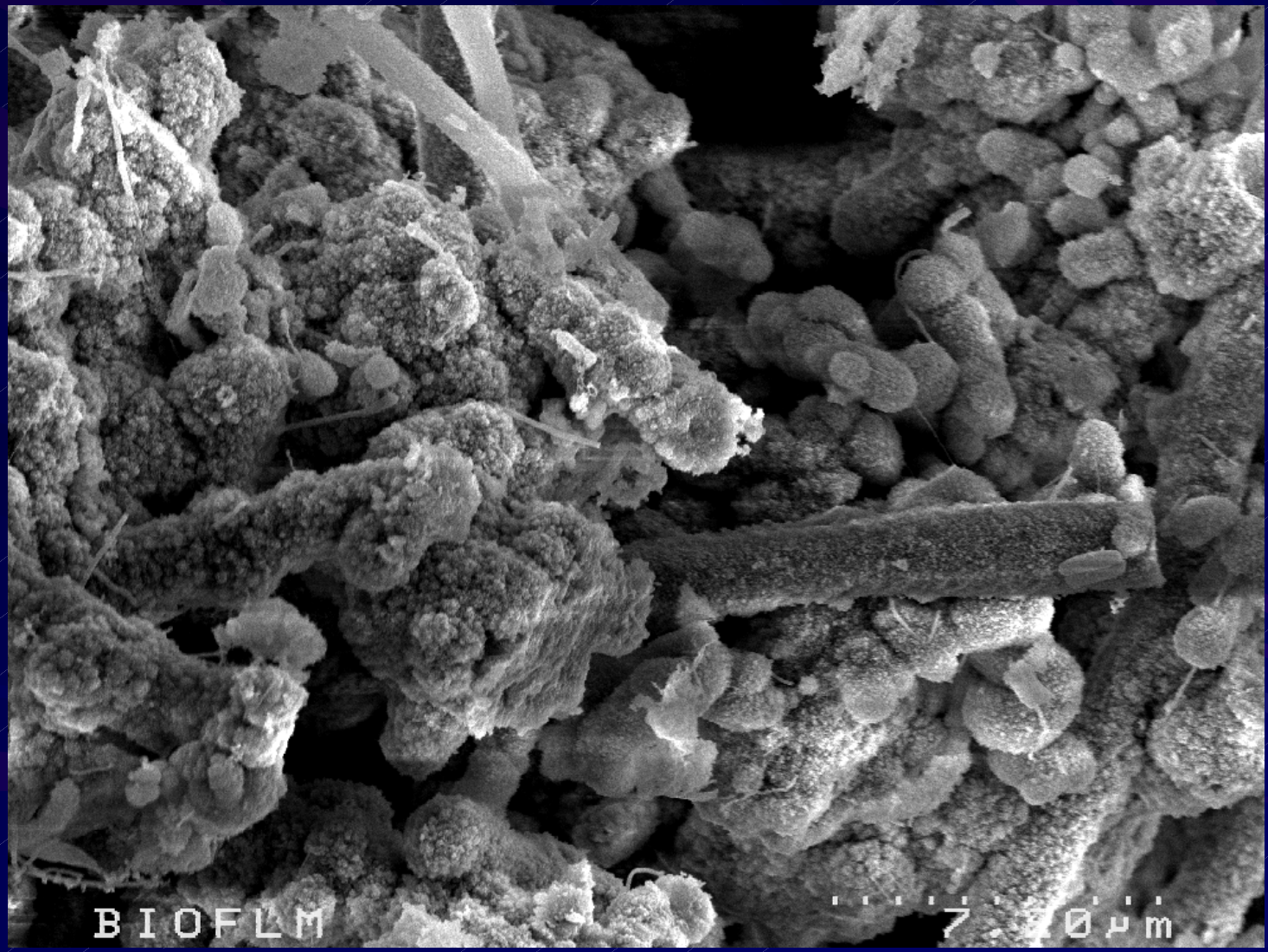


- Operator Education, Training, and Certification
  - Recommended that operator achieve one level above system classification
  - Ongoing and continuing education and training required for all operators.

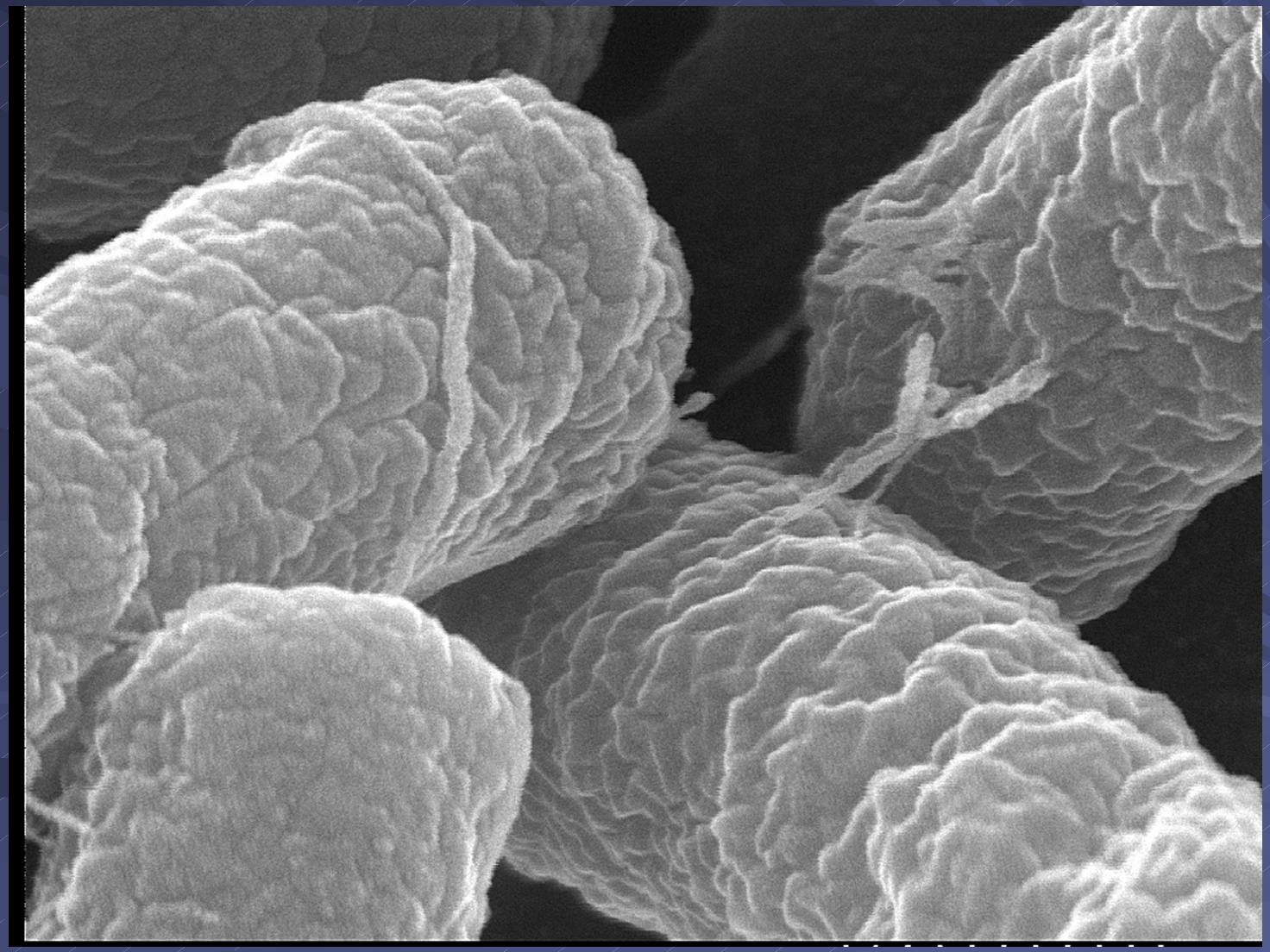
Biofilm



Biofilm



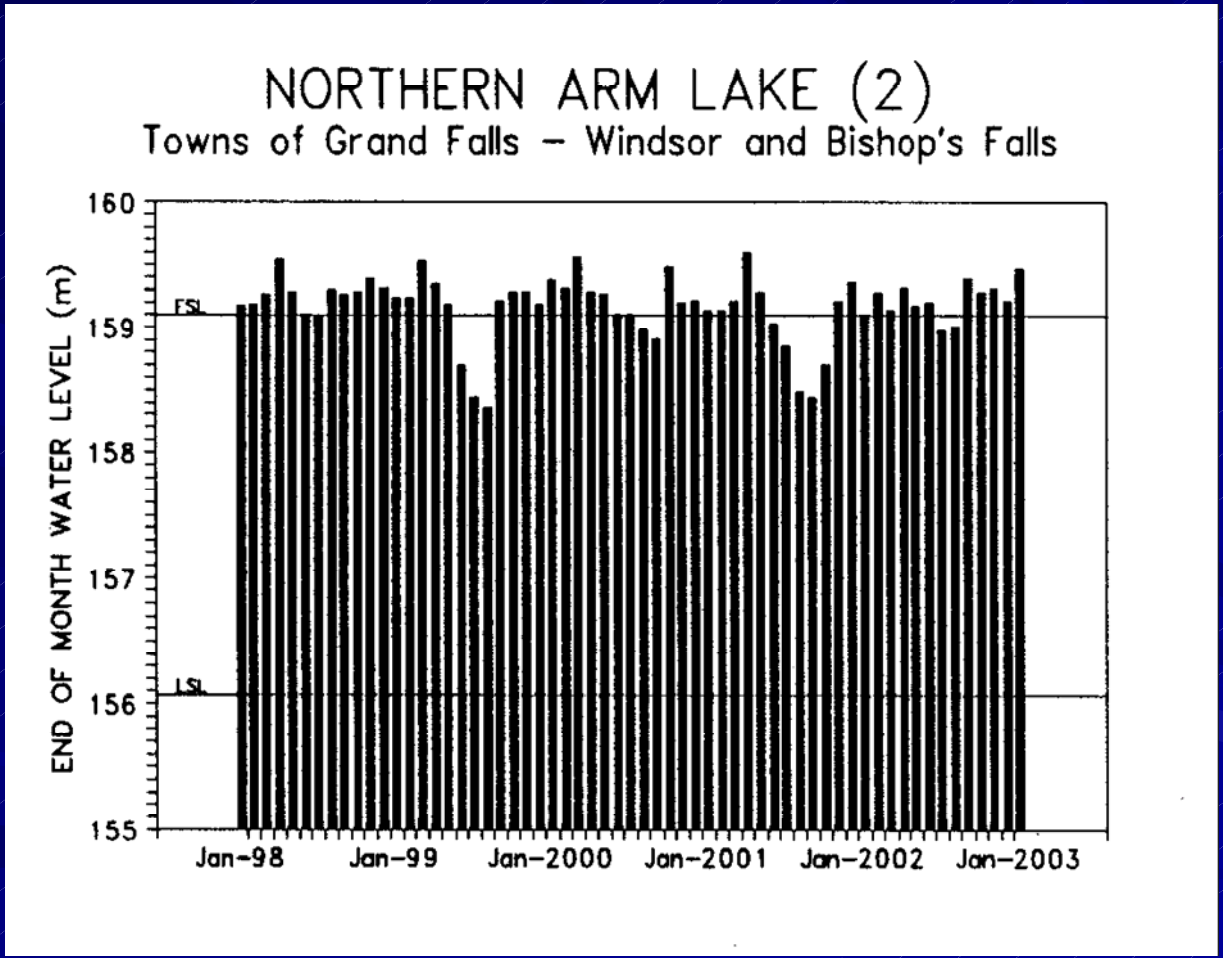
Biofilm



What are we doing?

- DOEC
  - conducts source and tap water quality monitoring
    - Provides analysis results to municipalities and on web page
      - Disinfection by-product testing
      - Water Quality Index
      - Langlier Corrosion Index
  - Chlorine demand management modeling of water systems experiencing elevated disinfection by-products.
  - Wastewater treatment plant influent/effluent monitoring
  - Conducts inspections and testing
  - Provides certification and “hands on” on site training

What are we doing?



What are we doing?

- GSC
  - Conducts bacteriological monitoring
  - Monitors chlorine residuals
  - Makes recommendation for adjustments
  - Recommends boil advisory as warranted

What are we doing?

- DMA
  - Funding programs
    - Municipal Capital Works Program
    - Canada/Newfoundland Infrastructure Program
    - Multi Year Capital Works Program
    - Labrador Coastal Agreement
    - Special Assistance Funding
  - Technical and engineering support

Funding

Provincial Funding 2003-04 for Municipal Infrastructure

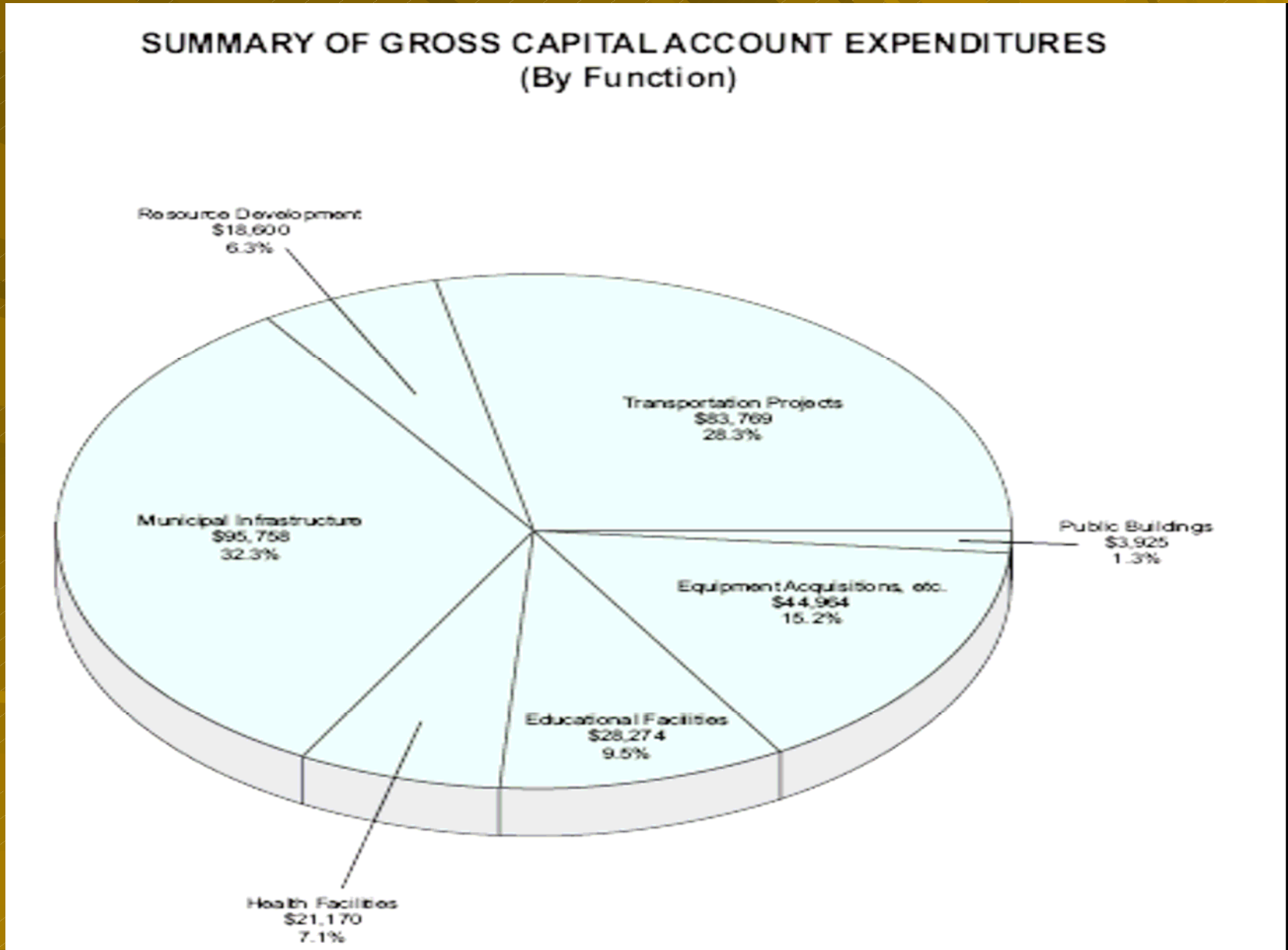
Municipal Capital Works Program -	*$ 11,656,651*
Canada/NL Infrastructure Program -	*$ 24,148,263*
Multi-Year Capital Works Program -	*$ 23,882,051*
Special Assistance -	*$ 358,926*
Inuit Peoples Agreement -	*$ 2,840,000*
Total	*$ 62,885,891*

Estimates

Budget 2005 – 2006 for Municipal Water & Wastewater Infrastructure

Municipal Operating Grants	$**19,125,000**
Municipal Infrastructure	$**60,830,800**
Canada/NL Infrastructure Program	$**24,208,900**
Community Dev. - Coastal Labrador	$ **8,145,800**
Total	$**112,310,500**

DMA Capital Expenditures



Compliance Screen

DMA reviews compliance with Permits to Operate as part of their process in approving capital and infrastructure funding requests.

Failure to comply may adversely affect funding decisions.

What is expected of you?

You, the municipal authority and system operator, are responsible for your water and wastewater systems. Plan and implement a structured and thorough operation and proactive maintenance program to deliver the best services possible for and on behalf of the residents of your Community

Proactive vs Reactive Operation & Maintenance

- Proactive Maintenance - **facility maintenance system (FMS)** A means of providing and recording preventive and scheduled equipment maintenance.
- Proactive or preventive maintenance represents organized procedures for keeping the system (equipment, plants, facilities) in such condition that it is able to continue performing its intended function.
- **preventive maintenance program** A specific, ongoing plan to inspect, monitor, and service - at scheduled and specified intervals - equipment, motors, pumps, valves, vehicles, and so on to ensure efficient operation of such equipment and prolong its productive life.

Proactive vs Reactive Operation & Maintenance

- Reactive or inactive maintenance program – the practice of ignoring suggested maintenance schedules. Repair or replacement of components when they fail. Reacting to system problems rather than trying to prevent them. Usually associated with inadequate resources and/or poor attitude.

Summary & Recommendations

Regulatory Perspective

- Water Supply, Treatment & Distribution
  1. Require Mandatory Certification
  2. Greater vigilance re Status & Compliance Monitoring Inspections.
  3. Assist municipalities to achieve compliance.
  4. Conduct audits of municipal operation & maintenance programs from both fiscal and human resources perspectives.
- Wastewater Collection, Treatment & Disposal
  1. Require secondary level treatment for all discharges to fresh water bodies and sensitive marine areas.
  2. Continue to monitor effluent discharges at least annually and report results.

Summary & Recommendations

Municipal Perspective

1. Require Operator(s) to become certified.
2. Provide for qualified back-up operator
3. Set appropriate budgets for adequate operation and maintenance programs
4. Establish and implement maintenance and operational schedules
5. Follow industry best practices.
6. Plan for life cycle capital upgrade, modification, or replacement.
7. Clean water in; clean water out

Questions?

Related Web Addresses:

Environment & Conservation Web page

http://www.env.gov.nl.ca/env/

Water Resources Management Division

http://www.env.gov.nl.ca/env/Env/water_resources.asp

Infra Guide – Best Practices

http://www.infraguide.ca/bestPractices/default_e.asp