

Water and Waste Department

**Annual Customer Seminar
December 7, 2004**



Agenda

- **9:05 – 9:35 a.m.**
Water Treatment Update
Water Main Criticality Study
- **9:35 – 9:50 a.m.**
Water Main Cleaning Program Update
- **9:50 – 10:00 a.m.**
Maintaining Your Private Water System
Winnipeg Water Quality Reporting
Lead Control Program
- **10:15 – 10:45 a.m.**
Wastewater Treatment
Wastewater Treatment Improvement Plan Update
Wastewater Treatment Plant Licensing
- **10:45 – 11:00 a.m.**
Upcoming Sewer Bylaw Review
- **11:00 – 11:15 a.m.**
2005 Water and Sewer Rates

Water Treatment Program Update

Outline

- Background
- Public health protection
- Water treatment program
 - UV Disinfection
- Schedule
- Chloramination

Background

- Since 1919, Winnipeg has enjoyed a high quality reliable water supply from Shoal Lake
 - minimal treatment (chlorine for disinfection)
- In 1993 Council
 - accepted the recommendation to undertake water treatment within a ten year time frame
 - established a Water Treatment Reserve Fund
- Between 1995 and 2004 a comprehensive program of monitoring, pilot testing and engineering studies were undertaken

Why Do We Need Water Treatment?

- Water treatment is about protecting public health
- *“The rationale for construction of a water treatment plant is based primarily on health concerns” Dr. Margaret Fast (WRHA)*
- *“Providing water that is safe and healthy to drink”* received the highest priority March 1999 and May 2002 Customer Surveys

Water treatment will allow us to:

- Reduce the risk of a waterborne disease outbreak caused by chlorine-resistant microorganisms
- Reduce chlorine disinfection by-products
- Meet the Canadian Drinking Water Quality Guidelines
- Improve taste, odour and appearance

Waterborne Pathogens

- Chlorine is effective against bacteria and viruses
- Chlorine is relatively ineffective against *Giardia* and requires high doses and long contact times
- Chlorine is not effective against *Cryptosporidium*



Disinfection By-Products (DBPs)

- Formed as a reaction between chlorine and natural organic matter in the water
- Objectives for DBPs and waterborne pathogen control are in conflict
 - more disinfection, better pathogen kill
 - more disinfection, higher DBPs
- Research shows a possible link between life time exposure to DBPs and cancer

Disinfection By-Products

- DBP (THM) levels in Winnipeg water are about 20% above the Canadian guideline
- Awwa Research Foundation research shows that with UV disinfection in place, chloramination may be used downstream of Deacon
- This will reduce THM levels below the Canadian guideline

Regulatory Trends

- Trend in the USA is for increasing stringency in water quality standards and guidelines to protect public health
- Canadian guidelines are following this trend:
 - Turbidity
 - Chlorine DBPS (THMs)
- Manitoba Government has passed the Drinking Water Safety Act

Water Treatment Program Schedule

- 2004:
 - Construct UV disinfection
 - Initiated WTP design
- 2005:
 - UV disinfection commissioning,
 - Start construction of the WTP
- Late 2007:
 - WTP commissioning
 - Convert the water distribution system to chloramines to reduce DBP (THM) levels

UV Disinfection at Deacon





48" UV Reactor



48" UV Reactor





Chloramination

- Chlorine and ammonia combine to form chloramines
- Chloramine is a more persistent disinfectant than chlorine
- Precautions for:
 - Medical treatment, kidney dialysis
 - Fish tanks
- We will notify the public in advance

What Will Water Treatment Do For Winnipeg?

- Help protect against outbreaks from parasites such as *Cryptosporidium* and *Giardia*
- Allow us to meet evolving *Guidelines for Canadian Drinking Water Quality*
- Support the long-term health and well being of our community

Questions?



Water Main Criticality Assessment Project

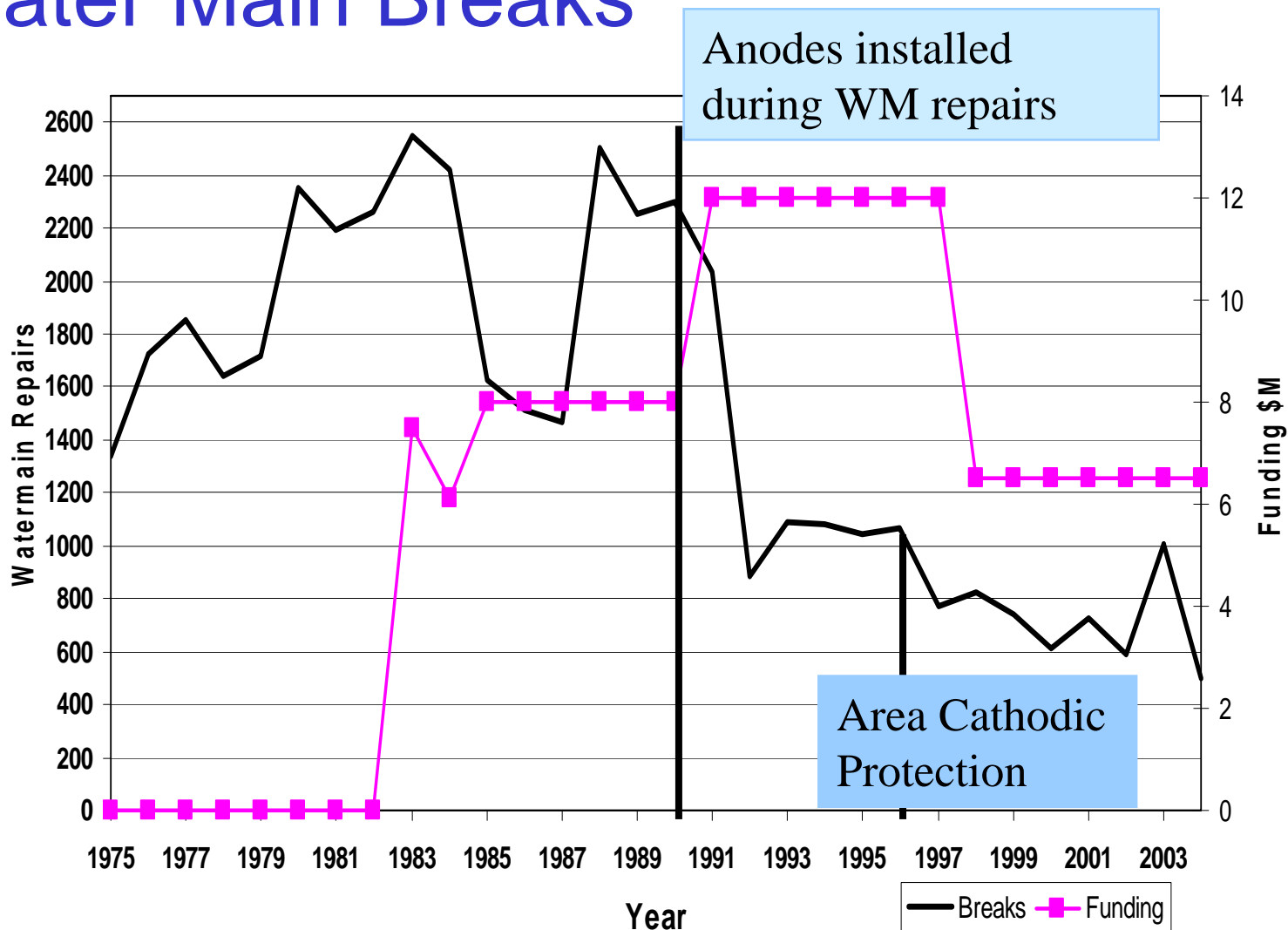
Outline

- Water Main Renewal Program background
- Study objectives
- Water Main Asset Management
- Benefits
- Timeline

Background

- Water Main Renewal Program
 - Funded through the frontage levy charge of \$0.65/frontage foot
 - Annual funding of about \$6.5 M
 - Priority is based on leak frequency and other considerations such as street pavement works

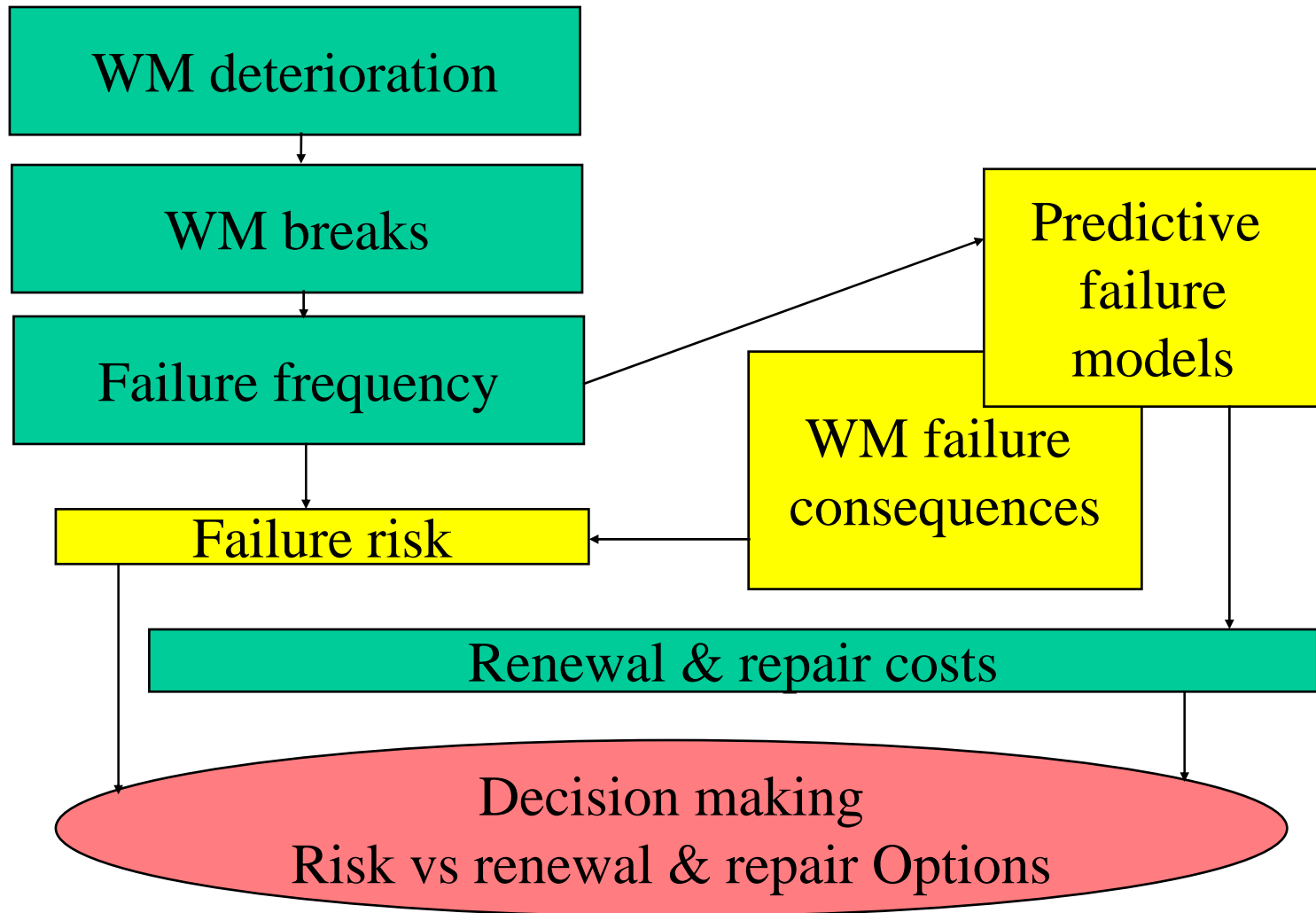
Water Main Breaks



Study Objectives

- Proactive water main management
 - Sensitive to customer service expectations
 - Protect the environment
 - Reduce risk
 - Target investment in water main infrastructure

Water Main Asset Management



Predictive Models

- Predicting water main failures based on
 - pipe size, materials and joint type
 - soil conditions
- Risk and consequences
 - customer impacts
 - large pipes crossing rivers
- Cost models
 - water main replacement
 - repair and rehabilitation

Water Main Failure Consequences

- Customer service impacts
 - industrial, health care, commercial, residential
- Traffic disruption and road repairs
- Environmental impacts
 - water discharge to a water course
- Other utilities

Benefits

- Prioritize leak repair response
- Maximize water main asset life cycle
- Minimize risk
- Prioritize budget investments in water main infrastructure
- Minimize consequential damages

Timeline

- 2004 Commenced the study
- 2004 & 2005 Study period
- 2006 Final report

Questions?



Water Main Cleaning Program



Outline

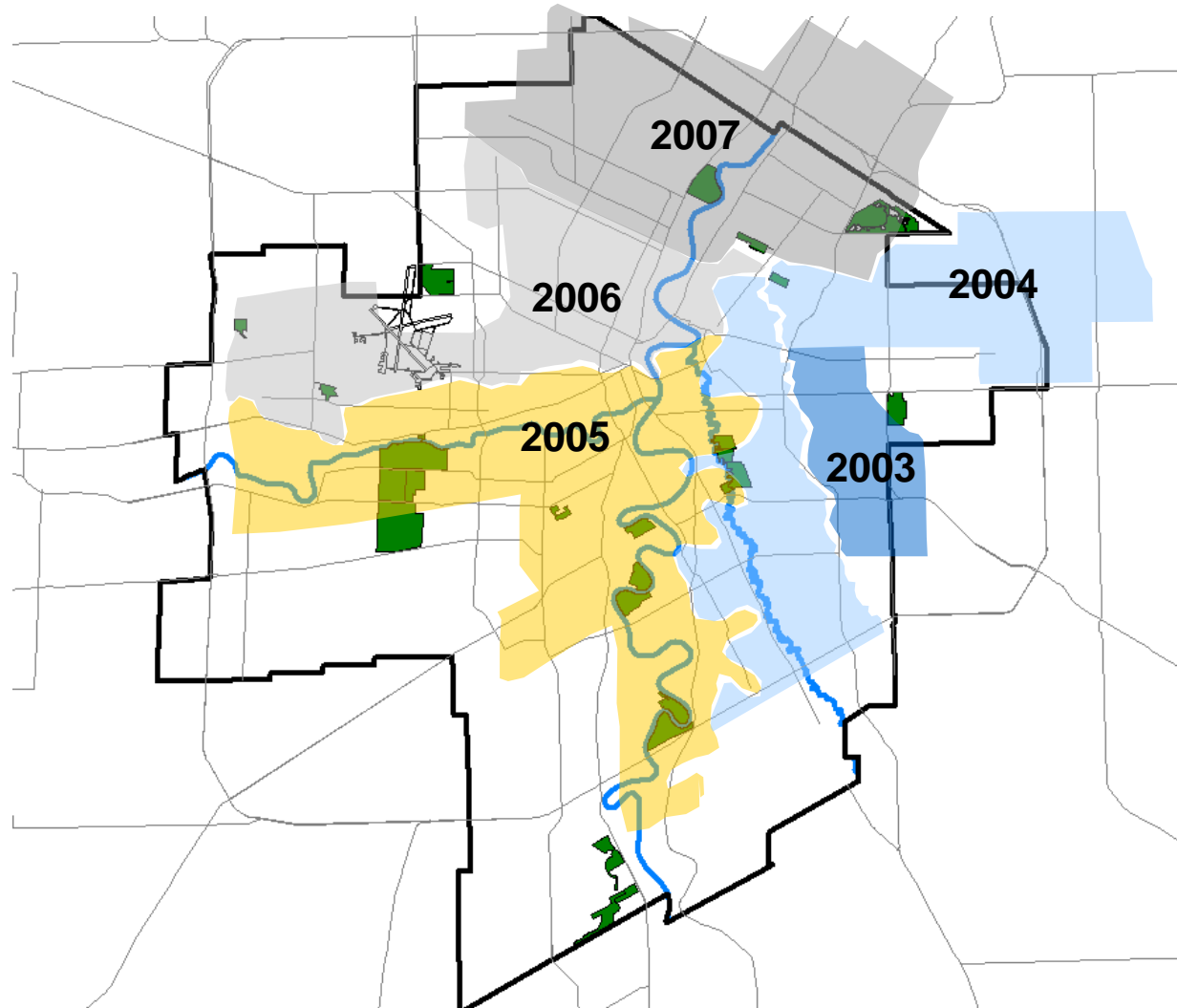
- Why are we cleaning the water mains
- When and where are we cleaning water mains
- What water main cleaning means to you
- How we clean water mains
- Water quality / environmental monitoring
- Next steps

Why are we cleaning the water mains?

- Improve water quality
 - Sediments (primarily dead algae) accumulate in water mains and should be removed
 - Water mains to be cleaned prior to WTP commissioning
- Reduce “dirty water” complaints from water main breaks or valve operation
- Test the distribution system for deficiencies



Water Main Cleaning Plan



What water main cleaning means to you

- Notices will be placed monthly in local newspapers
- Information is available on our Web site at www.winnipeg.ca/waterandwaste/water/



What water main cleaning means to you

- Before cleaning
 - We will contact you in person 1 – 2 days in advance to advise when work will begin and how long work is expected to take
 - If you need water while we are cleaning the water mains, fill containers with water or contact the Customer Service Centre

What water main cleaning means to you

- During cleaning
 - Do not use water while we are cleaning the water mains on your street
 - Recommend turning off water supply to prevent sediment entering water pipes



How we clean water mains

- Control the flow of water from cleaned source to the target mains
- Cleaning (scouring velocities required)

How we clean water mains

- Cleaning
 - Cleaning sequence completed in approximately 15 minutes



What water main cleaning means to you

- After cleaning
 - We will contact you when we are finished cleaning the water mains
 - Turn on cold tap water in building to see if water is clear

What water main cleaning means to you

- What else you may notice after the water mains are cleaned:
 - Cloudy water – water is cloudy when air gets in it and makes tiny bubbles
 - Chlorine smell – we add enough chlorine to the water to keep it safe
 - Drop in pressure – water pressure will soon return to normal

We monitor water quality

- Water samples are taken during the flushing runs
- Sampling is completed at regional/ residential/ business locations during the program



Water quality monitoring

- Water samples are tested to confirm total and free chlorine levels in the distribution system
- We also complete onsite random testing of water samples for chlorine residual



Next steps

- Entire City water mains (2,400 km) expected to be cleaned once prior to commissioning of the Water Treatment Plant
- Program to be continued as an ongoing maintenance program

Questions?



Maintaining Your Private Water System

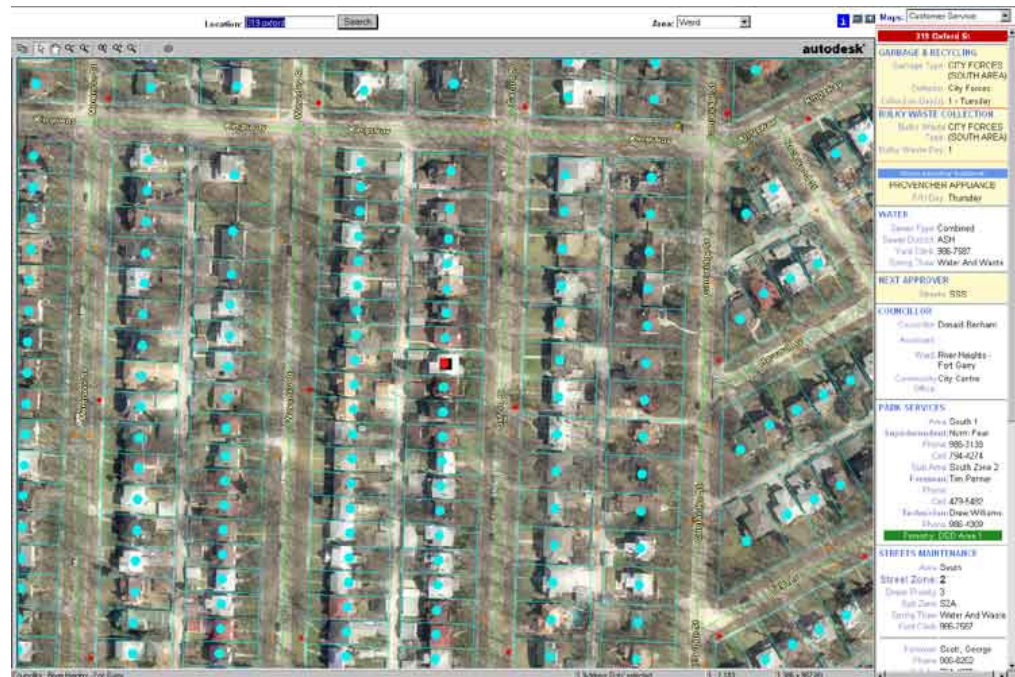
Maintaining Your Private Water System

- For commercial/industrial/institutional customers, the water service connection from the water main to the user is the responsibility of the owner



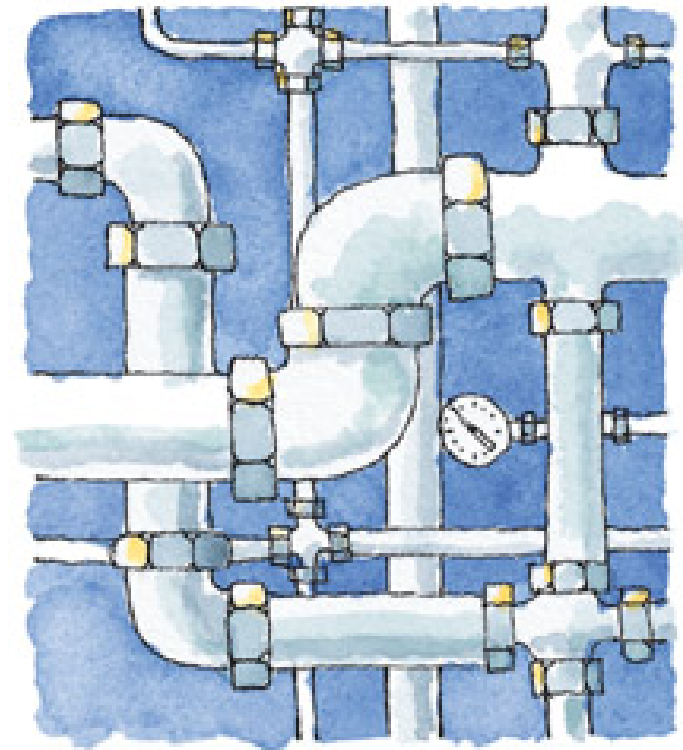
Maintaining Your Private Water System

- Maintenance of your water service connection and internal plumbing is key to continued reliability
 - Accurate mapping
 - Dual service connections
 - Condition assessment / rehabilitation



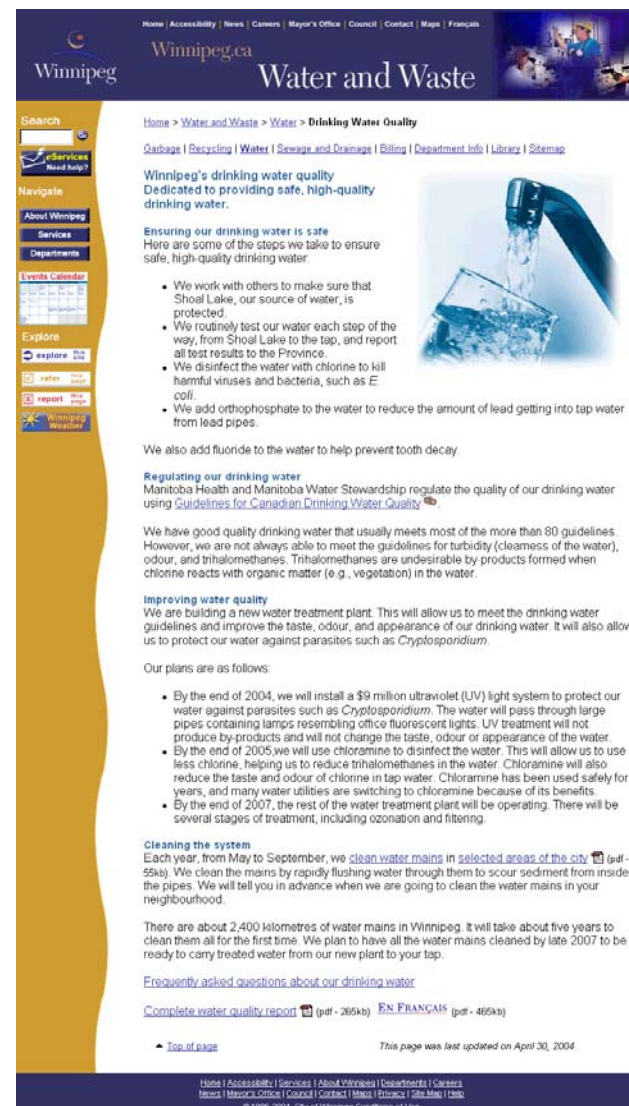
Maintaining Your Private Water System

- Maintenance of your water service connection and internal plumbing is key to continued water quality
 - **Flushing / cleaning**
 - Private water main systems – coordinate with City's water main cleaning program
 - Internal plumbing
 - **Filters**
 - For any customer requiring uninterrupted, high quality water



Testing and Reporting of Water Quality

- General water quality information
 - **MTS white pages**
 - **Website:**
www.winnipeg.ca/waterandwaste
- Annual water quality report
 - **Available on website**
- Safe Drinking Water Act and Regulations
 - **Reporting and accountability to public**



The screenshot shows the Winnipeg.ca website's 'Water and Waste' section. The page is titled 'Drinking Water Quality' and features a navigation menu on the left with links to Home, Accessibility, News, Careers, Mayor's Office, Council, Contact, Maps, and Français. The main content area includes a search bar, a 'Services Need help?' button, and a 'Navigate' section with links to About Winnipeg, Services, Departments, and Events Calendar. The page text discusses the city's commitment to providing safe, high-quality drinking water, mentioning the Shoal Lake source and the use of chlorine and orthophosphate for disinfection and lead reduction. It also mentions the addition of fluoride for tooth decay prevention. A section titled 'Regulating our drinking water' mentions Manitoba Health and Manitoba Water Stewardship. Another section, 'Improving water quality', discusses the building of a new water treatment plant. A 'Cleaning the system' section mentions cleaning water mains in selected areas of the city. The page also includes links to 'Frequently asked questions about our drinking water' and a 'Complete water quality report' (pdf - 265kb). The footer contains the Winnipeg logo and contact information.

Winnipeg.ca Water and Waste

Home > Water and Waste > Water > Drinking Water Quality

Garbage | Recycling | Water | Sewage and Drainage | Billing | Department Info | Library | Sitemap

Winnipeg's drinking water quality
Dedicated to providing safe, high-quality drinking water.

Ensuring our drinking water is safe
Here are some of the steps we take to ensure safe, high-quality drinking water:

- We work with others to make sure that Shoal Lake, our source of water, is protected.
- We routinely test our water each step of the way, from Shoal Lake to the tap, and report all test results to the Province.
- We disinfect the water with chlorine to kill harmful viruses and bacteria, such as E. coli.
- We add orthophosphate to the water to reduce the amount of lead getting into tap water from lead pipes.

We also add fluoride to the water to help prevent tooth decay.

Regulating our drinking water
Manitoba Health and Manitoba Water Stewardship regulate the quality of our drinking water using [Guidelines for Canadian Drinking Water Quality](#).

We have good quality drinking water that usually meets most of the more than 80 guidelines. However, we are not always able to meet the guidelines for turbidity (cleanness of the water), odour, and trihalomethanes. Trihalomethanes are undesirable by-products formed when chlorine reacts with organic matter (e.g., vegetation) in the water.

Improving water quality
We are building a new water treatment plant. This will allow us to meet the drinking water guidelines and improve the taste, odour, and appearance of our drinking water. It will also allow us to protect our water against parasites such as *Cryptosporidium*.

Our plans are as follows:

- By the end of 2004, we will install a \$9 million ultraviolet (UV) light system to protect our water against parasites such as *Cryptosporidium*. The water will pass through large pipes containing lamps resembling office fluorescent lights. UV treatment will not produce by-products and will not change the taste, odour or appearance of the water.
- By the end of 2005, we will use chloramine to disinfect the water. This will allow us to use less chlorine, helping us to reduce trihalomethanes in the water. Chloramine will also reduce the taste and odour of chlorine in tap water. Chloramine has been used safely for years, and many water utilities are switching to chloramine because of its benefits.
- By the end of 2007, the rest of the water treatment plant will be operating. There will be several stages of treatment, including ozonation and filtering.

Cleaning the system
Each year, from May to September, we [clean water mains in selected areas of the city](#) (pdf - 55kb). We clean the mains by rapidly flushing water through them to scour sediment from inside the pipes. We will tell you in advance when we are going to clean the water mains in your neighbourhood.

There are about 2,400 kilometres of water mains in Winnipeg. It will take about five years to clean them all for the first time. We plan to have all the water mains cleaned by late 2007 to be ready to carry treated water from our new plant to your tap.

[Frequently asked questions about our drinking water](#)

[Complete water quality report](#) (pdf - 265kb) [EN FRANÇAIS](#) (pdf - 465kb)

[Top of page](#) This page was last updated on April 30, 2004.

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Update on Lead Control Program

- Background

- Raw water is lead-free, but lead leaches out of plumbing materials, including lead service lines
- Research indicated City of Winnipeg tap water would not meet recent National Guidelines for lead concentrations



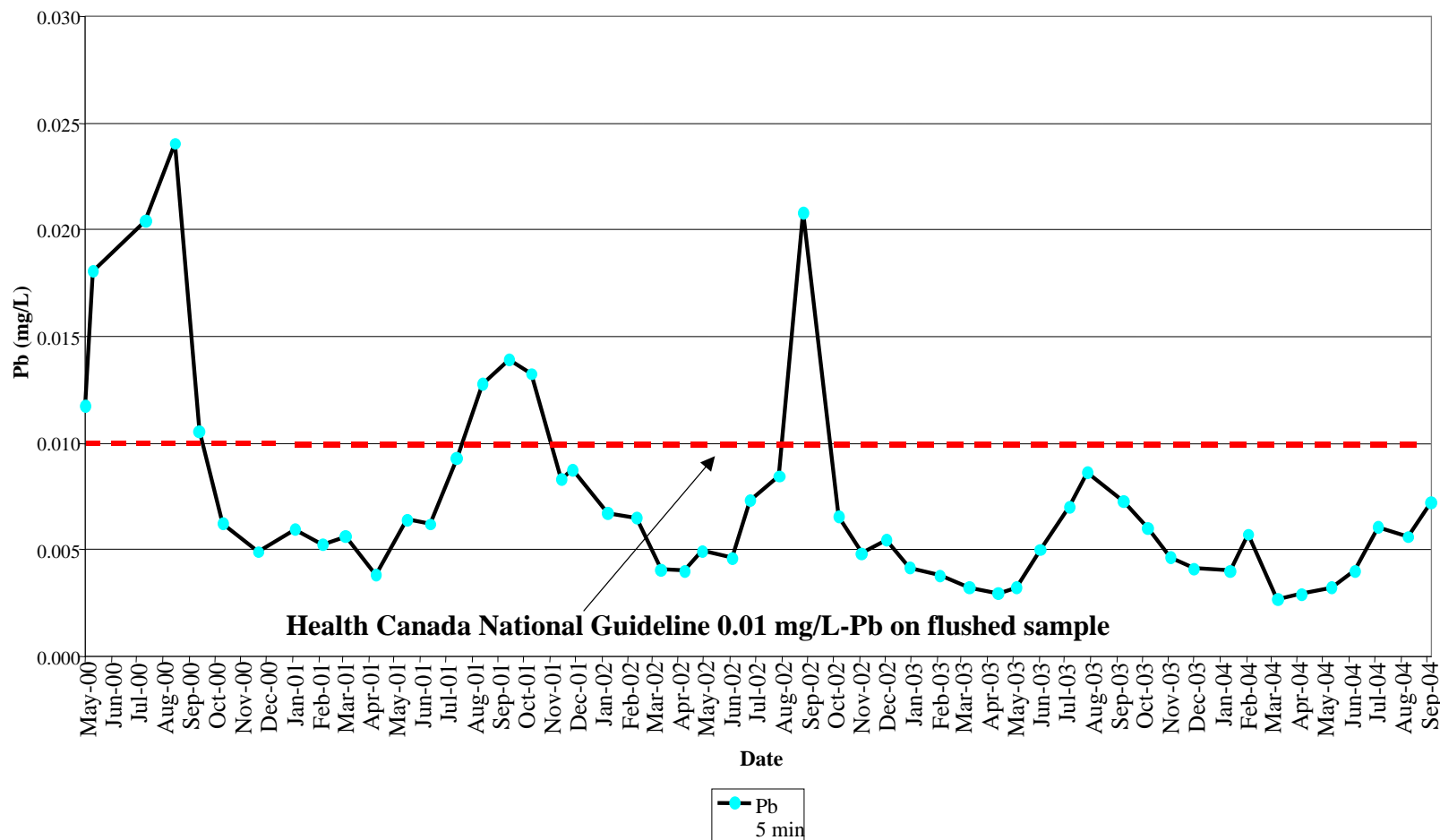
Update on Lead Control Program

- Implementation
 - Orthophosphate implemented in June 2002
 - Works by coating pipe interior
 - Implemented with initial low dose and customer consultation to minimize impact on customers (has potential to interfere with heat exchange systems)
 - Run-in dose continued until May 2001
 - Maintenance dose has been adjusted, but has now been constant at 2 ppm since January 2002

Update on Lead Control Program

- Program Status
 - Lead concentration in Winnipeg tap water is consistently below the National Guideline
 - Lead control program will continue at maintenance dose

Average 5 Min Flush Lead Concentration at Single Family Dwellings With Lead Service Connections



Flushing of School Fountains

- Background

April 2000 –
letter from City to school
divisions advising that
practice of daily flushing
of school fountains be
continued until further
notice

June 2000 –
lead control program
implemented



Flushing of School Fountains

- Update
 - In 2004 City consulted with WRHA regarding flushing of school fountains
 - Research indicated that only 1 out of 330 schools in City of Winnipeg had lead service
 - Extensive sampling at schools undertaken
 - WRHA agreed that flushing of school fountains no longer necessary as a health practice
 - School divisions are encouraged to practice appropriate maintenance procedures of their piping/plumbing systems

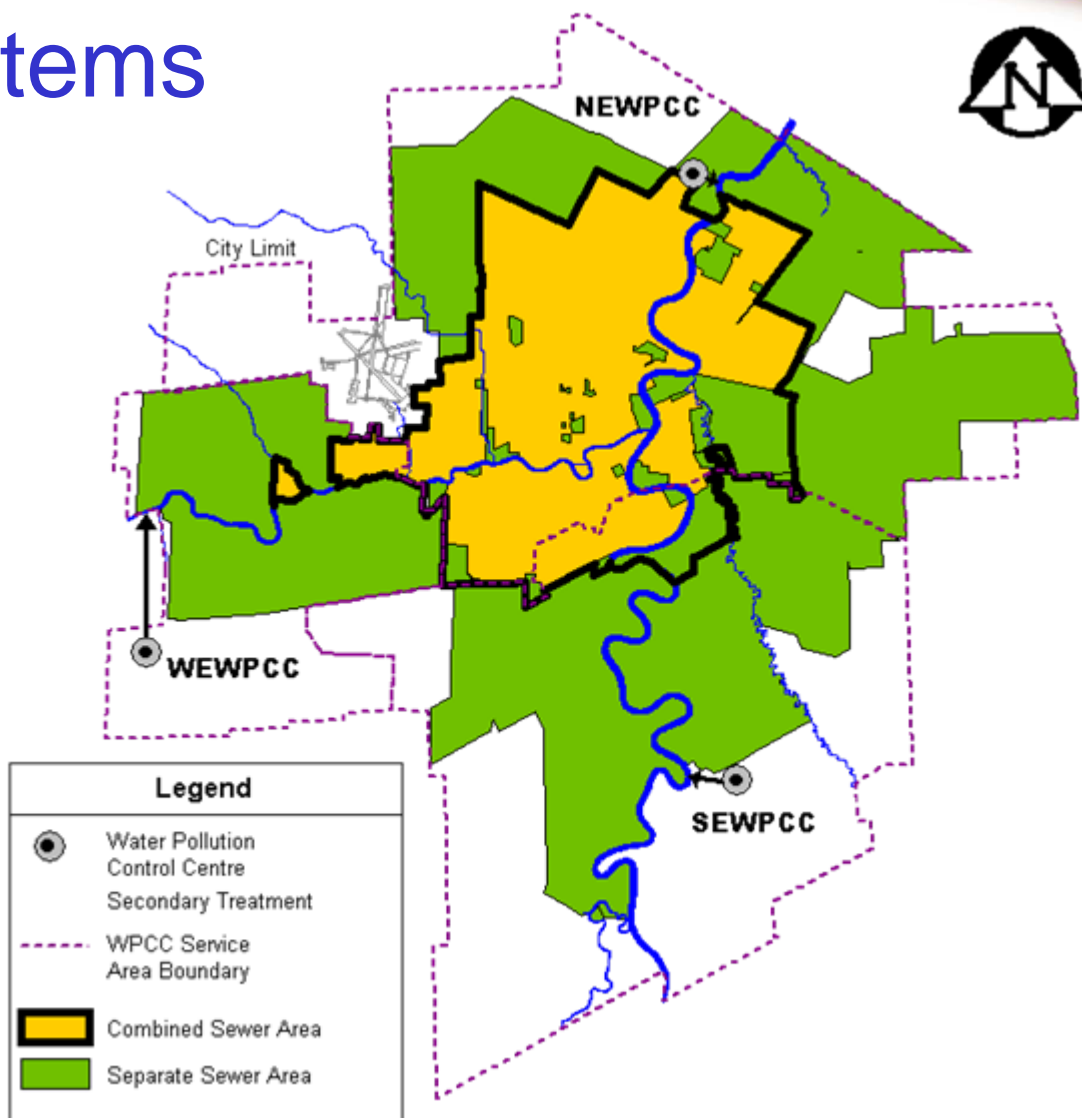
Questions?



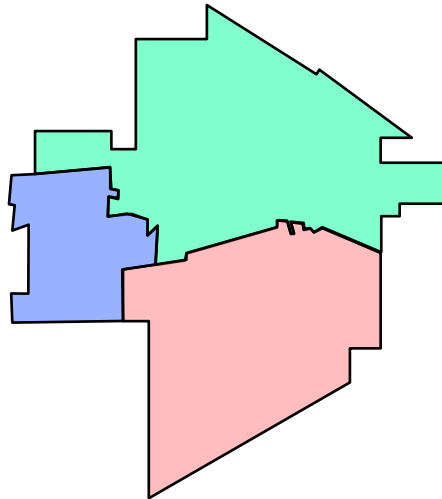
Wastewater Treatment Improvements




Existing Systems

- 5 Interceptor Sewer systems
- 3 Pollution Control Centres
- 79 CSO locations
- 231 Land drainage outlets
 - **101 to Red and Assiniboine**



Wastewater Treatment Plants



	<u>NEWPCC</u>	<u>SEWPCC</u>	<u>WEWPCC</u>
			
Population Served	374,000	170,000	86,000
ADWF Recorded in 2003	154	44	25
ADWF Design Capacities	302	59	32

ADWF = Average Dry Weather Flow (ML/d)

CEC Hearings

- Clean Environment Commission (CEC) held public hearings in January and April 2003
- Purpose was to resolve specific environmental, health and licensing issues associated with Winnipeg's wastewater collection and treatment systems
- Province adopted CEC recommendations in September 2003.

CEC Recommendations

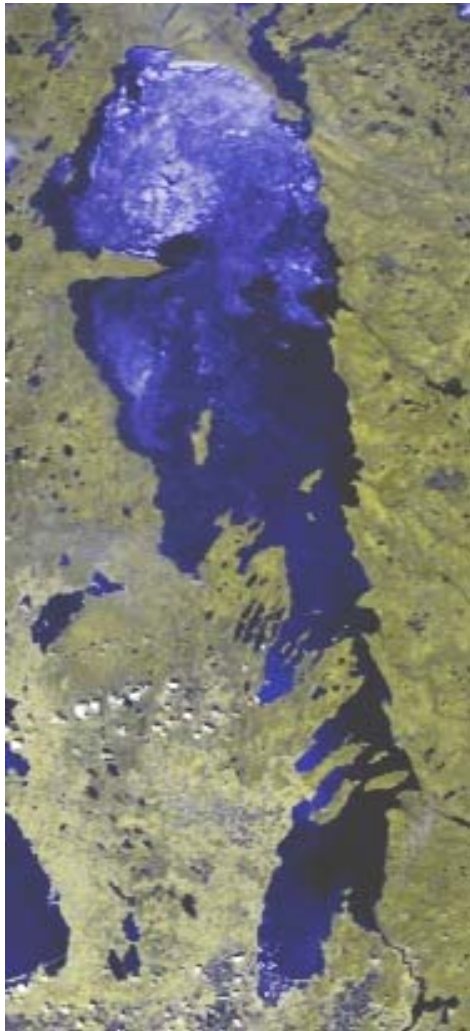
- Proceed with disinfection at NEWPCC and WWPCC
- Reduce nitrogen and phosphorus
- Complete risk and criticality assessments at 3 WPCCs
- Revise Sewer By-Law
- Reduce Combined Sewer Overflows
- Prepare Environmental Management System for WPCCs

Disinfection

- In place at SEWPCC
- New systems required at NEWPCC and WEWPCC



Nutrients - Background



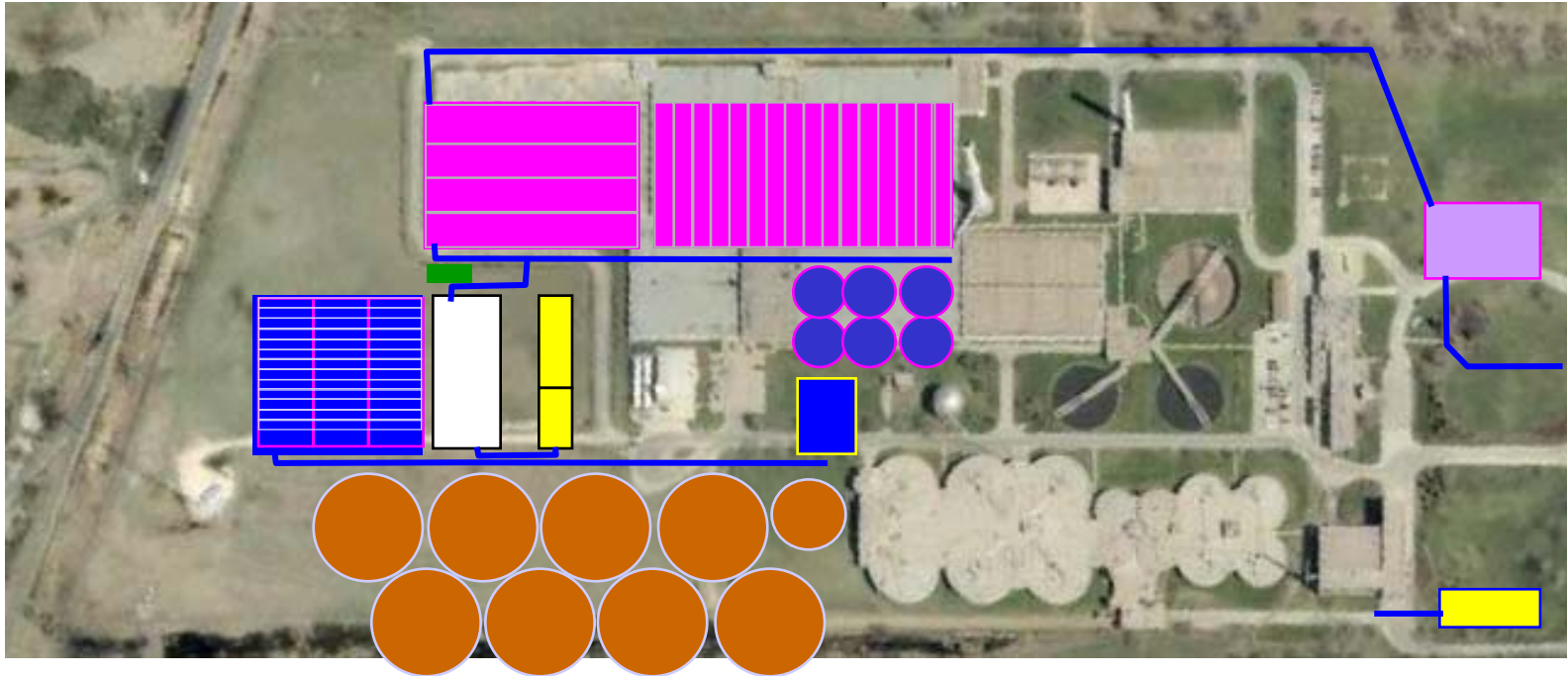
- Nutrients (N and P)
 - cause of algae blooms in Lake Winnipeg
- Nutrient loads to Lake Winnipeg have increased
- Our load has been constant for about 30 years
- Our nutrient load** to Lake Winnipeg is
 - 6.3% of total annual P load
 - 5.2% of total annual N load

*** Source: Manitoba Conservation, Nov 2002: "A Preliminary Estimate of Total Nitrogen and Total Phosphorus Loading to Streams in Manitoba, Canada".*

NEWPCC



NEWPCC



- Expansion required for nutrient removal
 - nearly double largest plant
 - \$230 million
 - cannot shut down plant

Nutrient Reduction

- Implementation
 - West End plant by 2006
 - North End plant phase I by 2006
 - South End plant by 2012*
 - North End plant phase II by 2014*

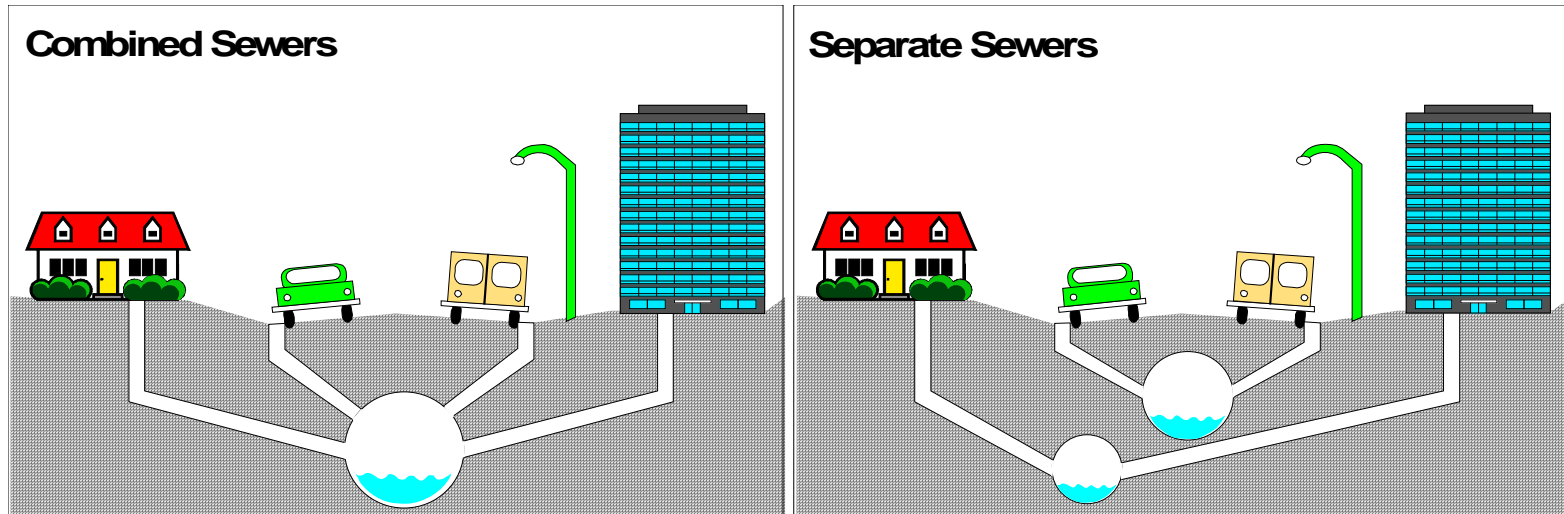
** to be confirmed*

Risk and Criticality Assessments

A study to identify anything that could put the plants out of service:

- Completed at all 3 plants
- Identified immediate, short- and long-term improvements
- Code compliance, safety and reliability
- Cost \$36 million

CSO Control



- Older parts of the city (pre 1960)
- Less than 30% of city has combined sewers
- CSO – dilute mixture of sewage and surface runoff
- On average, CSOs occur 18 times per recreation season (May 1 to Sept 30)
- Major effects of CSOs on river quality relate to:
 - Microbiological water quality
 - Aesthetic quality (floating debris)

CSO Reduction

- CEC recommendations on CSO reduction
 - Complete long-term plan in 20 to 25 years
 - Instrument outfalls, adjust weirs, accelerate combined sewer replacement, advance pilot retention project
- Provincial acceptance of plan (to be confirmed)
 - Reduce overflows to 4 per year on average
 - Consistent with US EPA direction
 - Based on storage, conveyance, and treatment
 - Complete by 2030
- Integrate with basement flooding relief and sewer rehab projects

Biosolids

- The residual solids from treatment that are digested and dewatered
- Major Biosolids Management Study underway
 - Preliminary indications are that \$63 million in capital could be required to:
 - Create heat dried pellets and store
 - Produce a product that can be managed when land application not appropriate
- Public consultation in 2005

What the City is Facing

- \$899 million in capital
 - \$24 M disinfection by 2006
 - \$26 M centrate nutrient reduction by 2006
 - \$359 M nutrient reduction by 2014
 - \$417 M CSO mitigation by 2030
 - \$63 M biosolids by 2010
 - \$10 M CEC and other related programs

Questions?

Sewer By-Law 7070/97 Planned Revision 2005

Purpose of this presentation

- Identify potential issues with sewer by-law that may affect you
- Identify how you can get involved

Outline

- Why have a sewer by-law
- What is driving the revision
- What are the changes
- How may it affect you
- What are the timelines
- Opportunities to get involved

A sewer by-law will:

- Ensure proper, safe, and reliable operation of the wastewater collection and treatment systems
- Protect public health and safety
- Protect the environment
- Protect property and sewerage systems
- Regulate the direct and indirect discharge of wastewater and pollutants to the sewerage system
- Establish legally enforceable compliance requirements

Sewer By-Law 7070/97

- Composed of
 - 14 parts
 - 2 schedules
- Came into force Jan. 1, 1998
- Stakeholders were involved

What is driving the revision?

- Heard from public at 2003 CEC Hearings
 - Believed that current by-law too lax
 - **many uncontrolled substances**
 - **making their way into the sewer**
 - **passing through treatment plants**
- CEC recommendations based on:
 - Pollution prevention (source control)
 - More stringent quality and quantity restrictions
 - Compliance (by-law enforcement)
 - Toronto's "model" sewer use by-law
- Working cooperatively with Province to realize recommendations ASAP

What are the changes?

- CEC Recommendation #13
 - Expand list of restricted substances
 - **Winnipeg**
 - **wastewater: 12 compounds; 23 criteria**
 - **stormwater: none**
 - **Toronto**
 - **wastewater: 53 compounds; 27 criteria**
 - **stormwater: 44 compounds**
 - Prevent disposal of contaminants of concern
 - Encourage treatment at source
 - Improve enforcement, and
 - Increase penalties for violations

How may it affect you?

- For pollutants you are discharging today
 - Limits may change
 - May not be permitted in the future
- You may be required to prepare pollution prevention plans, including material substitution
- You will see our inspectors more often

What are the timelines?

- Study will be conducted in two phases
 - Using specialist consultant services
 - Phase 1 of study (technical/financial)
 - **January to June 2005**
 - Phase 2 of study (stakeholder involvement)
 - **July to November 2005**
- Recommendations to Council, Dec. 2005
- Targeting Jan. 1, 2007 for compliance
 - Study will help determine enforcement date
 - Some flexibility in enforcement date

Opportunities to get involved?

- Phase 2 (stakeholder involvement)
 - Outreach campaign
 - Website
 - Public open houses
 - Meetings/workshops with stakeholders
- Presentation to Standing Policy Committee on Public Works
 - Gets you to the decision makers

Recent Change

- On November 24, 2004, City Council approved amendment to Schedule “B” of the Sewer By-law
 - City will pay to renew a failed sewer connection within City right-of-ways subject to \$1,000 deductible fee
 - Applies to business properties, multi-family residential and rental properties
 - Subject to conditions
 - Effective January 1, 2005

Questions?

2005 Water and Sewer Rates

Summary

- Sewer rates are increasing faster than inflation due to required improvements:
 - To remove nitrogen and phosphorous
 - To reduce combined sewer overflows

Rate Approval Process

(You can be involved*)

- Department prepares 10-year rate forecast
- Department recommends one year rate change
- *Standing Policy Committee on Public Works
 - in early November
- *Executive Policy Committee
 - in mid November
- *City Council – late November

2005 Rate

Approved by City Council November 24, 2004

- Sewer rate increase from \$3.11 to \$3.39 per 100 cubic feet (i.e., from \$1.10 to \$1.20 per 1000 litres)
- Water rate unchanged
- Fixed quarterly charge increase to recover water meter and billing costs

Full report is available at www.winnipeg.ca

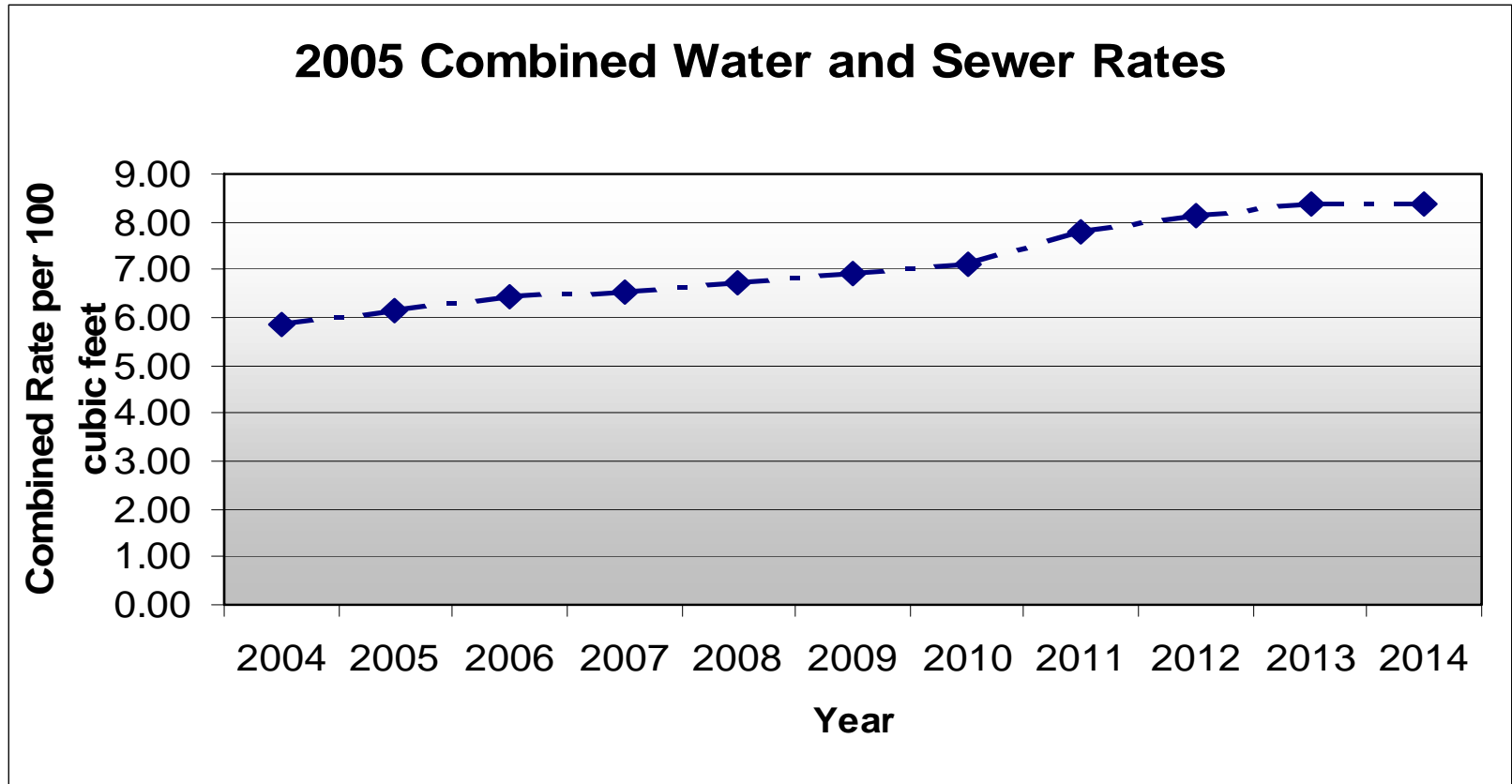
Fixed Quarterly Charge

Meter (inches)	2005 (\$/quarter)	2004 (\$/quarter)	Variance (\$/quarter)
5/8	13.75	12.10	1.65
3/4	14.80	13.05	1.75
1	17.70	15.92	1.78
1 1/2	21.45	19.75	1.70
2	31.80	30.28	1.52
3	109.45	107.81	1.64
4	139.25	136.53	2.72
6	207.60	203.53	4.07
8	285.70	280.11	5.59
10	363.80	356.68	7.12

Note: First increase in 8 years

10 Year Rate Forecast

(reviewed annually)



10 Year Forecast

(reviewed annually)

Forecast Water and Sewer Rates					
Per 100 Cubic Feet					
	Water		Sewer		Total
2005	\$	2.75	\$	3.39	\$ 6.14
2014	\$	3.26	\$	5.40	\$ 8.66
Average Annual Change		1.9%		5.3%	3.9%
Water Rate Shown is Block 1					

What Sewer Projects are Causing the Increase in Rates – Next 10 Years

- \$543 million in capital over the next ten years (over and above \$124 million in other capital)
 - \$352M Nutrient Removal
 - \$96M Combined Sewer Overflow
 - \$62M Biosolids
 - \$26M Centrate Treatment
 - \$21M Disinfection
 - \$3M Other recommendations
- \$307 million in operating over the next ten years
 - \$93M Debt servicing (on debt of \$313 million)
 - \$150M Contributions to the EPR
 - \$64M Operating and maintenance for new infrastructure

Debt Versus Cash is a Factor

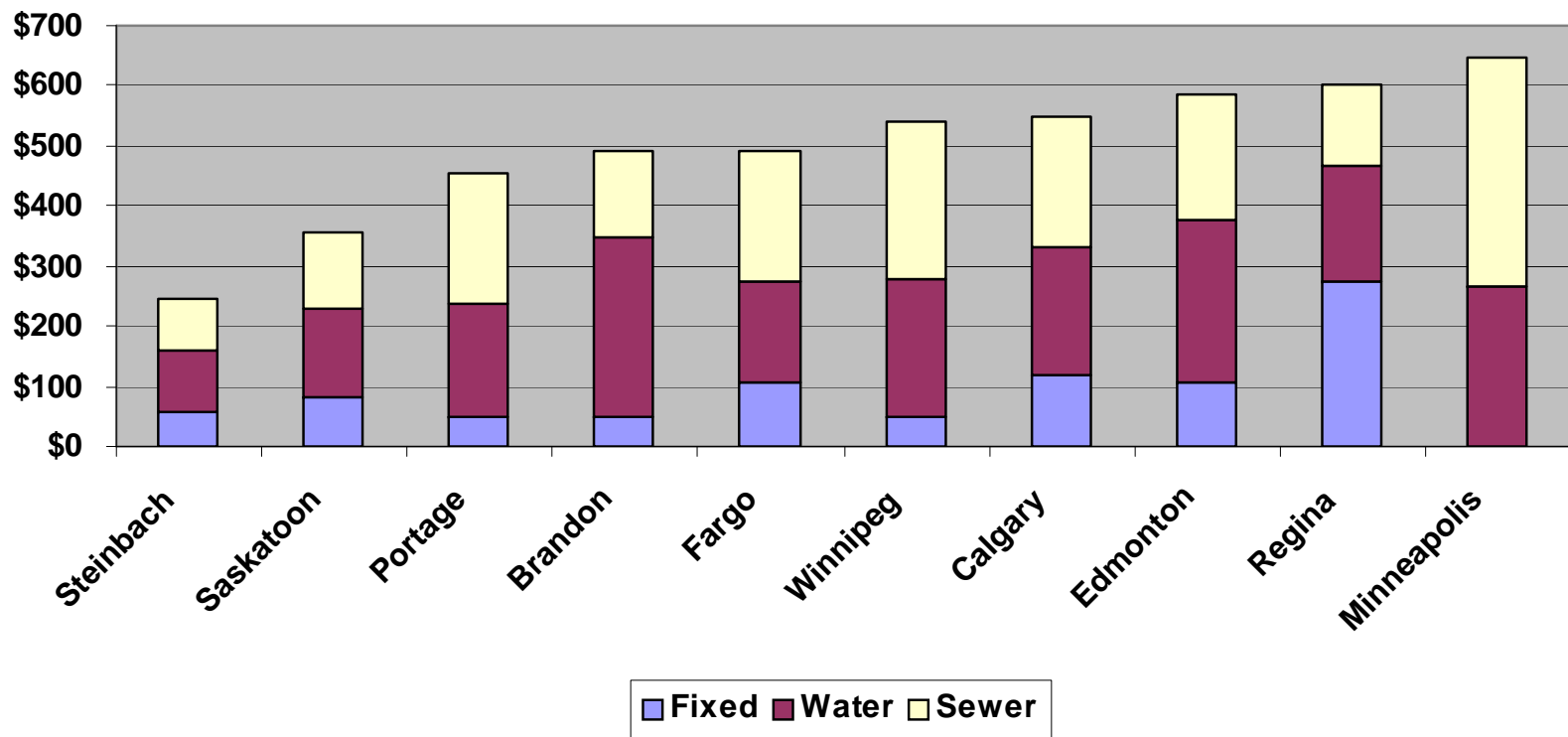
- City policy is to move away from debt financing except for very large projects
- Water Treatment Plant - \$214 million
 - \$117 cash and \$97 debt
- Wastewater Treatment Improvements - \$543 million (over next ten years)
 - \$230 cash and \$313 debt

2005 Rate Impact

- Customer impact – typical residential customer will see increase of \$29.61 from \$540.64 to \$570.25 (5.5%)
- Increase is \$0.08 cents per day
- Total cost of water and sewer is 1 cent per gallon

Residential Benchmarking

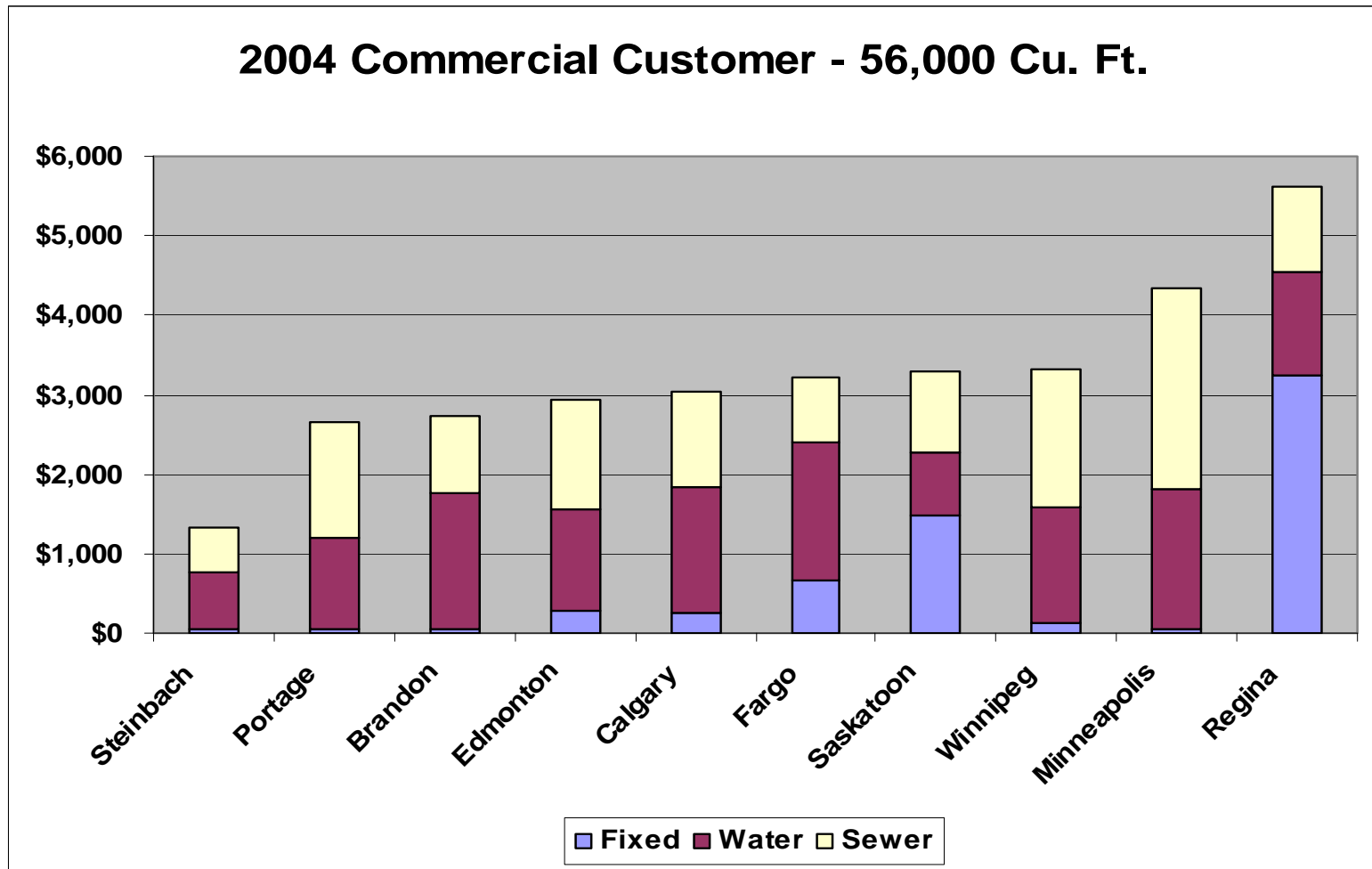
2004 Residential Customer - 8,400 Cu. Ft.



Trend is Rate Increases That Exceed Inflation

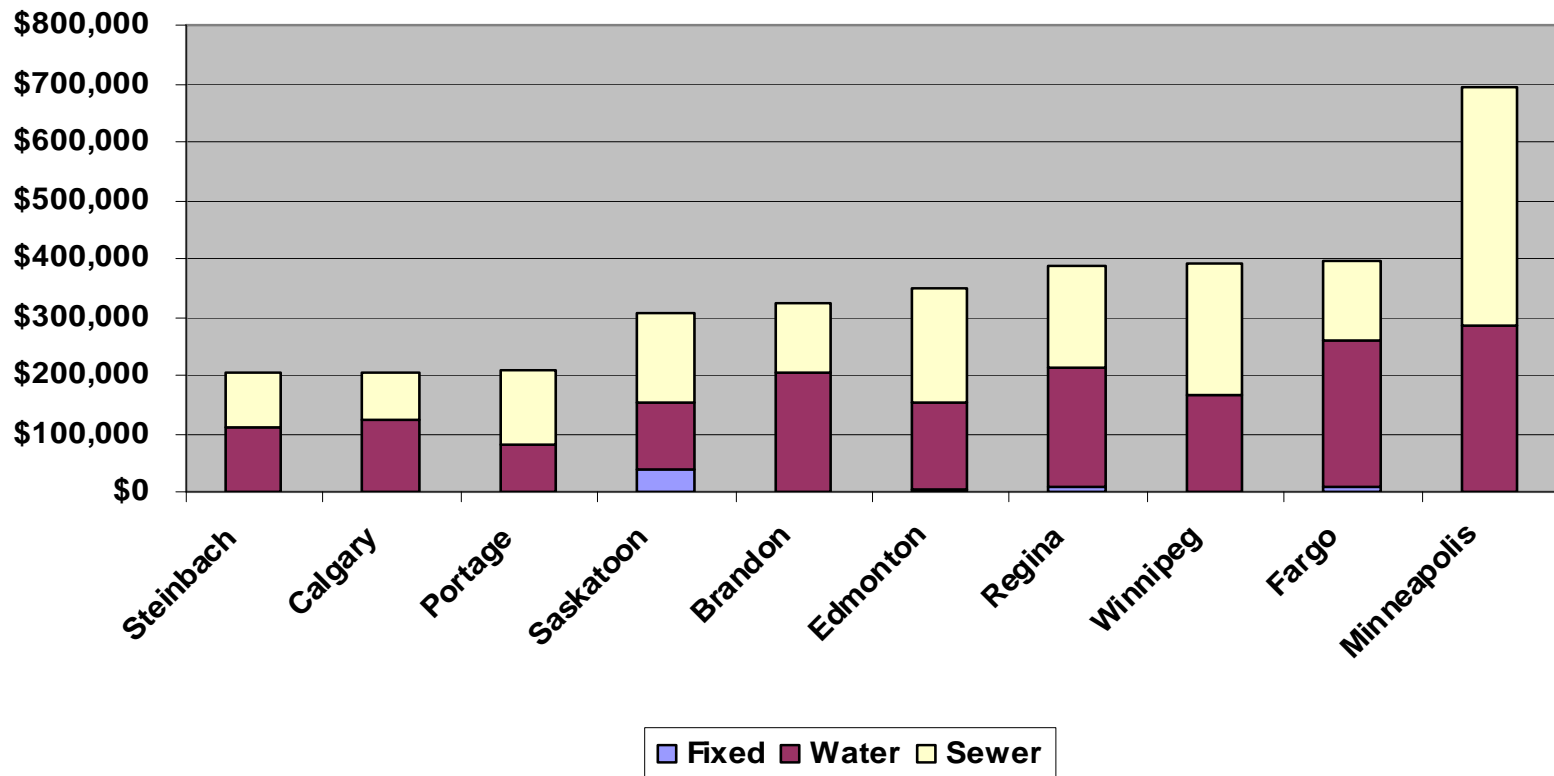
	Saskatoon	PLaP	Brandon	Fargo	Winnipeg	Calgary	Regina	Edmonton	Minneapolis
2004 Results	\$357.93	\$453.49	\$490.22	\$492.17	\$540.64	\$546.53	\$583.66	\$603.25	\$646.12
2003 Results	332.28	439.17	455.40	481.85	508.72	519.48	575.89	569.09	610.53
Variance	\$25.65	\$14.32	\$34.82	\$10.33	\$31.92	\$27.05	\$7.76	\$34.16	\$35.59
Percent	7.7%	3.3%	7.6%	2.1%	6.3%	5.2%	1.3%	6.0%	5.8%

Commercial Benchmarking



Large Commercial Benchmarking

2004 Large User - 8,987,000 Cu. Ft.



Questions?



www.winnipeg.ca