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# Tastes and Odours in Water Supplies

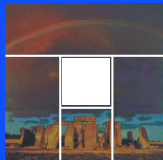
Identification and Treatment

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Eastern Ontario Water Works  
Association - Fall 1999

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engineers architects and planners

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# Outline

- **Introduction**
- **Causes**
- **Identification**
- **Treatment**

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# Introduction

- **Objectionable Taste and/or Odour in the Water**
- **Most Taste Problems Are Actually Odours**
- **Usually Aesthetic Problem, Not Health Related**
- **Can Indicate A Problem With Treatment**

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# Introduction

- **Problems**

- **Typically Infrequent and Unpredictable**
- **Can Be Hard To Treat**
- **Can Be Distribution System Related**
- **Customer Complaints**
- **Reduces Customer Confidence**
- **Differing Sensitivities In the Public**

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# Causes of Taste & Odours

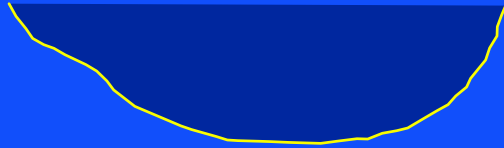
- **Algae or Microorganism Based**
- **Chlorination**
- **Inorganic Chemicals (iron, etc)**
- **Industrial Wastes**
- **Reservoir or Pipeline Coatings**

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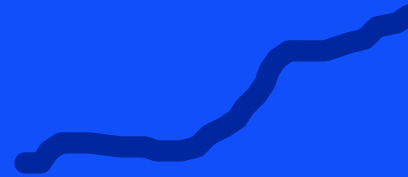
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# Location of Taste & Odours



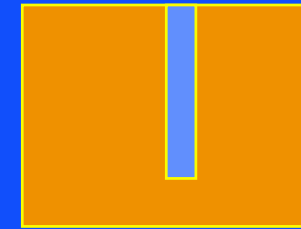
## Lakes

- Algae
- Zebra Mussels
- Treatment System



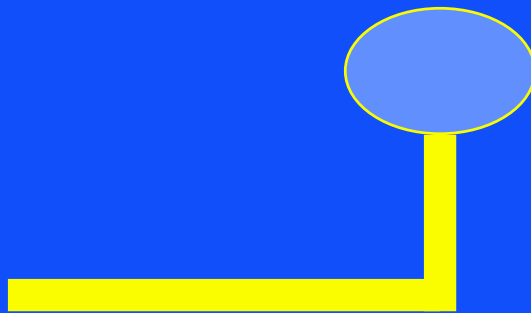
## Rivers

- Algae
- Runoff
- Industrial Waste
- Zebra Mussels
- Treatment System



## Groundwater

- Inorganic Chemicals (iron & hydrogen sulfide)
- Biogrowth in Wells



## Distribution System

- Disinfection, Pipe Materials
- Coatings, Stagnant Water, Biological Growth, Chlorination



## Customers Systems

- Hot Water Heaters
- Plumbing, POUs

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# Identification of Taste & Odours

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- **Earthy/Musty/Moldy**
  - **MIB & Geosmin**
  - **Algal By-products**
- **Chlorinous**
  - **Hypochlorous Acid**
  - **Di & Tri Chloramine**

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# Identification of Taste & Odours

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- **Grass/Hay/Straw/Wood**
  - **Algal by-products**
- **Marshy/Swampy/Septic/Sulfurous**
  - **Municipal Wastewater**
  - **Natural Hydrogen Sulfide**
  - **Hot Water Heaters**

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# Identification of Taste & Odours

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- **Vegetable or Flowery**
- **Fishy**
- **Medicinal/Phenolic**
- **Chemical/Hydrocarbon**

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# Identifying Taste & Odours

- **Customer Complaints**
- **Flavour Panels**
- **Chemical Measurement**
  - **MIB, Geosmin, Iron, Hydrogen Sulfide**
  - **Chlorine Residual**
  - **Chloramines**

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# Determine the Source

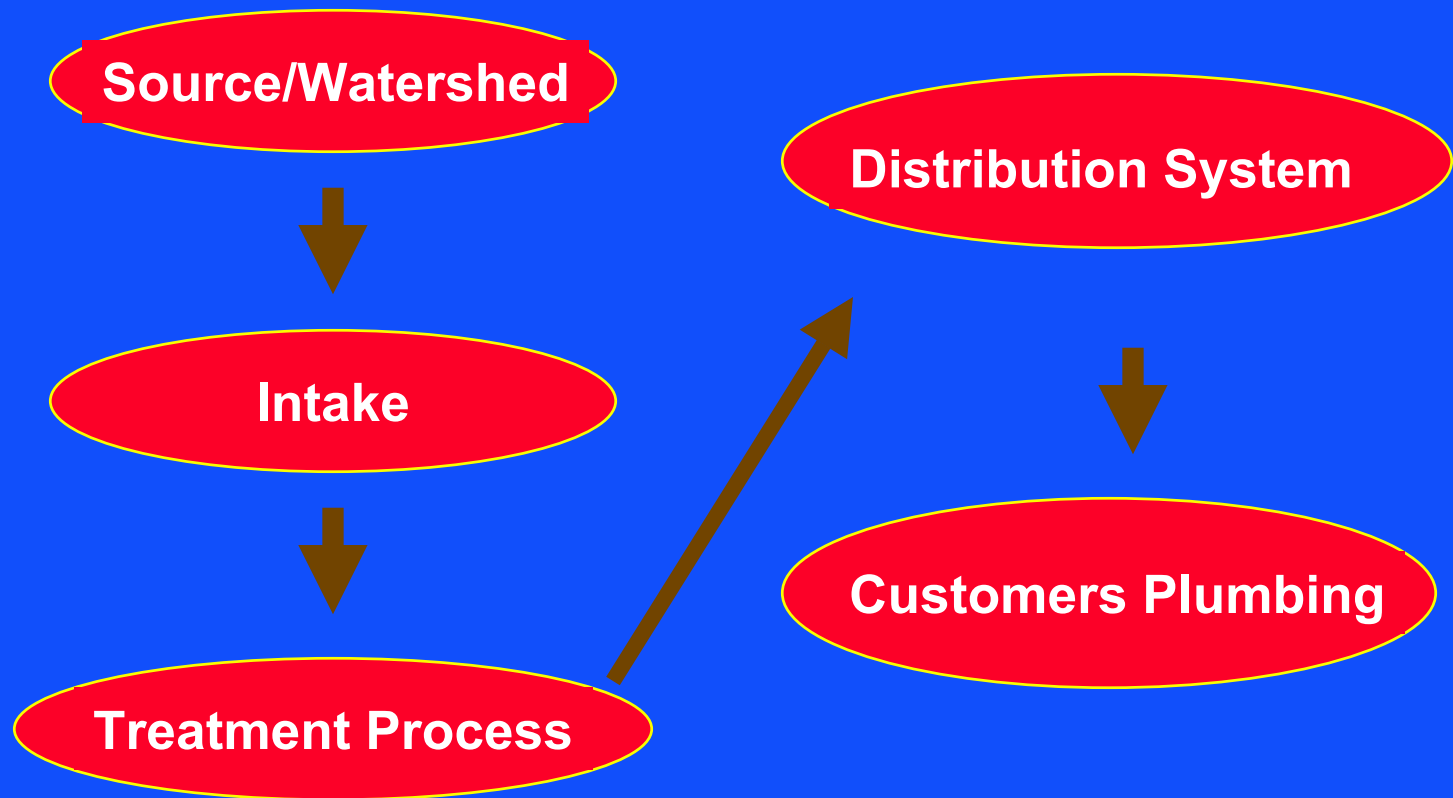
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# Checklist for Treatment System

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- Algae By-Products**
- Variability in Chlorination**
- Biological Growth**
- Anaerobic Conditions**
- Treatment System Failure**
- Breakthrough**

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# Checklist For Distribution System

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- Storage Facility Hydraulics
- Storage Facility Materials
- Loss of Chlorine Residual
- Boosting of Chlorine Residual
- Biological Growth
- Blending of Waters

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# Checklist For Watermains

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- New Mains (Lubricants, Coatings or Linings)**
- Plastic Pipe**
- Permeation**
- Cross Connections**
- Stagnant Mains**
- Corrosion/Biological Growth**

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# Checklist for Customers Plumbing

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- New Plastic Pipe**
- Corrosion**
- New Plumbing**
- Cross Connections**
- Hot Water Heaters**
- Point of Use Treatment Devices**

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# Treatment For Taste & Odours (Source Produced)

- Carbon Adsorption
- Chemical Oxidation
- Masking
- Control of Treatment System
- Customer Education

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# Carbon Adsorption

- **Powdered Activated Carbon (PAC)**
  - **Added as slurry or dry**
  - **Difficult to handle**
  - **Typical dosage (1 to 15 mg/L)**
  - **Requires contact time**
  - **Reacts with chlorine**

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# Carbon Adsorption

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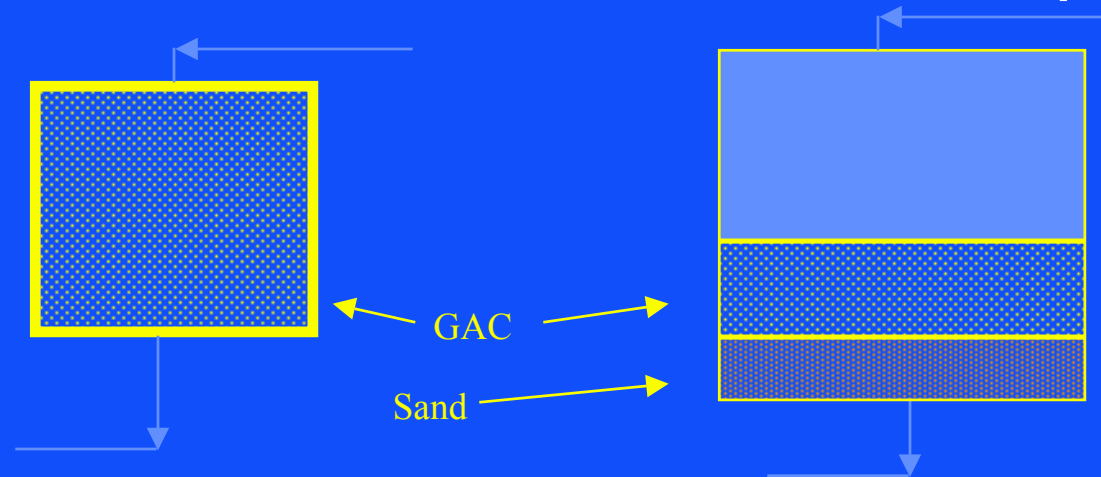
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- **Granular Activated Carbon (GAC)**



## GAC Contactor

- Empty Bed Contact Time 10-20 minutes
- Reacts with chlorine
- Can Blend

## Filter Adsorber

- Anthracite replaced with GAC
- Empty Bed Contact Time 5 -10 minutes
- Reacts with chlorine
- Can Blend



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# Chemical Oxidation

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- **Chlorine**
- **Potassium Permanganate**
- **Ozone**
- **Iron Removal**
- **Aeration**

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# Other Treatment Methods

- **Masking**
  - Increase finished water chlorine dose
- **Control of Treatment System**
  - Reduce chlorine dosage
  - Control super chlorination/dechlorination
  - Chloramine formation

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# Other Treatment Methods

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- **Customer Education**
  - Record complaints
  - Let drinking water stand
  - Media coverage
  - Education programs

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# Activated Carbon Use In Ontario

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- **49% of Plants Use Carbon**
- **Of Plants Using Carbon**
  - **40% PAC**
  - **45% GAC - mostly as filter adsorbers**
  - **15% PAC and GAC**
- **GAC Life Expectancy**
  - **63% plants 0 to 3 years**
  - **27% plants 4 to 5 years**

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# Summary

- **Approach Depends Upon Where Odours are Produced (source, distribution system, customers system)**
- **Taste & Odours Can Be Treated**
- **Customer Education is a Major Tool**

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