

Fundamentals of Water Conservation

**Marlborough
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WATER CONSERVATION OPPORTUNITIES

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INTRODUCTION

- **Encouraging water conservation**
- **Water Teams**
- **Simple Technologies**
- **Advanced Technologies**
- **Applied Research**



Encouraging Water Conservation

Management must make a clear policy statement.

- Everyone should participate in water conservation.
- There is a cost to water consumption just as there are for other raw materials.

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Encouraging Water Conservation

- **CREATE WATER MANAGEMENT TEAM:**

Teams consist of people at points of major water usage.

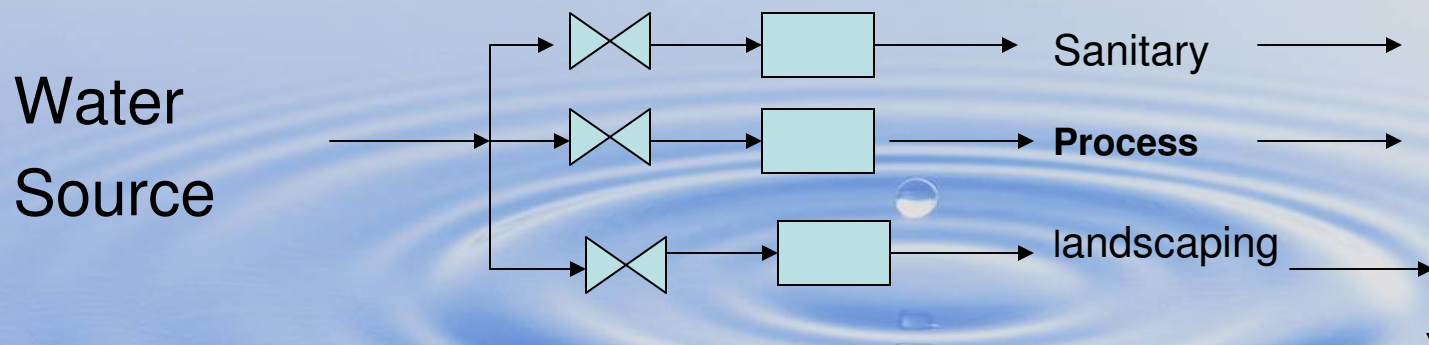
- Supervisors
- Operators
- Management



WATER CONSERVATION TEAM

- **THE TEAM WILL:**

- Break the flow into three sections
- Install Flowmeters



THE NEED FOR MEASUREMENT

Success = Measurement of flow before and after changes.

- To monitor water consumption install water flow meters and totalizers.
- Develop a flow baseline.
- Portable meters are often useful when there are numerous measuring points.



Portable Flow Meters

- Portable flow meters come in many brands and sizes.
- Prices start at about \$1200.00 and vary according to size and make.



SOLICIT EMPLOYEE SUGGESTIONS ON WAYS TO USE WATER MORE EFFICIENTLY

- **CRANSTON PRINT WORKS, CO.**

CPW's Water Conservation Team:

- Formed by employees from different departments
- Identified 25 water conservation projects

CPW achieved annual savings:

- Over 110 million gallons of water
- Over \$350,000



SIMPLE CONSERVATION METHODS

- **Physical cleaning methods can be used alone or to complement aqueous cleaning solutions**

These include:

1. Baking soda blasting
2. Dry Ice blasting
3. Steam cleaning
4. Compressed air cleaning (investigate cost)
5. Wet Vacuuming

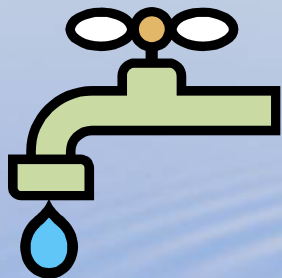


SIMPLE CONSERVATION METHODS

Identify Leaks in the Water Supply System

Main causes of leaks include:

- A. Damaged pipeline connections flanges and fittings
- B. Worn valves
- C. Flooded floats (balls) on water tank or cistern valves
- D. Corroded pipe work and tanks



AVAILABLE PRACTICES FOR REDUCING CONSUMPTION

In The Rinsing Process:-

- Use Countercurrent Flow
- Spray Rinsing with Low-Flow and High Impingement Nozzles



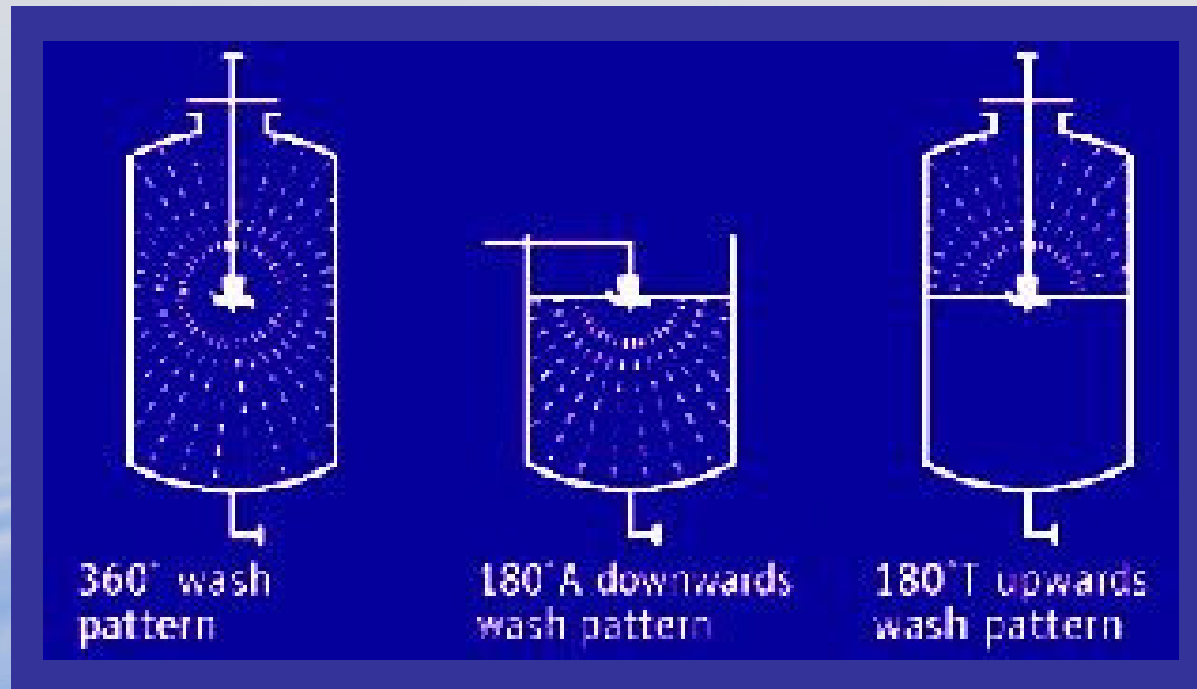
AVAILABLE PRACTICES FOR REDUCING WATER CONSUMPTION

The Automated Clean-In-Place System:

- Uses a microprocessor to ensure the optimum concentration of the recirculating cleaning agent.
- The spray ball used to clean the tank walls utilizes less water than filling the tank to overflowing to rinse the inside walls.



AVAILABLE PRACTICES FOR REDUCING WATER CONSUMPTION



Automated Clean-in-Place (CIP) systems, for cleaning pipes and tanks, control and optimize water use.

AVAILABLE PRACTICES FOR REDUCING WATER CONSUMPTION

- Some companies have had success at this using Membrane Systems.
- The membranes are used for:
 - Microfiltration – 1 micron = 10^{-3} millimeters
 - Ultrafiltration – 0.01 – 0.1 microns = 10^{-5} to 10^{-4} mm
 - Nanofiltration- 0.001 – 0.01 microns= 10^{-6} to 10^{-5} mm
 - Reverse Osmosis – Angstrom units
- All companies should aim for close-looped systems, i.e. reuse all the water used in the process.



CASE STUDY – CLOSE LOOP Columbia Mfg.

Columbia Manufacturing, Westfield, MA

- Reduced fresh water consumption by 150,000 gal/day.
- Zero discharge using a vacuum distillation unit to treat segregated waste water streams.



APPLIED RESEARCH

PAPER & TEXTILE INDUSTRIES

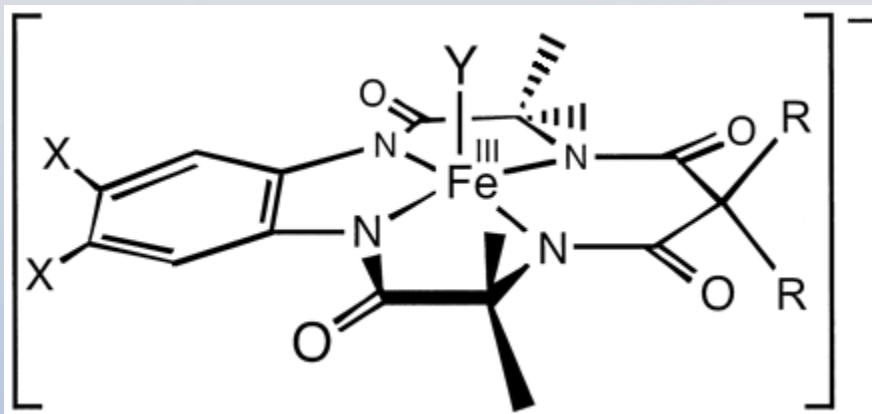
- Fiber is carried by the water which makes up over 99% of the volume.
- After separation, Water is reused as much as possible. It is dumped when it is not useable due to inappropriate color.

METHODS TO REDUCE COLOR

- A patented activator (TAML ®) and hydrogen peroxide are used to remove colorants. This method is in the testing phase
- Granulated Activated carbon is being tested as another method of removing colorants.



TAML[®] by Carnegie Mellon University



TAML[®] by Carnegie Mellon University

- low dosage, 0.1 - 4 ppm
- reactive and very selective
- stable between pH 1 – 13
- water soluble, non-toxic,



SUMMARY

- Water Conservation ranges from simple methods such as repairing leaks and physical blasting, to membrane filtration and countercurrent rinsing.
- OTA & consultants can assist in water conservation by conducting facility audits to identify areas where water can be conserved.
- For more information contact OTA at:
www.mass.gov/envir/ota or at 617-626-1060

