SUMMARY FOR NCDEM Poll'n Prevention Tips/Water Conservation 1993

2.a.v Water Conservation:NCDEM Poll'n Prevention Tips/Water Conservation 1993:THEY STATE THAT Methods of water conservation are described in detail.:MY COMMENTS This information should be used in its entirety. I can get permission from NCDEM if need be.

POLLUTION PREVENTION TIPS

Water Conservation for Textile Mills

Techniques

Water is expensive to buy, treat, and dispose. If a facility does not have a water conservation program, it is pouring money down the drain.

A water conservation program can cut water consumption by up to 30 percent or more, and the cost savings can pay for the required materials in a very short time. For example, at average water and sewage rates of about $2 per 1,000 gallons, a reduction of the flow to the washers by just 1 gallon per minute can save $250 per year. Since the average plant has a large number of washers, the savings can add up to thousands of dollars per year.

Numerous methods have been developed to conserve water at textile mills. The sections below discuss some of the techniques applicable to a wide variety of firms.

Counter-Current Washing

For both water and energy savings, counter-current washing is employed frequently on continuous preparation and dye ranges. Clean water enters at the final wash box and flows counter to the movement of the fabric through the wash boxes. Thus, when the fabric enters the actual wash process, the most contaminated wash water contacts it first, and, later, the cleanest water contacts the cleanest fabric.

This method of water reuse is contrary to the traditional method of providing clean water at every stage of the wash cycle. Water and energy savings are related to the number of boxes provided with the counterflow. Counter-current washing can be applied at desize washers, scour washers, mercerizing washers, bleach washers, dye ranges, and printhouse soaper ranges.

Reuse of Final Rinse Water From Dyeing for Dye Bath Make-Up

The rinse water from the final rinse in a batch dyeing operation is fairly clean and can be used directly for further rinsing or for make-up of subsequent dye baths. Several woven fabric and carpet mills use this rinse water for dye bath make-up.

Reuse of Soaper Wastewater

The colored wastewater from the soaping operation can be reused at the backgrey washer, which does not require water of a very high quality. Alternatively, the wastewater can be used for cleaning floors and equipment in the print and color shop.

Reuse of Scouring Rinses for Desizing

The rinse water from the scouring operation is adequate for reuse in other processes such as desizing that do not require water of an extremely high quality. This reuse is particularly true with scouring wastes from synthetic or cotton/synthetic blend fabrics. Scouring rinses may, in certain cases, also be reused to wash floors and equipment.

Reuse of Mercerizing or Bleach Wash Water for Scouring or Desizing

Mercerizing or bleaching rinse water can be used in scouring and desizing operations as long as size recovery is not practiced. Generally, the caustic or bleach stream will degrade many size compounds to an extent that they cannot be recovered.

Pollution Prevention Program
N.C. Department of Environment, Health, and Natural Resources

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Recycle/Reuse of Water Jet Weaving Wastewater

The jet weaving wastewater can be reused within the jet looms. Alternatively, it can be reused in the desizing or scouring process, provided that fabric impurities and oils are removed by in-line filters.

Use of Automatic Shut-Off Valves

An automatic shut-off valve set to time, level, or temperature will control the flow of water into a process unit. One plant estimated that a reduction in water use of up to 20 percent could be achieved with thermally controlled shut-off valves.

Use of Flow Control Valves

A flow- or pressure-reduction valve can significantly reduce the quantity of water used in a wash or clean-up step. These valves are particularly useful in cleaning areas where operators are not always aware of the need for water conservation.

Good Housekeeping

A program of maintenance, inspection, and evaluation of production practices should be established. Significant reductions in water use can be made by implementing the following:

- Minimize leaks and spills,
- Maintain production equipment properly,
- Identify unnecessary washing of both fabric and equipment, and
- Train employees on the importance of water conservation.

Capital and Operating Costs

The equipment used in a water conservation program is relatively inexpensive, consisting, in most cases, of valves, piping, small pumps, and tanks only. The operating costs for these systems are generally very low. Routine maintenance and, in some cases, electricity for the pumps, would be the major cost components.

For example, below are the costs for purchasing and installing the equipment necessary to reuse 75,000 gallons per day of bleach wastewater for scouring:

Pump	$3,000
Tank/Sump	$14,000
Piping	$5,000
Electrical	$1,000
Total cost	$23,000

The yearly operating costs are estimated to be $1,300, which include the electrical power for the pumps and routine maintenance.

Pay Back

The pay-back period for a water conservation system will vary with the quantity of water saved, sewer fees, and costs for raw water and wastewater treatment. For example, the pay-back period for the system discussed above would be 3 months. After this initial period, the company would save over $95,000 per year in water, sewer, and energy costs.

In addition to these direct cost savings, a water conservation program can reduce the capital costs of any required end-of-pipe wastewater treatment system, which can cost several thousands of dollars per gallon of flow per minute. Thus, a substantial reduction in water flow can produce corresponding savings in treatment water costs. However, small or token reductions will yield very few, if any, savings.

Selected References

1. Bergenthal, J.F. Wastewater Recycle and Reuse Potential for Indirect Discharge Textile Finishing Mills: Volume 1-Technical Report. EPA-600/2-84-070a. U.S. Environmental Protection Agency.
2. *Ibid.* Volume 2-Six Mill Engineering Reports. EPA-600-84-070b. Research Triangle Park, NC: Environmental Protection Agency. 1984.
3. Environmental Pollution Control: Textile Processing Industry. EPA-625/7-78-002. Cincinnati, OH: U.S. Environmental Protection Agency. 1978.

For additional information, contact

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WATER CONSERVATION FOR TEXTILE MILLS

Techniques

Are you pouring money down the drain? You are if your firm does not have a water conservation program. Water is expensive to buy, treat, and dispose of. A water conservation program can cut water consumption by up to 30%, or even more, and the cost savings can pay for the required materials in a very short period of time. For example, with average water and sewage rates about $2/1000 gallons, reducing the flow to a washer by just 1 gpm can save $250 per year. With the large number of washers in an average plant, the savings can add up to thousands of dollars per year. Add to this the reduced capital costs of a waste treatment system and the savings can be even greater.

There are numerous methods which have been developed to conserve water at textile mills. Some of the techniques applicable to a wide variety of firms are discussed below:

Counter-current Washing. This measure is employed frequently on continuous preparation and dye ranges for water and energy savings. Clean water enters at the final wash box and flows counter to the movement of the fabric through the wash boxes. Thus, the cleanest water contacts the cleanest fabric, and the more contaminated washwater contacts the fabric immediately as it (the fabric) enters the actual process. This method of water reuse is opposed to the traditional washing method of supplying clean

water at every stage of the washing. Water and energy savings are related to the number of boxes provided with counterflow. Countercurrent washing can be applied at desize washers, scour washers, mercerizing washers, bleach washers, dye ranges, and printhouse soaper ranges.

Reuse of Final Rinse Water from Dyeing for Dye Bath Make-up. The rinse water from the final rinse in a batch dyeing operation is fairly clean and can be used directly for further rinsing or for make-up of subsequent dyebaths. Several woven fabric and carpet mills use this rinse water for dyebath make-up.

Reuse of Soaper Wastewater. The colored wastewater from the soaping operation can be reused at the backgrey washer, which does not require very high quality water. Alternatively, it can be used for cleaning floors and equipment in the print and color shop.

Reuse of Scouring Rinses for Desizing. The rinsewater from the scouring operation is adequate for reuse in other processes that do not require extremely high water quality, such as desizing. This is particularly true with scouring wastes from synthetic or cotton/synthetic blend fabrics. Scouring rinses may, in certain cases, also be reused for the washing of floors and equipment.

Reuse of Mercerizing or Bleach Washwater for Scouring or Desizing. Mercerizing or bleaching rinsewater can be used in scouring and desizing operations as long as size recovery is not practiced. The caustic or bleach stream will generally degrade many size compounds to an extent that they cannot be recovered.

Recycle/Reuse of Water Jet Weaving Wastewater. The jet weaving wastewater can be reused within the jet looms. Alternatively it can be

reused in the desizing or scouring process. This is provided that fabric impurities and oils are removed by in-line filters.

Use of Automatic Shutoff Valves. An automatic shutoff valve will control the flow of water into a process unit based on time, level or temperature. One plant estimated that a reduction in water use of up to 20% could be achieved with thermally controlled shutoff valves.

Use of Flow Control Valves. A flow or pressure reduction valve can significantly reduce the quantity of water used in a wash or clean-up step. They are particularly useful in cleaning areas where operators are not always conscious of the need for water conservation.

Good Housekeeping. A program of maintenance, inspection and evaluation of production practices should be established. Significant water reductions can be made through such areas as minimizing leaks and spills, proper maintenance of production equipment, identification of unnecessary washing of both fabric and equipment, and employee education on the importance of water conservation.

These water conservation techniques are not without their drawbacks. Some of the techniques can adversely affect size recovery practices, impact quality of fabric and manufacturing processes, and be limited by physical plant constraints. However, since these measures are generally cost effective, each mill must evaluate the merits of a particular application within the physical and processing constraints of the mill.

Capital and Operating Costs

The equipment used in a water conservation program is relatively inexpensive. In most cases it will consist of only valves, piping,small pumps and

tanks. The operating costs for these systems are usually very low. The major portion of the cost would be for routine maintenance and in some cases electricity for the pumps.

For example, the cost of purchasing and installing the equipment necessary to reuse 75,000 gallons per day of bleach wastewater for scouring, is as follows:

Pump	$ 3,000
Tank/Sump	14,000
Piping	5,000
Electrical	1,000
Total Cost	$23,000

The yearly operating costs are estimated to be $1,300. This includes the electrical power for the pumps and routine maintenance.

Pay Back

The pay back period for a water conservation system will depend on the quantity of water saved, the cost of raw water, sewer fees and wastewater treatment costs. For example, the system discussed above would have a 3 month pay back period. After this initial period the system would save the company over $95,000 per year in reduced water, sewer and energy costs.

In addition to these direct cost savings, a water conservation program can reduce the capital cost of any required end-of-pipe wastewater treatment system. A treatment system can cost several thousands of dollars per gallon of flow per minute. Thus a substantial reduction in water flow can produce corresponding saving in treatment system costs. However, small or token reductions will yield very little, if any, savings.

Selected References

1. Bergenthal, J. F. Wastewater Recycle and Reuse Potential for Indirect Discharge Textile Finishing Mills: Volume I-Technical Report. EPA-600/2-84-070a. U.S. Environmental Protection Agency, Research Triangle Park, NC. 1984.

2. Bergenthal, J.F. Wastewater Recycle and Reuse Potential for Indirect Discharge Textile Finishing Mills: Volume II-Six Mill Engineering Reports. EPA-600/2-84-070b. U.S. Environmental Protection Agency, Research Triangle Park, NC. 1984.

3. Environmental Pollution Control: Textile Processing Industry. EPA-625/7-78-002. U.S. Environmental Protection Agency, Cincinnati, OH. 1978.

Additional Information

For additional information on water conservation techniques or other pollution prevention methods, contact:

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