2

Environmental legislation USA

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2.1 Introduction

Textile dyeing and all the related processes have a long history in the timeline of civilization. During this history, the chemicals used have been researched, synthesized, developed, and chosen to provide the consumer long life and continued fashion appeal of the garments, furnishings, or materials. To provide these qualities, the chemicals used had to resist the effects of the environment. Materials were required that were durable, fast (light and water), and not chemically degradable. However, these same properties that protect the properties of the consumer material create problems for the textile dyeing industry when the chemicals are released into the environment. In 1986, Horning, speaking of dyes, stated that 'The regulatory climate of today is one of increasing complexity.'[1] Today, we might think of those as the simpler days of regulation.

As regulatory agencies in the United States have addressed the chemicals associated with textile dyeing, there have been two approaches. The bulk of the regulations have been those of general environment legislation, while few have addressed specific chemicals, although this trend is changing. Although, environmental legislation related to textile processes was in place before, the passage of the USEPA 1986 Emergency Planning and Community Right-To-Know Act (Title III of SARA of 1986) began the increase in number and stringency of regulations that apply to textile dyeing and related processes. This was reaffirmed with the passage of the 1990 Pollution Prevention Act. Since then, legislation has increased at the Federal, state, and even the local level.

In the United States, the approach on the Federal and state levels, has been to create legislation that deals with the flow of materials in manufacturing and not with the different manufacturing sectors. This has led to regulations on air, water, wastewater, solid wastes, and consumer exposure. Then, industry sectors are examined within the framework of these regulations and, if needed, specific chemicals are limited or banned.

In addition to Federal and State legislation, other requirements that impact textile dyeing operations in the United States have increased. These include non-US regulations for those operating in the global economy, requirements of sustainability and ecological interest groups and, more frequently, the result of the increase in information through the media and, more recently, the internet.

This chapter is intended to provide an introduction to the Federal and state legislation in the United States that has an impact on textile dyeing. Because the US Textile Industry has become more specialized, not all cases where environmental regulations apply can be covered. In addition, legislation not directly related to dyeing, such as pesticide regulations under FIFRA and consumer regulations (flammability) have been excluded. Lastly, information on state legislation and requirements of non-government groups are given in the form of examples. General sourcing for information is given at the end of the chapter including information on the legislation and regulations sited.

2.2 Current regulations

A keyword search of the USEPA (United States Environmental Protection Agency) website (www.epa.gov, September 25, 2006) for the term 'textile' returns 11 348 hits while a search of the terms 'dye' or 'dyeing' returns 2181. A review of the entries doesn't reveal a good place to start a review without some previous knowledge. This is because the laws and regulations of the United States are not written from an industry viewpoint, but from the regulatory standpoint. Thus, it is important to understand how the processes of the textile dyeing industry are viewed by regulatory agencies. A search of the USEPA publications website NEPIS (National Environmental Publications Information System) by keywords returns 1758 (textile) and 1685 (dye) publication hits. Two publications that are essential in beginning a review of the processes of the textile dyeing industry, laws, and regulations are produced by the USEPA. These are 'Profile of the Textile Industry – EPA Office of Compliance Sector Notebook Project', USEPA 310-R-97-009, September 1997, and 'Best Management Practices for Pollution Prevention in the Textile Industry', USEPA 625-R-96-004, September 1996. The first publication gives a review of the processes involved, applicable regulations, and some history, while the second gives the details of textile dyeing processes and pollution prevention opportunities. The following summary of current regulations reflects those for which the majority of textile dyeing operations will be responsible for compliance.

2.3 Toxic Release Inventory and Right-To-Know

The requirements of what are commonly called the 'Toxic Release Inventory' (TRI) and 'Community Right-To-Know' are two parts of the Emergency

Planning and Community Right-to-Know Act (EPCRA) enacted in 1986 and expanded by the Pollution Prevention Act of 1990. This legislation, which is also called SARA Title III, requires manufacturers and related companies to report on their activities based on the usage of hazardous chemicals. The four main activities are Emergency Planning (Section 301-303), Emergency Release Notification (304), Community Right-To-Know (RTK) Reporting (311-312), and Toxic Chemical Release (TRI) Reporting (313). In addition to USEPA regulations, some states have additional requirements that may have to be met. This legislation and associated regulations are in the forefront of the public debate in the United States. The government and private groups publish documents each year and maintain websites that allow the public to review all of the data from the TRI 313 reporting for industries that must report and publicize the results. For example, the reader should review the websites, http://www.rtknet.org/ and http://www.scorecard.org/.

Right-To-Know reporting is required for chemicals present at a facility above listed threshold values. TRI reporting is required for listed chemicals that are used in total at a facility above threshold values during the reporting year. For textile dyeing, reporting under the RTK regulations is commonly required for textile auxiliaries and processing aids such as acids, caustic, and salt since no specific dyes or pigments are covered and the general threshold of 10 000 pounds is usually not met for most dyes and pigments. For TRI reporting, several specific dyes are listed, but again the threshold levels (25 000 pounds) are usually not met except for high volume dyes. Few of the TRI listed dyes are still in use in the United States.

However, unlike the RTK requirements, TRI reporting is also required for chemical categories. Dyes containing metals such as copper, chromium, cobalt, zinc, and nickel must be considered together as 'metal compounds' and, thus, thresholds can be exceeded. Thresholds for additional categories such as glycol ethers and polybrominated biphenyls may be exceeded by textile dyeing operations. The major impact of the RTK and TRI regulations are found in the reporting from processes related to textile dyeing including boiler operations (emissions and fuels), process water preparation, wastewater treatment, and cleaning operations.

The chemicals and chemical categories covered by the RTK and TRI regulations can change yearly and the trend is for an increasing number of listings and lowering of the threshold amounts. More recent additions include the Polycyclic Aromatic Compounds category (PACS) with a threshold of 100 pounds and the Dioxins category with a threshold of 0.1 grams. The standard summary of the chemicals and chemical categories can be found in the USEPA document called 'The List of Lists'.[2] In addition, two guidance documents have been developed that apply to textile dyeing operations.[3,4]

2.4 Waste

Waste from textile-dyeing operations can be of two types, hazardous and non-hazardous under Federal regulations. The Federal program that regulates hazardous waste is the Resource and Conservation and Recovery Act (RCRA). A summary of textile manufacturing and RCRA has been created.[5] RCRA Regulations establish a 'cradle-to-grave' system governing hazardous waste from the point of generation to disposal. RCRA hazardous wastes include the specific materials listed in the regulations (designated with the code 'P'– acutely toxic chemicals, 'U'– other listed chemicals, 'K'– specific industry wastes, or 'F'– specific industrial process wastes) or materials which exhibit a hazardous waste characteristic (ignitability, corrosivity, reactivity, or toxicity and designated with the code 'D').

The types of materials that can be regulated as hazardous waste in textile-dyeing operations included acids and caustic (corrosives), hydrogen peroxide (oxidizers), solvents used as carriers or cleaning agents, and chromium dyes. These will only be considered hazardous waste if collected and discarded as waste. Under many normal operations, these materials would be passed through a local or facility wastewater system and be exempt from the RCRA requirements. In addition, packaging (drums, totes, boxes) containing any of these materials may be subject to regulation if not cleaned and handled properly. Materials used for maintenance of machinery such as oil, lubricants, and paint are also subject to RCRA requirements. Currently, dyed fabric and apparel are not subject to RCRA regulations. Non-hazardous waste normally associated with textile dyeing operations is not subject to Federal regulations, but may be subject to state and local regulations including those governing recycling requirements.

2.5 Wastewater and water

Wastewater discharge is governed by the Federal Clean Water Act (CWA). States and localities may also have regulations that impose additional requirements. The CWA regulates both direct (point source, onsite) and indirect (public works, offsite) dischargers. In addition, the CWA regulates stormwater from sites that may have been contaminated due to industrial activity.

The regulations that govern the textile point source category are extensive and are divided into each type of textile operation (knits, wovens, carpet as examples) and the complexity of the operation.[6,7,8] These regulations are not specific to textile dyeing, but cover the entire operation of the facility. Typically for textile operations, the parameters covered include BOD (biochemical oxygen demand), COD (chemical oxygen demand), TSS (total suspended solids), sulfide, total chromium, pH, and phenol (wovens category) and require discharges to meet Best Available Technology (BAT) levels. Other requirements

of the CWA may include testing for specific contaminants known to be present, which may impact a receiving body of water and for general aquatic toxicity of the discharge towards a sensitive stream species. Many of these requirements may be based on USEPA Water Quality Standards.[9,10] Water Quality Standards define the goals for a waterbody by designating its uses, setting criteria to protect those uses, and establishing provisions to protect water quality from pollutants. The standards cover textile dyeing by regulating discharges of organic species and metals such as copper, chromium, antimony, silver, and zinc.

The sources of organic species in textile dyeing operations include dye carriers, machine cleaners, emulsifiers, and dyestuffs. Metals are most commonly associated with dyes, but can also be found in other chemical products where they are used in the manufacturing process of the chemical products. An exception to this is antimony. The major source in polyester textile dyeing operations is the polyester itself. Polyester is typically manufactured by a process that employs an antimony catalyst. While most dyeing processes will extract small amounts, any form of pressure dyeing will extract antimony at levels that may impact a facility's compliance with CWA requirements. Silver is being used in textiles today as an antimicrobial agent. Normally these agents are applied after dyeing, but in some cases, the silver is present as a fiber or fiber component in the fabric itself. There is the potential for silver to be released from such products during dyeing operations.

Indirect dischargers are governed by the rules of the public utility, which are governed by other USEPA rules.[11] With USEPA approval, all of these systems are governed under state regulations, which are at least as strict as USEPA guidelines with oversight from the USEPA.

2.6 Air

The Clean Air Act (CAA) and its amendments, including the Clean Air Act Amendments (CAAA) of 1990, are designed to protect and enhance the air resources of the United States. The CAA consists of six sections which direct EPA to establish national standards for ambient air quality and for EPA and the States to implement, maintain, and enforce these standards.

CAA regulations appear in 40 CFR Parts 50-99. Pursuant to Title I of the CAA, EPA has established national ambient air quality standards (NAAQSs) to limit levels of 'criteria pollutants,' including carbon monoxide, lead, nitrogen dioxide, particulate matter, volatile organic compounds (VOCs), ozone, and sulfur dioxide. Geographic areas that meet NAAQSs for a given pollutant are classified as attainment areas; those that do not meet NAAQSs are classified as non-attainment areas. Under section 110 of the CAA, each State must develop a State Implementation Plan (SIP) to identify sources of air pollution and to determine what reductions are required to meet Federal air quality

standards. Revised NAAQSs for particulates and ozone were proposed in 1996 and may go into effect as early as late 1997. Title I also authorizes EPA to establish New Source Performance Standards (NSPSs), which are nationally uniform emission standards for new stationary sources falling within particular industrial categories. NSPSs are based on the pollution control technology available to that category of industrial source. Under Title I; EPA establishes and enforces National Emission Standards for Hazardous Air Pollutants (NESHAPs), nationally uniform standards oriented towards controlling particular hazardous air pollutants (HAPs). Title I, section 112(c) of the CAA further directed EPA to develop a list of sources that emit any of 189 HAPs, and to develop regulations for these categories of sources. To date EPA has listed 174 categories and developed a schedule for the establishment of emission standards. The emission standards will be developed for both new and existing sources based on 'maximum achievable control technology' (MACT). The MACT is defined as the control technology achieving the maximum degree of reduction in the emission of the HAPs, taking into account cost and other factors.

Title IV of the CAA establishes a sulfur dioxide and nitrous oxide emissions program designed to reduce the formation of acid rain. Reduction of sulfur dioxide releases will be obtained by granting to certain sources limited emissions allowances, which, beginning in 1995, will be set below previous levels of sulfur dioxide releases. Title V of the CAA of 1990 created a permit program for all 'major sources' (and certain other sources) regulated under the CAA. One purpose of the operating permit is to include in a single document all air emissions requirements that apply to a given facility. States are developing the permit programs in accordance with guidance and regulations from EPA. Once a state program is approved by EPA, permits will be issued and monitored by that state. Title VI of the CAA is intended to protect stratospheric ozone by phasing out the manufacture of ozone-depleting chemicals and restrict their use and distribution. Production of Class I substances, including 15 kinds of chlorofluorocarbons (CFCs) and chloroform, were phased out (except for essential uses) in 1996.

The Clean Air Act governs the protection of the US air resources and impact textile dyeing operations in two main ways. First, the release of metals, organics, and particulates can be regulated. These 'Air Toxics' comprise a list of 189 Hazardous Air Pollutants (HAPs). In addition, general Volatile Organic Compounds (VOCs) are regulated. Legislation, referred to as the 'Textile MACT' specifies Maximum Achievable Control Technologies (MACT) under the umbrella of 'Fabric Printing, Coating, and Dyeing of Fabrics'. These rules required a final compliance date of May 29, 2006.[12] The principal HAPs targeted were toluene, methyl ethyl ketone (MEK), methanol, xylenes, methyl isobutyl ketone (MIBK), methylene chloride, trichloroethylene, n-hexane, glycol ethers (ethylene glycol), and formaldehyde.

The second is that all combustion sources are regulated; thus any boiler or other device providing hot water for textile dyeing is covered. A separate MACT Standard has been developed for 'Industrial, Commercial and Institutional Boilers and Process Heaters,' but referred to as the 'Boiler MACT' has a compliance date of September 13, 2007.

2.7 The Toxic Substances Control Act

The Toxic Substances Control Act (TSCA) granted USEPA authority to create a regulatory framework to collect data on chemicals in order to evaluate, assess, mitigate, and control risks, which may be posed by their manufacture, processing, and use. The TSCA framework provides a number of methods to prevent undue risk from exposure to chemicals in the United States. TSCA standards apply to a chemical any time in its 'cradle to grave' lifetime. Under TSCA, USEPA has established an inventory of chemical substances. If a chemical is not on the inventory and has not been specifically excluded by TSCA, a premanufacture notice (PMN) must be submitted to USEPA before manufacture or import. The PMN must give the identity of the chemical and provide available information on health and environmental effects. If enough information is not available to determine the chemical's effects, restrictions can be imposed until the development of information on its health and environmental effects. USEPA can also restrict significant new uses of chemicals based upon factors such as the projected volume and use of the chemical. In addition, USEPA can ban the manufacture or distribution in commerce, limit the use, require labeling, or place other restrictions on chemicals that pose risks beyond acceptable. The most familiar chemicals USEPA regulates under TSCA include chlorofluorocarbons (CFCs), asbestos, and polychlorinated biphenyls (PCBs).

For textile dyeing operations, the major impact of TSCA will be the notification to USEPA of chemicals that are imported from outside the US that are intended to be used in commerce. A textile dyeing operation cannot assume that imported products have met all the requirements, no matter how much testing has been completed or no matter how long the chemical has been used in other countries. Even research chemicals must be evaluated in relation to TSCA Standards. It is the responsibility of the importing company to make sure that any imported chemicals meet all the TSCA requirements.

2.8 California

In 1986, California voters approved an initiative to address their growing concerns about exposure to toxic chemicals. That initiative became the Safe Drinking Water and Toxic Enforcement Act of 1986, better known by its original name of Proposition 65. Proposition 65 requires the State to publish

a list of chemicals known to cause cancer or birth defects or other reproductive harm. The current list includes around 750 chemicals.[13] Proposition 65 requires businesses to notify Californians about significant amounts of chemicals in the products they purchase, in their homes or workplaces, or that are released into the environment. By providing this information, Proposition 65 enables Californians to make informed decisions about protecting themselves from exposure to these chemicals. The Office of Environmental Health Hazard Assessment (OEHHA) administers the Proposition 65 program. OEHHA, which is part of the California Environmental Protection Agency (Cal/EPA), also evaluates all currently available scientific information on substances considered for placement on the Proposition 65 list. Chemicals can be added to or removed from the Proposition 65 list under the program.

The list contains a wide range of naturally occurring and synthetic chemicals that are known to cause cancer or birth defects or other reproductive harm. The chemicals include a wide range of uses including ingredients in pesticides, household products, foods, drugs, dyes, or solvents. Listed chemicals may also be used in manufacturing and construction, or they may be byproducts of chemical processes, such as car exhaust.

Businesses are required to provide an obvious warning before exposing anyone to a listed chemical. This warning can be given by a number of means, but for textile dyeing operations, the main way will be by labeling a consumer product or by providing information to the business providing the end product to the public.

There are several listed chemicals that may impact a textile dyeing operation. These include dyes such as Acid Red 114 and Direct Blue 218, both considered cancer risks under Proposition 65. The list also contains several chemicals that may be used in textile dyeing products including formaldehyde, certain glycols, and nickel compounds. Because trace levels of some compounds may be present in products used or because limited exposures are not considered harmful, OEHHA has developed safe harbor numbers. A business can declare 'safe harbor' from Proposition 65 warning requirements if exposure to a chemical occurs at or below these levels. These safe harbor numbers consist of no significant risk levels for chemicals listed as causing cancer and maximum allowable dose levels for chemicals listed as causing birth defects or other reproductive harm. OEHHA has established safe harbor numbers for nearly 250 chemicals and continues to study current levels and new possible listings.

2.9 Future trends

The future trends in US textile dyeing regulations will be governed by several forces. These will include US government research, academic research, customer requirements, public opinion, and what can be called the EU influence. Many current avenues of investigation into environmental impacts can be

traced to research done in Europe and legislation first implemented in Europe. Examples include Consumer Protection Regulations on dyes from Germany and flame retardant legislation from Sweden.

The future trends in environmental legislation can be summarized by two words, 'specific and lower.' More specific chemical species will be evaluated for their impact on the environment, in addition to looking at general parameters. The trend is to look at individual chemicals or closely related families of chemicals. For 'lower,' analytical methods improve yearly and regulators are taking advantage of these advancements to explore just what is in the air and water. Also, Best Available Technologies (BAT) will allow for lower levels of pollutants to be released into the environment.

2.9.1 Regulatory

For a number of years, agreement has been that the method of regulating metals in wastewater does not take all factors into account, especially the speciation and bioavailability of the metals. The current USEPA effort is to conduct risk assessments of metals that take into account these factors, before imposing regulatory limits. Currently, USEPA has two methods they do allow to show that metals do not impact receiving streams. The older method that has been revised is the Water-Effects-Ratio (WER). This method can reduce the regulatory burden 10–50 times on metals such as copper and 5–10 times for metals such as zinc. This method relies on the use of laboratory Whole Effluent Toxicity Testing and is not accepted uniformly throughout the different states. The newer Biotic Ligand Model (BLM) method relies on data from the site itself and models the risk involved. It is intended to better simulate what is actually occurring in the stream. The method is new and studies continue as to its applicability for different types of metals and regulatory levels.[14]

Tributyl tin complexes have been used in textiles for many years as antimicrobial agents, although the use is not widespread. No Water Quality Criteria existed for these compounds until 2004 when USEPA introduced a part per trillion Water Quality Criteria.[15] The impact of this in textiles is not known since very little data has been collected from textile operations. Most operations do not use these complexes. The concern is the anecdotal evidence of unusual sources of these compounds. These complexes have been used in manufacturing as antitacking agents. It is also believed that some types of piping may have tributyl tin impurities. Could there be impurities from other sources that may impact textile dyeing directly? It is just not known.

Mercury has been regulated in wastewater for many years. What has changed recently is the implementation of a new method, USEPA 1669/1631E which has lowered the mercury quantification limit down to 0.50 ng l^{-1} (parts per trillion). This level is up to 100 times lower than facilities

have experienced using previous testing methods. In addition, facilities face another problem with mercury. The National Atmospheric Mercury Deposition Network is collecting data that shows mercury levels in rainfall are up to 15 ng l^{-1}.[16] A concern is that USEPA will attempt to regulate mercury at levels lower than the rainfall in some areas, requiring facilities to treat rainwater or surface water. This would impact textile dyeing in that the water would need to be treated either before use in processing or after processing, for a contaminant not arising from the textile process.

Color continues to be a parameter of concern to USEPA. Although no studies have shown color is a pollutant in the normal sense, it is believed that from a public perception point of view it should be regulated. There are some facilities that have been given color limits in the US, but the practice is not widespread because a consensus has not been formed on when color becomes a problem and how it should be regulated. The State of South Carolina has begun gathering data on the levels of color found in the wastewater effluent of facilities and in the receiving streams. Currently, there are no restrictions on the color levels and the data is being gathered for future evaluation.

Surfactants continue to be a concern worldwide. In many areas of the world, alkyl phenol ethoxylates are banned or restricted. In the United States, the only restrictions are related to their impact on aquatic toxicity of effluents from operations. Suggestions have been made for the replacement of these products including alcohol ethoxylates and quaternary ammonium compounds. However, the impact of these is still under investigation and standard testing procedures for these chemicals have not been developed.[17] Further research will provide guidance on the impact, measurement, and, therefore, requirements for the use of surfactants in textile dyeing operations in the future.

One critical need in determining the impact of textile dyeing on the environment is information. Through the adoption of Globally Harmonized Standards, Material Safety Data Sheets, required by OSHA in the United States, will be more standard in the information on chemical ingredients and hazards.[18] Still in use in the United States is the ATMI Voluntary Product Safety & Environmental Profile, which is a voluntary document completed by vendors, suppliers, and manufacturers to provide textile operations with more detailed information on the products they provide.[19] A new version of the form is currently under development by the Institute of Textile Technology, which will encompass new regulations and information sources that have arisen since the 1997 version.

2.9.2 Sustainability and environmental management

Another source of interest in the environment for textile-dyeing operations is the effort to make operations more sustainable within the regulatory, customer,

and public sectors. There are no current regulatory requirements that directly require any textile dyeing operation in the United States to practice sustainability. However, USEPA is beginning to view its programs within the larger frame of the idea of sustainability.[20] Of course, the major problem is that 'sustainability' cannot be defined. The Georgia Tech Research Institute states:

> Sustainability is a relationship, or balancing act, between factors which are constantly changing. Like 'family values,' everyone agrees that sustainability is a good thing, but no one agrees on what exactly it is or, even more significantly, how to achieve it and how to know when we have achieved it.

Various groups are evaluating how textile operations can approach a defined level of sustainability. Groups such as GreenBlue,[21] Business for Social Responsibility,[22] The Institute for Market Transformation to Sustainability,[23] Association for Contract Textiles,[24] Bromine Science and Environmental Forum,[25] and Wal-Mart[26] are all developing either guidelines, standards, or labeling policies for textiles that would impact dyeing operations. Many companies are reviewing systems such as Oeko-Tex for measuring chemical exposures of the consumer from the products they sell.[27] Another approach is the use of Environmental Management Systems (EMS) such as the ISO 14000 Series of Standards.[28] With ISO, the management of the environmental program within a company provides a basis for environmental stewardship.

Whichever systems are actually put into place, textile dyeing operations will be exposed to requirements that may be just as important as those that carry a regulatory burden due to the potential of loss of business. These requirements may also have the potential of being in conflict with each other and may not properly consider the economic impact on textile dyeing operations.

2.9.3 Interest groups

Although not impacted to the extent of larger chemical users, textile dyeing operations are being reviewed. Greenpeace Research Laboratories has published 'An Overview of Textile Processing and Related Environmental Concerns' which highlights '…major sources of environmental contamination'.[29] As stated previously, groups such at the Environmental Defense Fund publish a 'Scorecard' for industrial chemical users, which includes textile dyeing operations.[30] It is not clear how new legislation, such as California's carbon dioxide emission limits, will affect textile dyeing operations.[31] In the future, USA interest groups can impact textile dyeing operations through requests for legislation and new standards.

2.10 Sources of further information and advice

There are many sources of information on textile dyeing operations. These include industry groups, universities, government agencies, and interest groups. In today's electronic world, the internet has become the fastest way to obtain sources, replacing paper sources. The following lists give different types of internet sources where information can be obtained.

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2.10.1 General sources

Environmental, regulatory, and scientific links of author, www.itt.edu/documents/WebDocs/drhenry.html
Federal Register and CFR portal, www.gpoaccess.gov/index.html
Institute of Textile Technology Textile Links, www.itt.edu/links/liblinks.cfm
NC State University College of Textiles http://www.tx.ncsu.edu/centers_programs_initiatives.html
Textile compliance assistance clearinghouse, cfpub.epa.gov/clearinghouse/
United States Environmental Protection Agency, www.epa.gov
USEPA air portal, www.epa.gov/ttn/atw/
USEPA hotlines and clearinghouses, www.epa.gov/epahome/hotline.htm
USEPA regional offices, www.epa.gov/epahome/whereyoulive.htm
USEPA sustainability portal, www.epa.gov/sustainability/
USEPA TRI compliance portal, www.epa.gov/tri/
USEPA waste portal, www.epa.gov/osw/
USEPA wastewater portal, www.epa.gov/owm/

2.10.2 Textiles groups

American Association of Textile Chemists and Colorists, www.aatcc.org
American Fiber Manufacturers Association, www.afma.org/fiber.html
APE Research Council, www.aperc.org
CCACTI, www.gatip.org/tcwhatisccacti.html
Cotton Incorporated, www.cottoninc.com
Industrial Fabrics Association International, www.ifai.com
National Council of Textile Organizations, www.ncto.org
National Textile Association, www.nationaltextile.org
Oeko-Tex, www.oeko-tex.com

Society of Dyers and Colourists, www.sdc.org.uk
The Textile Institute of Great Britain, www.texi.org

2.10.3 Textiles schools

Auburn University, www.eng.auburn.edu/txen/
Clemson University, mse.clemson.edu
University of Georgia, www.fcs.uga.edu/tmi/index.html
Georgia Tech, www.tfe.gatech.edu
Institute of Textile Technology, www.itt.edu
North Carolina State University, www.tx.ncsu.edu
Philadelphia University, www.philau.edu/schools/tmt/index.htm

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4. US EPA 560-4-88-004h, 'Estimating Chemical Releases From Textile Dyeing', February 1988.
5. US EPA 530-K-02-028, 'RCRA in Focus – Textile Manufacturing'.
6. CFR Title 40, Part 410, 'Textile Mills Point Source Category'.
7. US EPA Publication 440182022, 'Development Document for Effluent Limitations Guidelines and Standards for the Textile Mills Point Source Category', September 1982.
8. US EPA 600-2-78-098, 'Textile Dyeing Wastewaters: Characterization and Treatment', 1978.
9. US EPA 823-B-94-005a, 'Water Quality Standards Handbook: Second Addition', August 1994.
10. http://www.epa.gov/wqsdatabase/, accessed September 1, 2006.
11. CFR Title 40, Part 403,437, 'Centralized Waste Treatment Point Source Category'.
12. http://www.epa.gov/ttn/atw/mactfnlalph.html, accessed September 1, 2006.
13. http://www.oehha.org/prop65.html, accessed September 1, 2006.
14. Hogue, C., 'Metallic refinement', *Chemical and Engineering News*, **2004**, **82**(32), 23–24.
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20. http://www.epa.gov/sustainability/, Accessed September 1, 2006.
21. http://www.greenblue.org/activities_stm.html, Accessed September 1, 2006.
22. http://www.bsr.org/, Accessed September 1, 2006.
23. http://mts.sustainableproducts.com/standards.htm, Accessed September 1, 2006.
24. http://www.contracttextiles.org/main.php?view=1_2, Accessed September 1, 2006.
25. http://www.bsef.com/product_stew/vecap/index.php?/product_stew/vecap/vecap.php, Accessed September 1, 2006
26. http://www.walmartstores.com/GlobalWMStoresWeb/navigate.do?catg=217, Accessed September 1, 2006.
27. http://www.oeko-tex.com/en/start/start.html, Accessed September 1, 2006.
28. http://www.iso.org/iso/en/iso9000-14000/index.html, Accessed September 1, 2006.
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30. http://www.scorecard.org/, Accessed September 1, 2006.
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