2015 TEXTILE INDUSTRY WASTEWATER DISCHARGE QUALITY STANDARDS | LITERATURE REVIEW REV1

ZDHC

ZERO DISCHARGE OF HAZARDOUS CHEMICALS PROGRAMME

adidas GROUP · BURBERRY · C&A · ESPRIT · F&F · Gap Inc. · G-STAR RAW

H&M · INDITEX · Jack Wolfskin · Lbrands · LEVI STRAUSS & CO. · LI-NING

MARKS & SPENCER LONDON · PRIMARK · PUMA · PVH · UNITED COLORS OF BENETTON.

IN ASSOCIATION WITH

BSI Association of the German Sporting Goods Industry · EUROPEAN OUTDOOR GROUP · Everlight Chemical · GermanFashion Modeverband Deutschland e.V. · JINTEX · PolyOne · SIWI

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Acronyms and Abbreviations

AAFA	American Apparel and Footwear Association
AOX	absorbable organic halogen
APEO	alkylphenol ethoxylates
ASTM	American Society for Testing and Materials
Australia EPA	Australia Environment Protection Authority
BAT	best available technology economically achievable
BOD	biological oxygen demand
BSR	Business for Social Responsibility
COD	chemical oxygen demand
CFR	Code of Federal Regulations
DIN	Deutsches Institut für Normung (German Institute of Standards)
EHS	environmental health and safety
EN	European norm
EU	European Union
GB	Guojia Biaozhun (Chinese Required National Standards)
GB/T	Guojia Biaozhun/Tuījiàn, (Chinese Recommended National Standard)
IC	ion chromatography
ICP	inductively coupled plasma
GC	gas chromatography
IFC	International Finance Corporation
IFC-EHS Guidelines	International Finance Corporation - Environmental, Health, and Safety Guidelines
ISO	International Organization for Standardization
kg	kilogram(s)
kkg	thousand kilograms
LAS	linear alkyl sulfonates
LC	liquid chromatography
NPE	nonylphenol
mg/L	milligram(s) per litre
MS	mass spectrometry
NA	not applicable
nm	nanometre
NPDES	National Pollutant Discharge Elimination System
NPS	new source performance
NSPS	new source performance standards
OIA	Outdoor Industry Association
POTW	publicly-owned treatment works
RSL	Restricted Substances List

SAC	Sustainable Apparel Coalition
SAR	sodium absorption ratio
STWI	Sweden Textile Water Initiative
TDS	total dissolved solids
TKN	total kjeldahl nitrogen
TSS	total suspended solids
UK	United Kingdom
U.S.	United States
USEPA	United States Environmental Protection Agency
WHO	World Health Organization
WWTP	wastewater treatment plant
ZDHC	zero discharge of hazardous chemicals

Textile Industry Wastewater Discharge Quality Standards: Literature Review

Zero Discharge of Hazardous Chemicals Programme

Executive Summary

Leading brands in this industry have recognised the need to limit hazardous wastewater discharges from the textile manufacturing industry. This has been driven both by heightened public scrutiny and the desire by industry leaders to be good stewards of the planet's resources. As a result, the industry has targeted zero discharge of hazardous chemicals as a target to work towards. In an effort to coordinate industry efforts, reduce duplication of effort and clarify requirements throughout the supply chain, this study has been undertaken to assess the current state of industry discharge parameters and to use these findings as a baseline for formulating a new set of common industry discharge guidelines. Uniform guidance that applies across nations and brands would simplify and ultimately reduce the cost of manufacturing by allowing all manufacturers to design facilities to the same set of guidelines.

This report provides an overview of currently available guidelines and regulations for textile industry wastewater discharge quality. As can be seen from the data, there is a wide range in discharge regulations from nation to nation, between guidelines published by different brands and amongst multi-brand consortia. Also many of the current regulations and guidelines are far from requiring zero discharge. Understanding the current state of regulations will help in formulating a new discharge guideline that will update the widely used guidelines developed by the Business for Social Responsibility (BSR). These guidelines were established in 2010, but due to rapidly changing regulations and new industry targets for zero discharge the guidelines now require updating.

Research for this study was conducted to gather textile industry wastewater discharge quality guidance and regulations developed by multi-brand consortia, other industry brands and national governments. This research included locating and reviewing literature from 6 multi-brand consortia, 18 brands and 20 countries and communicating with individuals or agencies representing these groups. Data collected are presented in the full report in figures that compare wastewater effluent parameters and limits between consortia guidelines, brand guidelines and country regulations. In addition, Appendix A includes values from each guideline and regulation found.

This study establishes a baseline on which to develop a revised global industrywide guideline that can help improve the environment and communities that support the textile industry.

SECTION 1

Overview

1.1 Purpose

In the apparel and footwear industry, water efficiency is a critical aspect of sustainable and environmentally-conscious manufacturing. A lot of manufacturing processes use water and generate wastewater that will require treatment before reuse or discharge. Treatment processes often are developed to align with effluent discharge parameters dictated by regulations that govern the receiving waterbody or by a publicly-owned treatment works (POTW). Many countries have developed wastewater discharge regulations, some specific to the textile industry, which reduce the potential for human health issues and/or negative environmental impacts. In addition, some multi-brand consortia and individual brands have undertaken the development of manufacturing facility wastewater discharge guidelines for locations at which wastewater discharge standards have not yet matured or are not sufficient from the brand's perspective.

Despite efforts devoted to developing wastewater discharge regulation, there is no single guideline that covers all discharge criteria. The Zero Discharge of Hazardous Chemicals (ZDHC) Programme has identified 11 priority chemical groups that they believe should be targeted for zero discharge: APEOs/NPEs, azo dyes, brominated and chlorinated flame retardants, chlorobenzenes, chlorophenols, chlorinated solvents, heavy metals, organotin compounds, perfluorinated chemicals, phthalates and short-chained chlorinated paraffins. Few of these priority chemical groups are specifically listed in existing guidelines. This also is true for other wastewater discharge criteria. National standards and industry guidelines also vary in their standard analytical methods/techniques for measuring wastewater constituents. The textile industry supply chain could benefit greatly from a single, unified discharge guideline and the development of standardised analytical methods for monitoring wastewater quality.

Leading brands in this industry have recognised the variation and outdated or loose requirements of some wastewater regulations and guidelines. In response to the brands' own concerns and reports from civil society organisations, brand leaders in conjunction with the ZDHC Programme are collaborating to develop a wastewater discharge quality guideline for the apparel and footwear industry that goes beyond regulatory compliance to help ensure that wastewater discharges do not adversely affect the environment or the surrounding communities. To build an industrywide wastewater discharge quality guideline, it is necessary to understand the guidelines and standards that currently exist, the constituents they address and the allowable concentration of each constituent. The purpose of this report is to summarise wastewater effluent standards from a variety of countries, multi-brand consortia and individual brands to develop a baseline of the current textile manufacturing wastewater discharge criteria landscape.

A uniform industry guideline would have many benefits. Currently, the supply chain is confronted with multiple guidelines depending on which brand is sourcing the material, and brands are faced with the added task of ensuring each vendor is complying with their own brand requirements. This added complexity imposes unnecessary contract and compliance cost on both the brand and vendor. There is also a significant benefit to to local communities and the environment from having a robust discharge guideline that is widely followed across the industry.

1.2 Methodology

This study focused on four categories of wastewater discharge documents: (1) multi-brand consortia wastewater guidelines; (2) individual brand wastewater guidelines; (3) wastewater regulations for selected countries in which the textile industry is prevalent; and (4) wastewater regulations for selected benchmark countries. Section 1.3 outlines the groups, brands and countries that were included in this research.

The collection of wastewater regulations were found via online research, collaboration with CH2M HILL's international offices and guidance from NIKE, Inc. For the multi-brand consortia guidelines, a search of respective web sites was performed to look for applicable documents prior to follow-up clarification via telephone and/or email. Research of the brand guidelines followed the same method as the multi-brand consortia. Brands included in the research are all current members of the ZDHC Programme committed to the Joint Roadmap (ZDHC, 2011/2013/2015). These brands also were asked to respond to a study questionnaire that included enquiries about whether the brand has developed guidelines that they are applying to factories producing their brand, how their parameters and limits were selected and the level of implementation at their factories.

1.3 Summary of Locations and Groups Researched

The literature review included researching guidelines of 6 multi-brand consortia, 18 apparel/footwear brands, 14 countries with a prevalent textile industry and 6 benchmark countries. Regulations in some North American and European states and provinces within those benchmark countries also were researched. Tables 1-1 through 1-4 summarise the groups, brands and countries that were part of this study and Figure 1-1 shows the global aspect of the research collected.

TABLE 1-1
Multi-Brand Consortia
List of multi-brand consortia that were researched as part of this study.

	Group name	Has a published wastewater guideline	Document	Notes
1	American Apparel and Footwear Association (AAFA)	Yes	AAFA Global Textile Effluent Guidelines (AAFA, not dated)	The AAFA guideline utilises the BSR guideline with some additional parameters.
2	Business for Social Responsibility (BSR)	Yes	BSR Sustainable Water Group Water Quality Guidelines (BSR, 2010)	The BSR Sustainable Water group has since disbanded. (Nishinaga, pers. comm., 2015)
3	Sweden Textile Water Initiative (STWI)	Yes	STWI Guidelines for Sustainable Water Use in the Production and Manufacturing Processes of Textiles (STWI, 2012) STWI Guidelines for Sustainable Water Use in the Production and Manufacturing Processes of Leather (STWI, 2014)	- STWI is a joint project with the Stockholm International Water Institute. - The textile guideline utilises the BSR guideline and the 2007 International Finance Corporation (IFC)-Environmental Health and Safety (EHS) Textile Manufacturing Guidelines. - The leather guideline utilises the parameters in table 5.3 of in the European Commission Best Available Techniques Reference Document for Tanning of Hides and Skins, 2013. (AbdelRahman, pers. comm., 2015)
4	Outdoor Industry Association (OIA)	No	NA (Hodgson, pers. comm., 2015)	
5	Sustainable Apparel Coalition (SAC)	No	NA (Blaisdell, pers. comm., 2015)	
6	The Sustainability Consortium	No	NA (Melhart Slay, pers. comm., 2015)	

TABLE 1-2
ZDHC Member Brands
List of ZDHC member brands and information found.

	Brand	Has a published guideline beyond legal regulation compliance found online or was provided by a brand representative	Document	Notes
1	adidas Group	Yes	adidas Group Environmental Guidelines (adidas Group, 2010)	
2	Benetton Group	No	NA (Francesco, pers. comm., 2015)	
3	Burberry Group PLC	No	NA (Gaviano, pers. comm., 2015)	
4	C&A	Yes	Supporting Guidelines for the C&A Code of Conduct (C&A, 2010)	Utilises BSR guidelines.

	Brand	Has a published guideline beyond legal regulation compliance found online or was provided by a brand representative	Document	Notes
5	Esprit	No	NA	
6	Gap Inc.	Yes	Water Quality Program (Gap Inc., 2004) Gap Inc. 2011/2012 Social & Environmental Responsibility Report (Gap Inc., 2013)	
7	G-Star Raw. C.V.	No	NA	
8	H&M	Yes	Code of Conduct (H&M, 2010)	No table of values is included in the document but rather the statement to follow BSR guidelines if they are stricter than legal regulations.
9	Inditex	No	NA (Ibáñez, pers. comm., 2015)	
10	Jack Wolfskin	No	NA	
11	Levi Strauss & Co.	Yes	Sustainability Guidebook (Levi Strauss & Co, 2013)	(Szarvas, pers. comm., 2015)
12	L Brands	No	NA (Lee, pers. comm., 2015)	
13	Li Ning	No	NA	
14	M&S	No	NA	
15	New Balance Athletic Shoe, Inc.	Yes	New Balance standards Manual "Sprint" Version (New Balance Athletic Shoe, Inc., 2015)	The New Balance Manual is used in conjunction with the BSR guidelines, and other local and national standards. (Stokes, pers. comm., 2015)
16	NIKE, Inc.	Yes	Nike Sustainable Water Program Guidelines and Ratings (NIKE, Inc., 2014)	(Rydzewski, pers. comm., 2014)
17	PUMA SE	Yes	PUMASafe Handbook of Environmental Standards Volume 1-Environmental Management (PUMA SE, 2012)	This document has both a textile and leather wastewater guideline. The sources of the limits are noted as IFC-EHS Guidelines-Textile Manufacturing and IFC-EHS Guidelines-Tanning and Leather Finishing respectively.
18	PVH Corp.	No	NA	

Notes:
IFC-EHS Guidelines = International Finance Corporation - Environmental, Health, and Safety Guidelines
NA = not applicable

TABLE 1-3
Country Regulations
List of selected countries that have a prominent textile industry and if regulations were identified.

	Country	Obtained a wastewater regulation with effluent values
1	Bangladesh	Yes (T)
2	Brazil	Yes
3	Cambodia	Yes
4	China	Yes (T)
5	Honduras	*
6	India	Yes (T)
7	Indonesia	Yes (T)
8	Malaysia	Yes (T)
9	South Korea	Yes
10	Taiwan	Yes (T)
11	Thailand	Yes (T)
12	Turkey	Yes (T)
13	Vietnam	Yes (T)
14	Sri Lanka	Yes (T)

Notes:
(T) = Has values specific to the textile industry
* Does not have national regulation regarding industrial wastewater discharge

TABLE 1-4
Benchmark Countries
List of countries selected to identify a benchmark of effluent limits.

	Country/Location	Obtained a wastewater regulation with effluent values	Document	Notes
1	United States	Yes	USEPA Code of Federal Regulations (CFR) Title 40 Part 410 - Textile Mills Point Source Category (USEPA, 2012a) USEPA CFR Title 40 Part 425 - Leather Tanning and Finishing Point Source Category (USEPA, 2012b)	These regulations list effluent values in mass of constituent per mass of manufactured product, thus are not directly comparable to other country's regulations that present wastewater values in mg/L.
	State or City			
1.1	Los Angeles	Yes	City of Los Angeles Department of Public Works Industrial Waste Management Division Industrial Waste Control Ordinance (City of Los Angeles, 2012)	The parameters and values within this regulation apply to the discharge to a POTW.
1.2	South Carolina	*	NA	
1.3	North Carolina	*	NA	
1.4	Georgia	*	NA	

	Country/Location	Obtained a wastewater regulation with effluent values	Document	Notes
2	Canada	Yes	Wastewater Systems Effluent Regulations SOR/2012-139, Current to May 25, 2015	The regulation does not apply to a wastewater system that is located on the site of an industrial, commercial or institutional facility if the wastewater system is designed to receive water when the volume consists of less than 50% blackwater and greywater combined. Blackwater is defined as water from sanitary appliances that contains human faecal matter or human urine. Greywater means used water, other than blackwater, from sanitary appliances or from other appliances in a kitchen or laundry.
	Province			
2.1	Ontario	*	NA	
2.2	Quebec	*	NA	
	European Union (EU)	Yes	91/271/EEC, EU Council Directive Concerning Urban Waste Water Treatment (European Commission – Environment, 1991)	Applies to discharge from urban wastewater treatment plants (WWTPs) to receiving waters.
3	Spain	Yes	Madrid, Industrial Liquid Dumping Law to Integrated System of Sanitation (The Statute of Autonomy of the Community of Madrid, 2015)	Applies to the city of Madrid for industrial discharges to sanitation systems.
4	United Kingdom (UK)	*	NA	
5	Germany	Yes	Ordinance on Requirements for the Discharge of Waste Water into Waters (Germany Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2004)	Applies at the point of discharge into a waterbody.
6	Italy	Yes	Legislative Decree 152, Code on the Environment (Food and Agriculture Organization of the United Nations, 2006	Applies to discharges to surface waters and the public sewer.

Notes:
mg/L = milligram(s) per litre
NA = not applicable
*Communication was made to representatives familiar with the area/country or to the environmental agency and no industrial wastewater regulation exists with specific effluent concentration limits.

FIGURE 1-1

Global Overview of Countries that were Included in Wastewater Regulation Review

Red dots are located on countries that are included in this review of wastewater effluent regulations.

Source: Geoscience News and Information. *Geology.Com World Map Political.* http://geology.com/world/world-map.shtml. Accessed and adapted 14 July 2015.

SECTION 2

Multi-Brand Consortia

2.1 Existing Guidelines

Three of the seven multi-brand consortia included in this research have wastewater guidelines available in the public domain. These guidelines vary from a two-page document focused on wastewater effluent to a multi-page guidebook on best practices. The parameters and limit values from these guidelines are documented in the Wastewater Effluent Parameters and Limits Summary table in Appendix A. Each guideline is summarised in this section with a specific statement about its application and testing/measurement standards, if available. Two additional textile manufacturing operation wastewater discharge quality guidelines, the International Finance Corporation - Environmental, Health, and Safety (IFC-EHS) guidelines (IFC, 2007) and bluesign® (bluesign, 2014), also were uncovered during this research and are described in this section. Figure 2-1 shows the breakdown of parameters noted in the three multi-brand consortia and two additional industry guidelines.

Business for Social Responsibility

In 2010, BSR's Sustainable Water Group developed a wastewater discharge quality guideline outlining the requirements for direct discharge to a water body (applicable except when the local regulatory permit was more stringent) (BSR, 2010). Although BSR details wastewater discharge guidelines, it does not detail nor recommend analytical methods for monitoring wastewater quality. This guideline is currently utilised by other multi-brand consortia as well (AAFA and STWI, for example). In addition to concentration limits, the BSR guideline discusses effluent to a POTW (as opposed to direct discharge to a water body) and recommends effluent monitoring practices such as the use proper measurement equipment and staff.

The BSR Sustainable Water Group is no longer active and their guideline has not been updated since 2010. According to a BSR representative, none of the former group participants are still with BSR, so the background and details behind how the guideline was developed could not be discussed (Nishinaga, pers. comm., 2015).

American Apparel and Footwear Association

The AAFA Global Textile Effluent Guidelines present wastewater effluent parameters such as temperature, pH, biochemical oxygen demand (BOD), chemical oxygen demand (COD), metals content and corresponding discharge limits. These values are based on the 2010 BSR Water Quality Guideline, however, the AAFA guideline has a lower COD limit and also includes phosphorous, sulphide and phenol parameters. AAFA also indicates that if a regulatory permit is more stringent than the BSR limits, then the more stringent limits must be followed. Like the BSR guideline, the AAFA guideline applies to direct discharge to a water body. This guideline references applicable testing standards from multiple organisations including the International Organization for Standardization and U.S., European and national standards. Based on a communication with an AAFA representative, guidelines have not been updated since they were first issued (following the release of the BSR guidelines) (AAFA, not dated; Montello, pers. Comm., 2015).

Sweden Textile Water Initiative

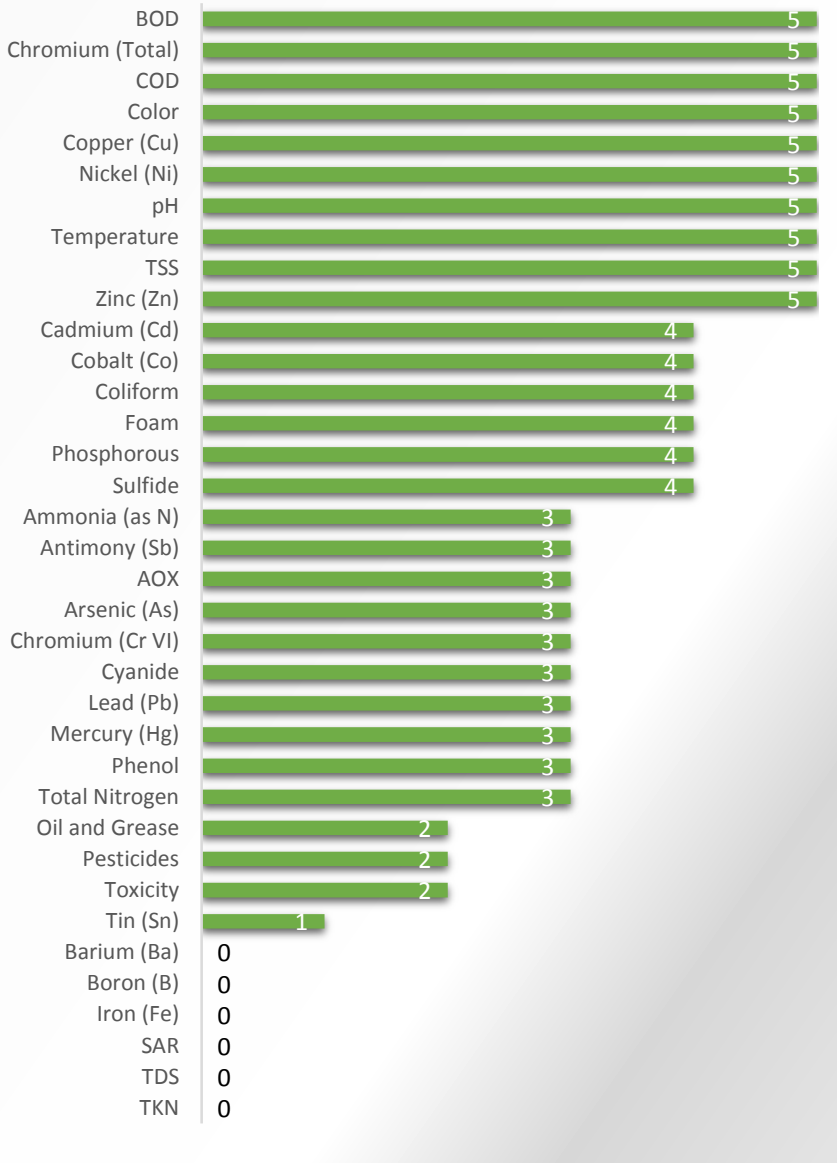
STWI has two current apparel manufacturing guideline documents, one specific to leather manufacturing and the other to textile manufacturing. Both of these documents provide guidelines for direct discharge of wastewater and include testing methods for monitoring wastewater quality. Like other consortia guidelines, the limits provided are to be followed unless local legal limits are more stringent. Textile guidelines are based on the 2010 BSR guidelines and the 2007 IFC-EHS Guidelines for Textile Manufacturing. The two STWI guidelines provide detailed wastewater and

pollution control practices and group these in levels of compliance: minimum, improver and achiever (STWI, 2012; STWI, 2014).

Additional Guidelines

Two additional wastewater effluent guidelines were located that provide supplementary data to the collection of existing multi-brand consortia guidelines: the 2007 IFC-EHS Guidelines for Textile Manufacturing and the 2014 bluesign® Criteria for Production Sites - Annex: Textile Manufacturer. Each of these documents provide industry-specific water quality guidelines for direct discharge of treated wastewater. The bluesign® document also includes standard testing methods. These guideline limit values are included in Appendix A and are graphed with the multi-brand consortia values in Section 6 (bluesign, 2014; IFC, 2007).

FIGURE 2-1
Parameters Listed in Consortia/Industry Guidelines
Prevalence of parameters that have limits specified by the five multi-brand consortia and industry guidelines. The first ten listed parameters appear in all five guidelines as noted by five at the end of each bar.



2.2 Multi-Brand Consortia that Do Not Publish Wastewater Discharge Quality Guidelines

Four of the multi-brand consortia researched have not developed a wastewater guideline, nor are they in the process of developing one. SAC developed the Higg Index which uses modules to assess manufacturing facility wastewater management systems, though it does not provide specific guidelines for effluent parameter limits (SAC, 2012). A revision of the Higg Index (Higg 3.0) is expected in the near future, but it is not expected to include wastewater discharge quality guidelines. The Sustainability Consortium includes a working group focused on clothing, footwear and textiles but wastewater effluent guideline development is not an active topic (Melhart, pers. Comm., 2015). In 2009, the OIA working group, focused on the Eco Index (a predecessor of the Higg Index), developed a draft water-use guideline that recommended alignment with the BSR wastewater quality guidelines. Currently, OIA has a sustainability group concentrating on four main areas: product indexing, material traceability, social responsibility and chemical management. Wastewater-related discussions have been included in the chemical management area discussions, though no industry guideline has been developed (Hodgson, pers. comm., 2015)

2.3 Summary

The multi-brand consortia outlined in this study all recognise the importance of water and wastewater management sustainable practices. Some understand that the ZDHC Programme is working on wastewater-related issues and thus do not intend to duplicate efforts. Most expressed interest in following and potentially participating in the ZDHC Programme's wastewater-specific forum and or helping to leverage the outcomes of an industry guideline developed by the programme.

SECTION 3

ZDHC Member Brands

3.1 Existing Brand Guidelines

Brands involved in the ZDHC Programme are listed in Table 1-2. Through review of their respective web sites and follow-up communication with brand representatives, it was determined that seven of the 18 brands either publish their own wastewater effluent guidelines or reference the consortia guidelines to which their supply chain must comply. Specifically, H&M, C&A and New Balance include statements in their wastewater-related public documents that note alignment with BSR guidelines. The limit values of brand wastewater discharge guidelines are shown in Appendix A. These guidelines are either based on or align closely to the multi-brand consortia or other guidelines within the textile industry (e.g., IFC-EHS and bluesign®). Figures in Section 6 compare the consortia and industry guideline values, brand guidelines and national standards for countries with significant textile manufacturing.

3.2 Overview of Guidelines

The majority of brand-specific wastewater discharge requirements include the common wastewater parameters of pH, BOD, COD, total suspended solids (TSS) and temperature. In addition to these common constituents, colour, coliform, foam (qualitative assessment) and metals such as cadmium, chromium, copper and mercury also have limits noted in the guidelines. Two of the seven brand guidelines include a list of test methods for these parameters and one guideline that does not list limit values does list test methods. The test methods listed include USEPA standards, ISO standards and European standards such as the Deutsches Institut für Normung (DIN). In addition to test methods, one of the brand guidelines also lists recommended/approved labs to conduct testing.

All reviewed brand-specific wastewater-related documents stated that, at a minimum, facilities must comply with national and local regulations. Some brand-specific documents describe how suppliers are rated against the guidelines and how they are scored, using a system specific to each brand, to assess the current level of compliance and identify areas for improvement. One brand indicated that they are in the process of developing guidelines that would not only include the common parameters, but heavy metals as well.

3.3 Summary

All brands researched in this study have a focus on wastewater and recognise the impact it has on the environment and surrounding communities. The majority of these brands have, at a minimum, guiding principles outlined in their documentation that promote safe, sustainable and environmentally-conscious operations. Many brands have sustainability reports or company annual updates that are readily available and provide the status of sustainable practices, have metrics of how they are doing in regards to water use and reuse and outline factories' compliance with wastewater effluent guidelines. Continued transparency of information and increased understanding of existing wastewater effluent guidelines and standards, along with collective industry participation in pushing beyond legal compliance, will promote progress in wastewater management.

SECTION 4

Global Regulations

4.1 Regulations by Country

Fourteen countries that have prominent textile industries were included in this industrial wastewater regulation review. Research was conducted within the public domain to find applicable regulations. Each regulation was reviewed for limits relating to industrial wastewater discharge and for those specific to the textile industry. Values for limited constituents from each regulation are noted in Appendix A. Some parameters that are listed within the regulations were excluded from Appendix A (as noted under the applicable regulation) since they do not pertain to wastewater from the textile industry. Comparative figures of selected parameters that show similarities and deviations between country regulations, consortia guidelines and brand guidelines are included in Section 6.

Bangladesh

The Environmental Conservation Rules (Environment Law Alliance Worldwide, 1997).

- Schedule 10 for industrial units or projects and 12B for textile plants. This rule applies to discharges to surface and inland water bodies.

Brazil

The National Environmental Council (CONAMA) Resolution 430 (CONAMA, 2011)

- Chapter II Section II, effluent release conditions and standards applies to effluent released to receptor water bodies.
- This document also includes parameters such as toluene, benzene and xylene which are not listed in Appendix A.

Cambodia

Kingdom of Cambodia No. 27 ANRK.BK Sub-Decree on Water Pollution Control (Royal Government of Cambodia, 1999)

- Annex 2 applies to discharge to public water areas or sewer.
- This document also includes parameters such as hexachloro butadiene and hexachloro cyclohexene which are not listed in Appendix A.

China

GB 4287-2012 +XG1-2015 Discharge Standards of Water Pollutants for Dyeing and Finishing of Textile Industry (China Ministry of Environmental Protection, 2015)

- Table 2 applies to an existing facility as of 1 January 1 2015, a new facility as of 1 January 2013 and Table 3 for special discharge that applies to areas in which the ecological environment is vulnerable. These standards apply to discharge to the environment and to the public wastewater treatment system.

GB 8978-1996 Integrated Wastewater Discharge Standard (China Ministry of Environmental Protection, 1996)

- Tables 1 and 4 apply to wastewater discharge to water bodies. Table 4 applies to enterprises built after 1 January 1998.
- This document also includes parameters such as chlorobenzene, oxybenzene and total organic carbon that are not listed in Appendix A.

Honduras

No regulatory document was found online. Additional investigation showed that Honduras does not have a legal standard covering wastewater effluent limits and that it is common practice for industrial complexes in Honduras to adopt standards from other countries.

India

IS: 2490 Tolerance Limits for Industrial Effluents Discharged into Inland Surface Waters (Bureau of Indian Standards, 1981)

- Part I, general limits schedule covers effluents discharged to a variety of receiving bodies.
- Percent sodium is listed in this regulation, but only for discharge to public sewers or land irrigation. It is not included in the table in Appendix A.

Environmental (Protection) Rules (India Ministry of Environment, Forest and Environment Change, 1986).

- Schedule VI is a general standard for discharge of environmental pollutants and schedule I that is specific to cotton textile and dye industries. These schedules cover effluents discharged to a variety of receiving bodies.

Indonesia

The Quality of the Raw Wastewater for Industries (Republic of Indonesia, 2013)

- Table C applies to the textile industry in the Jakarta Province only.
- This regulation was only found in the Indonesian language and is specific only to the Jakarta Province. Google Translate and the MS Word translation function were used to provide a loose translation of the document.

Regulation of the Minister of the Environment about Raw Wastewater Quality (Republic of Indonesia, 2014)

- Table XLII applies to the textile industry in all of Indonesia.
- This regulation was found only in the Indonesian language. Google Translate and the MS Word translation function were used to provide a loose translation of the document.

Malaysia

Environmental Quality (Industrial Effluent) Regulations (Malaysia Department of Environment Ministry of Natural Resources and Environment, 2009)

- Schedule 7 is specific to the textile industry and Schedule 5 pertains to industrial effluent. This regulation applies to the discharge of industrial effluent or mixed effluent onto or into any soil, inland waters or Malaysian waters.

South Korea

*Water Quality and Ecosystem Conservation Act [Act No. 12519], 2008 and Sewerage Act [Act No. 12466] (*Republic of Korea Ministry of Environment, 2008)

- An original document showing a table of limits was not found online, however, a table of industrial effluent limits from these acts was used from previous CH2M HILL work. These acts apply to discharge to surface water.
- Additional parameters are included in this regulation that are not listed in Appendix A, such as anionic surfactant, trichloroethylene and vinyl chloride.

Taiwan

Taiwan Effluent Standards (Taiwan Environmental Protection Administration, 2003).

- This document applies to effluents discharged to water bodies from industries, sewage systems and sewage treatment facilities attached to buildings. The original Chinese document was translated using Google Translate and MS Word to provide a general understanding of the standard.
- This document includes parameters for specific insecticides that are not listed in Appendix A, such as endosulfan, DDT and toxaphene.

Thailand

Ministerial Notification No.2 (B.E. 2539, 1996) Issued in Accordance with the Factory Act (B.E. 2535, 1992), Industrial Effluent Standard (Thailand Ministry of Natural Resources and Environment, Pollution Control Department, 1996)

- This regulation applies to the discharge of industrial wastewater to public receiving water or to the environment.

Turkey

Regulation for Water Pollution Control, No. 25687, 12/31/2004 (US Library of Congress, 2004)

- Tables 10.1 to 10.7 are specific to the textile industry and Table 19 applies to mixed industries or industries without sector determination.

Vietnam

QCVN 13-MT: 2015/BTNMT - National Technical Regulations on the Effluent of Textile Industry (Viet Nam, 2015)

- This regulation applies to textile industry wastewater being discharged to receiving water.
- This regulation was only available in Vietnamese and was translated using Google Translate and MS Word to gain a general understanding of the regulation.

TCVN 5945 - 2005 - Industrial Waste Water Discharge Standards (Socialist Republic of Viet Nam, Ministry of Science, Technology and Environment, 2005)

- This regulation applies to the quality of industrial wastewater before being discharged to a water body.

Sri Lanka

National Environmental (Protection and Quality) Regulations, No. 1 2008 (Sri Lanka Central Environmental Authority, 2008)

- Multiple lists within Schedule I cover wastewater effluent limits to various water body types. List V covers textile wastewater discharged into inland surface waters.

4.2 Summary

In total, 17 regulations were found covering 13 countries. Honduras is the only country of those researched that does not have regulations regarding industrial wastewater effluent. Of the 17 regulations, ten of these are specific to or have a few parameter limits that explicitly apply to the textile industry. Table 4-1 lists the top parameters that appeared in the regulations.

TABLE 4-1

Most Prevalent Regulated Parameters

List of parameters and how often they appear in regulations.

Limits noted in all regulations	Limits noted in all but 1 regulation	Limits noted in all but 2 regulations	Limits noted in all but 3 regulations	Limits noted in all but 4 regulations	Limits noted in all but 5 regulations
pH	BOD	Chromium (total or Cr III)	Cyanide	Copper	Arsenic
	COD	Chromium VI		Cadmium	Nickel
	TSS	Oil and grease		Lead	Temperature
		Phenol		Mercury	
		Sulphide		Zinc	

Notes:
BOD = biochemical oxygen demand
COD = chemical oxygen demand
TSS = total suspended solids

Figure 2-1 shows the parameters that have limits noted in the multi-brand or industry guidelines. Except for colour, the parameters listed in all five guidelines appear in Table 4-1, and thus were in at least 70 percent of the regulations found. Colour was found in all but six of the regulations, but was not always quantified. For example, the Thailand regulation states that colour be “not objectionable” and one of India’s regulations states “efforts should be made to remove colour as far as practical.”

SECTION 5

Benchmark Country Regulations

5.1 United States

Research conducted to find U.S. wastewater discharge regulations included federal documents and documents pertaining to selected states or cities. An online search was conducted to find regulatory documents available to the public, and if necessary, a follow-up email or phone call was made with the appropriate agency. Areas of the U.S. included in this study are Los Angeles, South Carolina, North Carolina and Georgia. These areas have a historical and/or current presence in the U.S. textile industry. For example, North Carolina was known as the centre of the textile business in the early 1920s (North Carolina History, 2006) and today the North Carolina State University College of Textiles is a renowned program for textile innovation. Dalton, Georgia is known as the carpet capitol of the world (City of Dalton, 2015).

5.1.1 Federal Regulations

U.S. federal environmental regulations are promulgated by the USEPA. The U.S. CFR Title 40: Protection of Environment is the section governing protection of human health and the environment. CFR Title 40 includes effluent standards based on the performance of treatment and control technologies for wastewater discharges to surface waters and municipal sewage treatment plants. The two standards pertaining to the textile industry are CFR Title 40 Part 410 – Textile Mills Point Source Category and Part 425 – Leather Tanning and Finishing Point Source Category (USEPA, 2012a; USEPA 2012b).

Subparts in each standard are specific to processes in the textile or leather industry. Within textile mill regulations, a few subparts also include woven fabric, knit fabric and stock and yarn finishing. Each subpart contains effluent limit tables for parameters that correlate with a specific level of treatment technology. Table 5-1 is the table of limits that apply to the stock and yarn finishing subcategory for new source performance standards. In each subcategory within Part 410 – Textile Mills there are three technology levels: best practical control technology, best available technology economically achievable (BAT) and new source performance standards (NSPS) (USEPA, 2012a).

NSPS for stock and yarn finishing wastewater effluent reflect effluent reductions that are achievable using the best available demonstrated control technology. New manufacturing system installations allow more opportunity to install the best and most efficient production processes and wastewater treatment technologies. As a result, NSPS represent the most stringent controls attainable through the application of the best available demonstrated control technology for all pollutants (USEPA, 2015). The seven parameters BOD 5, COD, TSS, sulphide, phenols, total chromium and pH shown in Table 5-1 are the only ones with regulated limits in the Part 410 document (USEPA, 2012b).

TABLE 5-1
CFR Title 40 Part 410, Subpart G – Stock and Yarn Finishing Subcategory New Source Performance Standard
§ 410.75: New source performance standards (NSPS)
Any new source subject to this subpart must achieve the following new source performance standards:

Pollutant or pollutant property	NPS	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
	kg/kkg (or pounds per 1,000 pounds) of product	
BOD 5	3.6	1.9
COD	33.9	21.9
TSS	9.8	4.4
Sulphide	0.24	0.12
Phenols	0.12	0.06
Total chromium	0.12	0.06
pH	(1)	(1)

Notes:
(1) = Within the range 6.0 to 9.0 at all times
BOD = biochemical oxygen demand
COD = chemical oxygen demand
kg = kilogram(s)
kkg = thousand kilograms
NPS = new source performance
TSS = total suspended solids

Limit units in this U.S. federal regulation are in kilogram (or pound) per thousand kilograms (or pounds) of product. Since this is based on product mass, it is not comparable to the regulations of other countries in which parameters are generally based on concentration in the wastewater (milligrams of constituent per litre of wastewater discharged).

5.1.2 Select United States' State and Local Regulations

It was rare to find a document that listed wastewater constituent concentration limits for a state or city. In almost all cases, industrial wastewater discharge permits are based on the specific industry and the wastewater composition and location of the discharge since most industries in the U.S. discharge into a POTW. Based on their local industrial pre-treatment programme, municipalities have the discretion to set incoming wastewater quality limits for industries based on the municipality's ability to meet the requirements of their National Pollutant Discharge Elimination System (NPDES) permit with state and federal governments.

Los Angeles

Rules and Regulations Governing Disposal of Industrial Wastewater into the Publicly-Owned Treatment Works of the City of Los Angeles (City of Los Angeles, 2012)

- Regulation listing effluent limits and general requirements for discharge into a POTW.
- Individual requirements on wastewater characteristics are established for each discharge after an evaluation of the proposed discharge. These discharge limits are shown in Appendix A.

North Carolina

Via contact with the North Carolina Department of Environmental and Natural Resources, it was determined that no local regulation listing effluent limits have been established (Berry, pers. comm., 2015).

Summary of Communication

- CFR Title 40 regulations are followed at a minimum.
- In addition, other factors may apply such as watershed requirements/restrictions, water quality standards of the receiving body and wastewater components.
- Each discharge permit is determined case by case, based on where the treated wastewater discharges.

South Carolina

Via contact with the South Carolina Department of Health and Environmental Control, it was determined that no local regulation listing effluent limits have been established (DeBessonet, pers. comm., 2015).

Summary of Communication

- CFR Title 40 regulations are adopted.
- For discharge to surface water, other limits may be dictated by state water classifications and standards.
- For discharge to a POTW, local limits may dictate additional parameters or more stringent values set by the POTW.

Georgia

Via contact with the Georgia Department of Natural Resources, it was determined that no local regulation listing effluent limits have been established (Dickson, pers. comm., 2015).

Summary of Communication

- The state does not have a document for effluent limits.
- Each permitted discharge is evaluated individually and the limits are based on water quality standards and the technology-based effluent limits in CFR Title 40.
- A Reasonable Potential Analysis calculation is done for each discharge application to see if it will cause a water quality violation.

5.2 Canada

Canadian regulations are similar to those in the U.S. A national regulation was found, however, based on how the standard is applied, it may not directly apply to any specific industrial wastewater. Provincial regulations detailing wastewater discharge limits for the two provinces researched (Ontario and Quebec) did not appear to exist.

5.2.1 Federal Regulations

Environment Canada regulates the country's standards for wastewater treatment through Wastewater Systems Effluent Regulations SOR/2012-139. The current amendment for this regulation is dated 25 May 2015. This regulation applies to a wastewater system with a capacity of 100 cubic metres or more per day. It does not apply to wastewater treatment systems located on the site of an industrial, commercial or institutional facility if the wastewater system is designed to collect wastewater that measures less than 50 percent blackwater and greywater combined. Limits noted in this document are shown in Appendix A, but, depending on the type of waste treated at the factory, these limits may not apply to an industrial wastewater treatment system (Government of Canada, 2015).

5.2.2 Select Provincial Regulations

The first Canadian woollen cloth manufacturing factory was established in Quebec in 1826. In 1925 the age of synthetics was initiated with the building of a rayon production plant in Ontario. Today, most of the textile manufacturing plants in Canada are located in Ontario and Quebec (Historica Canada, 2015).

Ontario

Via communication with the Ministry of the Environment and Climate Change, Land and Water Policy Branch (Vecchiarelli, pers. comm., 2015), it was determined that:

- There is no single document that lists industrial wastewater effluent limits.
- Wastewater effluent limits are normally site specific and determined case by case.
- If discharged to a municipal sanitary or combined sewer, the wastewater discharge is subject only to the municipality's sewer use by-law and/or any agreement between the municipality and the discharger and not subject to any provincial rules.

Quebec

Via communication with the Ministry of Sustainable Development, Environment and the Fight against Climate Change (Thiboutot, pers. comm., 2015), it was determined that:

- There is no document for wastewater discharge limits.
- Wastewater discharge limits depend on the industrial sector but there is no textile-specific industrial-sector guideline.

5.3 European Union

Four European countries were selected for a review of their industrial wastewater regulations. This included four of the top five largest producers of textiles in the EU (European Commission, 2015). The specific-limit values from each regulation can be found in Appendix A.

5.3.1 European Union and Selected Country Regulations

European Union

Urban Wastewater Treatment Directive 91/271/EEC (European Commission – Environment, 1991)

- Annex 1 applies to discharge from urban WWTPs to receiving waters, for which urban wastewater is defined as domestic wastewater or the mixture of domestic wastewater with industrial wastewater and/or run-off rain water.
- Although this directive does not apply specifically to industrial wastewater discharge into water bodies, it provides insight into the limits of water body discharge parameters allowed by the EU. This regulation does state pre-treatment guidelines for industrial wastewater being sent to an urban WWTP, such as pre-treatment required to protect the health of the WWTP staff and to prevent WWTP equipment damage.
- There are additional European Commission standard documents that apply to the textile industry such as the Integrated Pollution Prevention Control Reference Document on BAT for the Textile Industries (2003) and BAT Reference Document for the Tanning of Hides and Skins (2013). Only the tanning document was found to have wastewater effluent discharge criteria. This criteria is listed in the STWI leather manufacturing guideline and shown in Appendix A under that STWI guideline.

Germany

Ordinance on Requirements for the Discharge of Waste Water into Waters (Waste Water Ordinance - AbwV) (Germany Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2004)

- Appendix 38, regarding textile manufacturing and finishing, specifies the minimum requirements to be stipulated when granting a permit for discharging wastewater to water bodies.

Italy

Legislative Decree No. 152, Code on the Environment (Food and Agriculture Organization of the United Nations, 2006)

- Part 3, Annex 5, Table 3 is applicable for emissions to surface water and sewage.
- This document also includes parameters such as aldehydes, total surfactants and chlorinated solvents, among others, which are not listed in Appendix A.
- This regulation was only available in Italian. Google Translate and MS Word were used to translate the document for a general understanding of the regulation.

Spain

Madrid, Industrial Liquid Dumping Law to Integrated System of Sanitation (The Statute of Autonomy of the Community of Madrid, 2015)

- Annex 2 applies to discharge of industrial wastewater entering collection and treatment facilities in Madrid.
- This document also includes parameters such as total detergents, benzene and toluene, among others, which are not listed in Appendix A.
- This regulation was only available in Spanish. Google Translate and MS Word were used to translate the document to gain a general understanding of the regulation.

United Kingdom

No UK regulation for industrial wastewater effluent limits was found. Discharges to the environment in the UK are led by EU legislation and applied by the UK government, which may have additional stipulations based on the receiving water, the habitat around the receiving water and the nature of the discharge. When discharging to a treatment works, the receiving facility dictates acceptable parameters and limits.

5.4 Summary

Among the locations benchmarked for this effort, it was rare to find a regulation that published a comprehensive table summarising limit values that could be applied to industrial wastewater discharged to a water body. Regulations do exist that cover environmental protection but specific effluent limits are seldom listed. Discharge permits often are established based on circumstantial parameters such as the wastewater composition, location of the industrial facility, whether the effluent will be sent to a POTW or directly discharged to a water body and the type and quality of the receiving water.

Limit values noted in the benchmark regulations, for which effluent parameters are listed, fall within the ranges of other country regulations covered in Section 4. The exception is BOD, which has a lower limit in the benchmark regulations compared to other country regulations. Figures in Section 6 compare limit values between the benchmark countries and the other countries, as well as the multi-brand consortia and brand guidelines.

SECTION 6

Figures Comparing Limit Values

Figure 2-1 shows a variety of wastewater effluent limit parameters for the five multi-brand consortia and industry guidelines reviewed. Parameters that are specified in at least three of the five guidelines are graphed in this section to compare those limits to the country regulations and to the brand-specific guidelines. The one parameter that is specified in three of the five guidelines, but that is not graphed, is foam. No country regulations have limits pertaining to foam. Values from the country regulations shown in this section's figures are the lowest regulation limits found. These most often apply to direct discharges to surface waters used for drinking water or domestic water supply. When regulations were found to address both the textile industry and general industry, both are graphed if the limits differed.

The title of each figure indicates the parameter, the industry guidelines are shown as bars with the limit value above the bar, the country regulations are shown as lines, and the brand guidelines are graphed as dashed lines. Each figure's legend states the country, group or brand, the regulations from which the value came (textile or industrial), the receiving water if applicable and the limit value. Figures are presented alphabetically by parameter.

FIGURE 6-1
Absorbable Organic Halogen

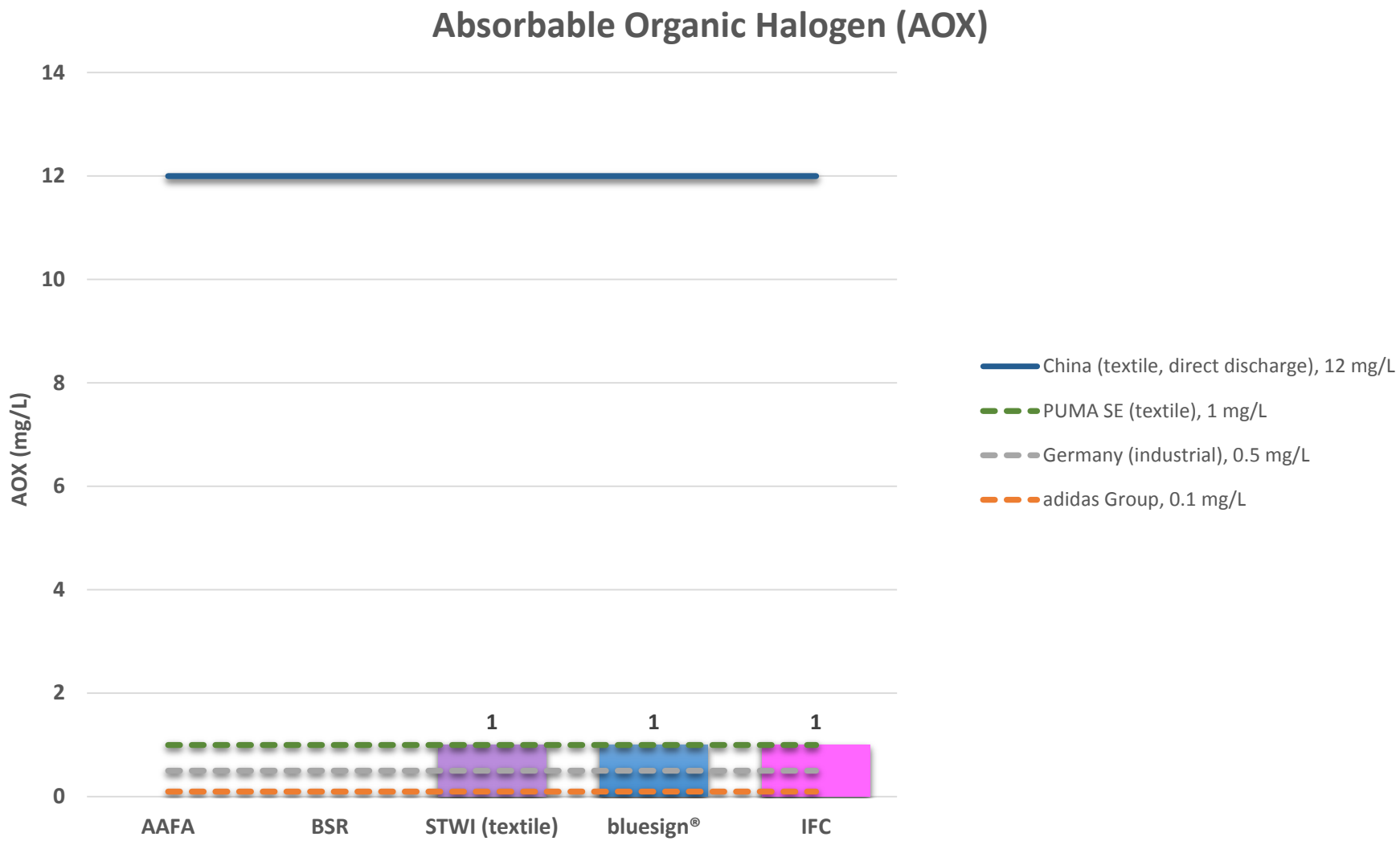


FIGURE 6-2
Ammonia as N

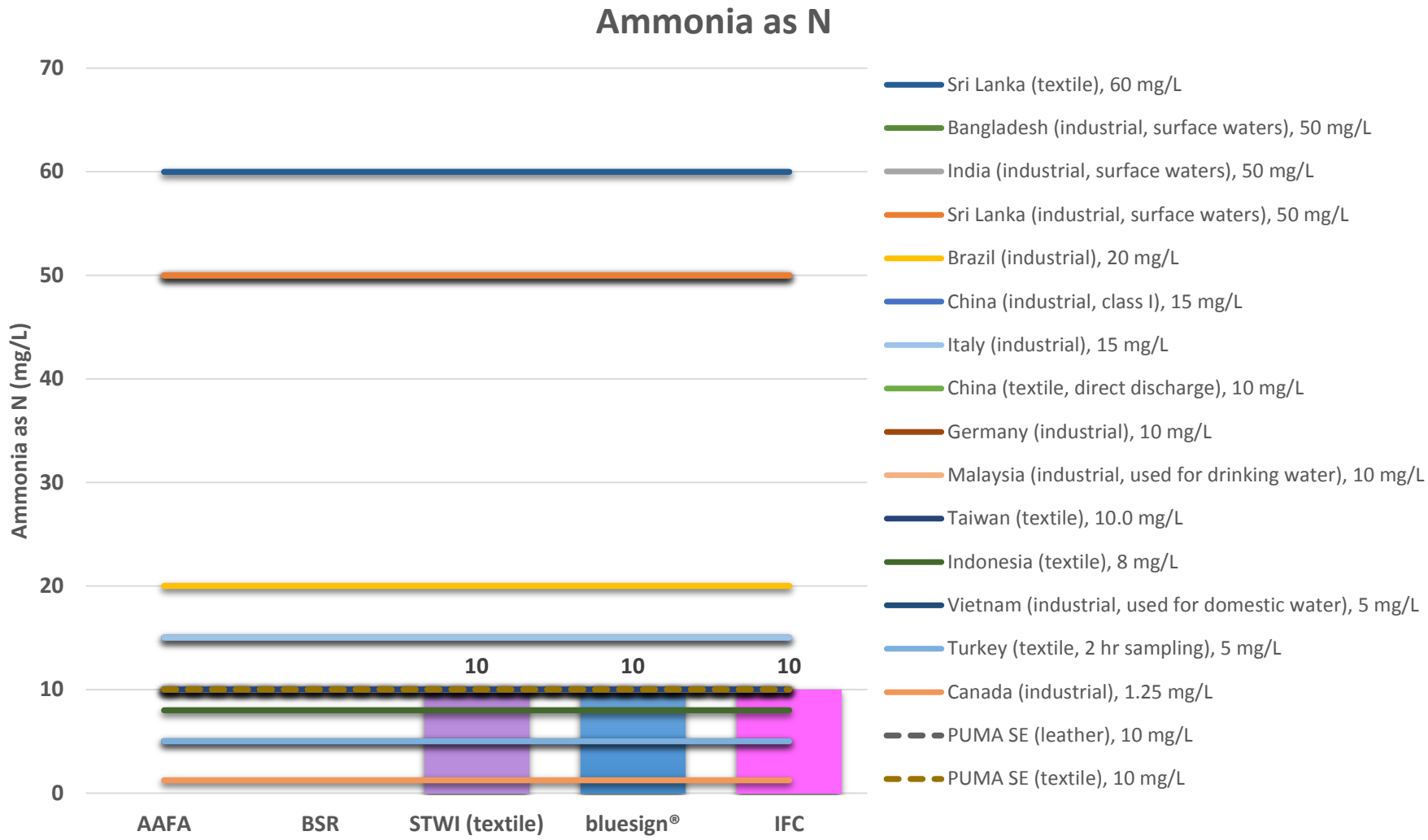


FIGURE 6-3
Antimony

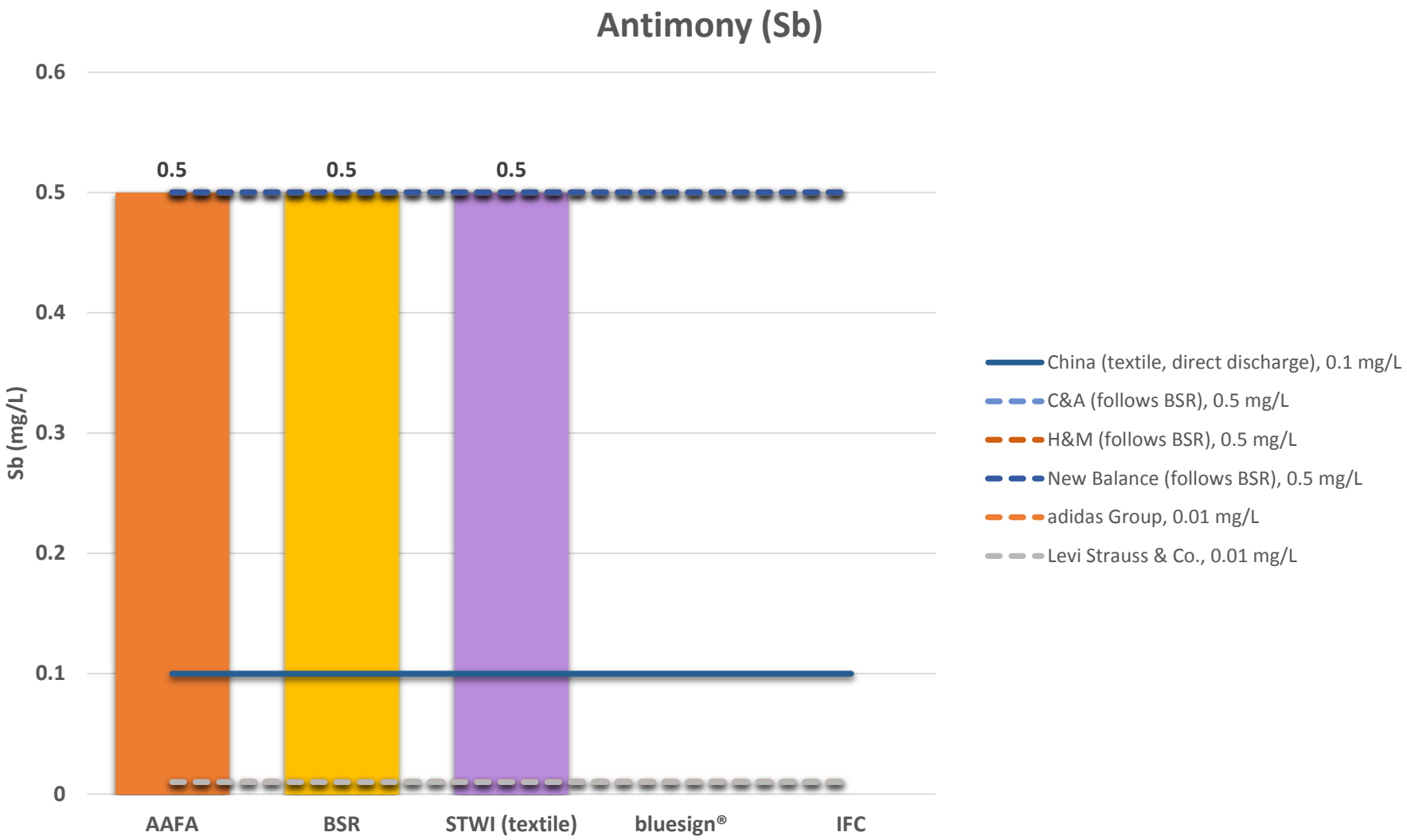


FIGURE 6-4
Arsenic

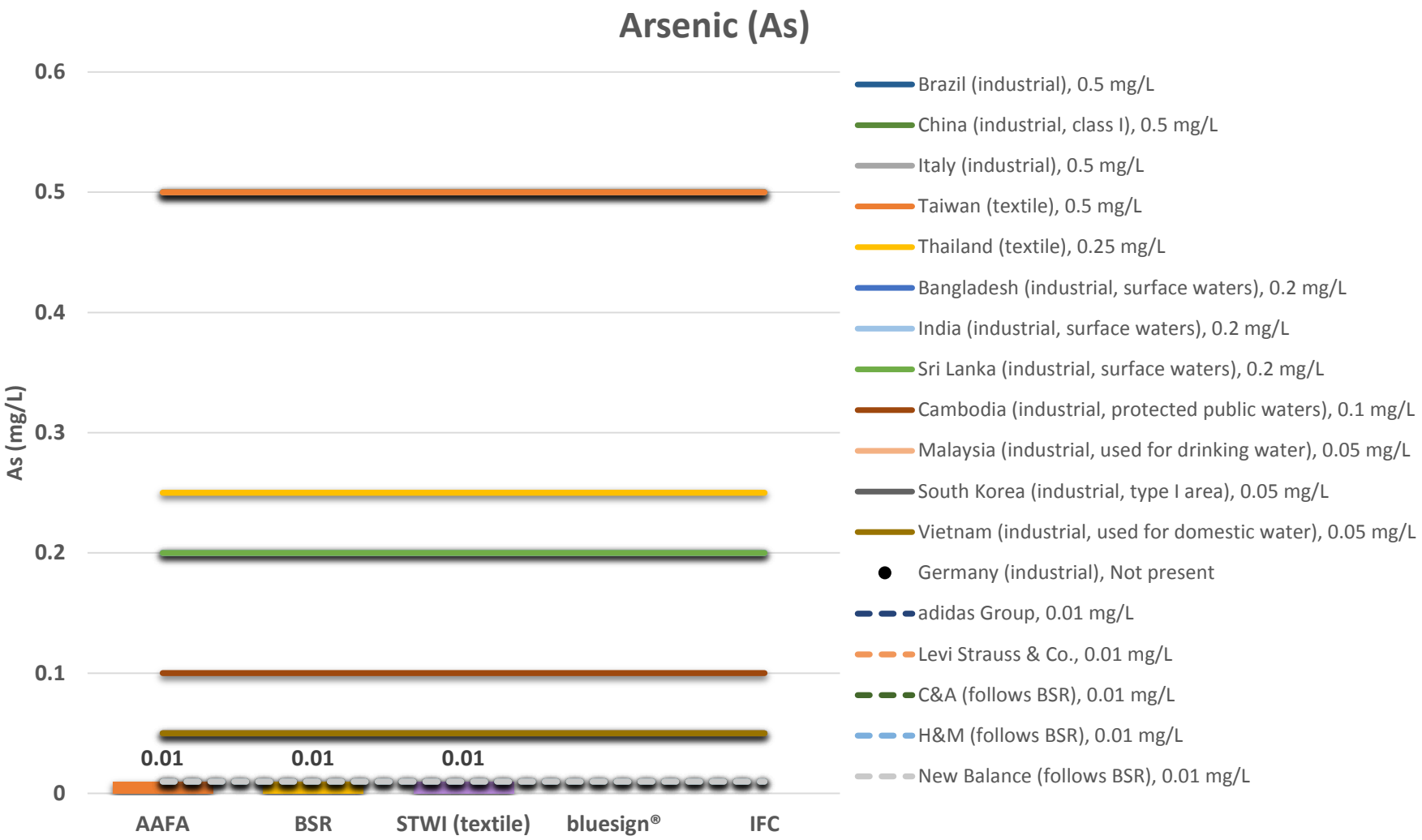


FIGURE 6-5
Biochemical Oxygen Demand

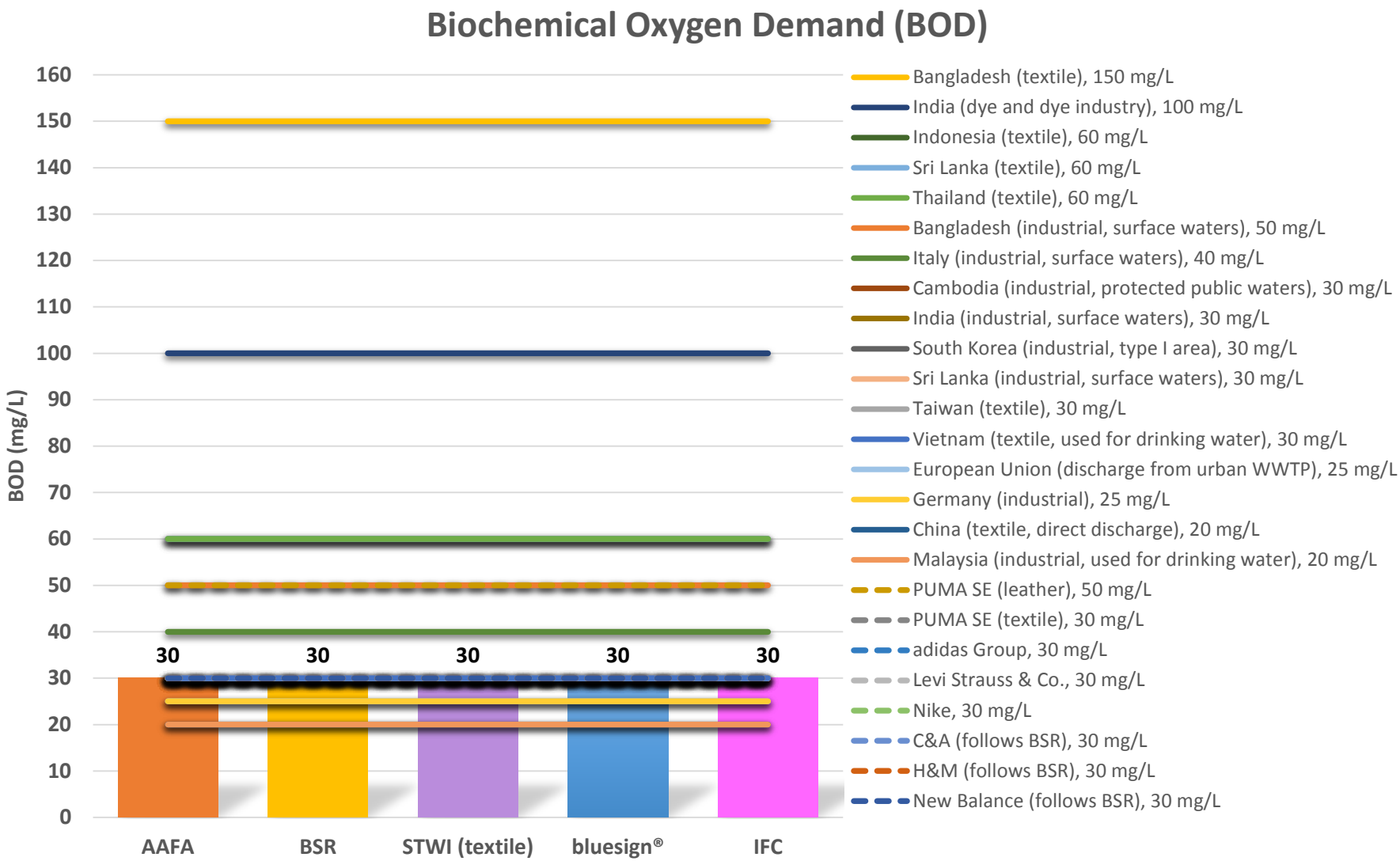


FIGURE 6-6
Cadmium
India dye and dye industry regulation reporting 2 mg/L and Bangladesh industrial regulation reporting 0.5 mg/L were omitted from this figure.

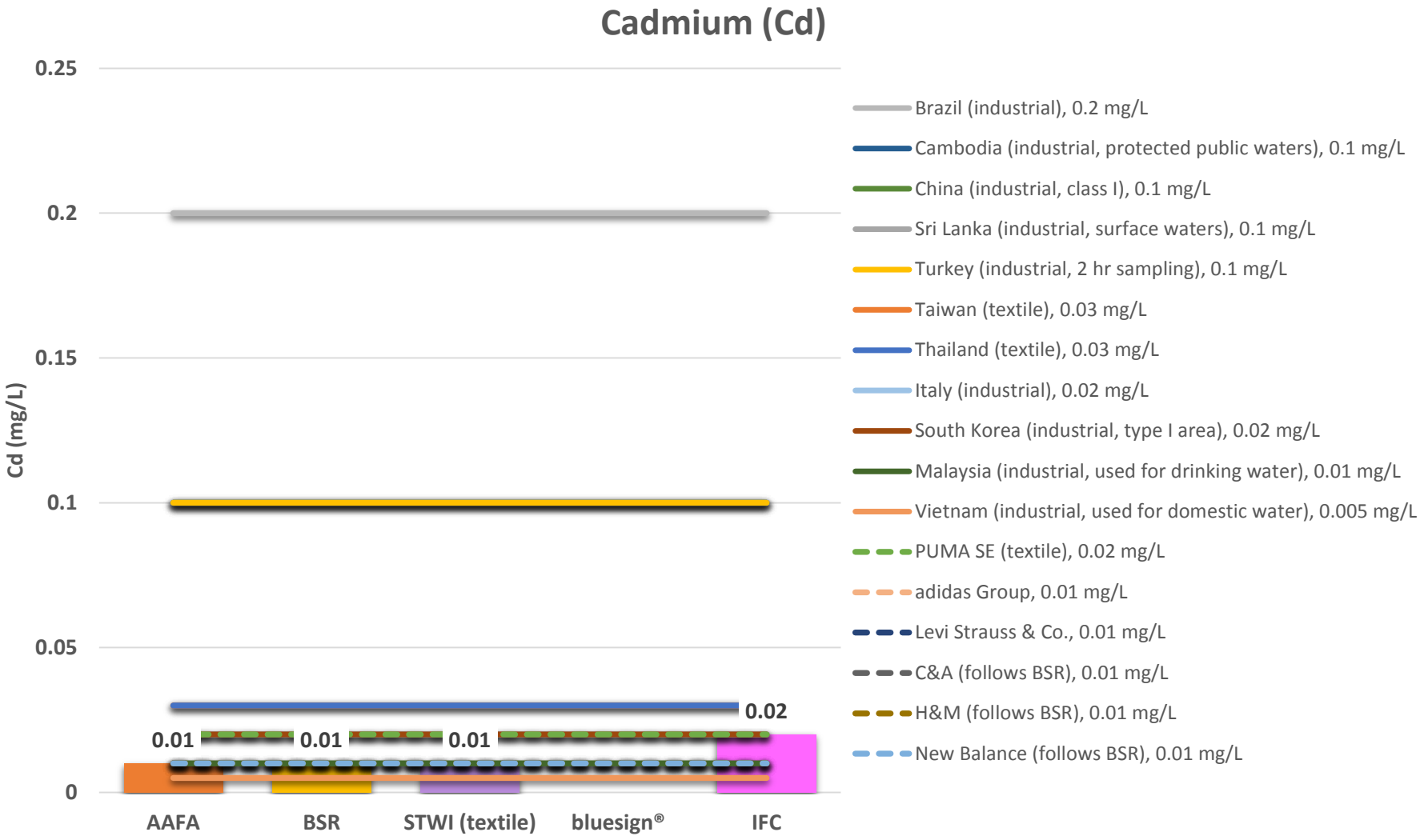


FIGURE 6-7
Total Chromium

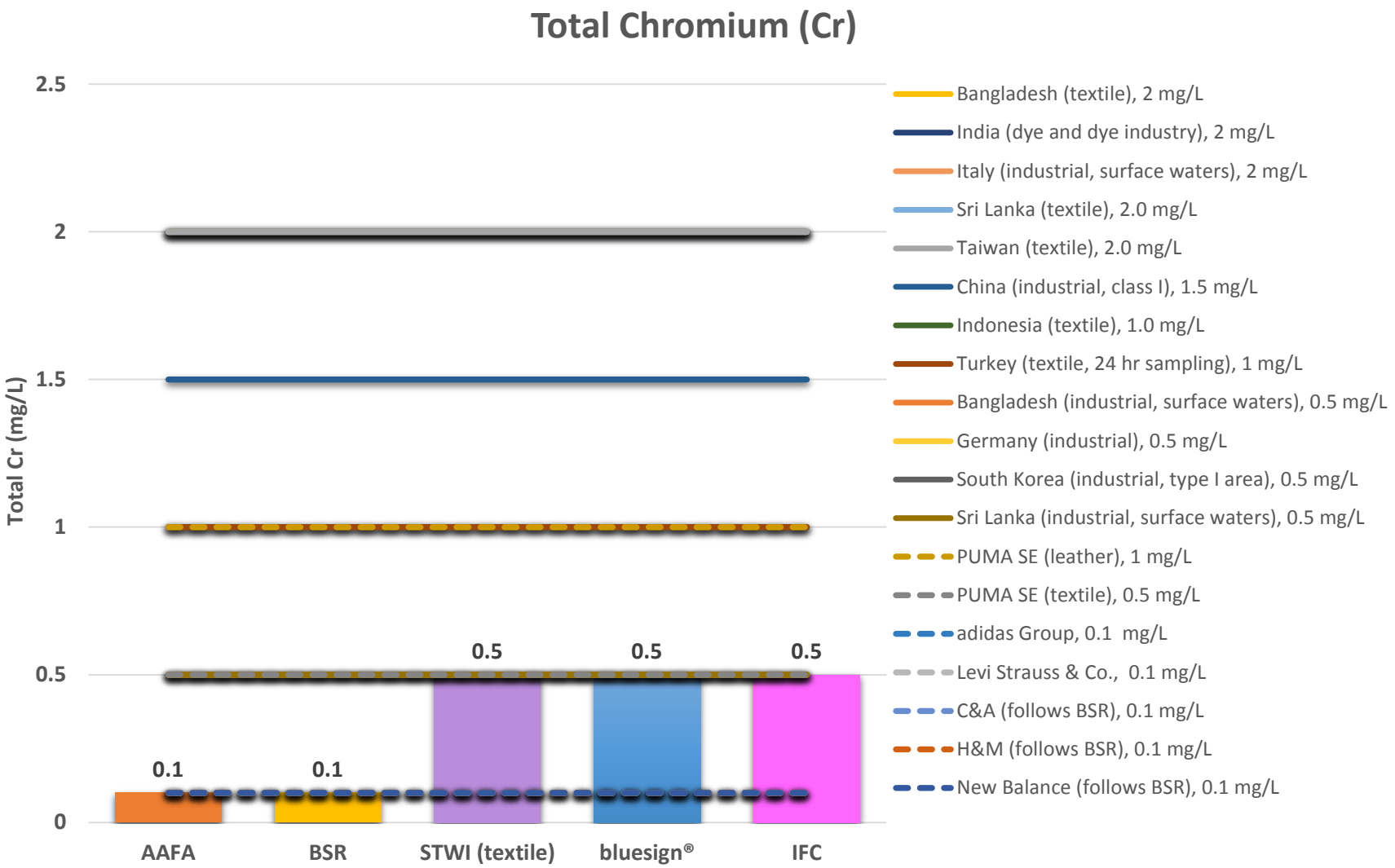


FIGURE 6-8
Chromium VI

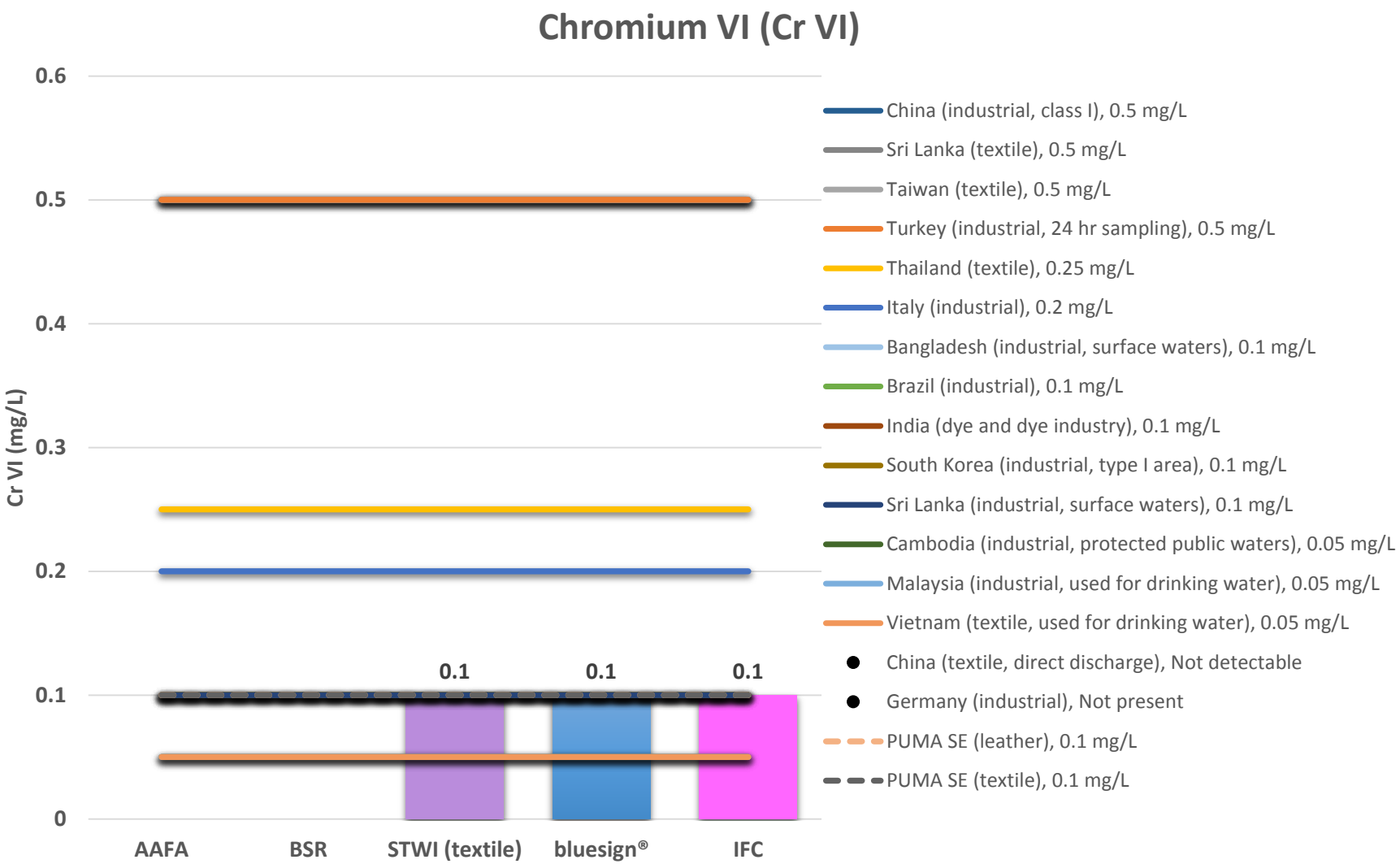


FIGURE 6-9
Cobalt

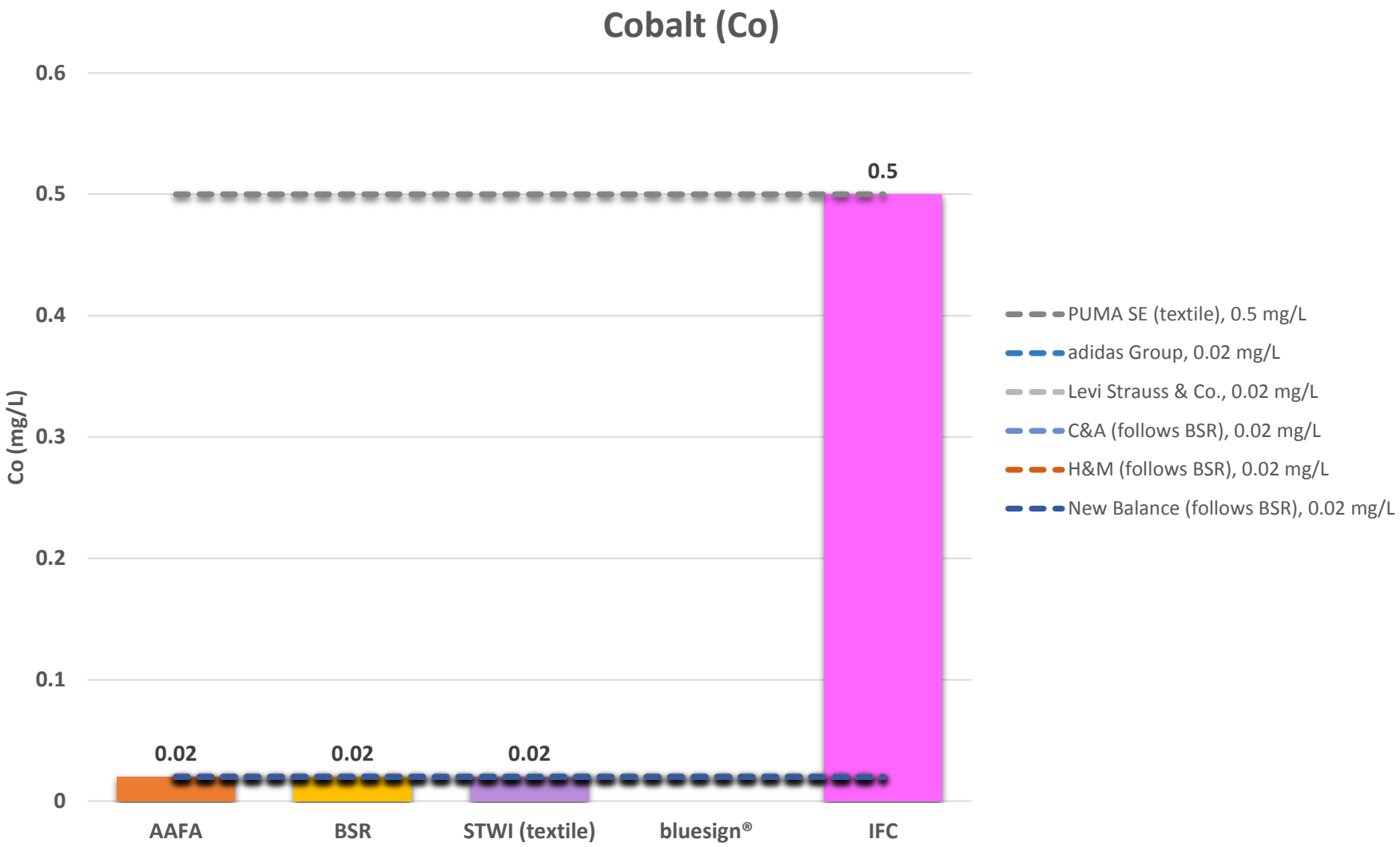


FIGURE 6-10
Chemical Oxygen Demand (COD)

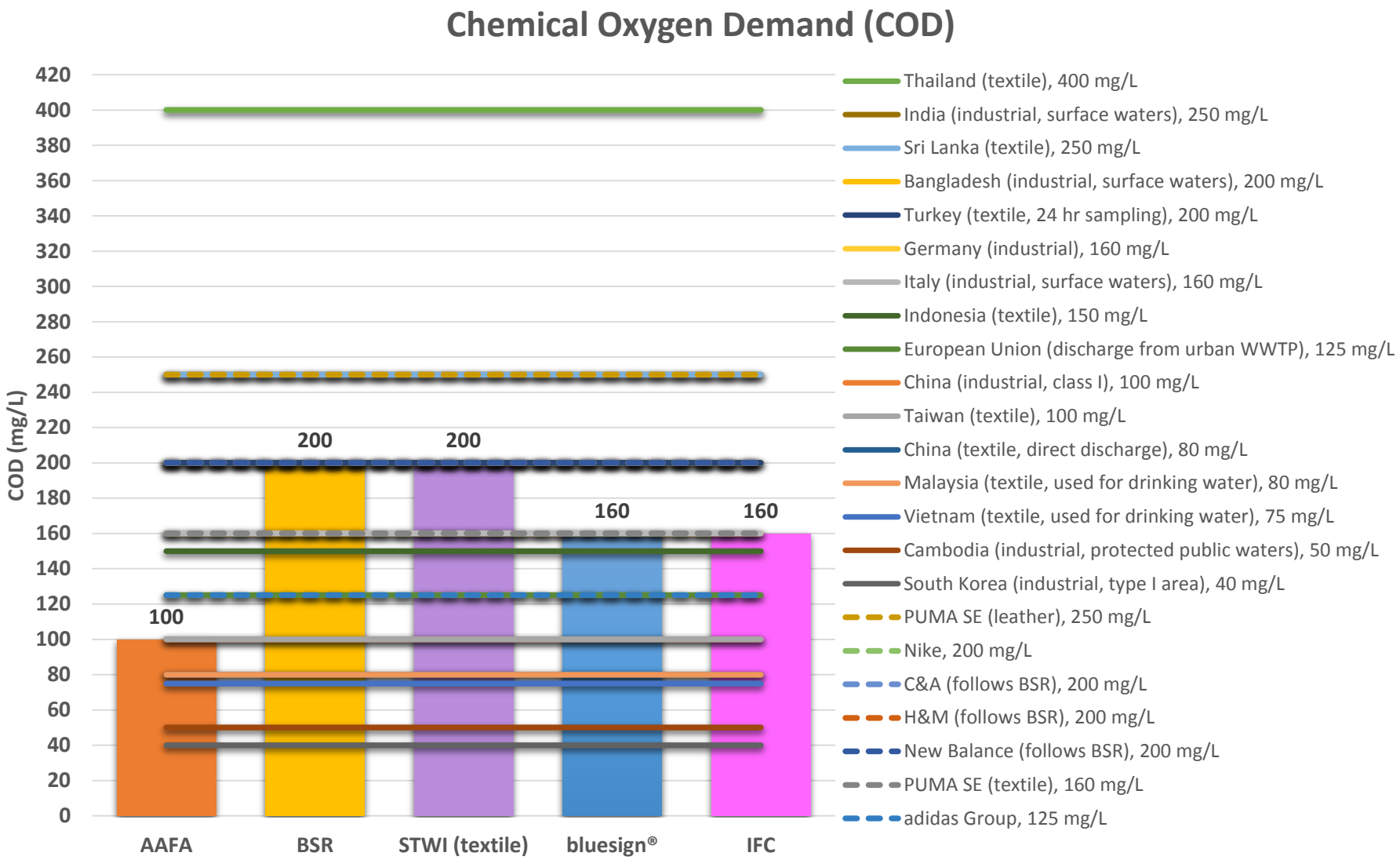


FIGURE 6-11

Coliform

The units per volume reported in the regulations include bacteria, units, most probable numbers and colony-forming units. These all mean the same thing. South Korea has a limit for this set at 100 bacteria/millilitre (10,000 units/100 millilitre) which is omitted from this figure.

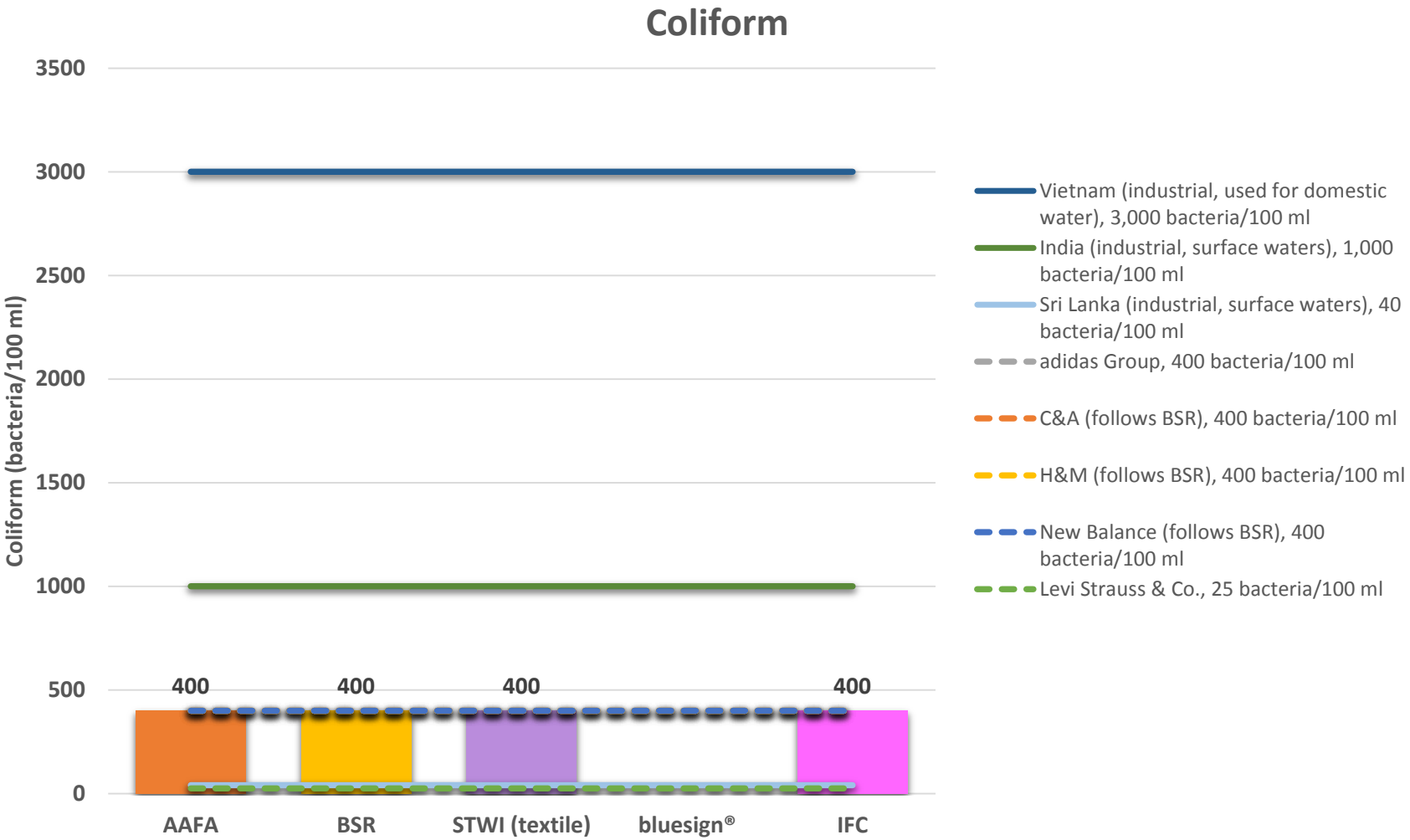


FIGURE 6-12
Colour

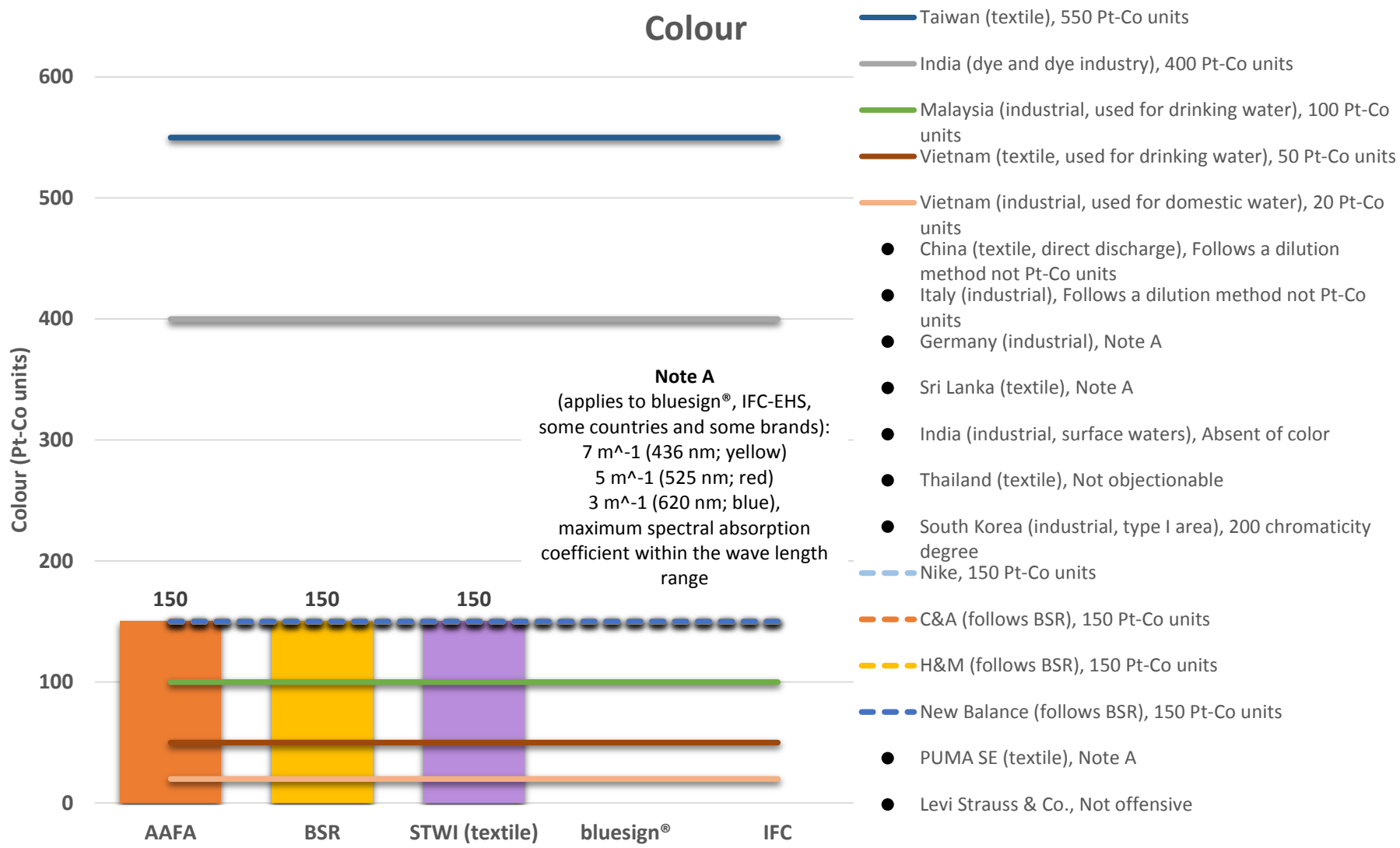


FIGURE 6-13
Copper

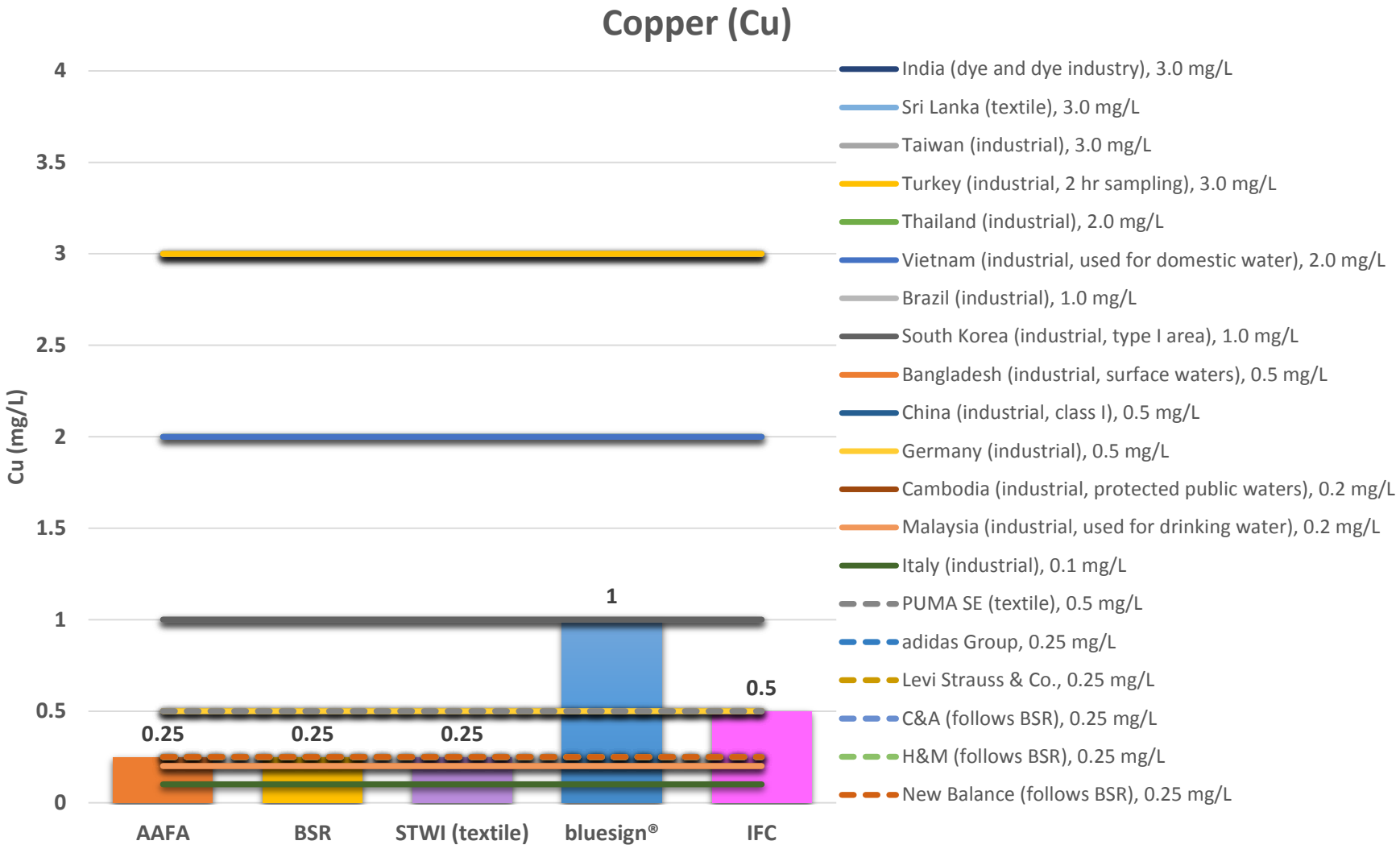


FIGURE 6-14
Cyanide

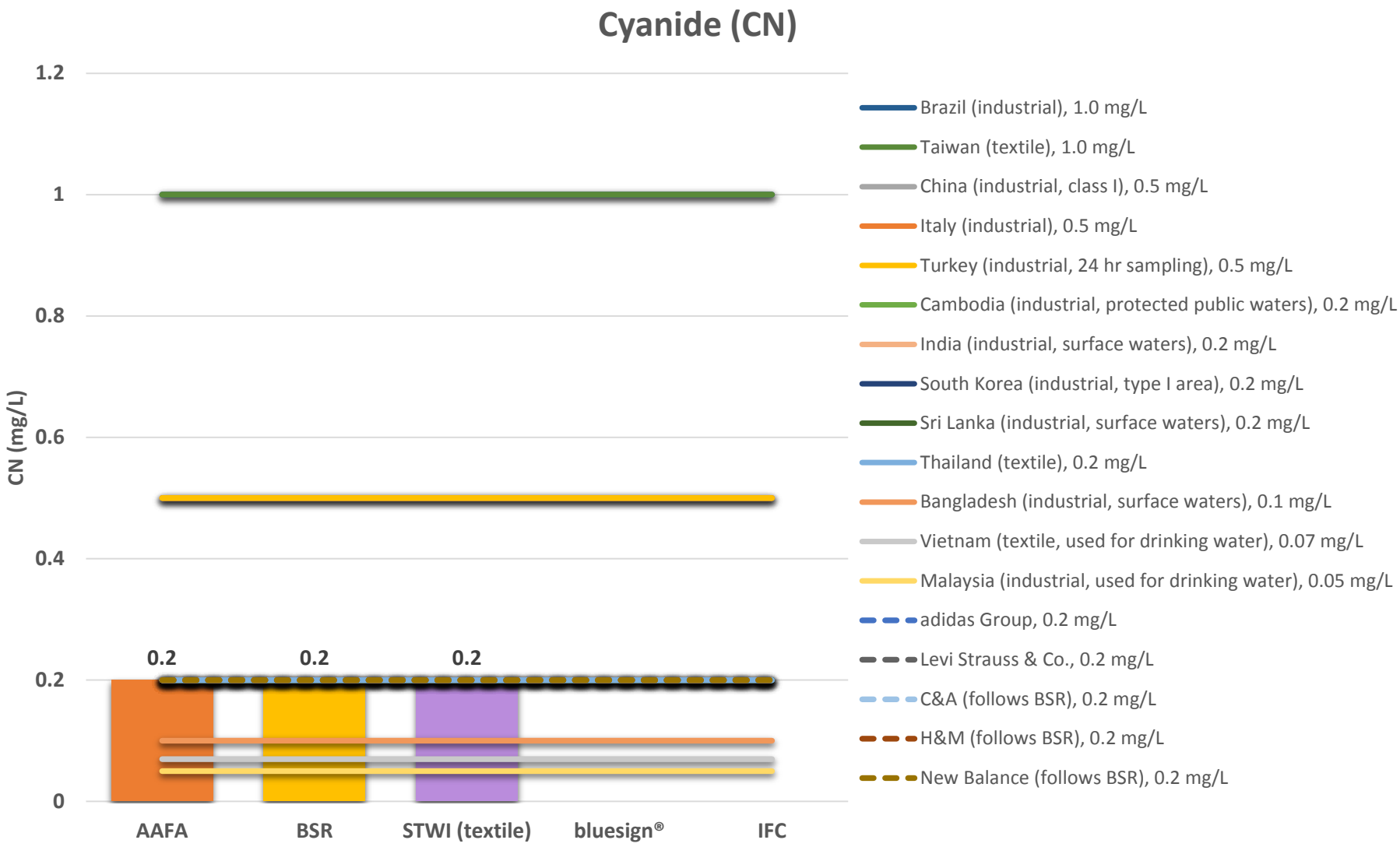


FIGURE 6-15
Lead

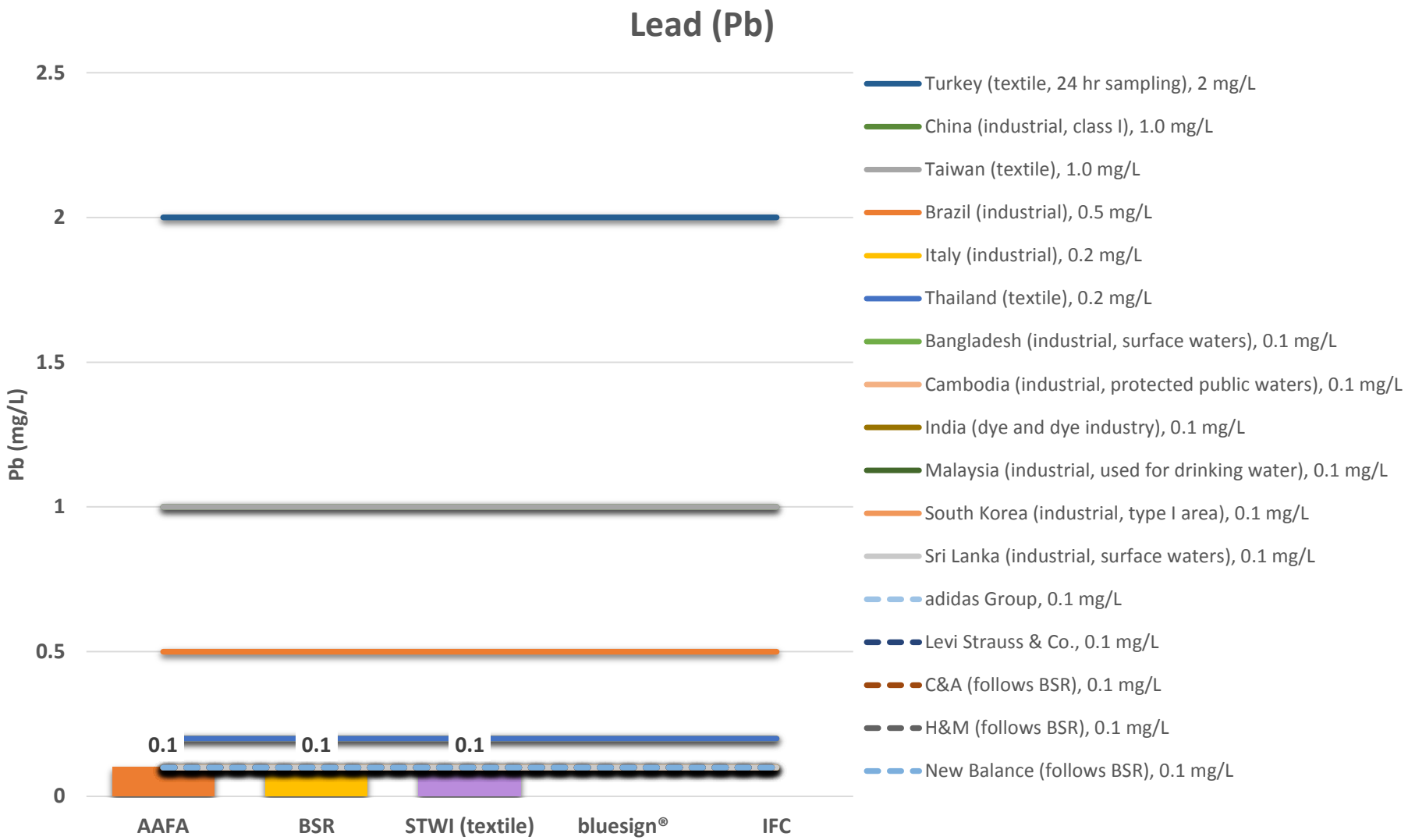


FIGURE 6-16
Mercury

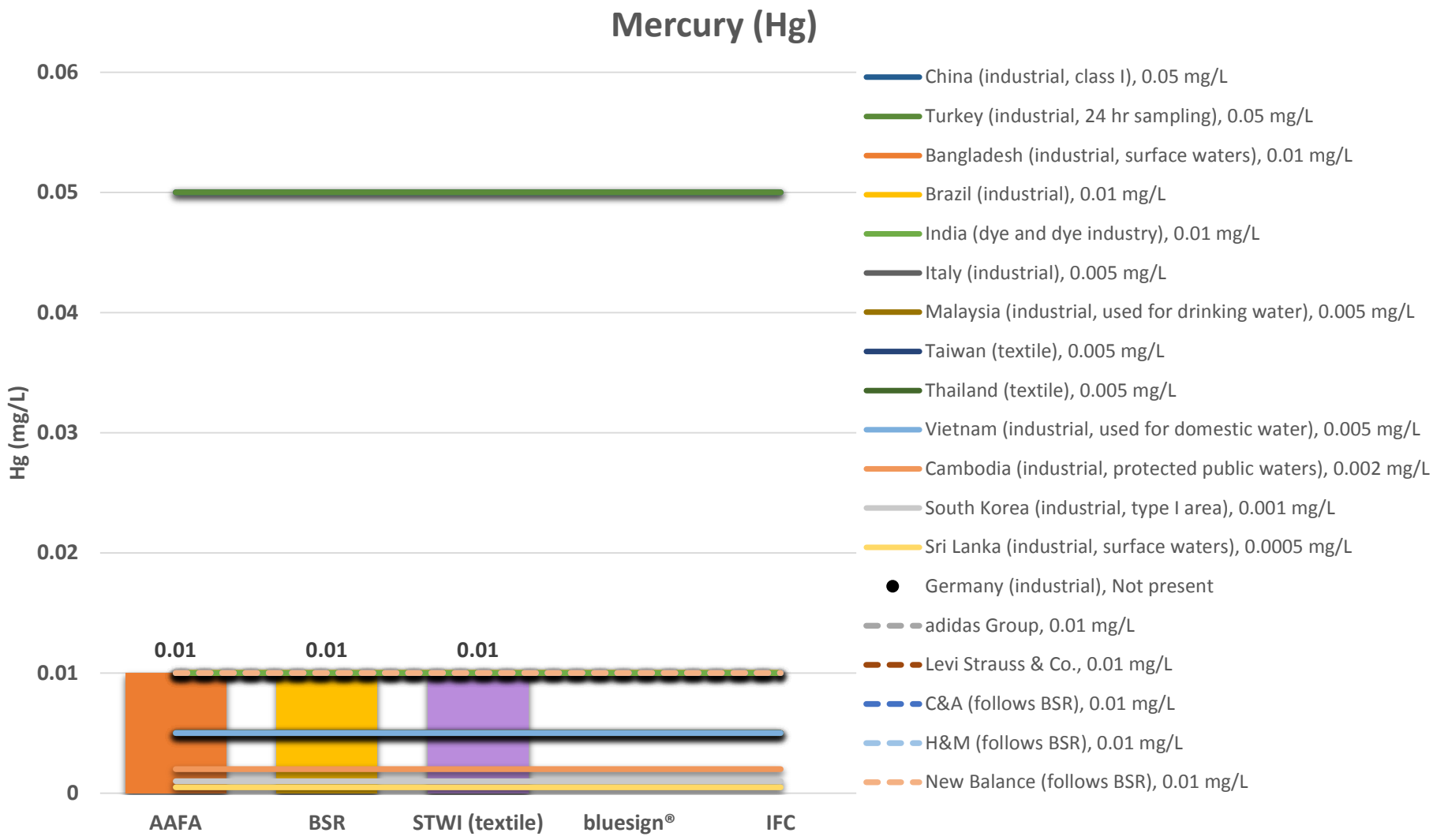


FIGURE 6-17
Nickel

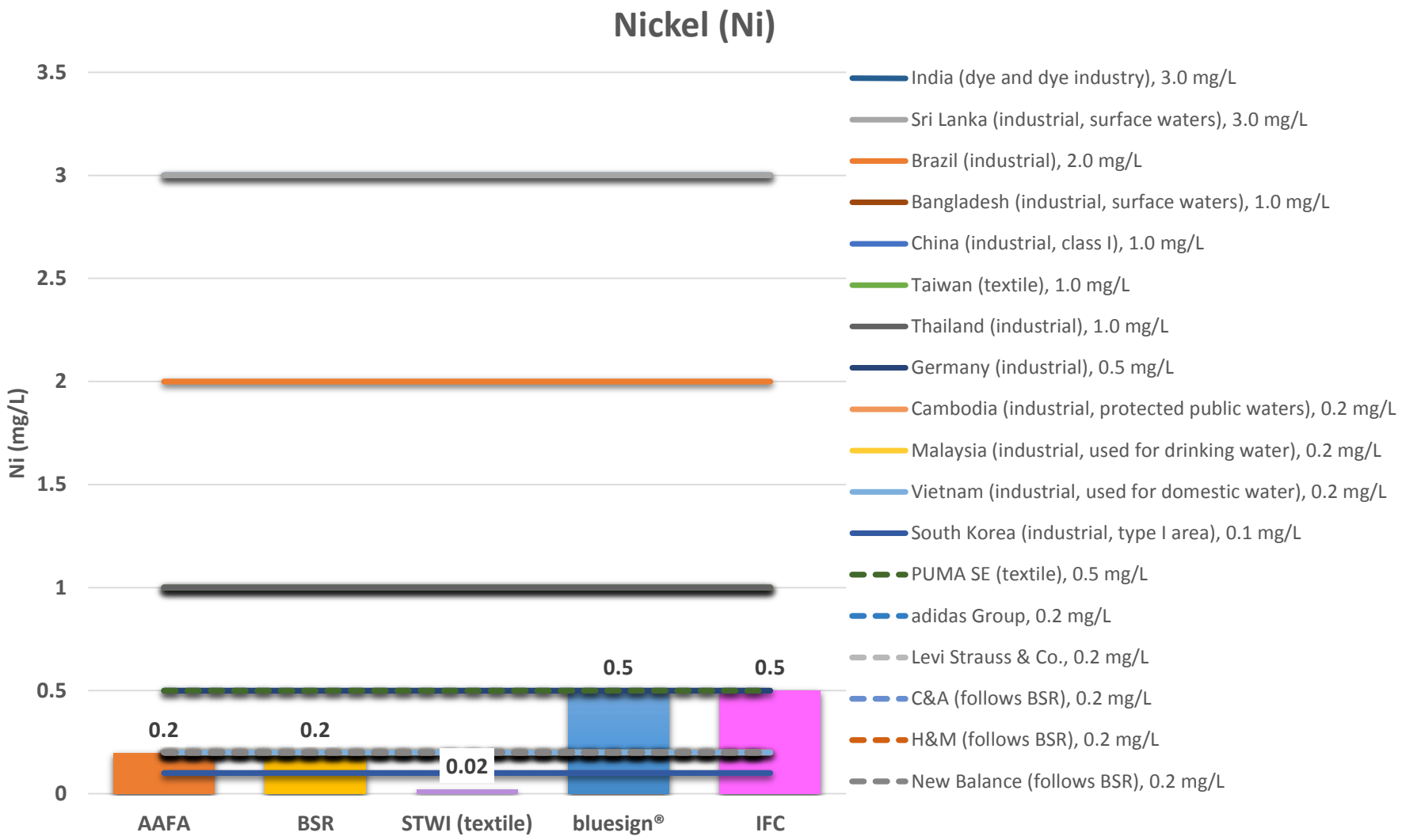


FIGURE 6-18
Total Nitrogen

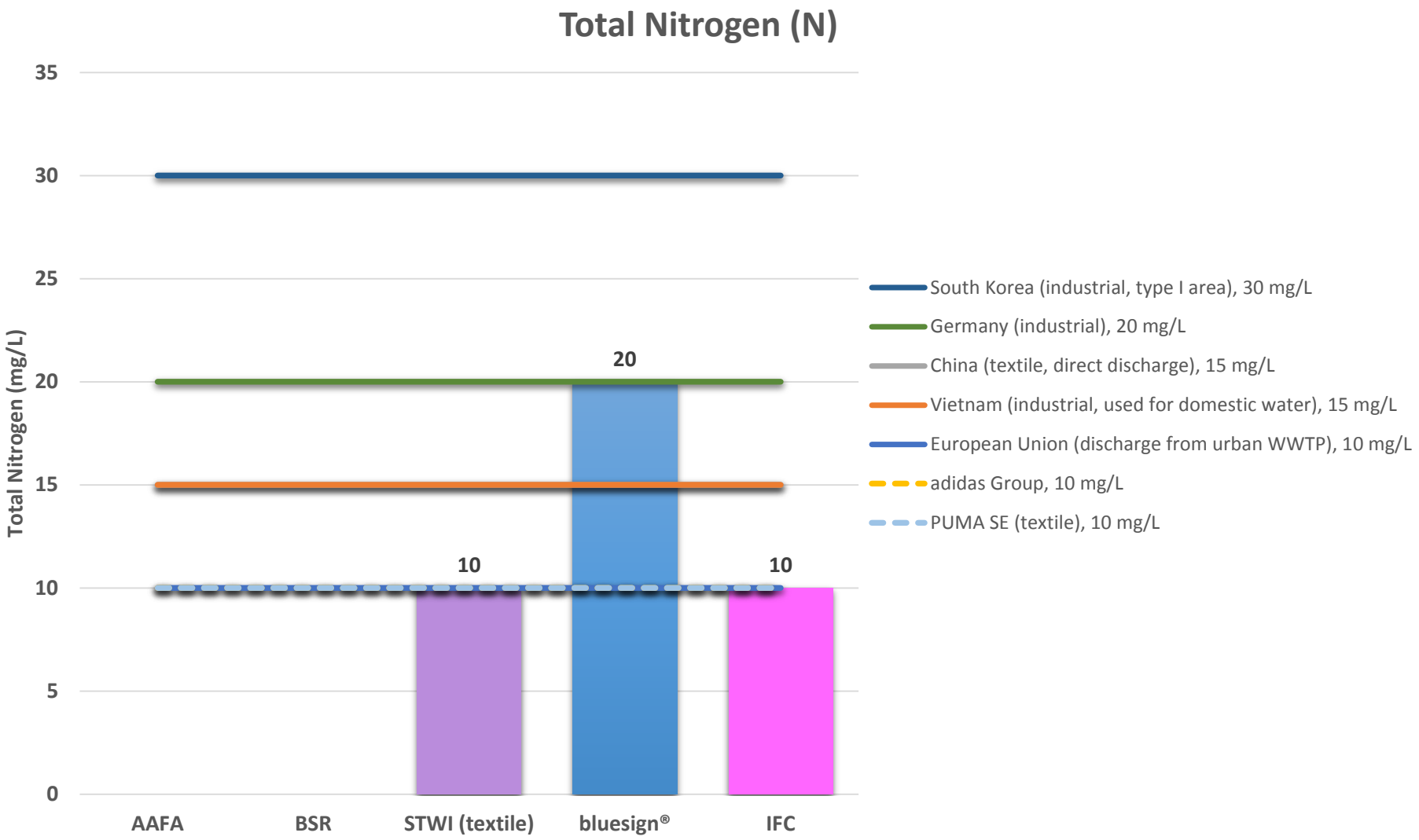


FIGURE 6-19
pH

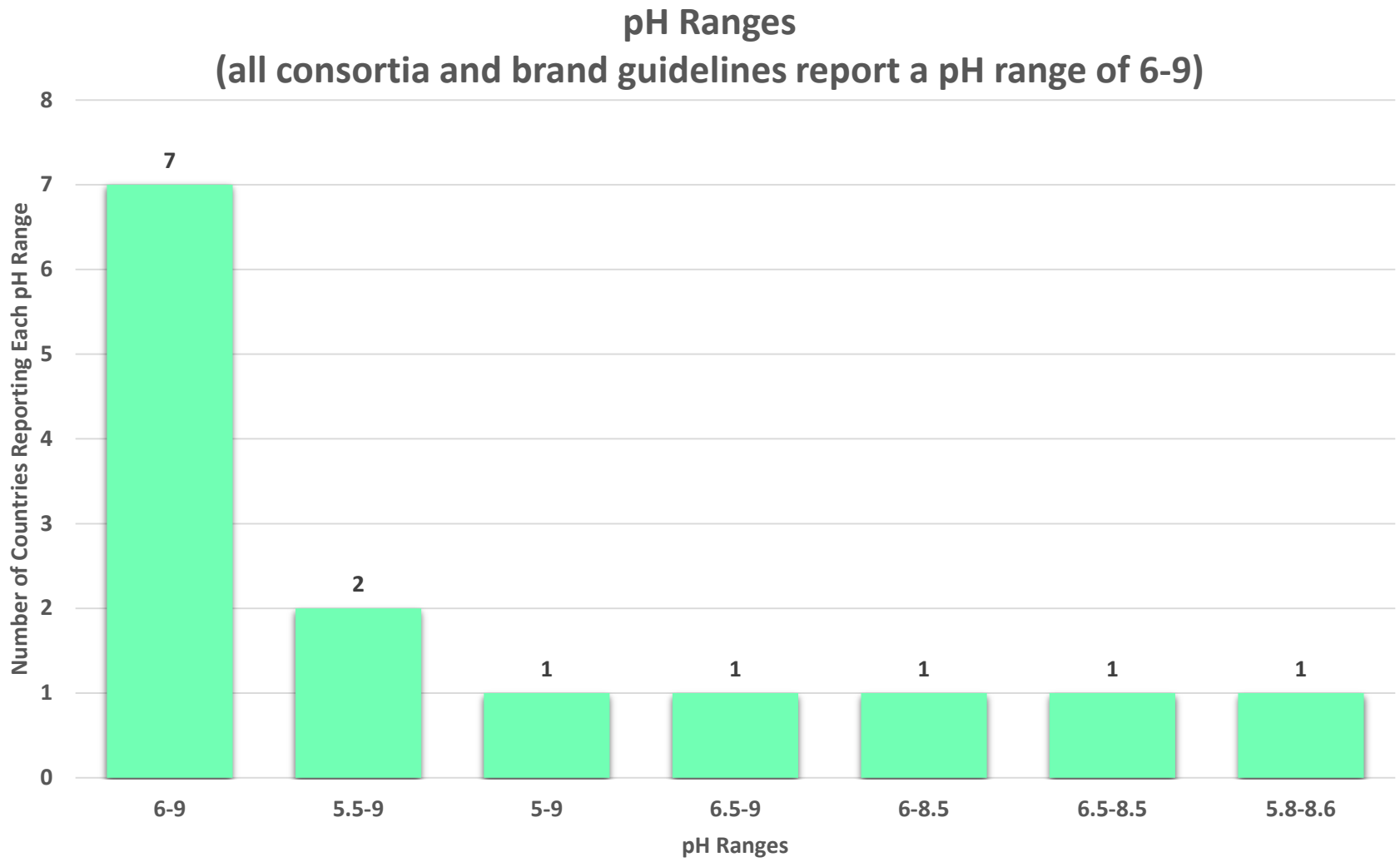


FIGURE 6-20
Phenol

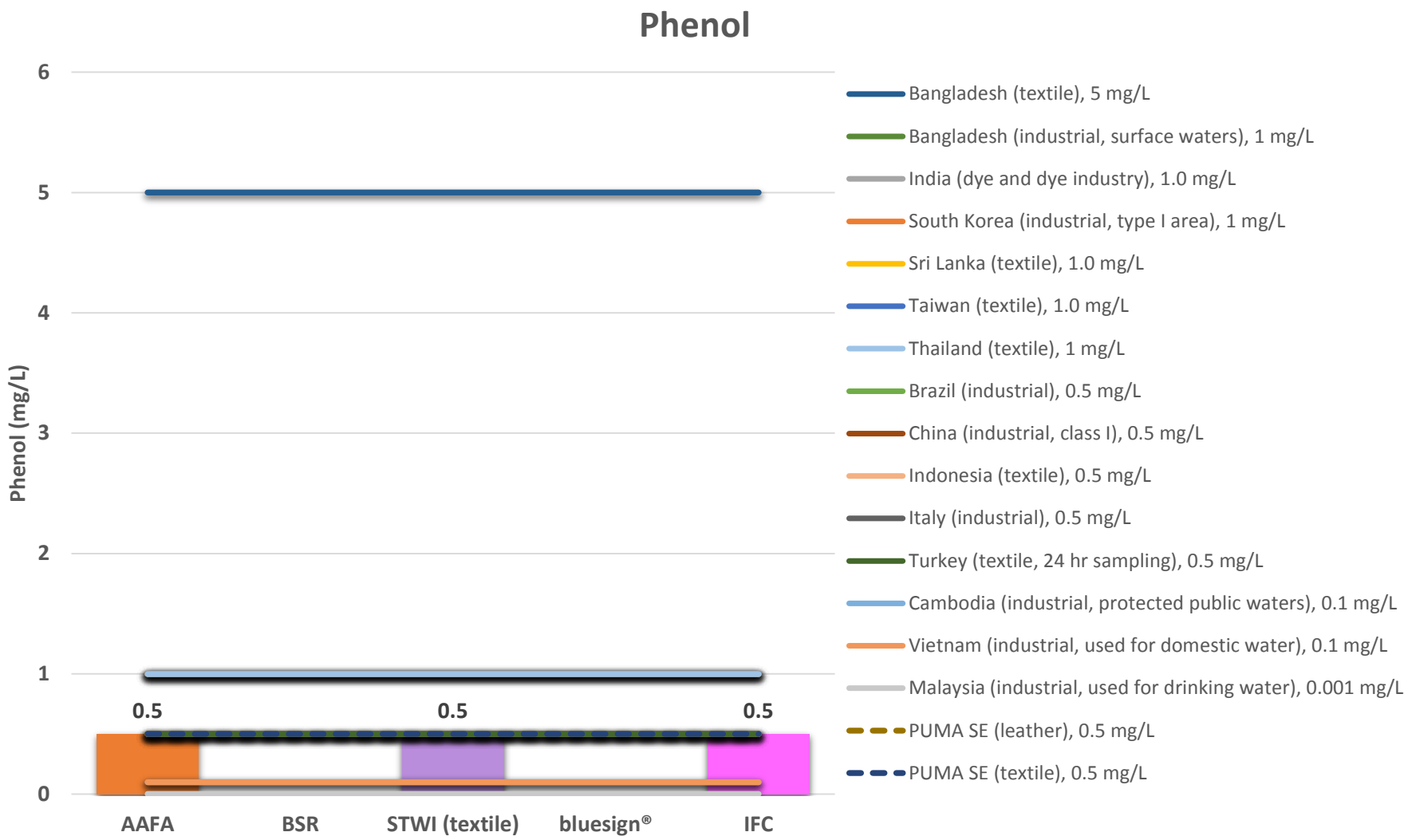


FIGURE 6-21
Phosphorous

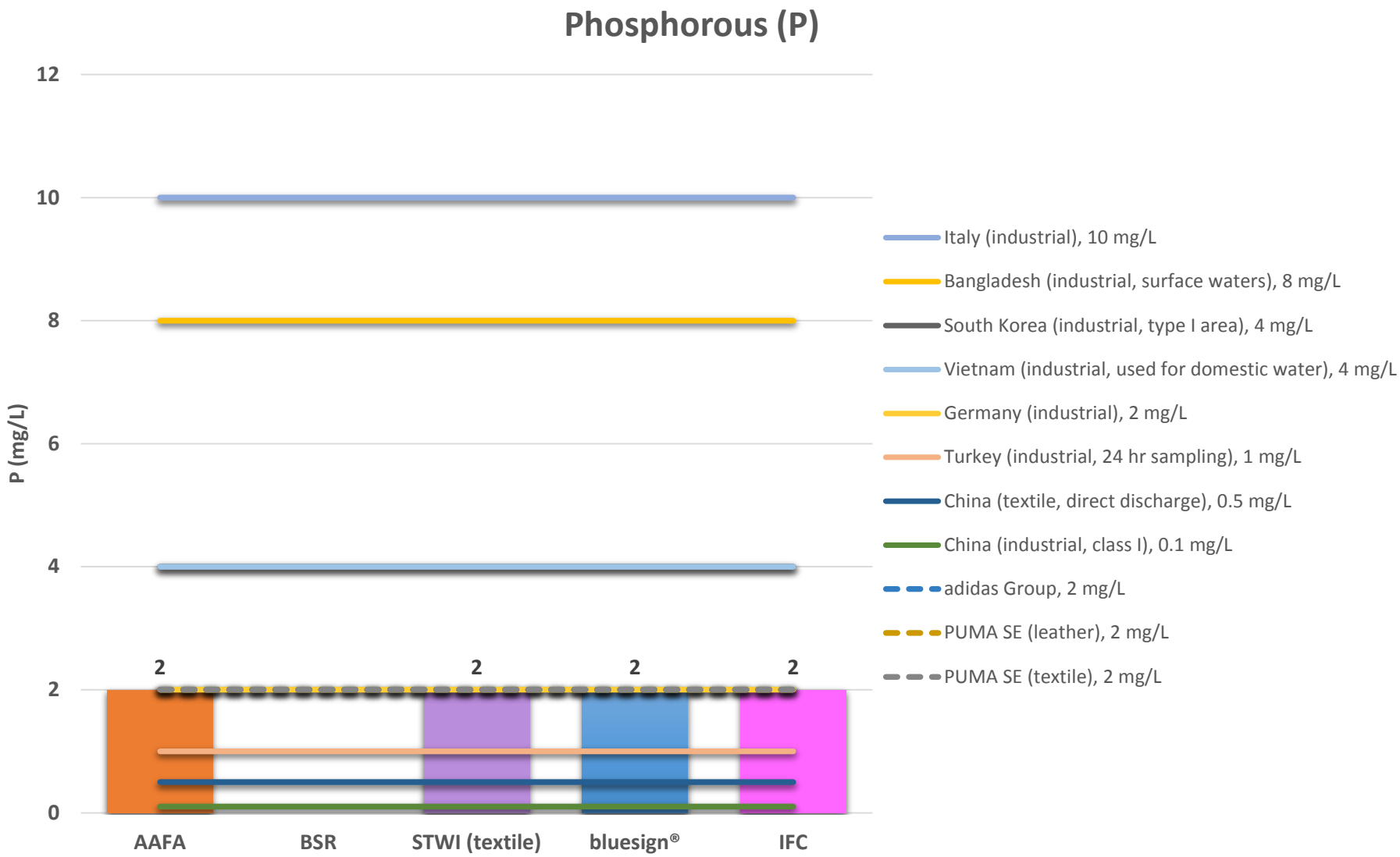


FIGURE 6-22
Sulphide

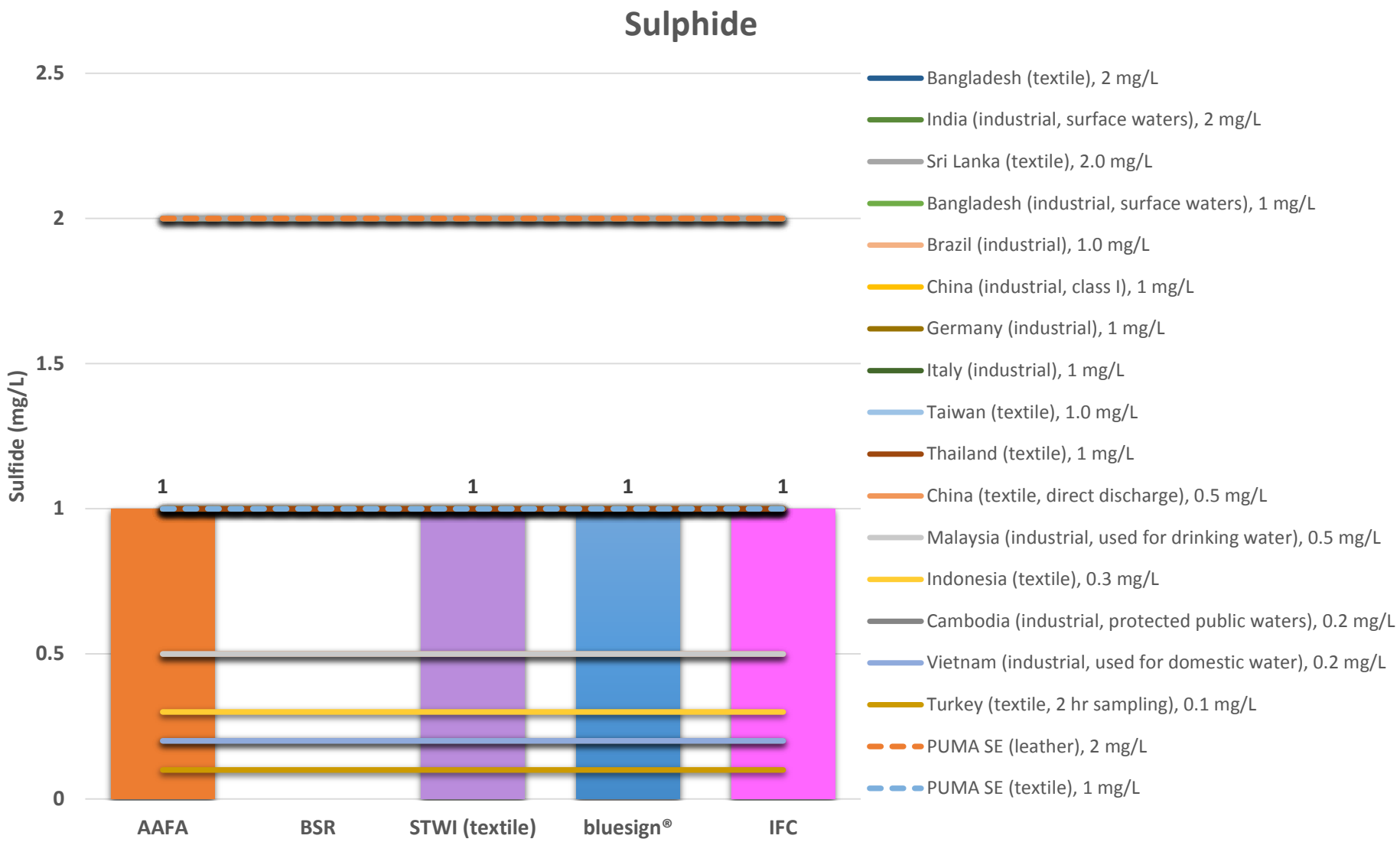


FIGURE 6-23
Temperature

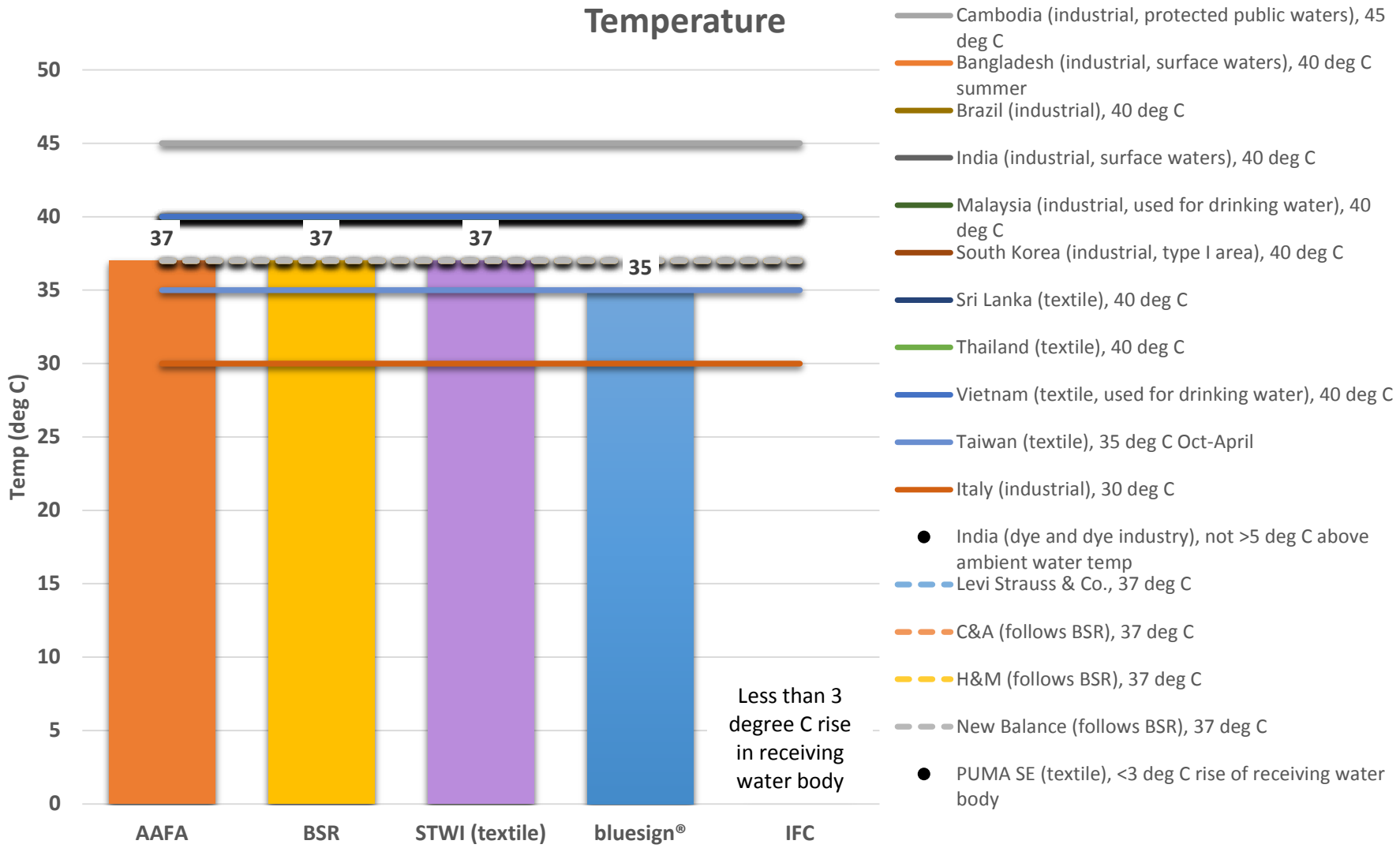


FIGURE 6-24
Total Suspended Solids

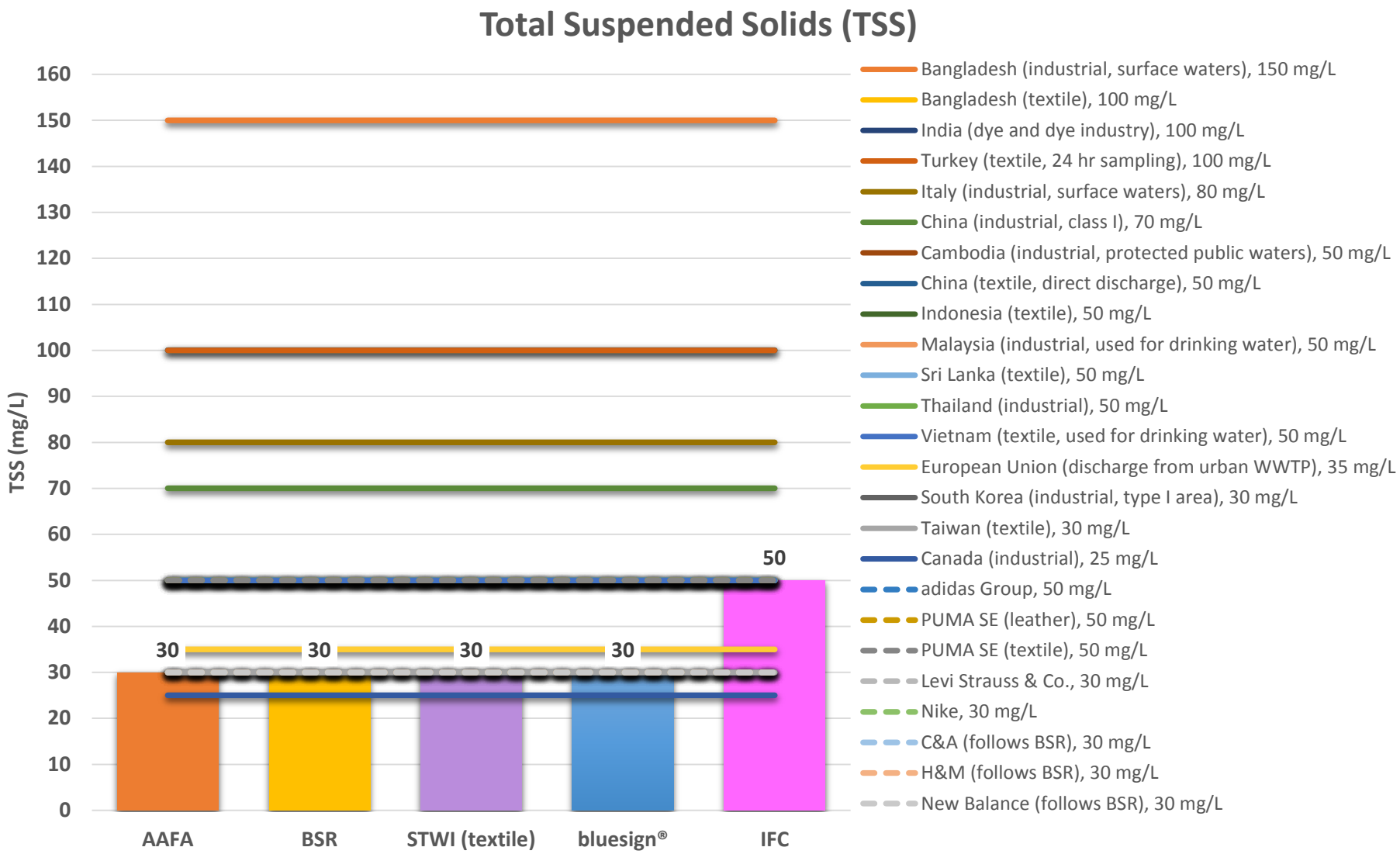
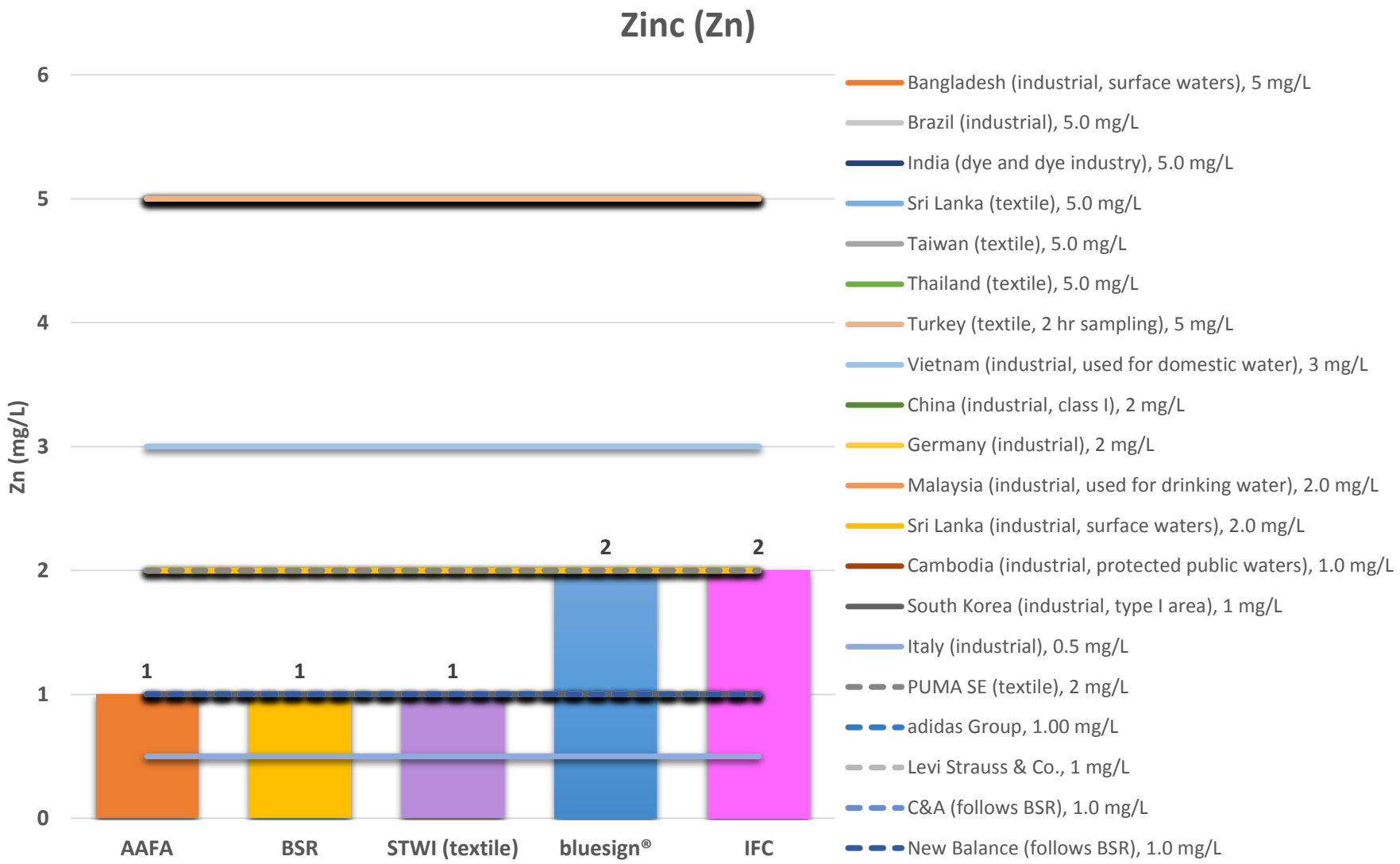


FIGURE 6-25
Zinc



SECTION 7

Wastewater Analytical Standards

The following three tables list wastewater analytical standards used by the brands, consortia and various nations.

TABLE 7.1a
Brand Wastewater Analytical Standards

	Brands					
	Gap Inc.			NIKE, Inc.		
Parameter	US Standard	ISO	European	US Standard	ISO	European
Temperature	USEPA 170.1 or SM 2550	None Listed	DIN 38404-C 4	None Listed	None Listed	None Listed
pH, Standard Units	USEPA 150.1 or SM 4500H	ISO 10523	DIN 38404-C 5	USEPA 150.1 or SM 4500H	ISO 10523	None Listed
Total Suspended Solids	USEPA 160.2 or SM 2540D	ISO 11923	DIN EN 872	USEPA 160.2 or SM 2540D	ISO 11923	DIN EN 872
Biochemical Oxygen Demand	USEPA 405.1 or SM 5210	ISO 5815-1, -2	DIN EN 1899-1	USEPA 405.1 or SM 5210	ISO 5815-1, -2	DIN EN 1899-1
Chemical Oxygen Demand	USEPA 410.4 or SM 5220B or HACH Method	ISO 6060:1989	DIN 38409-H 41	USEPA 410.4 or SM 5220B or HACH Method	ISO 6060:1989	DIN 38409-H 41
Colour	USEPA 110.1 or SM 2120E	ISO 7887	DIN EN ISO 7887	USEPA 110.1 or SM 2120E	ISO 7887	DIN EN ISO 7887
Antimony	USEPA 204.2 or SM 3500	None Listed	None Listed			
Arsenic	USEPA 206.2 or SM 3500	ISO 11885*	DIN EN ISO 11885*			
Cadmium	USEPA 213.2 or SM 3500	ISO 5961**,ISO 11885*	DIN EN ISO 11885*			
Chromium	USEPA 218.2 or SM 3500	ISO 9174**, ISO 11885*	DIN EN 1233**, DIN EN ISO 11885*			
Cobalt	USEPA 219.2 or SM 3500	ISO 8288**, ISO 11885*	DIN EN ISO 11885*			
Copper	USEPA 220.1 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*	None Listed	None Listed	None Listed
Cyanide	USEPA 335.2 or SM 4500CNE	ISO 6703-1, -2, -3	DIN 38405-D 13-1			
Lead	USEPA 239.2 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*			
Mercury	USEPA 245.1 or SM 3112	ISO 5666	DIN EN 1483			
Nickel	USEPA 249.1 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*			
Zinc	USEPA 289.1 or SM 3500	ISO 8288**, ISO 11885*	DIN EN ISO 11885*			
Phthalates (Ortho-Phthalates)	None Listed	None Listed	None Listed	None Listed	None Listed	None Listed
APEOs/NPEs						
Perfluorinated Chemicals						
Brominated and Chlorinated Flame Retardants						
Azo Dyes						
Organotin Compounds						
Chlorobenzenes						
Chlorinated Solvents						
Chlorophenols						
Short-Chained Chlorinated Paraffins						
Ammonia-Nitrogen (NH_3-N)						
Petroleum Oil (Reporting Oil and Grease)						

	Brands					
	Gap Inc.			NIKE, Inc.		
Parameter	US Standard	ISO	European	US Standard	ISO	European
Volatile Phenols (Phenolic Compounds)						
Fluoride						
Cationic Surfactant LAS (Anionic Surfactant)						
Aniline Compounds						

Notes:
APEO = alkylphenol ethoxylates
DIN = Deutsches Institute für Normung (German Institute of Standards)
EN = European norm
ISO = International Organization for Standardization
LAS = linear alkyl sulfonates
NPE = nonylphenol
USEPA = U.S. Environmental Protection Agency

TABLE 7.1b
Brand Wastewater Analytical Standards

	Brands					
	Levi Strauss & Co.					
Parameter	**US**	**ISO**	**European and National Standards**	**Burberry Group PLC**	**C&A**	**Esprit**
Temperature	USEPA 170.1 or SM 2550	None Listed	DIN 38404-C4	None Listed	None Listed	None Listed
pH, Standard Units	USEPA 150.1 or SM 4500H	ISO 10523	None Listed	None Listed		
Total Suspended Solids	USEPA 160.2 or SM 2540D	ISO 11923	DIN EN 872	GB/T 11901-198		
Biochemical Oxygen Demand	USEPA 405.1 or SM 5210	ISO 5815-1, -2	DIN EN 1899-1	HJ 505-2009		
Chemical Oxygen Demand	USEPA 410.4 or SM 5220B or HACH Method	ISO 6060:1989	DIN 38409-H 41	GB/T 11914-89		
Colour	None Listed	None Listed	None Listed	None Listed		
Antimony	None Listed	None Listed	None Listed	USEPA 7196A/ IC-ICP-MS		EU Drinking Water Standard
Arsenic	USEPA 206.2 or SM 3500	ISO 11885*	DIN EN ISO 11885*	None Listed		EU Drinking Water Standard
Cadmium	USEPA 213.2 or SM 3500	ISO 5961**, ISO 11885*	DIN EN ISO 1185*	USEPA 7196A/ IC-ICP-MS		EU Drinking Water Standard
Chromium	USEPA 218.2 or SM 3500	ISO 9174**, ISO 11885*	DIN EN 1233**, DIN EN ISO 11885*	USEPA 7196A/ IC-ICP-MS		EU Drinking Water Standard
Cobalt	USEPA 219.2 or SM 3500	ISO 8288**, ISO 11885*	DIN EN ISO 11885*	USEPA 7196A/ IC-ICP-MS		GB3838-2002
Copper	USEPA 220.1 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*	USEPA 7196A/ IC-ICP-MS		EU Drinking Water Standard
Cyanide	USEPA 335.2 or SM 4500CNE	ISO 6703-1, -2, -3	DIN 38405-D 13-1	APHA 4500 CN-C&E		EU Drinking Water Standard
Lead	USEPA 239.2 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*	USEPA 7196A/ IC-ICP-MS		EU Drinking Water Standard
Mercury	USEPA 245.1 or SM 3112	ISO 5666	DIN EN 1483	USEPA 7196A/ IC-ICP-MS		EU Drinking Water Standard
Nickel	USEPA 249.1 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*	USEPA 7196A/ IC-ICP-MS		EU Drinking Water Standard
Zinc	USEPA 289.1 or SM 3500	ISO 8288**, ISO 11885*	DIN EN ISO 11885*	USEPA 7196A/ IC-ICP-MS		WHO Drinking Water Standard
Phthalates (Ortho-Phthalates)	None Listed	None Listed	None Listed	GC/MS (USEPA 8270 or ISO/DIN equivalent)		GB3838-2002
APEOs/NPEs				ASTM D7065 GC/MS or LC/MS		These are not regulated in China and no standards exist elsewhere for allowable limits in discharge water.
Perfluorinated Chemicals				LC-MS		These are not regulated in China and no standards exist elsewhere for allowable limits in discharge water.
Brominated and Chlorinated Flame Retardants				USEPA 527 (Modified) and USEPA 8321B		None Listed
Azo Dyes				DIN 38407-16, EN 14362-1 incorporating Corrigendum and EN 14362-3		
Organotin Compounds				ISO 17353:2005		
Chlorobenzenes				USEPA 8260B and 8270D		
Chlorinated Solvents				USEPA 8260B		GB3838-2002
Chlorophenols				USEPA 8270B		None Listed

	Brands					
	Levi Strauss & Co.					
Parameter	US	ISO	European and National Standards	Burberry Group PLC	C&A	Esprit
Short-Chained Chlorinated Paraffins				ISO/PRF 12010 or USEPA 8082 (Modified GC/MS or LC/MS)		
Ammonia-Nitrogen (NH_3-N)				HJ 535-2009		
Petroleum Oil (Reporting Oil and Grease)				HJ 637-2012		
Volatile Phenols (Phenolic Compounds)				HJ 503-2009		
Fluoride				GB/T 7484-1987		
Cationic Surfactant LAS (anionic surfactant)				GB/T 7494-1987		
Aniline Compounds				None Listed		

Notes:
APEO = alkylphenol ethoxylates
ASTM = American Society for Testing and Materials
DIN = Deutsches Institute für Normung (German Institute of Standards)
EN = European norm
EU = European Union
GB = Guojia Biaozhun (Chinese Required National Standards)
GB/T = Guojia Biaozhun/Tuījiàn, (Chinese Recommended National Standard)
GC = gas chromatography/
IC/ICP/MS = ion chromatography/inductively coupled plasma/mass spectroscopy
ISO = International Organization for Standardization
LAS = linear alkyl sulfonates
LC = liquid chromatography
MS = mass spectrometry
NPE =nonylphenol
USEPA = U.S. Environmental Protection Agency
WHO = World Health Organization

TABLE 7.1c
Brand Wastewater Analytical Standards

	Brands					
Parameter	**G-Star Raw C.V.**	**H&M**	**Li Ning**	**L Brands**	**M&S**	**New Balance Athletic Shoe, Inc.**
Temperature	None listed in the documents provided for the landscaping effort	1) USEPA Guidelines – Regulatory monitoring and testing Water and wastewater sampling 2) Australia EPA (Victoria) Guideline – Sampling and Analysis of Waters, Wastewaters, Soils and Wastes. 3) ISO 5667-3, Water Quality – Sampling – Part 3: Guidance on the preservation and handling of water samples 4) ASTM D3976-92 (Reapproved 2010) – Standard Practice for preparation of Sediment Samples for Chemical Analysis. Specific standard method not detailed out for each analyte tested in the material provided for the landscape effort.	None listed as part of information provided for landscaping effort.	None listed as part of information provided for landscaping effort.	None listed as part of information provided for landscaping effort.	None listed as part of information provided for landscaping effort, but refers to BSR Guideline
pH, Standard Units						
Total Suspended Solids						
Biochemical Oxygen Demand						
Chemical Oxygen Demand						
Colour						
Antimony	With reference to USEPA 3015A and with reference to USEPA 6020A./ With reference to USEPA 7196A./ With reference to APHA 4500 CN-C:2012 & APHA 4500 CN- E:2012 (For Wastewater)					
Arsenic						
Cadmium						
Chromium						
Cobalt						
Copper						
Cyanide						
Lead						
Mercury						
Nickel						
Zinc						
Phthalates (Ortho-Phthalates)	USEPA 8270D.					
APEOs/NPEs						
Perfluorinated Chemicals						
Brominated and Chlorinated Flame Retardants	With reference to USEPA 527 and with reference to USEPA 8321B.					
Azo Dyes	With reference to German Standard DIN 38407-16, with reference to European Standard EN 14362-1 incorporating Corrigendum and with reference to European Standard EN 14362-3. (For Wastewater)					
Organotin Compounds	EN ISO 17353					
Chlorobenzenes	USEPA 8260B and with reference to USEPA 8270D.					
Chlorinated Solvents	USEPA 8260B					
Chlorophenols	USEPA 8270D					
Short-Chained Chlorinated Paraffins	ISO 12010					
Ammonia-Nitrogen (NH_3-N)	None Listed					

	Brands					
Parameter	**G-Star Raw C.V.**	**H&M**	**Li Ning**	**L Brands**	**M&S**	**New Balance Athletic Shoe, Inc.**
Petroleum Oil (Reporting Oil and Grease)						
Volatile Phenols (Phenolic Compounds)						
Fluoride						
Cationic Surfactant LAS (Anionic Surfactant)						
Aniline Compounds						

Notes:
APEO = alkylphenol ethoxylates
Australia EPA = Australia Environment Protection Authority
BSR = Business for Social Responsibility
DIN = Deutsches Institute für Normung (German Institute of Standards)
EN = European norm
ISO = International Organization for Standardization
LAS = linear alkyl sulfonates
NPE = nonylphenol
USEPA = U.S. Environmental Protection Agency

TABLE 7.1d
Brand Wastewater Analytical Standards

	Brands		
Parameter	**PUMA SE**	**PVH Corp.**	**Benetton Group**
Temperature	None listed as part of information provided for landscaping effort, but refers to the IFC-EHS Guidelines "Textile Manufacturing"	None listed as part of information provided for landscaping effort.	None Listed
pH, Standard Units			
Total Suspended Solids			
Biochemical Oxygen Demand			
Chemical Oxygen Demand			
Colour			
Antimony			Reference to USEPA 3015A & 6020A
Arsenic			
Cadmium			
Chromium			
Cobalt			
Copper			
Cyanide			
Lead			
Mercury			
Nickel			
Zinc			
Phthalates (Ortho-Phthalates)			Reference to USEPA 8270D
APEOs/NPEs			ASTM D7065
Perfluorinated Chemicals			LC-MS-MS
Brominated and Chlorinated Flame Retardants			Reference to USEPA 527 & USEPA 8321B
Azo Dyes			Reference to DIN 38407-16 and EN 14362-1 & 3
Organotin Compounds			Reference to EN ISO17353:2005
Chlorobenzenes			Reference to USEPA 8260B & USEPA 8270D
Chlorinated Solvents			Reference to USEPA 8260D
Chlorophenols			Reference to USEPA 8270D
Short-Chained Chlorinated Paraffins			Reference to ISO/PRF 12010
Ammonia-Nitrogen (NH_3-N)			
Petroleum Oil (Reporting Oil and Grease)			
Volatile Phenols (Phenolic Compounds)			None Listed
Fluoride			
Cationic Surfactant LAS (Anionic Surfactant)			
Aniline Compounds			

Notes:
APEO = alkylphenol ethoxylates
DIN = Deutsches Institute für Normung (German Institute of Standards)
EN = European norm
GB = Guojia Biaozhun (Chinese Mandatory National Standards)
GB/T = Guojia Biaozhun/Tuījiàn (Chinese Voluntary/Recommended National Standard)
GC/MS = gas chromatography/mass spectrometry
ISO = International Organization for Standardization
LAS = linear alkyl sulfonates
LC = liquid chromatography
MS = mass spectrometry
NPE = nonylphenol
USEPA = U.S. Environmental Protection Agency

TABLE 7.2
National Wastewater Analytical Standards

	Countries		
Parameter	**China GB 4827-2012 + XG1-2015 and GB 8978-1996 Combined**	**Taiwan Effluent Standards (1997)**	**Vietnam**
Temperature	None Listed	No Standard Methods Listed	TCVN 4557:1998 , Nước thải - Phương pháp xác định nhiệt độ; - SMEWW 2550.B - Phương pháp chuẩn phân tích nước và nước thải – Xác định nhiệt độ.
pH, Standard Units	GB/T 6920-86		TCVN 6492:2011 (ISO 10523:2008), Chất lượng nước - Xác định pH.
Total Suspended Solids	GB/T 11901-89		TCVN 6625:2000 (ISO 11923:1997), Chất lượng nước - Xác định chất rắn lơ lửng bằng cách lọc qua cái lọc sợi thuỷ tinh; - SMEWW 2540 - Phương pháp chuẩn phân tích nước và nước thải – Xác định chất rắn lơ lửng.
Biochemical Oxygen Demand	HJ 505-2009		TCVN 6001-1:2008 (ISO 5815-1:2003), Chất lượng nước – Xác định nhu cầu oxy sinh hóa sau n ngày (BOD_n) – Phần 1: Phương pháp pha loãng và cấy có bổ sung allylthiourea; TCVN 6001-2:2008 (ISO 5815-2:2003), Chất lượng nước – Xác định nhu cầu oxy sinh hóa sau n ngày (BODn) – Phần 2: Phương pháp dùng cho mẫu không pha loãng; - SMEWW 5210 B – Phương pháp chuẩn phân tích nước và nước thải – Xác định BOD.
Chemical Oxygen Demand	GB/T 11914-89		TCVN 6491:1999 (ISO 6060:1989), Chất lượng nước - Xác định nhu cầu oxy hoá học (COD); - SMEWW 5220 - Phương pháp chuẩn phân tích nước và nước thải – Xác định COD.
Colour	GB/T 11903-89 (Dilution Factor Method)		TCVN 6185: 2008, Chất lượng nước – Kiểm tra và xác định độ màu.
Antimony	None Listed		None Listed
Arsenic	GB 7485-87		None Listed
Cadmium			None Listed
Chromium	GB 7466-87, GB 7477-87		TCVN 6658: 2000, Chất lượng nước – Xác định crom (VI) - Phương pháp đo phổ dùng 1,5 – diphenylcacbazid; - SMEWW 3500-Cr.B - Phương pháp chuẩn phân tích nước và nước thải - Xác định crôm.
Cobalt			None Listed
Copper	GB 7475-87, GB 7474-87		None Listed
Cyanide	GB 7486-87		TCVN 6181:1996 (ISO 6703-1:1984), Chất lượng nước - Xác định Xyanua tổng; - SMEWW 4500-CN - - Phương pháp chuẩn phân tích nước và nước thải – Xác định Xyanua.
Lead			None Listed
Mercury			
Nickel	GB 11912-89; GB 119910-89		
Zinc	GB 7475-87		
Phthalates (Ortho-Phthalates)			
APEOs/NPEs	TBD		
Perfluorinated Chemicals	TBD		
Brominated and Chlorinated Flame Retardants	TBD		

	Countries		
Parameter	**China GB 4827-2012 + XG1-2015 and GB 8978-1996 Combined**	**Taiwan Effluent Standards (1997)**	**Vietnam**
Azo Dyes	TBD		
Organotin Compounds	TBD		
Chlorobenzenes	TBD		
Chlorinated Solvents	TBD		
Chlorophenols	TBD		
Short-Chained Chlorinated Paraffins	TBD		
Ammonia-Nitrogen (NH_3-N)	HJ 535-2009, HJ 536-2009, HJ 537-2009, or HJ/T 195-2005		
Petroleum Oil (Reporting Oil and Grease)	GB/T 16488-1996		
Volatile Phenols (Phenolic Compounds)	GB 7490-87		
Fluoride	GB 7484-87		
Cationic Surfactant LAS (Anionic Surfactant)	GB 7494-87		TCVN 6622-1:2009, Chất lượng nước - Xác định chất hoạt động bề mặt – Phần 1: xác định chất hoạt động bề mặt anion bằng phương pháp đo phổ metylen xanh.
Aniline Compounds	GB 11889-89		None Listed

Notes:
APEO =alkylphenol ethoxylates
GB = Guojia Biaozhun (Chinese Mandatory National Standards)
GB/T = Guojia Biaozhun/Tuījiàn (Chinese Voluntary/Recommended National Standard)
LAS = linear alkyl sulfonates
NPE = nonylphenol
TVCN = Tiêu chuẩn Việt Nam (Vietnam Standards)

TABLE 7.3A
Consortia Wastewater Analytical Standards

	Consortia Guidelines				
		OIA			
Parameter	**STWI**	**US Standard**	**ISO**	**European**	**IFC**
Temperature					
pH, Standard Units	DIN 38404-C4	USEPA 170.1 or SM 2550	None Listed	DIN 38404-C 4	
Total Suspended Solids	ISO 10523	USEPA 150.1 or SM 4500H	ISO 10523	DIN 38404-C 5	
Biochemical Oxygen Demand	ISO 11923, DIN EN 872	USEPA 160.2 or SM 2540D	ISO 11923	DIN EN 872	
Chemical Oxygen Demand	ISO 5815-1, -2, DIN EN 1899-1	USEPA 405.1 or SM 5210	ISO 5815-1, -2	DIN EN 1899-1	
Colour	ISO 6060:1989, DIN 38409-H41	USEPA 410.4 or SM 5220B or HACH Method	ISO 6060:1989	DIN 38409-H 41	
Antimony	EN ISO 7887 target 436 nm: <7/m, 525 nm: <5/m, 620 nm: <3/m	USEPA 110.1 or SM 2120E	ISO 7887	DIN EN ISO 7887	
Arsenic	ISO 6703-1, -2, -3, DIN 38405-D 13-1	USEPA 204.2 or SM 3500	None Listed	None Listed	
Cadmium	EN ISO 11885	USEPA 206.2 or SM 3500	ISO 11885*	DIN EN ISO 11885*	
Chromium	ISO 5961, EN ISO 11885	USEPA 213.2 or SM 3500	ISO 5961**,ISO 11885*	DIN EN ISO 11885*	
Cobalt	DIN EN 1233, ISO 9174, EN ISO 11885	USEPA 218.2 or SM 3500	ISO 9174**, ISO 11885*	DIN EN 1233**, DIN EN ISO 11885*	
Copper	None Listed	USEPA 219.2 or SM 3500	ISO 8288**, ISO 11885*	DIN EN ISO 11885*	
Cyanide	DIN 38406, ISO 8288, EN ISO 11885	USEPA 220.1 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*	
Lead	ISO 6703-1, -2, -3, DIN 38405-D 13-1	USEPA 335.2 or SM 4500CNE	ISO 6703-1, -2, -3	DIN 38405-D 13-1	
Mercury	DIN 38406, ISO 8288, EN ISO 11885	USEPA 239.2 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*	
Nickel	ISO 5666, DIN EN 4183	USEPA 245.1 or SM 3112	ISO 5666	DIN EN 1483	
Zinc	DIN 38406, ISO 8288, EN ISO 11885	USEPA 249.1 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*	
Phthalates (Ortho-Phthalates)	ISO 8288, EN ISO 11885	USEPA 289.1 or SM 3500	ISO 8288**, ISO 11885*	DIN EN ISO 11885*	
APEOs/NPEs	None Listed	None Listed	None Listed	None Listed	No Standard Methods Listed
Perfluorinated Chemicals					
Brominated and Chlorinated Flame Retardants					
Azo Dyes					
Organotin Compounds					
Chlorobenzenes					
Chlorinated Solvents					
Chlorophenols					
Short-Chained Chlorinated Paraffins					
Ammonia-Nitrogen (NH_3-N)					
Petroleum Oil (Reporting Oil and Grease)					
Volatile Phenols (Phenolic Compounds)					

	Consortia Guidelines				
		OIA			
Parameter	STWI	US Standard	ISO	European	IFC
Fluoride					
Cationic Surfactant LAS (Anionic Surfactant)					
Aniline Compounds					

Notes:
* = inductively coupled plasma atomic emission spectroscopy
** = atomic adsorption spectrometry

APEOs = alkylphenol ethoxylates
DIN = Deutsches Institute für Normung (German Institute of Standards)
EN = European norm
IFC = International Finance Corporation
ISO = International Organization for Standardization
OIA = Outdoor Industry Association
ISO = International Organization for Standardization
LAS = linear alkyl sulfonates
LC = liquid chromatography
nm = nanometre
NPE = nonylphenol
STWI = Sweden Textile Water Initiative
US = United States
USEPA = U.S. Environmental Protection Agency

TABLE 7.3b
Consortia Wastewater Analytical Standards

	AAFA/BSR		
Parameter	**US Standard**	**ISO**	**European**
Temperature			
pH, Standard Units	USEPA 170.1 or SM 2550	ISO 5667-1 ff	DIN 38402-A 11 ff
Total Suspended Solids	USEPA 150.1 or SM 4500H	ISO 10523	DIN 38404-C 5
Biochemical Oxygen Demand	USEPA 160.2 or SM 2540D	ISO 11923	DIN EN 872
Chemical Oxygen Demand	USEPA 405.1 or SM 5210	ISO 5815-1, -2	DIN EN 1899-1
Colour	USEPA 410.4 or SM 5220B or HACH Method	ISO 6060:1989	DIN 38409-H 41
Antimony	USEPA 110.1 or SM 2120E	ISO 7887	DIN EN ISO 7887
Arsenic	USEPA 204.2 or SM 3500	None Listed	None Listed
Cadmium	USEPA 206.2 or SM 3500	ISO 11885*	DIN EN ISO 11885*
Chromium	USEPA 213.2 or SM 3500	ISO 5961**,ISO 11885*	DIN EN ISO 11885*
Cobalt	USEPA 218.2 or SM 3500	ISO 9174**, ISO 11885*	DIN EN 1233**, DIN EN ISO 11885*
Copper	USEPA 219.2 or SM 3500	ISO 8288**, ISO 11885*	DIN EN ISO 11885*
Cyanide	USEPA 220.1 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*
Lead	USEPA 335.2 or SM 4500CNE	ISO 6703-1, -2, -3	DIN 38405-D 13-1
Mercury	USEPA 239.2 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*
Nickel	USEPA 245.1 or SM 3112	ISO 5666	DIN EN 1483
Zinc	USEPA 249.1 or SM 3500	ISO 8288**, ISO 11885*	DIN 38406**, DIN EN ISO 11885*
Phthalates (Ortho-Phthalates)	USEPA 289.1 or SM 3500	ISO 8288**, ISO 11885*	DIN EN ISO 11885*
APEOs/NPEs	None Listed	None Listed	None Listed
Perfluorinated Chemicals			
Brominated and Chlorinated Flame Retardants			
Azo Dyes			
Organotin Compounds			
Chlorobenzenes			
Chlorinated Solvents			
Chlorophenols			
Short-Chained Chlorinated Paraffins			
Ammonia-Nitrogen (NH_3-N)			
Petroleum Oil (Reporting Oil and Grease)			
Volatile Phenols (Phenolic Compounds)			
Fluoride			
Cationic Surfactant LAS (Anionic Surfactant)			
Aniline Compounds			

Notes:
* = inductively coupled plasma atomic emission spectroscopy
** = atomic adsorption spectrometry

AAFA = American Apparel and Footwear Association
ADMI = American Dye Manufacturers Institute
APEOs = alkylphenol ethoxylates
BSR = Business for Social Responsibility
DIN = Deutsches Institute für Normung (German Institute of Standards)
EN = European norm
ISO = International Organization for Standardization
LAS = linear alkyl sulfonates
NPE = nonylphenol
USEPA = U.S. Environmental Protection Agency

SECTION 8

Closing Remarks

The variation in limits of regulated wastewater effluent parameters is evident from the graphs in Section 6. The breadth of manufacturing locations within this industry can make it challenging to establish a global industry wastewater guideline. Despite geographic complexities, a standard industry guideline can be an important incentive for improving factory functionality and supply chain management. Continued collaboration between brands, multi-brand consortia and manufacturers toward developing this industrywide guideline can further align the shared commitment to improve human health and the environment.

Though a few multi-brand consortia have worked towards developing industry wastewater guidelines, in recent years this engagement appears to have lost energy. In fact, guidelines developed in the past are now lagging behind current government regulations. This offers a unique opportunity to reinvigorate the topic.

Existing guidelines provide a solid baseline on which to build, and when combined with the current regulatory information assembled in this study, a global industrywide guideline can be developed that can contribute to improving the environment and communities that support the textile industry.

SECTION 9

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Appendix A
Wastewater Effluent Parameters and Limits Summary Table

Entity	Multi-Brand Consortia					
	AAFA	BSR	STWI		bluesign®	IFC
Standard/Regulation/ Guideline Source	AAFA Global Textile Effluent Guidelines	BSR Water Quality Guidelines, Revised June 2010	Guidelines for Sustainable Water use in the Production and Manufacturing Processes of Leather_5/31/2012 (15)	Guidelines for Sustainable Water Use in the Production and Manufacturing Processes of Textiles_2012 (16)	bluesign® Criteria for Production Sites Annex: Textile Manufacturer ver. 2.0, 2014	International Finance Corporation Environmental, Health, and Safety Guidelines for Textile Manufacturing 2007 (5)
Parameters (units in table are ppm unless otherwise noted) ↓	These guidelines reproduced the 2010 BSR guidelines, except values shown below (1)					
pH		6.0-9.0	6.0-9.0	6-9	6.0-9.0	6-9
Temperature (deg C)		37		37	35	<3 deg increase
TSS		30	<35	30	30	50
TDS						
BOD		30	15-25	30	30	30
COD	100	200	200-500	200	160(d)	160
Color		150 (ADMI units) or 150 (Pt-Co units)		150 (ADMI units) or 150 (Pt-Co units)	7 m^-1 (436 nm; yellow) 5 m^-1 (525 nm; red) 3 m^-1 (620 nm; blue) (2)	7 m^-1 (436 nm; yellow) 5 m^-1 (525 nm; red) 3 m^-1 (620 nm; blue) (γ)
Dissolved O2						
Ammonia (as N)			<10	10	10(m)	10
Ammonia (free)						
Total Nitrogen			50-100	10	20	10
Total Kjeldahl Nitrogen						
Absorbable Organic Halogen (AOX)				1	1	1
Oil and Grease				10		10
Pesticides				0.05-0.1		0.05-0.10(j)
Herbicides						
Formaldehyde						
Toxicity e.g. fish eggs (T.U. 96 h)				2		2
Nonylphenol/nonylphenol ethoxylate				20-100 mg/kg		
Aluminum (Al)						
Antimony (Sb)		0.50		0.5		
Arsenic (As)		0.01		0.01		
Barium (Ba)						
Boron (B)						
Cadmium (Cd)		0.01		0.01		0.02
Calcium (Ca)						
Chromium (Cr) (17)		0.10	0.3-1	0.1/0.5(x)	0.5	0.5
Cr (VI)				0.1	0.1	0.1
Chlorine (Residual)						
Cobalt (Co)		0.02		0.02		0.5
Copper (Cu)		0.25		0.25	1	0.5
Cyanide		0.20		0.2		
Iron (Fe)						
Lead (Pb)		0.10		0.1		
Magnesium (Mg)						
Manganese (Mn)						
Mercury (Hg)		0.01		0.01		
Molybdenum (Mo)						
Nickel (Ni)		0.20		0.02	0.5	0.5
Silver (Ag)						
Selenium (Se)						
Tin (Sn)					2	
Zinc (Zn)		1.0		1.0	2	2
Chloride						
Fluoride						
Nitrate						
Phosphorous	2.0			2	2	2
Phosphate						
Sulfide	1.0		<1	1	1	1
Sulfate						
Sulfite					1	
CCl4						
ClO2						
PCBs						
Phenol	0.5			0.5		0.5
Coliform		400 bacteria/100 ml		400 bacteria/100 ml		400 MPN/100 ml
Aniline						
Conductivity (µS/cm)						
Foam		Not persistent, no visible discharge of floating solids		No visible discharge of floating solids or persistent foam	Must not be visible at point of discharge	
Domestic Sewage		Sewage must not be discharged directly into open bodies of water. If there is no public treatment facility available, a treatment system should be installed.				

Entity	Brands							
	Levi Strauss & Co.	NIKE, Inc.	adidas Group	PUMA SE		H&M	C&A	New Balance Athletic Shoe, Inc.
Standard/Regulation/ Guideline Source	Levi Strauss & Co. 2013 Sustainability Guidebook	Nike Sustainable Water Program, Current Standard	adidas Group Environmental Guidelines 2010	Handbook of Environmental Standards 2012		H&M Code of Conduct 2010	Supporting Guidelines for the C&A Code of Conduct for the Supply of Merchandise	New Balance Standards Manual "Sprint" Version
Parameters (units in table are ppm unless otherwise noted) ↓				Textiles (23)	Leather (24)	States follow BSR guidelines	This document utilizes the BSR guidelines	References BSR guidelines
pH	6.0-9.0	6-9	6-9	6-9	6-9	6.0-9.0	6.0-9.0	6.0-9.0
Temperature (deg C)	37(c)			<3 deg increase		37	37	37
TSS	30	30	50	50	50	30	30	30
TDS								
BOD	30	30	30	30	50	30	30	30
COD	Test, monitor, and report. No stated limit.	200	125	160	250	200	200	200
Color	Qualitative observation, no offensive color	150 ADMI or Pt-Co units		7 m^-1 (436 nm; yellow) 5 m^-1 (525 nm; red) 3 m^-1 (620 nm; blue) (γ)		150 (ADMI units) or 150 (Pt-Co units)	150 (ADMI units) or 150 (Pt-Co units)	150 (ADMI units) or 150 (Pt-Co units)
Dissolved O2								
Ammonia (as N)				10	10			
Ammonia (free)								
Total Nitrogen			10	10				
Total Kjeldahl Nitrogen					10			
Absorbable Organic Halogen (AOX)			<0.1	1				
Oil and Grease			10	10				
Pesticides				0.05-0.1(j)				
Herbicides								
Formaldehyde								
Toxicity e.g. fish eggs (T.U. 96 h)				2				
Nonylphenol/nonylphenol ethoxylate								
Aluminum (Al)								
Antimony (Sb)	0.01		<0.01			0.50	0.50	0.50
Arsenic (As)	0.01		<0.01			0.01	0.01	0.01
Barium (Ba)								
Boron (B)								
Cadmium (Cd)	0.01		<0.01	0.02		0.01	0.01	0.01
Calcium (Ca)								
Chromium (Cr) (17)	0.1		<0.10	0.5	1	0.10	0.10	0.10
Cr (VI)				0.1	0.1			
Chlorine (Residual)								
Cobalt (Co)	0.02		<0.02	0.5		0.02	0.02	0.02
Copper (Cu)	0.25		<0.25	0.5		0.25	0.25	0.25
Cyanide	0.2		<0.20			0.20	0.20	0.20
Iron (Fe)								
Lead (Pb)	0.1		<0.10			0.10	0.10	0.10
Magnesium (Mg)								
Manganese (Mn)	0.1							
Mercury (Hg)	0.01		<0.01			0.01	0.01	0.01
Molybdenum (Mo)								
Nickel (Ni)	0.2		<0.20	0.5		0.20	0.20	0.20
Silver (Ag)								
Selenium (Se)								
Tin (Sn)								
Zinc (Zn)	1		<1.00	2		1.0	1.0	1.0
Chloride								
Fluoride								
Nitrate								
Phosphorous			2	2	2			
Phosphate								
Sulphide				1	2			
Sulfate					300			
Sulfite								
CCl4								
ClO2								
PCBs								
Phenol				0.5	0.5			
Coliform	25 CFU/100 ml		400 MPNb/100 ml			400 bacteria/100 ml	400 bacteria/100 ml	400 bacteria/100 ml
Aniline								
Conductivity (µS/cm)								
Foam	Not persistent, no visible discharge of floating solids	No visible discharge of floating solids or persistent foam.	No visible discharge			Not persistent, no visible discharge of floating solids	Not persistent, no visible discharge of floating solids	Not persistent, no visible discharge of floating solids
Domestic Sewage		Untreated sewage much not be discharged directly into open bodies of water.				Sewage must not be discharged directly into open bodies of water. If there is no public treatment facility available, a treatment system should be installed.	Sewage must not be discharged directly into open bodies of water. If there is no public treatment facility available, a treatment system should be installed.	Sewage must not be discharged directly into open bodies of water. If there is no public treatment facility available, a treatment system should be installed.

Entity	Global Regulatory Standards																
	China			Taiwan	Bangladesh				Vietnam					Thailand	Cambodia	Turkey	
Standard/Regulation/ Guideline Source	GB 4287-2012 +XG1-2015 - Discharge Standards of Water Pollutants for Dyeing and Finishing of Textile Industry (with 2015 Amendment)		GB 8978-1996 - Integrated Wastewater Discharge Standard, Table 1 and 4 (9, 11)	Taiwan Effluent Standards dated 2003 (4)	Environment Conservation Rules, 1997 (6)				QCVN 13-MT: 2015/BTNMT - National Technical Regulations on the Effluent of Textile Industry (18)		TCVN 5945 - 2005 - Industrial Waste Water Discharge Standards			Ministerial Notification No.2 B.E. 2539 (1996) Issued in accordance with the Factory Act B.E. 2535. Industrial Effluent Standard	Kingdom of Cambodia No. 27 ANRK.BK Sub-Decree on Water Pollution Control 1999	Regulation for Water Pollution Control, No. 25687, 12/31/2004, Table 10.1-10.7 (textile industry specific) and Table 19 (13)
Parameters (units in table are ppm unless otherwise noted) ↓	Direct/Indirect discharge, Table 2 (7)	Special discharge limit, direct/Indirect discharge, Table 3 (7, 8)	Class I/II/III (10)		Sch 12 B, specific to textile industry.	Sch 10, wastewater from industrial units or projects, to inland surface water	Sch 10, wastewater from industrial units or projects, to public sewerage connected to treatment	Sch 10, wastewater from industrial units or projects, to irrigated land	Discharge into water sources used for drinking water supply	Discharge into water sources not used for drinking water supply	Discharge into water bodies used for domestic water supply	Discharge into water bodies used for irrigation, bathing, aquatic breeding and cultivation, etc.	Discharge into water bodies permitted by authority agencies		Discharge to protected public water/discharge to public water and sewer (12)	2 hr sampling/24 hr sampling (14)
pH	6.0-9.0		6-9	6.0-9.0	6.5-9	6-9	6-9	6-9	6-9	5.5-9	6-9	5.5-9	5-9	5.5-9	6-9/5-9	6-9/6-9	
Temperature (deg C)				Discharge to surface water: <38(e)/<35(f) Discharge to marine waters: 42(g)		40/45(n)	40/45(n)	40/45(n)	40	40	40	40	45	40	45/45		
TSS	50/100(a)	20/50(a)	70/150/400	30(i)	100	150	500	200	50	100	50	100	200	50(u)	50/80	140/100	
TDS					2100	2100	2100	2100						3000(t)	1000/2000		
BOD	20/50	15/20	20/60/600	30(i)	150(l)	50	250	100	30	50	30	50	100	60(v)	30/80		
COD	80/200	60/80	100/200/1000	100(i)		200	400	400	75/100(p)	150/200(p)	50	80	400	400(v)	50/100	250/200	
Color	50/80(k)	30/50(k)	50/80/-	550 (Pt-Co units)(h, i)					50/75 (Pt-Co units)(p)	150/200 (Pt-Co units)(p)	20 (Pt-Co units)	50 (Pt-Co units)	-	Not objectionable			
Dissolved O2						4.5-8	4.5-8	4.5-8							>2.0/>1.0		
Ammonia (as N)	10/20(b)	8/10(b)	15/50/-	10.0(b)		50	75	75			5	10	15			5/-	
Ammonia (free)						5	5	15							5.0/7.0		
Total Nitrogen	15/30	12/15									15	30	60				
Total Kjeldahl Nitrogen						100	100	100						100(u)		20/15(w)	
Absorbable Organic Halogen (AOX)	12/12	8/8															
Oil and Grease			10/15/100	10.0	10	10	20	10			5(r)	5(r)	10(r)	5.0(u)	5.0/15	10/-	
Pesticides			Not detectable/0.5/0.5	0.5							0.1(s)	0.1(s)	-(s)	Not detectable			
Herbicides				1.0													
Formaldehyde			1/2/5	3.0										1			
Toxicity e.g. fish eggs (T.U. 96 h)											90% of the test fish exposed to the concentration of 100% wastewater survive after 96 hours of constant exposure		-			3/2	
Nonylphenol/nonylphenol ethoxylate																	
Aluminum (Al)																	
Antimony (Sb)	0.10/0.10 (ac)	0.10/0.10 (ac)															
Arsenic (As)			0.5	0.5		0.2	0.05	0.2			0.05	0.1	0.5	0.25	0.10/1.0		
Barium (Ba)														1.0	4.0/7.0		
Boron (B)				1.0		2	2	2							1.0/5.0		
Cadmium (Cd)			0.1	0.03		0.5	0.05	0.05			0.005	0.01	0.5	0.03	0.1/0.5	0.1/-(w)	
Calcium (Ca)															150/200		
Chromium (Cr) (17)			1.5	2.0	2	0.5	1.0	1.0			0.2 (Cr III)	1 (Cr III)	2 (Cr III)	0.75(Cr III)	0.2 (Cr III)/1.0 (Cr III)	2/1	
Cr (VI)	Not detectable	Not detectable	0.5	0.5		0.1	1.0	1.0	0.05	0.1	0.05	0.1	0.5	0.25	0.05/0.5	0.5/0.5(w)	
Chlorine (Residual)									1	2	1	2	-	1.0	1.0/2.0	0.3/-	
Cobalt (Co)																	
Copper (Cu)			0.5/1/2	3.0		0.5	3.0	3.0			2	2	5	2.0	0.2/1.0	3/-(w)	
Cyanide			0.5/0.5/1	1.0		0.1	2.0	0.2	0.07	0.1	0.07	0.1	0.2	0.2	0.2/1.5	1/0.5(w)	
Iron (Fe)				10.0		2	2	2			1	5	10		1.0/20	10/-(w)	
Lead (Pb)			1.0	1.0		0.1	1.0	0.1			0.1	0.5	1	0.2	0.1/1.0	2/1(w)	
Magnesium (Mg)															150/200		
Manganese (Mn)			2/2/5	10.0		5	5	5			0.5	1	5	5.0	1.0/5.0		
Mercury (Hg)			0.05	0.005		0.01	0.01	0.01			0.005	0.01	0.01	0.005	0.002/0.05	-/0.05(w)	
Molybdenum (Mo)															0.1/1.0		
Nickel (Ni)			1.0	1.0		1.0	2.0	1.0			0.2	0.5	2	1.0	0.2/1.0		
Silver (Ag)			0.5	0.5											0.1/0.5		
Selenium (Se)			0.1/0.2/0.5	0.5		0.5	0.5	0.5						0.02	0.05/0.5		
Tin (Sn)											0.2	1	5		2.0/8.0		
Zinc (Zn)			2/5/5	5.0		5	10	10			3	3	5	5.0	1.0/3.0	5/-	
Chloride						600	600	600							500/700		
Fluoride			10/10/20	15.0		2	15	10			5	10	15			15/-(w)	
Nitrate				50		10		10							10/20		
Phosphorous	0.5/1.5	0.5/0.5	0.1/0.1/0.3			8	8	15			4	6	8			2/1(w)	
Phosphate			0.5/1/-	4.0											3.0/6.0		
Sulphide	0.5/0.5	Not detectable/Not detectable	1/1/1	1.0	2	1	2	2			0.2	0.5	1	1	0.2/1.0	0.1/-	
Sulfate															300/500	1500/1500(w)	
Sulfite																1/-	
CCl4			0.03/0.06/0.5												3/3		
ClO2	0.5/0.5	0.5/0.5															
PCBs				Not detectable							0.003	0.01	-				
Phenol			0.5/0.5/2	1.0	5	1	5	1			0.1	0.5	1	1	0.1/1.2	1/0.5	
Coliform											3000 MPN/100 ml	5000 MPN/100 ml	-				
Aniline	Not detectable/Not detectable	Not detectable/Not detectable	1/2/5														
Conductivity (µS/cm)						1200	1200	1200									
Foam																	
Domestic Sewage																	

Entity	Global Regulatory Standards																					
	South Korea				India									Indonesia		Sri Lanka				Malaysia	Brazil
Standard/Regulation/ Guideline Source	Water Quality and Ecosystem Conservation Act 2008 and Sewerage Act 2009				IS: 2490, 1981, Tolerance Limits for Industrial Effluents discharged into Inland Surface Waters, Part 1 - General Limits and Environmental (Protection) Rules, 1986, Sch VI								Environmental (Protection) Rules, 1986, Sch I		Regulation of the Minister of the Environment about Raw Wastewater Quality_2014, table XLII (18)	The Quality of the Raw Wastewater for [Industries]_2013, Table C (18)	National Environmental (Protection and Quality) Regulations, 2008				Environmental Quality (Industrial Effluent) Regulations 2009, Sch 7 (specific to textile industry) and 5	The National Environmental Council (CONAMA), Resolution 430, May 13th 2011, Ch II Section II - Effluent Release Conditions and Standards
Parameters (units in table are ppm unless otherwise noted) ↓	Discharge to Type I Area (22)	Discharge to Type II Area (22)	Discharge to Type III Area (22)	Discharge to Type IV Area (22)	Into inland surface water, IS: 2490	Into inland surface water, Envi rules sch VI	Into Public Sewers, IS: 2490	Into Public Sewers, Envi rules sch VI	On land for irrigation, IS: 2490	On land for irrigation, Envi rules sch VI	Marine/coastal Area, IS: 2490	Marine/coastal Area, Envi rules sch VI	Cotton textile industries (composite and processing)	Dye and dye industry	This applies to the textile industry in all Indonesia	This applies to the textile industry in the Jakarta Province only	Limits for waste from textile industry discharged into Inland surface waters (19)	Discharge to inland surface water (19, 20)	Discharge on land for irrigation purpose	Discharge into marine coastal areas (19)	Standard A/B (21)	
pH	5.8-8.6	5.8-8.6	5.8-8.6	5.8-8.6	5.5-9	5.5-9	5.5-9	5.5-9	5.5-9	5.5-9	5.5-9	5.5-9	5.5-9	6-8.5	6.0-9.0	6-9	6.5-8.5	6.0-8.5	5.5-9.0	5.5-9.0	6.0-9.0/5.5-9.0	5-9
Temperature (deg C)	40	40	40	40	40 in any section of the stream w/in 15 meters downstream of effluent outlet	Shall not exceed 5 deg C above the ambient temp of receiving body	45 at point of discharge	-	-	-	-	Shall not exceed 5 deg C above the ambient temp of receiving body		Shall not exceed 5 deg C above the ambient temp of receiving body			40 measured at site of sampling	40 in any section of stream within 15 m downstream from effluent outlet		45 at point of discharge	40/40	<40 and receptor body cannot exceed 3 deg C temp change at limit of mixing zone
TSS	30/40 (ai)	60/80 (ai)	80/120 (ai)	30/30 (ai)	100	100	600	600	200	200	100	100	100	100	50	50	50	50		150	50/100	(ae)
TDS					2100		2100		2100		-								2100			
BOD	30/40 (ai)	60/80 (ai)	80/120 (ai)	30/30 (ai)	30	30	350	350	100	100	100	100	150	100	60	60	60	30	250	100	20/50	Minimum removal of 60% BOD
COD	40/50 (ai)	70/90 (ai)	90/130 (ai)	40/40 (ai)	250	250	-	-	-	-	250	250			150	100	250	250	400	250	80/250(aa)	
Colour	200 (Chromaticity degree) (ag)	300 (Chromaticity degree) (ag)	400 (Chromaticity degree) (ag)	400 (Chromaticity degree) (ag)	Absent of colour	Efforts should be made to remove colour as far as practical	-	-	Absent of colour	Efforts should be made to remove colour as far as practical	Absent of colour	Efforts should be made to remove colour as far as practical		400 (Hazen unit)			7 m^-1 (436 nm; yellow) 5 m^-1 (525 nm; red) 3 m^-1 (620 nm; blue) (y)	7 m^-1 (436 nm; yellow) 5 m^-1 (525 nm; red) 3 m^-1 (620 nm; blue) (y)			100/200 (ADMI units)	
Dissolved O2																						
Ammonia (as N)					50	50	50	50	-	-	50	50			8.0	8	60	50		50	10/20	20.0
Ammonia (free)					5.0	5.0	-	-	-	-	5.0	5.0										
Total Nitrogen	30	60	60	60																		
Total Kjeldahl Nitrogen					100	100	-	-	-	-	100	100						150				
Absorbable Organic Halogen (AOX)																						
Oil and Grease	5	30	30	30	10	10	20	20	10	10	20	20	10	10	3.0	3	10	10	10	20	1.0/10	20/50 (ad)
Pesticides					Absent		Absent		Absent		Absent							0.005		0.005		
Herbicides																						
Formaldehyde	0.5 (ah)	5 (ah)	5 (ah)	5 (ah)																	1.0/2.0	
Toxicity e.g. fish eggs (T.U. 96 h)	1	2	2	2		90% survival of fish after 96 hours		90% survival of fish after 96 hours		90% survival of fish after 96 hours		90% survival of fish after 96 hours	90% survival of fish after 96 hours	90% survival of fish after 96 hours								
Nonylphenol/nonylphenol ethoxylate																						
Aluminum (Al)																					10/15	
Antimony (Sb)																						
Arsenic (As)	0.05	0.25	0.25	0.25	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2						0.2	0.2	0.2	0.05/0.10	0.5
Barium (Ba)	1	10	10	10																	1.0/2.0	5.0
Boron (B)					2.0		2.0		2.0		-								2.0		1.0/4.0	5.0
Cadmium (Cd)	0.02	0.1	0.1	0.1	2	2	1	1	-	-	2	2		2.0				0.1	2.0	2.0	0.01/0.02	0.2
Calcium (Ca)																						
Chromium (Cr) (17)	0.5	2	2	2	2.0	2.0	2.0	2.0	-	-	2.0	2.0	2	0.1 Cr/2.0 total	1.0	1	2.0	0.5	1.0	2.0	0.20 (Cr III)/1.0 (Cr III)	1.0 (Cr III)
Cr (VI)	0.1	0.5	0.5	0.5	0.1	0.1	2.0	2.0	-	-	1.0	1.0		0.1			0.5	0.1		1.0	0.05/0.05	0.1
Chlorine (Residual)					1.0	1.0	-	-	-	-	1.0	1.0						1.0		1.0	1.0/2.0	
Cobalt (Co)																						
Copper (Cu)	1	3	3	3	3.0	3.0	3.0	3.0	-	-	3.0	3.0		3.0			3.0	3.0	1.0	3.0	0.2/1.0	1.0
Cyanide	0.2	1	1	1	0.2	0.2	0.2	2.0	0.2	0.2	0.2	0.2						0.2	0.2	0.2	0.05/0.10	1.0
Iron (Fe)	2	10	10	10		3		3		-		3						3.0			1.0/5.0	15.0
Lead (Pb)	0.1	0.5	0.5	0.5	0.1	0.1	1.0	1.0	-	-	2.0	2.0		0.1				0.1	1.0	1.0	0.1/0.5	0.5
Magnesium (Mg)																						
Manganese (Mn)	2	10	10	10		2		2		-		2		2							0.2/1.0	1.0
Mercury (Hg)	0.001	0.005	0.005	0.005	0.01	0.01	0.01	0.01	-	-	0.01	0.01		0.01				0.0005	0.01	0.01	0.005/0.05	0.01
Molybdenum (Mo)																						
Nickel (Ni)	0.1	3	3	3	3.0	3.0	3.0	3.0	-	-	-	5.0		3.0				3.0		5.0	0.2/1.0	2.0
Silver (Ag)																					0.1/1.0	0.1
Selenium (Se)	0.1	1	1	1	0.05	0.05	0.05	0.05	-	-	0.05	0.05						0.05		0.1	0.02/0.5	0.30
Tin (Sn)																					0.2/1.0	4.0
Zinc (Zn)	1	5	5	5	5	5	15	15	-	-	15	15		5.0			5.0	2.0		5.0	2.0/2.0	5.0
Chloride					1000		1000		600		-			1000			70		600			
Fluoride	3	15	15	15	2.0	2.0	15	15	2.0	-	15	15						2.0		15	2.0/5.0	10.0
Nitrate						10		-		-		20										
Phosphorous	4	8	8	8																		
Phosphate					5	5	-	-	-	-	-	-						5				
Sulphide					2	2	-	-	2	-	5	5	2		0.3	0.3	2.0	2.0		5.0	0.5/0.5	1.0
Sulfate					1000		1000		1000		1000			1000					1000			
Sulfite																						
CCl4	0.004	0.04	0.04	0.08																		
ClO2																						
PCBs	Not detection	0.003	0.003	0.003																		
Phenol	1	3	3	5	1	1	5	5	5	-	5	5	5	1.0	0.5	0.5	1.0	1		5	0.001/1.0	0.5
Coliform	100 units/ml	3000 units/ml	3000 units/ml	3000 units/ml		1000 MPN/100 ml		1000 MPN/100 ml		1000 MPN/100 ml		1000 MPN/100 ml						40 MPN/100 ml	40 MPN/100 ml	60 MPN/100 ml		
Aniline																						
Conductivity (µS/cm)																			2250			
Foam																						
Domestic Sewage																						

Entity	Benchmark Countries						
	United States	Canada	Germany	Italy		Spain	European Union
Standard/Regulation/ Guideline Source	Los Angeles Municipal Code 2012	Canadian Wastewater Systems Effluent Regulations 2012 (29)	Ordinance on Requirements for the Discharge of Waste Water into Waters (Waste Water Ordinance - AbwV) June 17th 2004 (27)	Legislative Decree No. 152, Code on the Environment, 2006 Part 3, Annex 5, Table 3 (18)		Madrid, Industrial Liquid Dumping Law to Integrated System of Sanitation, 2015, Annex 2 (18)	Urban Wastewater Treatment Directive 91/271/EEC
Parameters (units in table are ppm unless otherwise noted) ↓	Discharges into publicly owned treatment works, applied to all types of industries		Appendix 38 - Textile manufacturing and finishing (28)	Discharge into surface waters	Discharge into public sewer	Discharge to collecting systems and treatment facilities	Discharge from urban WWT plants to receiving waters (30)
pH	5.5-11			5.5-9	-	6-10	
Temperature (deg C)	60			30 (al)	30 (al)	40	
TSS		25		80	200	1000	35
TDS							
BOD		25	25	40	250	1000	25
COD			160	160	500	1750	125
Colour			7 m^-1 (436 nm; yellow) 5 m^-1 (525 nm; red) 3 m^-1 (620 nm; blue) (y)	not perceived after 1:20 dilution	not perceived after 1:40 dilution		
Dissolved O2							
Ammonia (as N)		1.25	10	15 (am)	30 (am)		
Ammonia (free)							
Total Nitrogen			20			125	10 (an)
Total Kjeldahl Nitrogen							
Absorbable Organic Halogen (AOX)			0.5 (ak)			5	
Oil and Grease	600			20	40	100	
Pesticides				0.05, 0.10 (j)	0.05, 0.10 (j)		
Herbicides							
Formaldehyde							
Toxicity e.g., fish eggs (T.U. 96 h)			2				
Nonylphenol/nonylphenol ethoxylate							
Aluminum (Al)				1	2.0	20	
Antimony (Sb)							
Arsenic (As)	3		Not present	0.5	0.5	1	
Barium (Ba)				20	-	20	
Boron (B)				2	4	3	
Cadmium (Cd)	15			0.02	0.02	0.5	
Calcium (Ca)							
Chromium (Cr) (17)	10		0.5 (ak)	2	4	3	
Cr (VI)			Not present	0.2	0.2	1	
Chlorine (Residual)		0.02		0.2	0.3		
Cobalt (Co)							
Copper (Cu)	15		0.5 (ak)	0.1	0.4	3	
Cyanide	10			0.5	1.0	5	
Iron (Fe)				2	4	10	
Lead (Pb)	5			0.2	0.3	1	
Magnesium (Mg)							
Manganese (Mn)				2	4	2	
Mercury (Hg)	Essentially none		Not present	0.005	0.005	0.1	
Molybdenum (Mo)							
Nickel (Ni)	12		0.5 (ak)	2	4	5	
Silver (Ag)	5					1	
Selenium (Se)				0.03	0.03	1	
Tin (Sn)			2 (ak)	10	-	2	
Zinc (Zn)	25		2 (ak)	0.5	1.0	3	
Chloride				1200	1200	2000	
Fluoride				6	12	15	
Nitrate				20			
Phosphorous			2	10 (am)	10 (am)	40	
Phosphate							1 (an)
Sulphide	0.1		1 (ak)	1	2	5	
Sulfate				1000	1000	1000	
Sulfite			1	1	2		
CCl4							
ClO2							
PCBs							
Phenol				0.5	1		
Coliform							
Aniline							
Conductivity (µS/cm)							
Foam							
Domestic Sewage							

Notes:
Regarding all tables, a cell left blank means the regulation or guideline does not report a limit for that parameter.

(1) AAFA reproduction of BSR guidelines showed COD at 100 ppm where the BSR guidelines show 200 ppm. AAFA document also does not note coliform limits that are noted in the BSA guidelines.
(2) Per the bluesign® document, "Values currently only monitored." The units are the maximum spectral absorption coefficient within the wave length range.
(4) This document was found in Chinese and was translated via MS Word.
(5) Document states this value is at the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity.
(6) The standard states these shall be applicable to all industries or projects other than those specified under the heading "Standards for Sector-wise Industrial Effluent or Emission."
(7) Direct discharge (to environment)/indirect discharge (to public wastewater treatment system). The amendment notes that the wastewater flowing into the municipal wastewater treatment plant or discharged through municipal wastewater pipelines shall reach the direct discharge limitation.
(8) Special discharge limit applying to areas of vulnerable ecological environment specified by the State Council or provincial People's Government.
(9) Within the application scope section there is a statement that, according to the principal, the integrated discharge standards and the industry discharge standards shall not be implemented crossly, the GB 4287 standard shall be implemented for the textile dyeing and finishing industry. Other chemicals are noted in this document but were omitted from this table as they were not listed in any other standard document.
(10) Class I - surface water suitable for general industrial use as well as for recreational purposes (not for human contact) or sea water suitable for bathing/beach activities and scenic use.
Class II - surface water suitable for agricultural and general scenic purposes or sea water suitable for general industrial use and marine exploration.
Class III - sewer of a city and town where a wastewater treatment plant has been constructed.
(11) Per code, these tables are applicable to work units constructed after 1/1/1998.
(12) Public water areas refers to water areas that are for public use such as river, stream, gully, lake, pond, well, sea, river mouth and other waterways that are for public use and ground water. In the standard, all values are noted as less than the number shown.
(13) The standard has seven tables of parameters for various materials and processes within the textile industry. The values listed are the most conservative from all the tables.
(14) The limit is based on the sampling method. These 2 sampling methods are outlined in Article 29 of the standard.
(15) The values within this document are from the European Commission Best Available Techniques Reference Document for Tanning of Hides and Skins 2013, Table 5.3.
(16) Per this document, parameters are from the BSR Sustainable Water Group 2010 Water Quality Guidelines and the IFC 2007 document on Environmental, Health and Safety Guidelines for Textile Manufacturing.
(17) The values in the table are assumed to be total Chromium, even if the regulation just states Chromium, unless otherwise noted in the table.
(18) This standard was only found in its native language. The title of the document was roughly translated using MS word.
(19) All efforts should be made to remove unpleasant odour and colour as far as practical. The values are based on dilution of effluents by at least 8 volumes of clean receiving water. If the dilution is below 8 times, the permissible limits are multiplied by 1/8 of the actual dilution.
(20) These standards shall cease to apply, with regard to a particular industry, when industry specific standards are notified for that industry.
(21) Standard A is defined as discharge into any inland water within the catchment areas as specified in the 6th schedule of this standard. The 6th schedule defines locations where the water is used for drinking water. Standard B is discharge to any other inland waters or Malaysian waters.
(22) The regulation defines discharge areas I to IV in order decreasing water quality: Area I - water quality of area is Class Ia, the highest quality defined in the "Environmental Standards of Living Environment" (ex. BOD of this water body is 1 ppm or less and COD is 2 ppm or less). Area II - water quality of area is Class Ib or II. Area III - water quality of area is Class III, IV, or V. Area VI - All other areas.
(23) The guideline notes these values are from IFC-EHS textile manufacturing guidelines.
(24) The guideline notes these values are from IFC-EHS tanning and leather finishing guidelines.
(27) This Ordinance specifies the minimum requirements to be stipulated when granting a permit to discharge waste water into water bodies.
(28) By random sample or 2-hour composite sample. Random samples shall refer to a single sample taken from the wastewater flow. Composite samples shall refer to a sample taken either continuously or discontinuously over a given period and blended.
(29) This regulation applies to a wastewater system that is designed to collect an average daily volume of 100 m^3 or more influent. It does not apply to a wastewater system that is located on the site of an industrial, commercial or institutional facility if the wastewater system is designed to collect influent whose volume consists of less than 50% blackwater and greywater combined.
(30) Urban wastewater is defined in this directive as domestic wastewater or the mixture of domestic wastewater with industrial wastewater and/or run-off rain water.
(a) Stated as suspended substance.
(b) Stated as ammonia nitrogen.
(c) Exception: for areas of extremely high air temperature, (>40 degrees Celsius), discharge temp must not be greater than temperature of the receiving water body.
(d) Can be TOC or COD but TOC relationship to COD must be identified to assess TOC limit.
(e) From May to September.
(f) From October to April.
(g) Temperature difference should exceed 4 degrees Celsius for surface water at 500 meters from the discharge point.
(h) Regulation states this as "true colour" which shall be measured by ADMI method.
(i) The standard has 3 tables of parameters that are applicable to the textile industry. The values listed are the most conservative from these tables.
(j) 0.05 mg/L for total pesticides not including organophosphorus, 0.10 mg/L for organophosphorus.
(k) The standard states GB 11903-89 - Water Quality Determination of Colority is to be used to measure colour. This code has two methods, Pt-Co standard comparison and multiple dilution. The value here is by multiple dilution method.
(l) Standard states this limit applies only with physico-chemical processing.
(m) Stated as NH_4-N in standard document.
(n) Summer/winter.
(p) New facility/existing operating facility.

Notes (continued):

(r) Stated as mineral oil and fat. Animal-vegetable oil also noted at higher values, 10/20/30 ppm.

(s) Stated as pesticide: organic chlorine. Pesticide: organic phosphorous also noted at higher values, 0.3/1/-.

(t) TDS shall not exceed 3000 mg/L or different value depending on effluent flow rates, receiving type of receiving water or factory type as prescribed by Department of Industrial Works, but not exceed 5000 mg/L. For receiving water with salinity of more than 2000 mg/L TDS in effluent shall not exceed TDS of receiving water more than 5000 mg/L or different value depending on effluent flow rates, receiving type of receiving water, or factory type as prescribed by Department of Industrial Works.

(u) The standard notes "Or different value as prescribed by Department of Industrial Works. For TSS, not exceed 150 mg/L. For oil and grease, not exceed 15.0 mg/L. For TKN, not exceed 200 mg/L."

(v) Value published is in an additional document referencing 2539 that allows for more lenient limits for BOD, TKN and COD for certain industries. This value pertains to the textile industry.

(w) These values come from Table 19 as they are not in the tables that are specific to the textile industry. The standard states: "The discharge standards of the industry types which are not covered in this Regulation will be specified by the General Directorate of Environment of the Prime Ministry on the basis of Table 19."

(x) The document lists "Chromium" as 0.1 mg/L then "Chromium total" as 0.5 mg/L.

(y) The units are the maximum spectral absorption coefficient within the wave length range.

(aa) From schedule 7 which is specific to the textile industry.

(ac) As noted in the XG1-2015 amendment.

(ad) Mineral oil/vegetable oil and animal fats.

(ae) The standard states sedimentable material can be up to 1 ml/L during a 1 hour test in the Imhoff cone. Sedimentable materials must be virtually non-existent in releases into lakes and lagoons.

(ag) Chromaticity is only applicable to 1) textile dyeing and processing industry; 2) other textile products manufacturing industry; and 3) pulp, paper and paper related products manufacturing industry.

(ah) Limit becomes enforced on 1/1/2016.

(ai) Applies to factory with discharge ≥ 2,000 m^3/day; Applies to factory with discharge <2,000 m^3/day.

(ak) This requirement shall apply to the wastewater prior to its blending with other wastewater.

(al) Temperature increase shall not exceed 3 degrees Celsius over 50 meters away from point of entry.

(am) When discharging to areas deemed sensitive areas, total P not to exceed 1 mg/L and total N not to exceed 10 mg/L.

(an) These limits apply to areas deemed "sensitive areas" and wastewater treatment plants that have a pollution equivalent (p.e.) greater than 100,000. Total N and total P can be 15 mg/L and 2 mg/L respectively for a p.e. below or equal to 100,000.

µS/cm = microsiemens per centimeter

AAFA = American Apparel and Footwear Association

ADMI = American Dye Manufacturer's Institute

BOD = biological oxygen demand

BSR = Business for Social Responsibility

CCl_4 = carbon tetrachloride

ClO_2 = chlorine dioxide

COD = chemical oxygen demand

deg C = degrees Celsius

IFC = International Finance Corporation

m^ 3 = volume in cubic meters

mg/L = milligrams per liter

ml = milliliter(s)

MPN = most probable number

N = nitrogen

nm = nanometer

P = phosphorous

PCB = polychlorinated biphenyl

p.e. = pollution equivalent

ppm = parts per million

Pt-Co units = platinum-cobalt units

Sch = schedule

TOC = total organic carbon

TSS = total suspended solids

TDS = total dissolved solids

STWI = Sweden Textile Water Initiative