Achieving
ZDHC
2020

Wastewater Discharge Analysis 2018

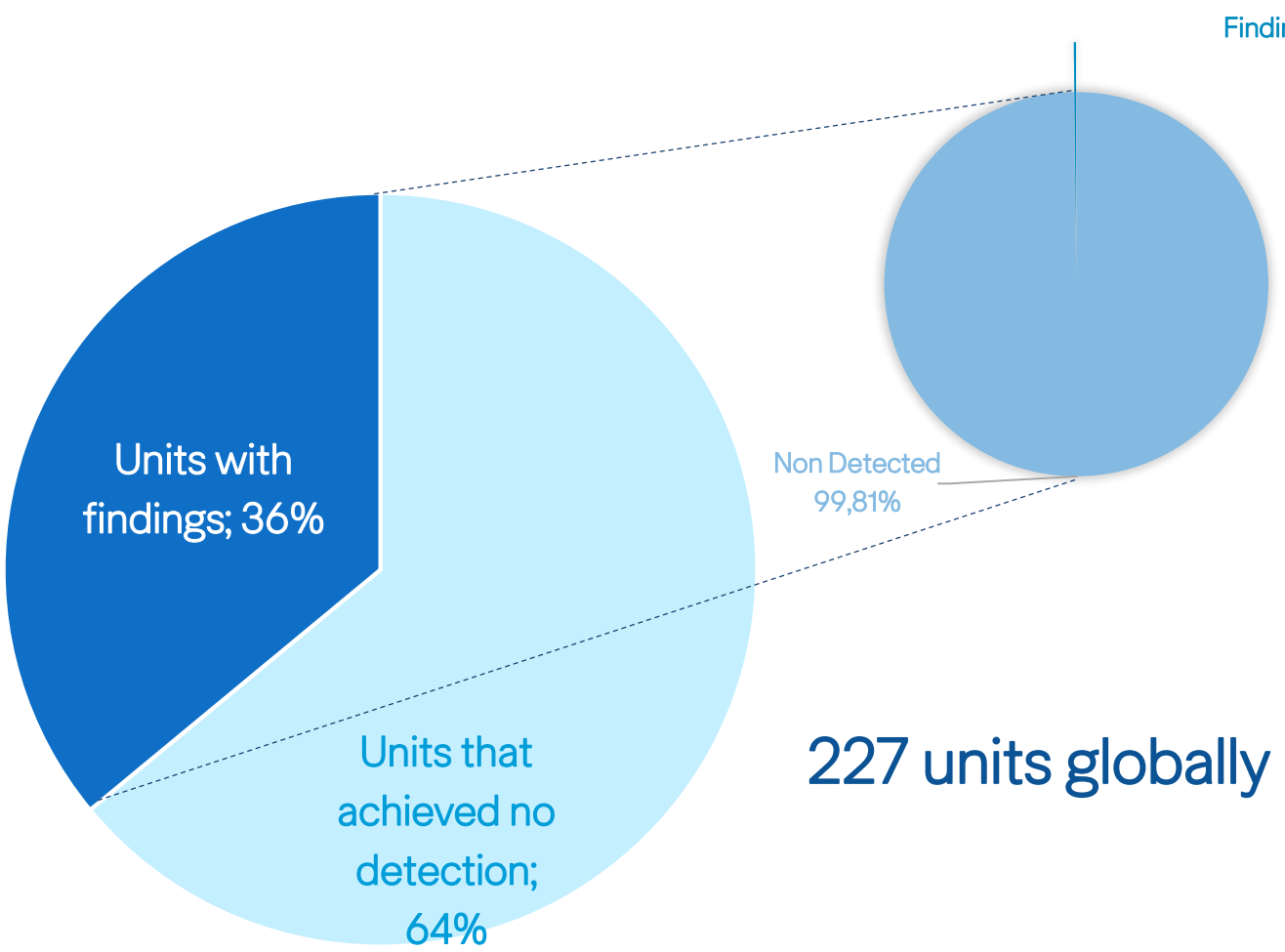
Summary

2018 was the first year that we fully implemented the ZDHC Wastewater Guidelines on all of our facilities. All of these results are published on ZDHC Gateway and IPE Platform.

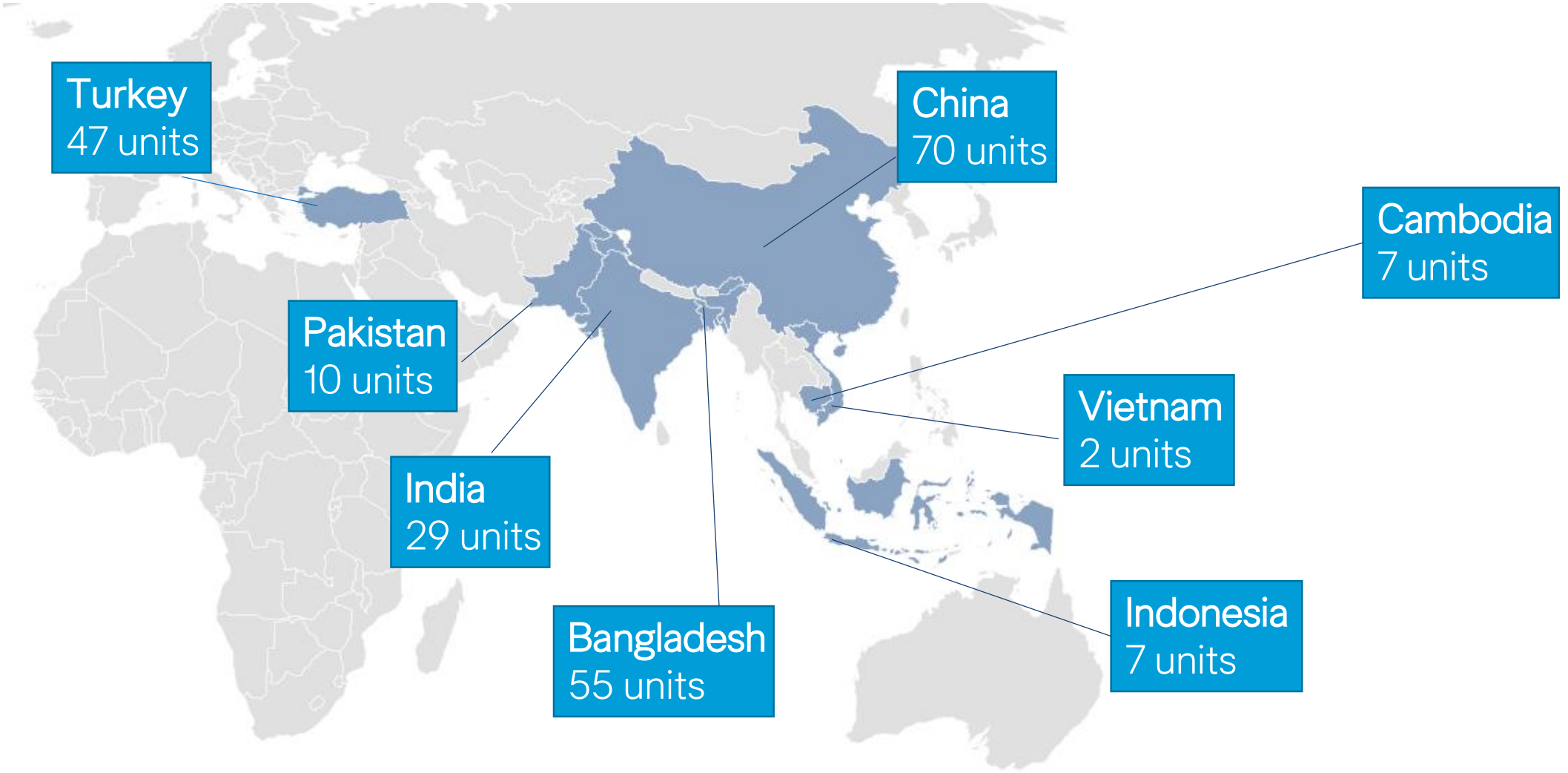
In 2018, we tested at 227 of our suppliers' facilities according to ZDHC Wastewater Guidelines 2016. This is 30% of our scope units from textile and leather supply chain in both T1 and T2 (garment and textile manufacturers).

We had 64% of our tested scope units achieved no detection of hazardous chemicals–while the rest (36%) had at least one finding of hazardous chemical.

Focusing to the units with findings, 99.81% of our test result had no detection of 183 chemical analytes tested from ZDHC MRSL. In the 0.19% findings of ZDHC MRSL, the most common findings were AP&APEOs and Halogenated Solvents.



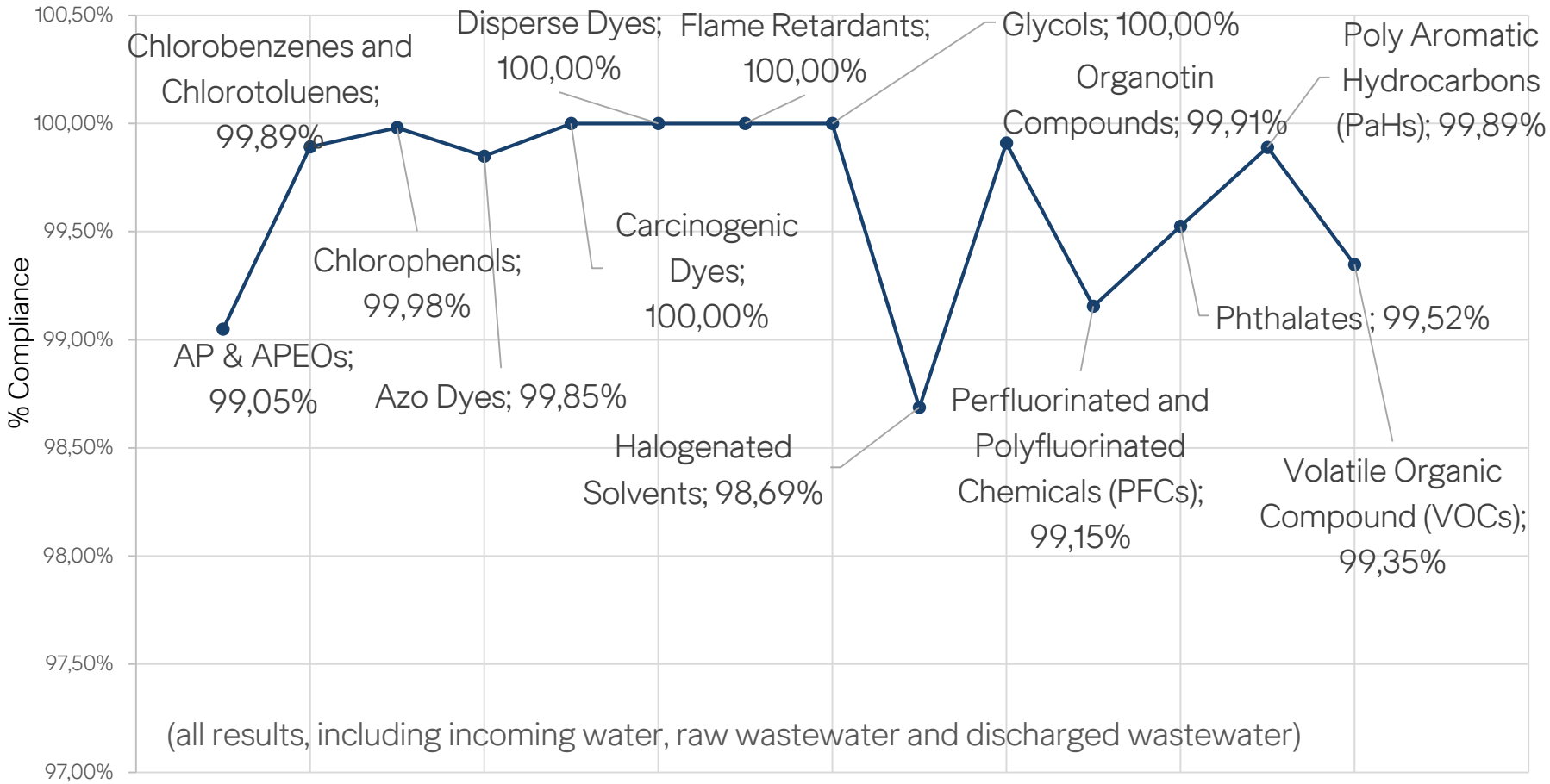
Country Distribution



Result Overview

INCOMING WATERS	RAW WASTEWATERS	TREATED WASTEWATERS
7 analytes found out of **183** tested analytes of ZDHC MRSL.	**30** analytes found out of **183** tested analytes of ZDHC MRSL.	**42** analytes found out of **183** tested analytes of ZDHC MRSL.
For Heavy metals, **3 out of 13** analytes are exceeding foundational limits.	For Heavy metals, **8 out of 13** analytes are exceeding foundational limits.	For Heavy metals, **4 out of 13** analytes are exceeding foundational limits.

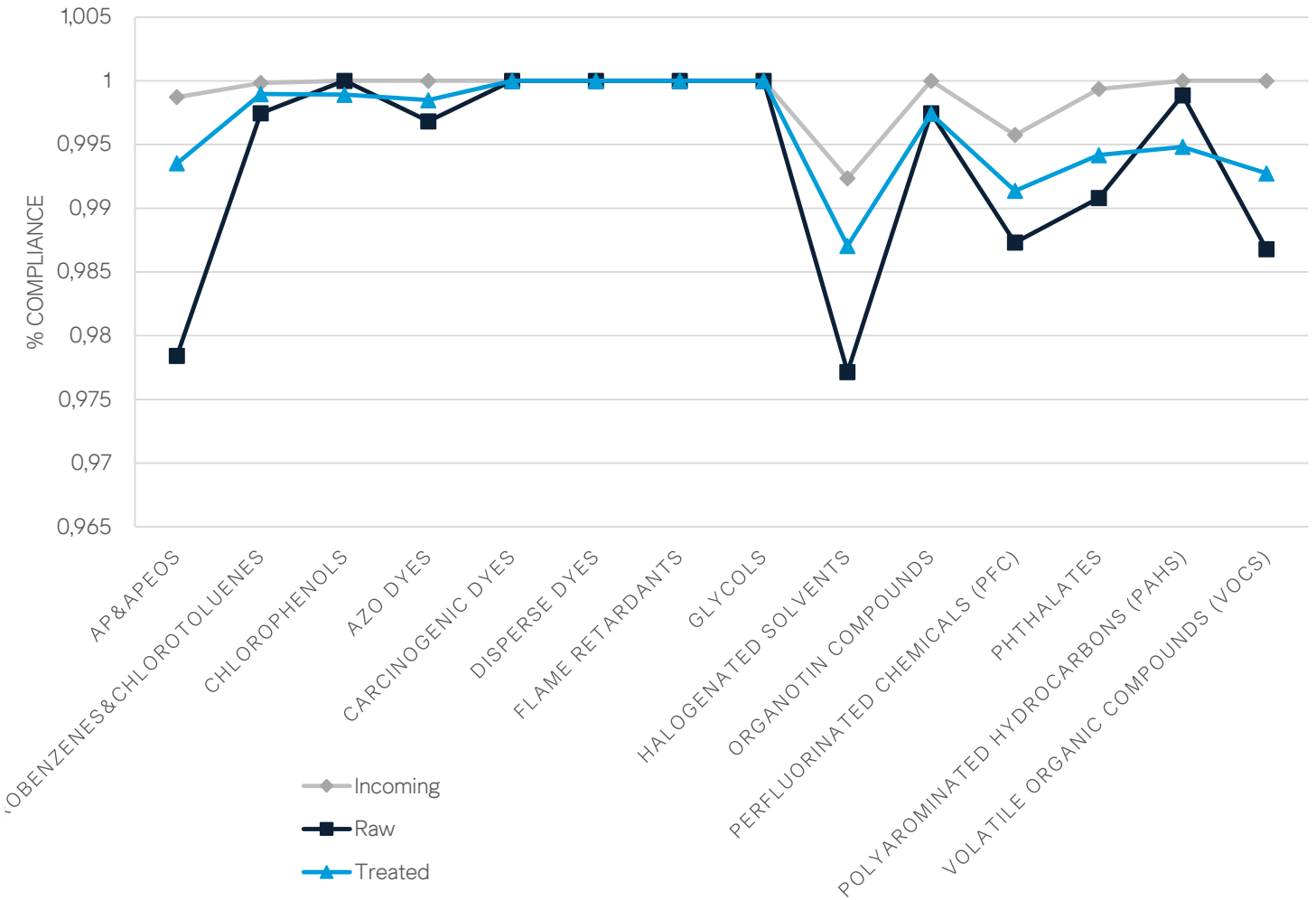
ZDHC MRSL Compliance



Among the lowest compliance levels,
NPEO (from AP&APEOs Group), 4-Chloroaniline (from Azo-dyes Group) and Methylene Chloride (from Halogenated Solvents Group) are most commonly detected.

NPEO may be found in various types of chemicals used in the fabric manufacturing process and therefore it is difficult to pinpoint its source. 4-Chloroaniline may come from dyeing process from either reactive black dye or disperse dye. Methylene chloride may come from degreasing process in pre-treatment.

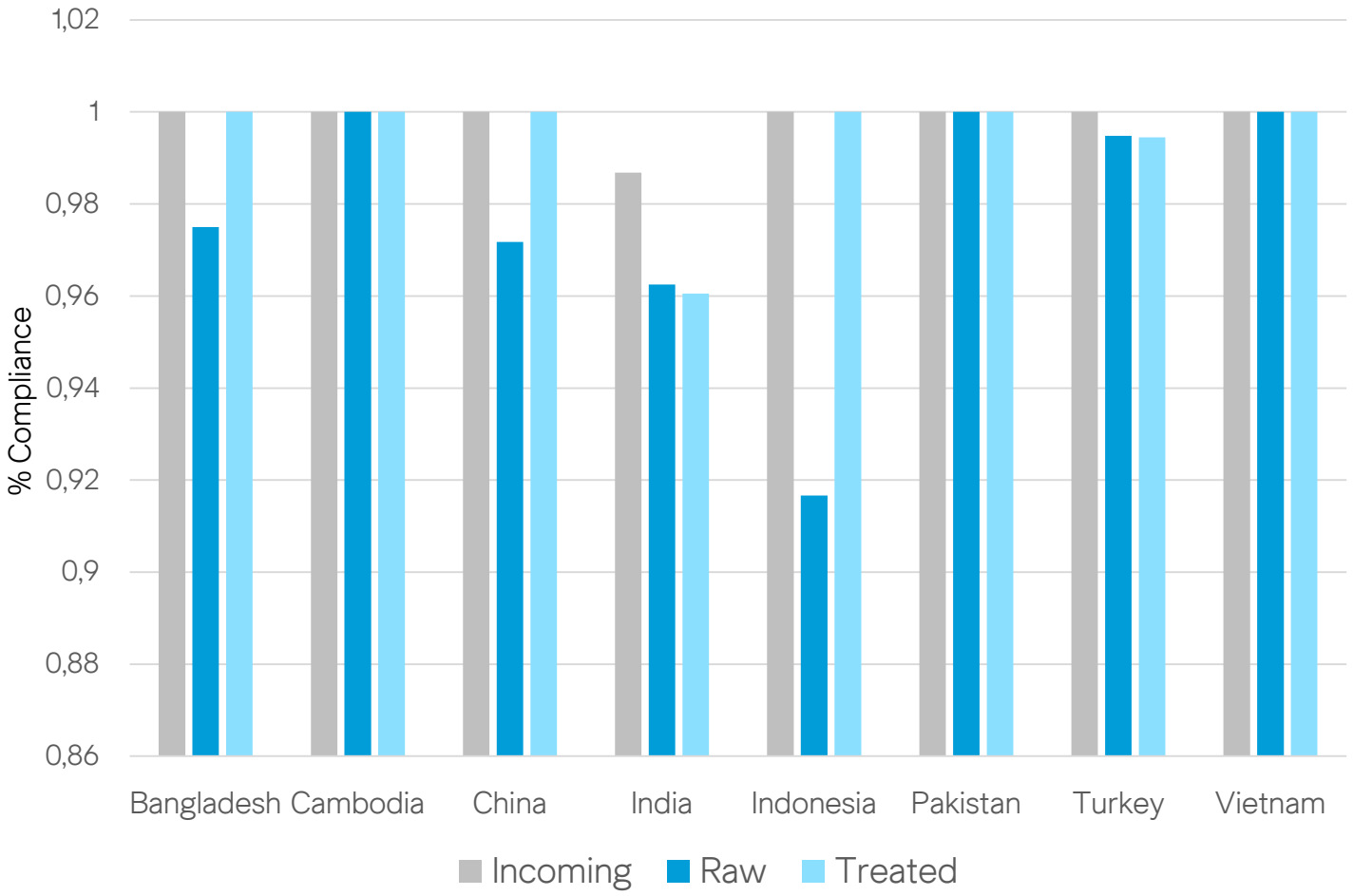
ZDHC MRSL Compliance: Incoming, Raw and Treated Wastewater



Within the lowest compliance levels group of AP & APEOs, Halogenated Solvents and PFC, incoming water is already polluted. This increases the chance of higher level of pollutants in the wastewater by the “cocktail effect” that may happened in production or effluent treatment plant (ETP).
For Chlorophenols, the treated wastewater has lower compliance than raw wastewater further indicating the likelihood of “cocktail effect” within the ETP.

This overall results suggest that ETP is not effective to eliminate MRSL chemical groups and clean supply chain must be achieved through better input chemical management.

AP & APEOs

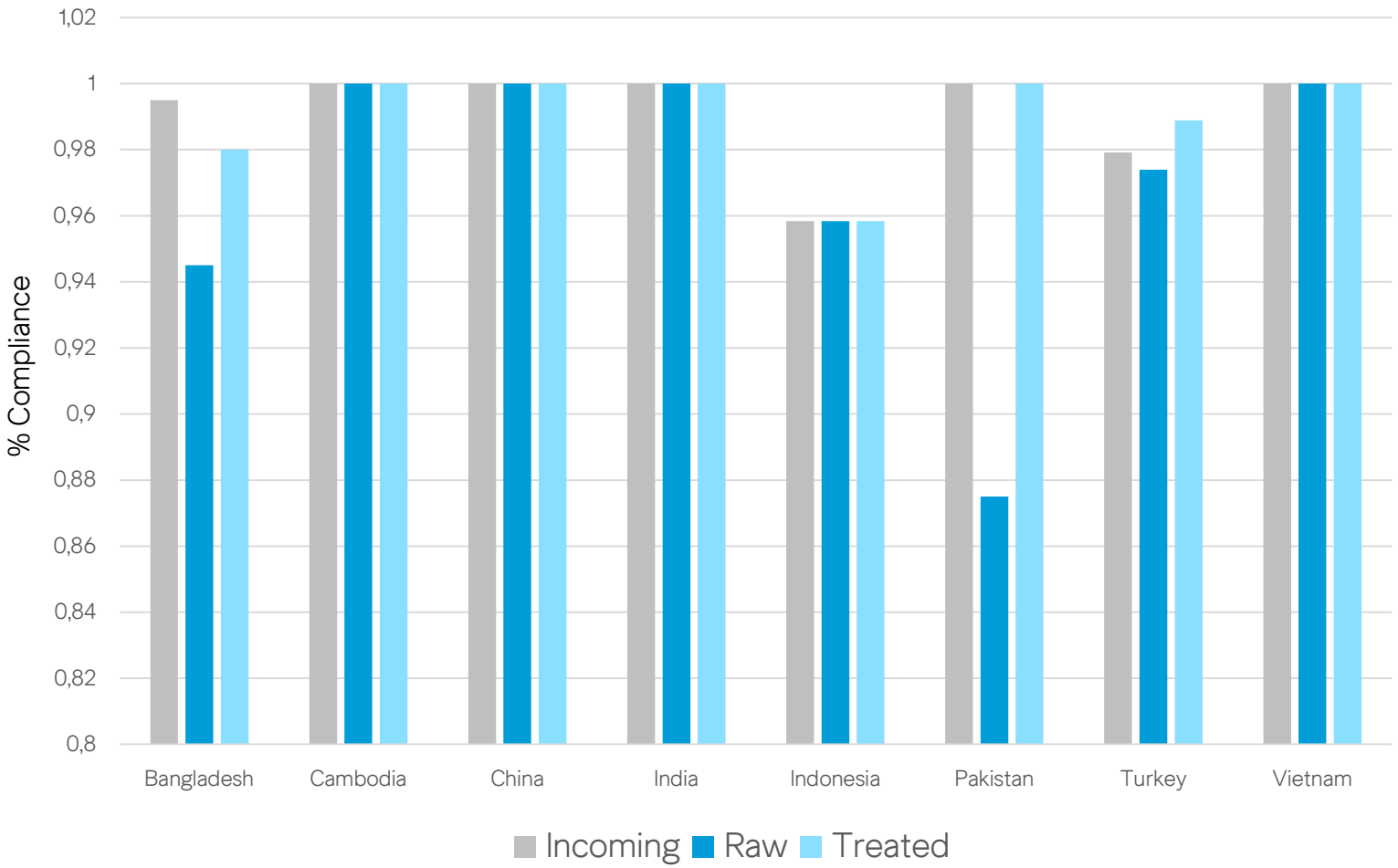


NPEO is the most found among AP & APEOs family.

NPEO is still detected in most regions which suggests that facilities are still using NPEO-containing chemical products even after many brands have banned the use of this chemical group. From our assessment, NPEO has never shown up in the incoming chemical data. This suggest that NPEO comes as impurity contamination or result of non-transparency in chemical industry.

NPEO that was detected in the incoming water was not eliminated in the treated wastewater. This confirm ETP's inability to eliminate NPEO–and after this point, NPEO will re-enter the water systems within the environment.

Halogenated Solvents

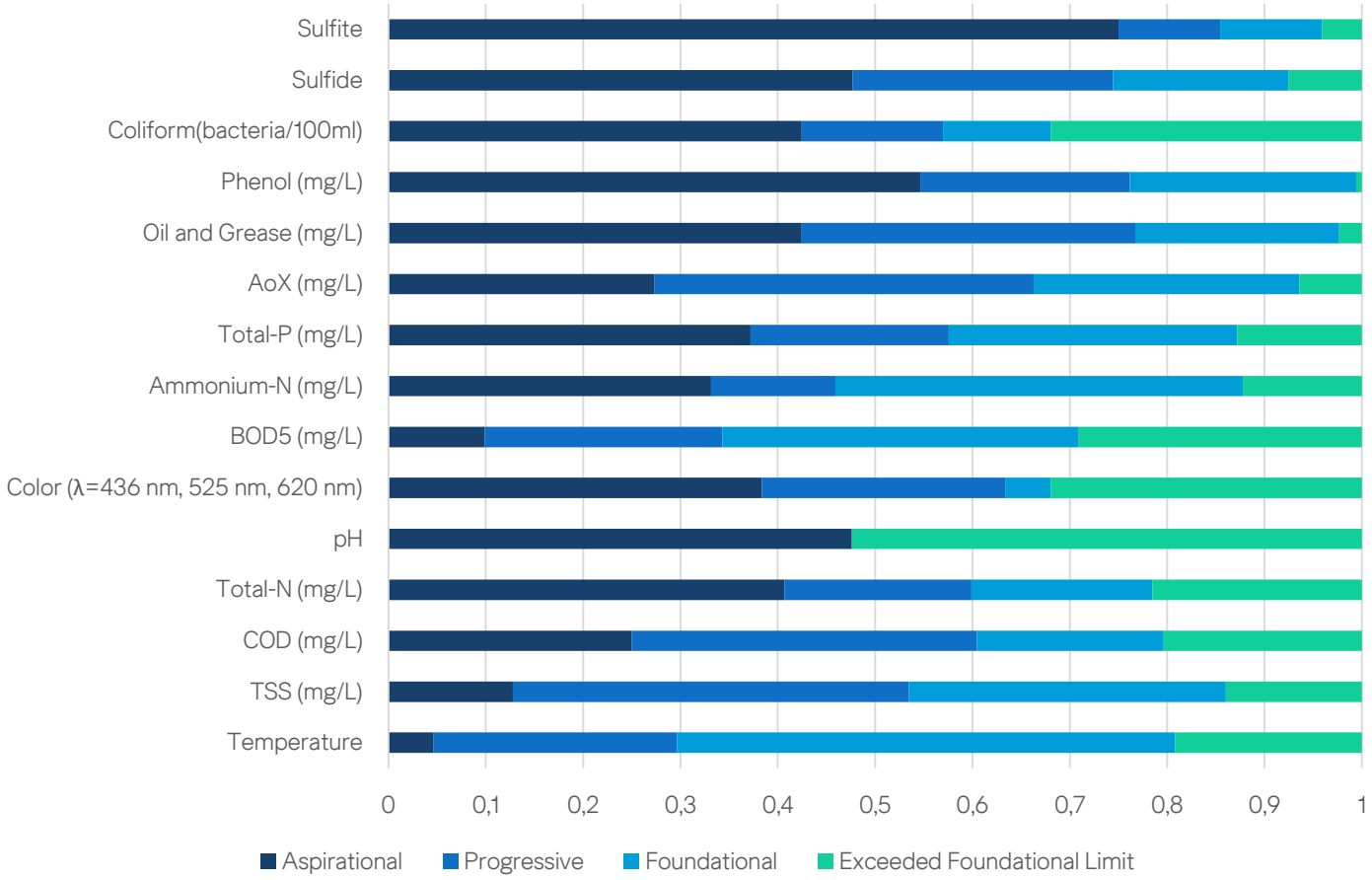


Methylene chloride is the most commonly found analytes in halogenated solvents.

In the cases in Indonesia and Bangladesh, methylene chloride was found in incoming water and it stayed in the water system until treated wastewater which indicates that ETP is unable to eliminate methylene chloride.

Methylene chloride found in incoming water may come from chlorination treatment process of the incoming water from municipalities or it may exist in the surrounding environment as residue from upstream industrial wastewater. Since in Bangladesh and Pakistan, methylene chloride was also find in higher level in raw wastewater, this indicated the use of it in production process–most likely coming from degreasing process in pre-treatment.

Conventional Parameters



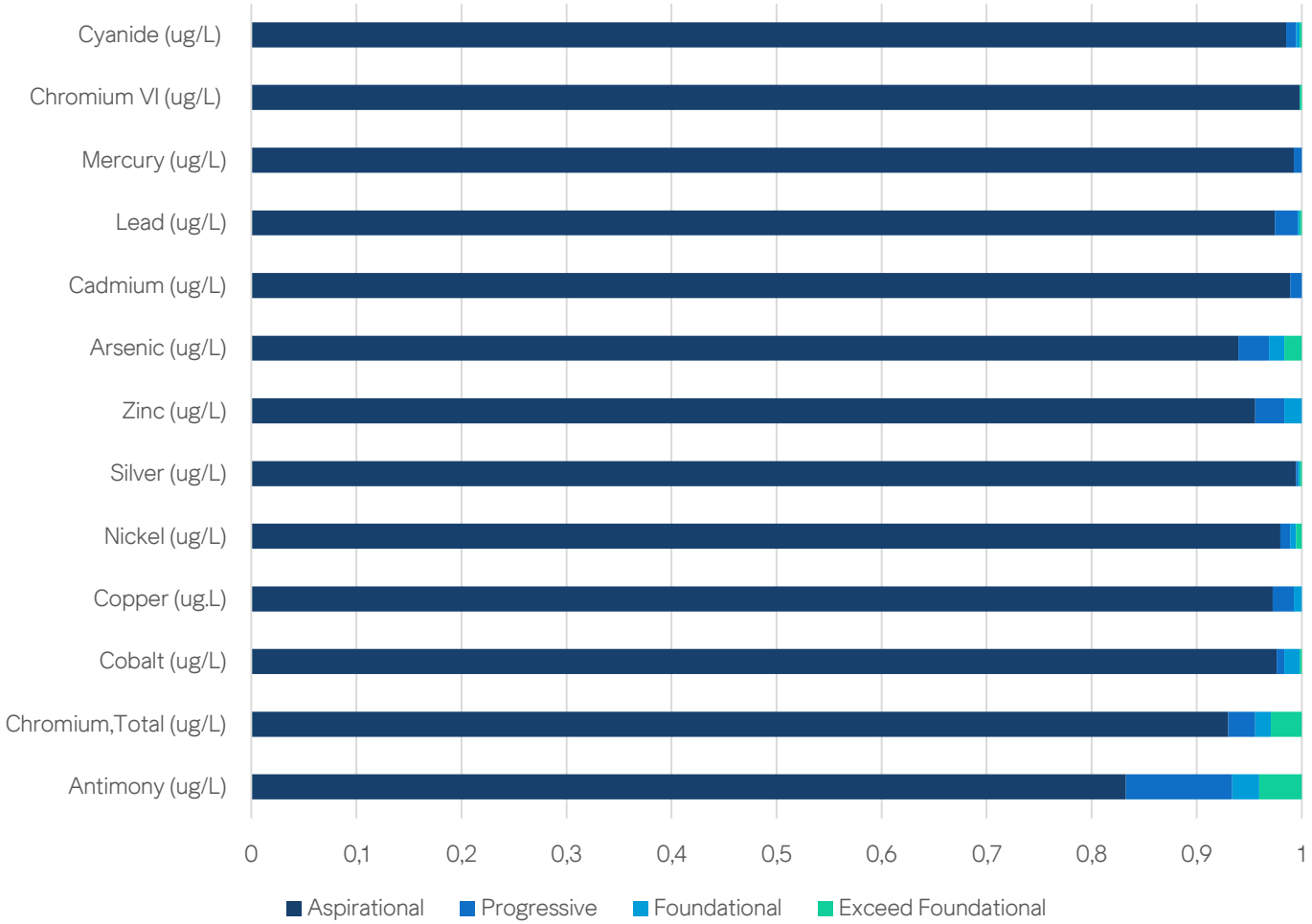
pH, color, coliform and BOD are among those with the highest occurrences of exceeding foundational limits.

Coliform and BOD might be incomplete/inadequate secondary treatments or lower legal standards in many regions.

pH must be assessed in case-by-case situation as it depends on chemicals being used in the ETP systems and these results beyond foundational range is duet to lack of operational control over treatment.

Color might be improved by better implementation of chemical precipitation, advanced oxidation or application of decoloring agents.

Heavy Metals Parameters



Antimony, chromium and arsenic continue to be
the heavy metals that exceeded foundational levels.

Antimony is currently still used as raw material for polyester production. As apparel industry, we are heavily reliant on the upstream polyester industry to make this changes in eliminating antimony.

Chromium and arsenic can be attributed from dyes and we are in power to continue our influence on chemical industry to eliminate the uses of these heavy metals in dye production.

Next Steps from H&M

- Input Chemical Management: From our results, it shows that chemicals in MRSL cannot be eliminated by ETP. Therefore, we must enforce more control in input chemicals management. We analyze and compare wastewater data with our input chemicals data, managed through Environmental Emission Evaluator (E3) by Bureau Veritas. With this tool, we can ensure the utilization ZDHC MRSL compliant chemical products from ZDHC Gateway, our H&M Positive List and BV reviewed chemicals.
- General Chemicals and Colorants: Based on our data from input chemicals, many of the findings may come from impurities in general chemicals or commodities and colorants. We are supporting the development of a method to better assess these classes of chemicals.
- Safer Chemistry Task Team: In 2019 we have entrusted ZDHC Foundation as the owner and driver of the Safer Chemistry task team with Screened Chemistry as its framework. This work is to drive more transparency and traceability in the industry to achieve clean production.
- ZDHC Gateway Wastewater Module: We are working with other brands to enhance the visibility in ZDHC Gateway Wastewater Module to further analyze our results as an industry. From this analyses, we can better identify the hotspots in the industry and our next steps forwards, whether through public policy or industry stakeholder engagement and improvement of our programs.
- ETP Functionality: At H&M, we fully assess all our on-site ETP with our own team. This is to ensure that all ETP are functioning optimally to protect the environment. Even with these efforts, our results still show some discrepancy and this shows the need to further strengthen our program to optimize wastewater quality.
- Public Policy and Stakeholder Engagements: We will continue at both local and global level to engage our partners in setting higher environmental standards and safer practices to eliminate hazardous chemicals. As our results have shown, many of the findings come from incoming water–which indicates issues further upstream. Our conventional parameters results also shows that loose local standards may impact our performance to achieve clean production.

Appendix 1: Conventional Parameters

Table 1:

Conventional parameters showing foundational, progressive, and aspirational limits; and the standard test methods for measurement.

It is expected that suppliers will use the standard methods that best apply to their region. When reporting data, state the standard test methods used to obtain the data.

Sum parameters + metals (mg/L unless otherwise noted)	Limits			Standard Test Method			
	Foundational	Progressive	Aspirational	ISO	European Union	United States	China
Temperature [°C] *	Δ15 / max. 35	Δ10 or 30	Δ5 or 25	No standard		USEPA 170.1	GB/T 13195
TSS	50	15	5	ISO 11923		USEPA 160.2, APHA 2540D	GB/T 11901
COD	150	80	40	ISO 6060**		USEPA 410.4, APHA 5220D**	GB/T 11914**
Total-N	20	10	5	ISO 5663, ISO 29441		USEPA 351.2, APHA 4500P-J, APHA 4500N-C	HJ 636, GB 11891
pH	6-9			ISO 10523	EN ISO 10523	USEPA 150.1	GB/T 6920
Colour [m⁻¹] (436nm; 525; 620nm)	7; 5; 3	5; 3; 2	2; 1; 1	ISO 7887-B	-	-	-
BOD_5	30	15	5	ISO 5815-1, -2 (5 days)	EN 1899-1 (5days)	USEPA 405.1 (5 days), APHA 5210B (5 days)	HJ 505
Ammonium-N	10	1	0.5	ISO 11732, ISO 7150	EN ISO 11732	USEPA 350.1, APHA 4500 NH_3-N	HJ 535, HJ 536
Total-P	3	0.5	0.1	ISO 11885, ISO 6878	EN ISO 11885	USEPA 365.4, APHA 4500P-J	GB/T 11893
AOX	5	1	0.1	ISO 9562	EN ISO 9563	USEPA 1650	HJ/T 83-2001
Oil and Grease	10	2	0.5	ISO 9377-2	EN ISO 9377-2	USEPA 1664	HJ 637
Phenol	0.5	0.01	0.001	ISO 14402	EN ISO 14402	APHA 5530 B, C&D	HJ 503
Coliform [bacteria/100 ml]	400	100	25	ISO 9308-1	EN ISO 9308-1	USEPA 9132	GB/T 5750.12
Persistent Foam	Not visible			N/A			
Anions							
Cyanide	0.2	0.1	0.05	ISO 6703-1,2,-3, ISO 14403-1,-2		USEPA 335.2, APHA 4500-CN	HJ 484
Sulfide	0.5	0.05	0.01	ISO 10530		APHA 4500-S2-D	GB/T 16489
Sulfite	2	0.5	0.2	ISO 10304-3	EN ISO 10304-3	USEPA 377.1	**
Metals							
Antimony***	0.1	0.05	0.01	ISO 11885	EN ISO 11885	USEPA 200.7, USEPA 200.8, USEPA 6010c, USEPA 6020a	GB7475, HJ700
Chromium, total	0.2	0.1	0.05				GB 7466, HJ700
Cobalt	0.05	0.02	0.01				HJ700
Copper	1	0.5	0.25				GB7475, HJ700
Nickel	0.2	0.1	0.05				GB 11907, HJ700
Silver	0.1	0.05	0.005				GB11907,HJ700
Zinc	5.0	1.0	0.5				GB 7472, GB 7475, HJ 700
Arsenic	0.05	0.01	0.005	ISO 11885	EN ISO 11885	USEPA 200.7, USEPA 200.8, USEPA 6010c, USEPA 6020a	GB7475, HJ700
Cadmium	0.1	0.05	0.01	ISO 11885	EN ISO 11885	USEPA 200.7, USEPA 200.8, USEPA 6010c, USEPA 6020a	GB7475, HJ700
Chromium (VI)	0.05	0.005	0.001	ISO 18412	EN ISO 18412	USEPA 218.6	GB 7467
Lead	0.1	0.05	0.01	ISO 11885	EN ISO 11885	USEPA 200.7, USEPA 200.8, USEPA 6010c, USEPA 6020a	GB7475, HJ700
Mercury	0.01	0.005	0.001	ISO 12846 or ISO 17852	EN ISO 18412 or ISO 17852	USEPA 200.7, USEPA 200.8, USEPA 6010c, USEPA 6020a	HJ 597

*Degrees above ambient temperature of receiving water body.

** validated cuvette methods can be used alternatively

*** we aknowledge that for polyester production it will take time to reach this limit.

According to ZDHC Wastewater Guideline 2016

Appendix 2: ZDHC MRSL Parameters

Table 2A:

Alkylphenol (AP) and Alkylphenol Ethoxylates (APEOs): Including All Isomers

Reporting limits mentioned in the following tables apply to each single chemical substance of the respective substance group

Substance or Substance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
Nonylphenol (NP), mixed isomers	104-40-5 11066-49-2 25154-52-3 84852-15-3	5	NP/OP: ISO 18857 -2 (modified dichloromethane extraction) or ASTM D7065 (GC/MS or LC/MS(-MS) OPEO/NPEO (n>2): ISO 18254-1 OPEO/NPEO (n=1,2): ISO 18857-2 or ASTM D7065
Octylphenol (OP), mixed isomers	140-66-9 1806-26-4 27193-28-8		
Octylphenol ethoxylates (OPEO)	9002-93-1 9036-19-5 68987-90-6		
Nonylphenol ethoxylates (NPEO)	9016-45-9 26027-38-3 37205-87-1 68412-54-4 127087-87-0		

Table 2B:

Chlorobenzenes and Chlorotoluenes

Substance or Substance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
Monochlorobenzene	108-90-7	0,2	USEPA 8260B, 8270D. Dichloromethane extraction followed by GC/MS
1,2-Dichlorobenzene	95-50-1		
1,3-Dichlorobenzene	541-73-1		
1,4-Dichlorobenzene	106-46-7		
1,2,3-Trichlorobenzene	87-61-6		
1,2,4-Trichlorobenzene	120-82-1		
1,3,5-Trichlorobenzene	108-70-3		
1,2,3,4-Tetrachlorobenzene	634-66-2		
1,2,3,5-Tetrachlorobenzene	634-90-2		
1,2,4,5-Tetrachlorobenzene	95-94-3		
Pentachlorobenzene	608-93-5		
Hexachlorobenzene	118-74-1		
2-Chlorotoluene	95-49-8		
3-Chlorotoluene	108-41-8		
4-Chlorotoluene	106-43-4		
2,3-Dichlorotoluene	32768-54-0		
2,4-Dichlorotoluene	95-73-8		
2,5-Dichlorotoluene	19398-61-9		
2,6-Dichlorotoluene	118-69-4		
3,4-Dichlorotoluene	95-75-0		
3,5-Dichlorotoluene	25186-47-4		
2,3,4-Trichlorotoluene	7359-72-0		
2,3,6-Trichlorotoluene	2077-46-5		
2,4,5-Trichlorotoluene	6639-30-1		
2,4,6-Trichlorotoluene	23749-65-7		
3,4,5-Trichlorotoluene	21472-86-6		
2,3,4,5-Tetrachlorotoluene	76057-12-0		
2,3,5,6-Tetrachlorotoluene	29733-70-8		
2,3,4,6-Tetrachlorotoluene	875-40-1		
Pentachlorotoluene	877-11-2		

Appendix 2: ZDHC MRSL Parameters (continued)

Table 2C:

Chlorophenols

Substance or Substance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
2-chlorophenol	95-57-8	0.5	USEPA 8270 D. Solvent extraction, derivatisation with KOH, acetic anhydride followed by GC/MS ISO 14154:2005
3-chlorophenol	108-43-0		
4-chlorophenol	106-48-9		
2,3-dichlorophenol	576-24-9		
2,4-dichlorophenol	120-83-2		
2,5-dichlorophenol	583-78-8		
2,6-dichlorophenol	87-65-0		
3,4-dichlorophenol	95-77-2		
3,5-dichlorophenol	591-35-5		
2,3,4-trichlorophenol	15950-66-0		
2,3,5-trichlorophenol	933-78-8		
2,3,6-trichlorophenol	933-75-5		
2,4,5-trichlorophenol	95-95-4		
2,4,6-trichlorophenol	88-06-2		
3,4,5-trichlorophenol	609-19-8		
2,3,4,5-tetrachlorophenol	4901-51-3		
2,3,4,6-tetrachlorophenol	58-90-2		
2,3,5,6-tetrachlorophenol	935-95-5		
Pentachlorophenol	87-86-5		

Table 2D:

Dyes – Azo (Forming Restricted Amines)

Substance or Substance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
4,4'-methylene-bis-(2-chloro-aniline)	101-14-4	0.1	EN 14362-1 EN 14362-3 Reduction step with Sodiumdithionite, solvent extraction, GC/MS or LC/MS
4,4'-methylenedianiline	101-77-9		
4,4'-oxydianiline	101-80-4		
4-chloroaniline	106-47-8		
3,3'-dimethoxylbenzidine	119-90-4		
3,3'-dimethylbenzidine	119-93-7		
6-methoxy-m-toluidine	120-71-8		
2,4,5-trimethylaniline	137-17-7		
4,4'-thiodianiline	139-65-1		
4-aminoazobenzene	60-09-3		
4-methoxy-m-phenylenediamine	615-05-4		
4,4'-methylene-di-o-toluidine	838-88-0		
2,6-xylidine	87-62-7		
o-anisidine	90-04-0		
2-naphthylamine	91-59-8		
3,3-dichlorobenzidine	91-94-1		
4-aminodiphenyl	92-67-1		
Benzidine	92-87-5		
o-toluidine	95-53-4		
2,4-xylidine	95-68-1		
4-chloro-o-toluidine	95-69-2		
4-methyl-m-phenylene-diamine	95-80-7		
o-aminoazotoluene	97-56-3		
5-nitro-o-toluidine	99-55-8		

Appendix 2: ZDHC MRSL Parameters (continued)

Table 2E:

Dyes – Carcinogenic or Equivalent Concern

Substance or Substance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
C.I. Direct Black 38	1937-37-7	500	Liquid extraction, LC/MS
C.I. Direct Blue 6	2602-46-2		
C.I. Acid Red 26	3761-53-3		
C.I. Basic Red 9	569-61-9		
C.I. Direct Red 28	573-58-0		
C.I. Basic Violet 14	632-99-5		
C.I. Disperse Blue 1	2475-45-8		
C.I. Disperse Blue 3	2475-46-9		
C.I. Basic Blue 26 (with Michler's Ketone > 0.1%)	2580-56-5		
C.I. Basic Green 4 (malachite green chloride)	569-64-2		
C.I. Basic Green 4 (malachite green oxalate)	2437-29-8		
C.I. Basic Green 4 (malachite green)	10309-95-2		
Disperse Orange 11	82-28-0		

Table 2F:

Dyes – Disperse (Sensitizing)

Substance or Substance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
Disperse Yellow 1	119-15-3	50	Liquid extraction, LC/MS
Disperse Blue 102	12222-97-8		
Disperse Blue 106	12223-01-7		
Disperse Yellow 39	12236-29-2		
Disperse Orange 37/59/76	13301-61-6		
Disperse Brown 1	23355-64-8		
Disperse Orange 1	2581-69-3		
Disperse Yellow 3	2832-40-8		
Disperse Red 11	2872-48-2		
Disperse Red 1	2872-52-8		
Disperse Red 17	3179-89-3		
Disperse Blue 7	3179-90-6		
Disperse Blue 26	3860-63-7		
Disperse Yellow 49	54824-37-2		
Disperse Blue 35	12222-75-2		
Disperse Blue 124	61951-51-7		
Disperse Yellow 9	6373-73-5		
Disperse Orange 3	730-40-5		
Disperse Blue 35	56524-77-7		

Appendix 2: ZDHC MRSL Parameters (continued)

Table 2G:

Flame Retardants

Substance or Substance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
Tris(2-chloroethyl)phosphate (TCEP)	115-96-8	5	US EPA 8270 ISO 22032, USEPA 527 and USEPA 8321B. Dichloromethane extraction GC/MS or LC/MS(-MS)
Decabromodiphenyl ether (DecaBDE)	1163-19-5		
Tris(2,3,-dibromopropyl)-phosphate (TRIS)	126-72-7		
Pentabromodiphenyl ether (PentaBDE)	32534-81-9		
Octabromodiphenyl ether (OctaBDE)	32536-52-0		
Bis(2,3-dibromopropyl)phosphate (BIS)	5412-25-9		
Tris(1-aziridinyl)phosphine oxide) (TEPA)	545-55-1		
Polybromobiphenyls (PBB)	59536-65-1		
Tetrabromobisphenol A (TBBPA)	79-94-7		
Hexabromocyclododecane (HBCDD)	3194-55-6		
2,2-bis(bromomethyl)-1,3-propane-diol (BBMP)	3296-90-0		
Tris(1,3-dichloro-isopropyl) phosphate (TDCP)	13674-87-8		
Short-chain chlorinated Paraffins (SCCP) (C10-C13)	85535-84-8		

Table 2H:

Glycols

Substance or Substance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
Bis(2-methoxyethyl)-ether	111-96-6	50	US EPA 8270 Liquid extraction, LC/MS GC-MS
2-ethoxyethanol	110-80-5		
2-ethoxyethyl acetate	111-15-9		
Ethylene glycol dimethyl ether	110-71-4		
2-methoxyethanol	109-86-4		
2-methoxyethylacetate	110-49-6		
2-methoxypropylacetate	70657-70-4		
Triethylene glycol dimethyl ether	112-49-2		

Table 2I:

Halogenated Solvents

Substance or Sub-stance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
1,2-dichloroethane	107-06-2	1	USEPA 8260B Headspace GC/MS or Purge-and-Trap-GC/MS
Methylene chloride	75-09-2		
Trichloroethylene	79-01-6		
Tetrachloroethylene 127-18-4			

Table 2J:

Organotin Compounds

Substance or Sub-stance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
Mono-, di- and tri-methyltin derivatives		0.01	ISO 17353 Derivatisation with NaB(C2H5) GC/MS
Mono-, di- and tri-butyltin derivatives	Multiple		
Mono-, di- and tri-phenyltin derivatives	Multiple		
Mono-, di- and tri-octyltin derivatives	Multiple		

Table 2K:

Perfluorinated and Polyfluorinated Chemicals (PFCs)

Substance or Sub-stance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
PFOS	355.46-4, 432-50-7	0.01	DIN 38407-42 (modified) Ionic PFC: Concentration or direct injection, LC/MS(-MS); Non-ionic PFC (FTOH): derivatisation with acetic anhydride followed by GC/MS
PFOA	335-67-1		
PFBS	29420-49-3, 29420-43-3		
PFHxA	307-24-4		
8:2 FTOH	678-39-7	1	
6:2 FTOH	647-42-7		

Appendix 2: ZDHC MRSL Parameters (continued)

Table 2L:

Otho-Phthalates – Including all ortho esters of phthalic acid

Substance or Substance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
Di(ethylhexyl) phthalate (DEHP)	117-81-7	10	US EPA 8270D, ISO 18856 Dichloromethane extraction GC/MS
Bis(2-methoxyethyl) phthalate (DMEP)	117-82-8		
Di-n-octyl phthalate (DNOP)	117-84-0		
Di-iso-decyl phthalate (DIDP)	26761-40-0		
Di-isononyl phthalate (DINP)	28553-12-0		
Di-n-hexyl phthalate (DnHP)	84-75-3		
Dibutyl phthalate (DBP)	84-74-2		
Butyl benzyl phthalate (BBP)	85-68-7		
Dinonyl phthalate (DNP)	84-76-4		
Diethyl phthalate (DEP)	84-66-2		
Di-n-propyl phthalate (DPRP)	131-16-8		
Di-isobutyl phthalate (DIBP)	84-69-5		
Di-cyclohexyl phthalate (DCHP)	84-61-7		
Di-iso-octyl phthalate (DIOP)	27554-26-3		
1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	68515-42-4		
1,2-benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)	71888-89-6		

Table 2M:

Polycyclic Aromatic Hydrocarbons (PAHs)

Substance or Sub-stance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
Benzo[a]pyrene (BaP)	50-32-8	1	US EPA 8270 DIN 38407-39 Solvent extraction GC/MS
Anthracene	120-12-7		
Pyrene	129-00-0		
Benzo[ghi]perylene	191-24-2		
Benzo[e]pyrene	192-97-2		
Indeno[1,2,3-cd]pyrene	193-39-5		
Benzo[j]fluoranthene	205-82-3		
Benzo[b]fluoranthene	205-99-2		
Fluoranthene	206-44-0		
Benzo[k]fluoranthene	207-08-9		
Acenaphthylene	208-96-8		
Chrysene	218-01-9		
Dibenz[a,h]anthracene	53-70-3		
Benzo[a]anthracene	56-55-3		
Acenaphthene	83-32-9		
Phenanthrene	85-01-8		
Fluorene	86-73-7		
Naphthalene	91-20-3		

Table 2N:

Volatile Organic Compounds (VOC)

Substance or Sub-stance Group	CAS	Reporting Limit (µg/L)	Standard Test Method
Benzene	71-43-2	1	ISO 11423-1 Headspace- or Purge-and-Trap-GC/MS US EPA 8260
Xylene	1330-20-7		
o-cresol	95-48-7		
p-cresol	106-44-5		
m-cresol	108-39-4		