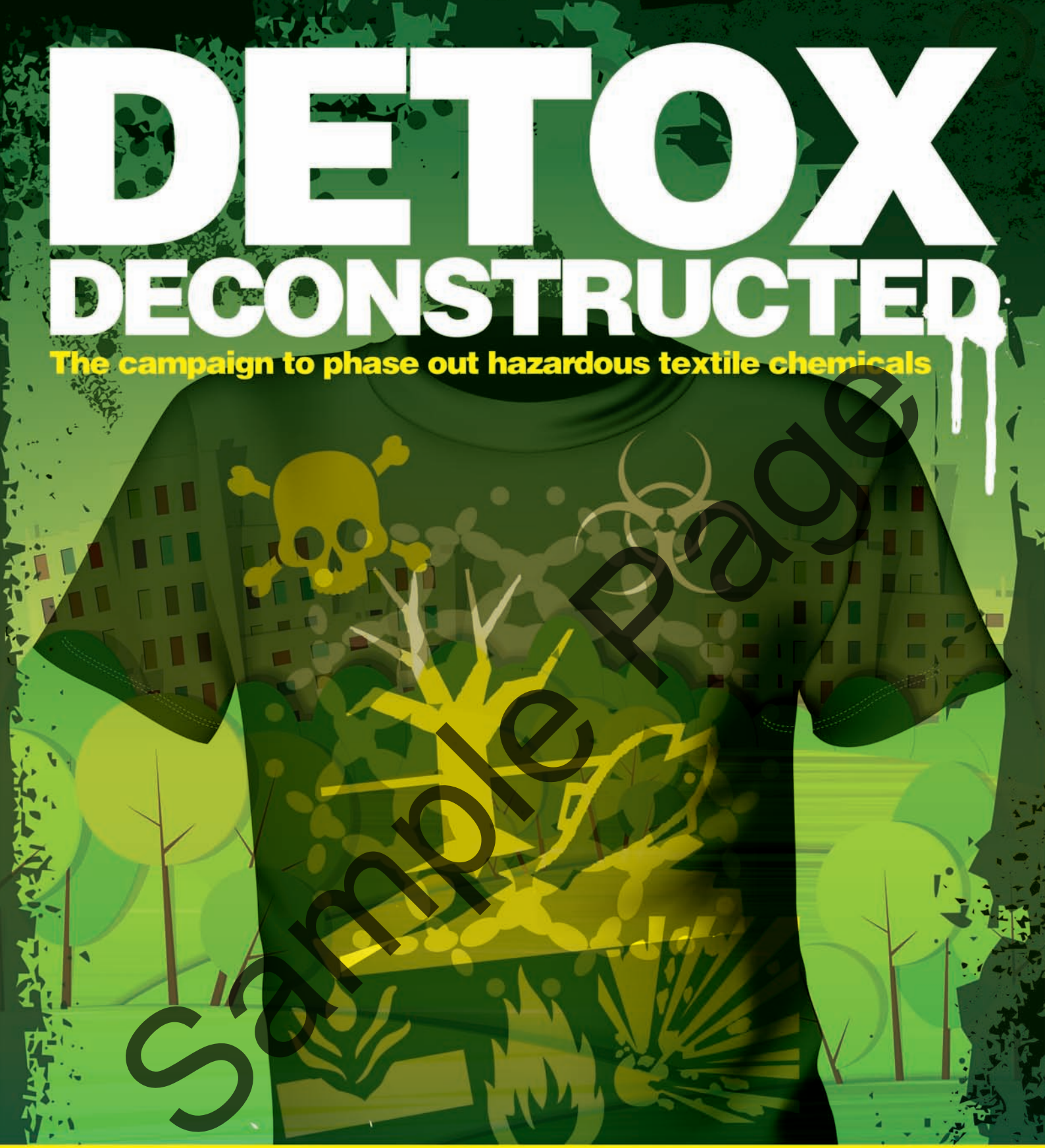
DETOX DECONSTRUCTED

The campaign to phase out hazardous textile chemicals



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A technical guide and best practice advice

From the publishers of ECOTEXTILE NEWS

Executive summary

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This report examines the problem of potentially hazardous chemicals used in the manufacture of textiles. The potential risks posed by chemicals used in the textile industry are well known, and it's certainly the case that the more responsible and enlightened apparel brands have long-since had chemicals management policies, including restricted substances lists (RSLs), in place in order to manage these risks. Many brands are also signed up to voluntary standards which place limits and restrictions on the use of certain chemicals.

But do these policies and voluntary standards go far enough? Is the apparel industry as a whole doing enough, and is it treating this issue with the urgency that is required? The simple answer to this question as far as direct action pressure group, Greenpeace, is concerned is no. In 2011, Greenpeace launched its 'Detox Campaign' which aims to halt the use of potentially toxic chemicals in the global textile industry by 2020. The campaign has centred on a series of in-depth research reports from textile manufacturing hubs around the world, including China and Indonesia.

In these places, Greenpeace has tested for the presence of chemicals such as nonylphenol ethoxylates (NPEs), phthalates, per- and polyfluorinated chemicals (PFCs) and antimony. As well as suggesting that the suppliers of leading clothing brands are allowing these chemicals to be released into the environment at harmful levels in these manufacturing countries, the reports have also said that the chemicals are being found in clothing items purchased by Western consumers at potentially hazardous levels. Consequently, Greenpeace has argued that the apparel industry needs to completely eliminate the presence of 11 specific, potentially hazardous chemicals.

Is this possible? This central question underpins *Detox Deconstructed*. After looking at the work of Greenpeace and the ZDHC Group – which was set up by brands in response to Greenpeace – we have contacted, individually, 20 Greenpeace Detox 'signatories' to look at the challenges they are facing as they attempt to adhere to Greenpeace's ambitious demands. We are far from convinced that the current demands laid out by Greenpeace are realistic within the framework of a 2020 deadline. This is certainly true for some of the brands that have signed up to meet them – brands which, hitherto, had not been particularly proactive on chemicals management. Indeed, based on experience and knowledge of the hugely complex global textile industry, our own feeling has always been that the achievement of 'zero' discharge is unattainable – although that is not to disparage Greenpeace's campaign which has done a great deal to focus industry minds on this critical issue.

Elementary problems

In this chapter, we briefly outline the 9+2 'chemicals of concern' highlighted by Greenpeace in its original '*Dirty Laundry*' report and look at how and why they are a problem, what they are being used for, and what – if any – alternatives are available.

It's clear that responsible brands and retailers should be already meeting their legal obligations on these chemicals, but is questionable whether some of them can be removed completely.

The use of alkylphenol ethoxylates (APEOs) has been badly managed by the textile sector over the years, and with APEO-free products now becoming increasingly available it should in theory be possible to eliminate these from supply chains. However, the same cannot be said of perfluorinated chemicals used for water, stain and oil repellence. There is currently no effective direct replacement for 'C8'-based PFCs that have the same level of performance.

As we went to press, moves were being made by the Swedish government that could herald a new chapter in chemical management in Europe where existing environmental legislation is challenged by governments. Here, the Swedish government has initiated legal action against the European Commission in a bid to speed up legislation that could outlaw the sale and import of consumer products – such as textiles – that have trace amounts of chemicals known as endocrine disruptors.

It's likely that campaigns by NGOs, such as Greenpeace, together with increasing press coverage of environmental issues on various platforms, will serve to create pressure on some governments via greater consumer awareness.

Retailers, brands and the global textile industry therefore need to take a hard look at the following types of chemistry (table below) to heavily restrict

	Natural fibres	Synthetic fibres	Natural and synthetic blends	Artificial leather with fibre backing	Natural leather	Plastic, rubber, paint and coatings	Natural materials (e.g., paper, wood)	Metal	Fusing, padding, feather and down
AP / APEO	●	●	●	●	●	●			●
AZO	●	●	●		●				
Chlorinated Organic Carriers		●	●						
Chloroparaffins (SCCP and MCCP)					●				
Flame Retardants	If special finish								
Metals, extractable	●		●		●				
Metals, total				●		●		●	
Nickel release								●	
Perflurooctane Sulfonate (PFOS) and PFOS-related substances Perfluorooctane Acid (PFOA) and its salts	If water-repellent finish								
Phenols	●		●		●		●		●
Phthalates				●		●			
Tin Organic Compounds				●		●			

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their use or adopt new alternatives. The one caveat here is that not all environmental R&D budgets (if there is one) should be directed against these substances alone, as there are also other – probably bigger – environmental problems faced by the global textile sector and the assessment of risk should also be an important consideration.

RSL Test	Cotton, Linen	Viscose, Tencel	Cotton/ PES Viscose / PES	Wool & hair fibres	Wool / PES	Silk	Polyester	Polyamide	Natural leather	Acrylic	Acetate	Pigment Dye/ Print	Reactive Print	Plastisol Print	Mock Leather	Metal - Zips etc.
Azo dyes	Black	Black	Black													
Disperse dyes								Pale		Pale						
APEOs																
Organotins																
Chlorinated Phenols																
Mercury	Cotton															
Moothproofing agents																
PFOS/PFOA	Where PFC finish applied															
Dye carriers																
Chrome VI				Black Nay	Black Navy											
Organic Solvents																
Biocidal finishes	Where Biocidal finish applied															
Dimethyl fumurate																
Flame detardants	Where FR finihs applied															
Phthalates																
Formaldehyde	Easy care			Dark					Dark							
Pesticides	Easy care															
pH	Childrenswear and intimates															
Cadium												Red, Orange, Yellow		Red, Orange, Yellow		
Nickel	Bright Green/ Turq	Bright Green/ Turq	Bright Green/ Turq			Bright Green/ Turq						Bright Green/ Turq	Bright Green/ Turq	Bright Green/ Turq		
Antimony																
Lead																
Copper	Bright Green/ Turq	Bright Green/ Turq	Bright Green/ Turq			Bright Green/ Turq						Bright Green/ Turq	Bright Green/ Turq	Bright Green/ Turq		
Chromium																
SCCPs																

= Area of high risk

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Testing times

Testing for potentially hazardous chemicals is a far from black and white issue, with similar tests for the same product often throwing up contradictory results. Ultimately, forming deep, long-term relationships with reputable chemical suppliers which have shown a consistent ability to comply with stringent testing standards is probably the only sure-fire way to reduce testing frequency and brand damage and, of course, lessen the environmental impact.

The standard testing procedures for the eleven chemical groups of concern flagged up in this report are fairly straightforward when it comes to fabric or garment testing at currently accepted limits. A variety of standardised test methods are used widely in the industry, yet the quest for zero discharge also requires internationally agreed test protocols for effluent discharge and emissions to air from textile production. This is a much more challenging area.

As we mention in our opening chapter, the Greenpeace campaign has so far sampled traces of chemicals in textile waste water discharge, fabrics from commercially available clothing, and it has also measured emissions to air of some volatile substances.

Yet although there are standard procedures to measure pollutants in air and water, for example the US EPA approves sampling procedures and analytical methods used to determine pollutants in wastewater to issue permits under the Clean Water Act (CWA); there is no universally accepted protocol for accurately testing the trace amounts of the eleven 'detox' chemicals of concern in developing countries – which is where most textiles are produced.

To a lesser extent, it's also the same in terms of fabric testing where during the course of the Greenpeace Detox campaign there have been claims and counter-claims about the exact nature of these procedures.

Most notably, controversy on product testing erupted in 2013 when the German Federal Environment Agency (UBA), which used the laboratories at the Fresenius University of Applied Sciences, found traces of PFOA and PFOS on clothing from a variety of brands and retailers.

At the time, The North Face, one of the brands flagged up by Greenpeace, said the test results did not agree with its own findings and were not even reflective of the chemistry used in the manufacture of the tested jacket.

The US brand said: "The UBA test results are not in line with the (latest) testing that either the independent laboratory, or the chemical supplier carried out on the same product.

"We have reviewed the UBA findings in great detail, together with our chemistry supplier. Findings of extremely low concentrations of PFPeA, PFNA and PFUnA are not in line with the chemistry used to make this product. Detecting extremely low levels of PFCs is very complicated due to the high possibility of external influences on the laboratory and equipment process."

Perhaps highlighting the difficulties of a risk-based testing approach, the US brand said the trace amount of the three chemicals found in the UBA study were down to residual contamination within the laboratory from prior product analyses, and should be 'excluded from any conclusions'.
The North Face also claimed: "No trace of these

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A price worth paying

Textile dyes are not manufactured using cost-prohibitive fine chemicals, which means contaminents are much more likely. But with price volatility in the dyestuff sector, it is time for brands to pay a fair price to suppliers to minimise risks to consumers and the environment.

Supply chain transparency in the textile chemical sector is a huge challenge when it comes to the intermediate chemicals and raw materials that make up these specialist products.

These chemicals are obviously designed for use in industrial processes and not in high-grade applications such as pharmaceuticals, for example, where 'fine chemicals' are used. Therefore the required level of refinement to rid textile dyes and chemicals of impurities during production is much lower than in products applied direct to the skin or in chemicals that are ingested – such as drugs and skin creams.

Costs

This is reflected in the cost of these products. Pharmaceutical raw materials and intermediates known as 'fine chemicals' are expensive, whereas commodity and specialty chemicals for the textile industry are relatively cheap and are produced in much higher volumes. Hence the costs of these commodities can fluctuate widely based on market supply and demand.

As a consequence, the supply chain for fine chemicals is much more transparent since these products are mainly custom manufactured although they are also used as starting materials for specialty chemicals.

From here, in the more commoditised markets, the supply chain often gets less transparent with inevitable consequences for the environment. This has been illustrated in 2013/2014 with the closure of Chinese intermediate chemicals suppliers due to environmental transgressions resulting in higher textile dye prices as raw materials and intermediates become scarce.

In summer 2013, Disperse blue 56 was selling to UK end users at around £4 – 5 per kilo. By summer 2014, prices to buy the same dye were in the region of £15 per kilo: a 300 per cent rise.

When the new, higher costs of these dyes cannot be passed on to retailers, smaller fabric suppliers often move to lower cost commodity products and technology, which often creates non-compliance headaches in terms of colour, performance, environmental impact and also delivery times.

This non-compliance can add much more in terms of financial cost than the dollar savings seen by using sub-standard low costs dyes, and is obviously a ludicrous situation. Yet despite some in the industry bemoaning the current high costs of dyestuffs, today's prices are in fact still very low compared to 20 years ago.

In the medium-term, the textile supply chain will likely get used to this new upward price adjustment and dye prices will likely stabilise at or around the current level in some cases. Yet wide fluctuations do still occur and as we go to press, European buyers tell us they are seeing a 5 – 10 per cent increases on certain textile dyes every week.

To improve the transparency of the textile chemicals supply chain, retailers should accept that paying higher prices for dyes from reputable suppliers is one way to improve the green credentials of their sourcing strategies.

Yet retailers are often still a long way from the intermediate suppliers and dye price rises can take 12 – 18 months to have an effect due to

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binding price contracts in the case of very large brands that consume vast quantities of dyestuffs via their supply chains.

In addition, because textile dyes are not manufactured with cost-prohibitive fine chemicals, then impurities and contaminants are pretty much inevitable due to the way textile dyes are traded – which is something that NGOs such as Greenpeace really do not want to hear.

Neither do we. But this is how the textile sector operates today. So the task is now to lobby brands to procure responsibly and also pay a fair price to minimise this inevitable risk to both consumers and the environment. ○

Can zero mean zero?

Is complete supply chain transparency in the textile manufacturing industry a realistic goal or a pipe dream? Can we ever achieve zero discharge? We put this question and other issues to Dr Volker Schröder of TEGEWA and Dr Pierfrancesco Fois of ETAD.

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Can ETAD/TEGEWA suggest alternative chemistries that can replace each of the Detox 11 chemicals of concern identified by Greenpeace?

Textile chemicals are in nearly all cases textile auxiliary and colorant formulations. Most of the substances from the mentioned 11 substance groups that Greenpeace intend to ban have no function in textile processing and therefore do not need to be "replaced". In fact, it is necessary to monitor their presence as contaminants in textile chemicals formulations and to minimise their concentrations in the commercial products.

Most of the other substances were phased out from intentional use in the products of our member companies many years ago. Therefore, in many cases alternative textile auxiliary and colorant formulations can already be provided by chemical companies if the specific use of the product, the application conditions and the technical requirements are known.

As regards to azo-dyes which can potentially cleave to carcinogenic aromatic amines, ETAD/TEGEWA member companies have long since been providing alternative products in the framework of many existing voluntary standards.

Other chemicals in the list which might be of concern for dyes are only present as impurities. The members of the two associations have in-house systems to monitor the level of such impurities and guarantee that they are not present in concentrations of concern. Accordingly, each dye-manufacturing ETAD member has a constantly updated company-specific list of products compliant with certain standards. Similar lists are provided by TEGEWA members for general textile auxiliaries. These lists are available on request at the single companies.

However, in the case of fluorinated polymers TEGEWA members fundamentally disagree with the Greenpeace approach. While it goes without saying that impurities such as PFOA and PFOS have to be avoided, it should be clear as well that fluorinated polymers for durable water and stain repellency from our member companies are safe in view of workers' and consumers' health and the environment.

Are ETAD/TEGEWA members working with brands to develop drop-in replacement chemistry?

At the moment there are no specific collaboration projects. There are, on the other hand, companies