

# LEVI STRAUSS & CO.'S PHASE OUT OF ALKYLPHENOL ETHOXYLATES (APEOS)

APRIL 2013, APPENDED JUNE 2013

## A PROVEN TRACK RECORD OF DRIVING CHANGE

Levi Strauss & Co. has a proven and longstanding track-record of working toward the elimination of harmful chemicals in its supply chain.

We were one of the first companies in our industry to establish a [Restricted Substances List](#) (RSL); identifying the chemicals we will not allow to be used in our products or in the production process due to their potential impact on consumers, workers and the environment. Every six months, the RSL is updated taking into consideration the latest science, global regulatory change, and industry best practice.

Building on our RSL, Levi Strauss & Co. joined the [Joint Roadmap Toward Zero Discharge of Hazardous Chemicals](#) (ZDHC), an apparel industry collaboration to drive systemic change with a goal of zero discharge of hazardous chemicals by 2020. Based on our years of experience with the RSL and supply chain compliance, we believe this collaborative approach to chemicals management is the most effective way to achieve the scope and scale necessary to meet the goal of zero discharge in the apparel industry. Read our commitment to zero discharge [here](#). We are also supporting our goal of zero discharge by 2020 through a specific company action plan, which you can read more about [here](#).

## ELIMINATION OF ALKYLPHENOL ETHOXYLATES (APEOS) IN OUR GLOBAL SUPPLY CHAIN

The elimination of APEOs across our supply chain is a key success metric for Levi Strauss & Co.'s individual action plan toward zero discharge of hazardous chemicals. Levi Strauss & Co. is sourcing from about 630 facilities in 45 countries globally, so this is a significant commitment and a challenge to ensure compliance and understanding by suppliers when the regulatory

environment in all these countries does not align with Levi Strauss & Co.'s prohibition on APEO use.

We understand that there are multiple supply-chain pathways for potential APEO contamination (including chemical formulations) and we are committed to enhancing both training and auditing of our supply chain to ensure our suppliers have the latest information on APEOs, highlighting where there is a risk that APEOs may enter into the undocumented contamination of chemical supplier formulations.

Through this report, we are sharing the baseline findings from Levi Strauss & Co.'s phase out of APEOs in our supply chain.

## WHAT ARE APEOS AND WHY WE WANT TO ELIMINATE THEIR USE IN APPAREL PRODUCTION

Alkylphenol ethoxylates (APEOs — often called alkylphenols or alkylphenyls) are a class of chemicals commonly used as surfactants, which have an emulsifying and dispersing action, so they have good wetting, penetration, emulsification, dispersion, solubilizing and washing characteristics. A common subset of APEOs are nonylphenol ethoxylates (NPEs), a non-ionic surfactant that has been used for the past 50 years in laundry, ware-washing, hard surface cleaners and floor care products. About 90 percent of APEOs used in the textile and leather industry are NPEs.

Nonylphenols (NPs), a byproduct of NPEs, have been detected widely in wastewater around the globe. They have been determined to be persistent, bioaccumulative and toxic to aquatic life. Additionally, in some studies, NPs are considered to be an endocrine disruptor due to their ability to mimic estrogen.

## LEVI STRAUSS & CO.'S PHASE OUT OF ALKYLPHENOL ETHOXYLATES (APEOS)

### EUROPEAN UNION REGULATION OF NONYLPHENOL ETHOXYLATES (NPES)

NPs and NPEs have been restricted in the European Union with a focus on human and environmental safety. An EU risk assessment found that NPE products were the main pathway of NPs into the environment. For NPs, the risk assessment showed that the main concern is the aquatic toxicity and that it did not break down readily in ecosystems. No adverse human exposure risks during use were identified.

The environmental risk assessment indicated the need to reduce the risks associated with the production, formulation into products, and end uses of NPEs and NPs. It is estimated that the EU restrictions would decrease emissions to the aquatic environment by about 80 percent.

In July 2003, the EU passed [Directive \(2003/53/EC\)](#), which restricts the marketing and use in Europe of NPEs or NPs in higher concentrations than 0.1 percent in product formulations. This applies to many industries, including the textile and leather industries, except in the case of closed application systems where no release into waste water occurs. This EU Directive came into force in 2005.

### UNITED STATES POLICY ON NONYLPHENOL ETHOXYLATES (NPES)

In the United States, there is no restriction on the use of APEOs. The U.S. Environmental Protection Agency (EPA) has focused research efforts on determining acceptable levels of these compounds in water and identified NPEs as well as NPs for further study because of concern about their impact on the environment.

In August 2010, then EPA Administrator Lisa Jackson announced a new action plan for NPEs, and the agency is now supporting and encouraging the ongoing voluntary phase-out of NPEs in industrial laundry detergents. The U.S. EPA has initiated rulemaking to add NP and NPEs to the Concern List of chemicals

that present or may present an unreasonable risk of injury to health or the environment.

### LEVI STRAUSS & CO. PHASING-OUT APEOS SINCE 2008

With this scientific understanding and regulatory change, Levi Strauss & Co. began focusing on phasing out APEOs in 2008 — long before our most recent commitment to extending a usage ban throughout our supply chain. Our 2008 RSL listed APEOs as a substance identified for phase out, requiring manufacturing suppliers to assess the scope of their usage within their own supply chains.

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2008 Restricted Substances List (RSL) Chemical  
Phase-Out List communicated to business partners:

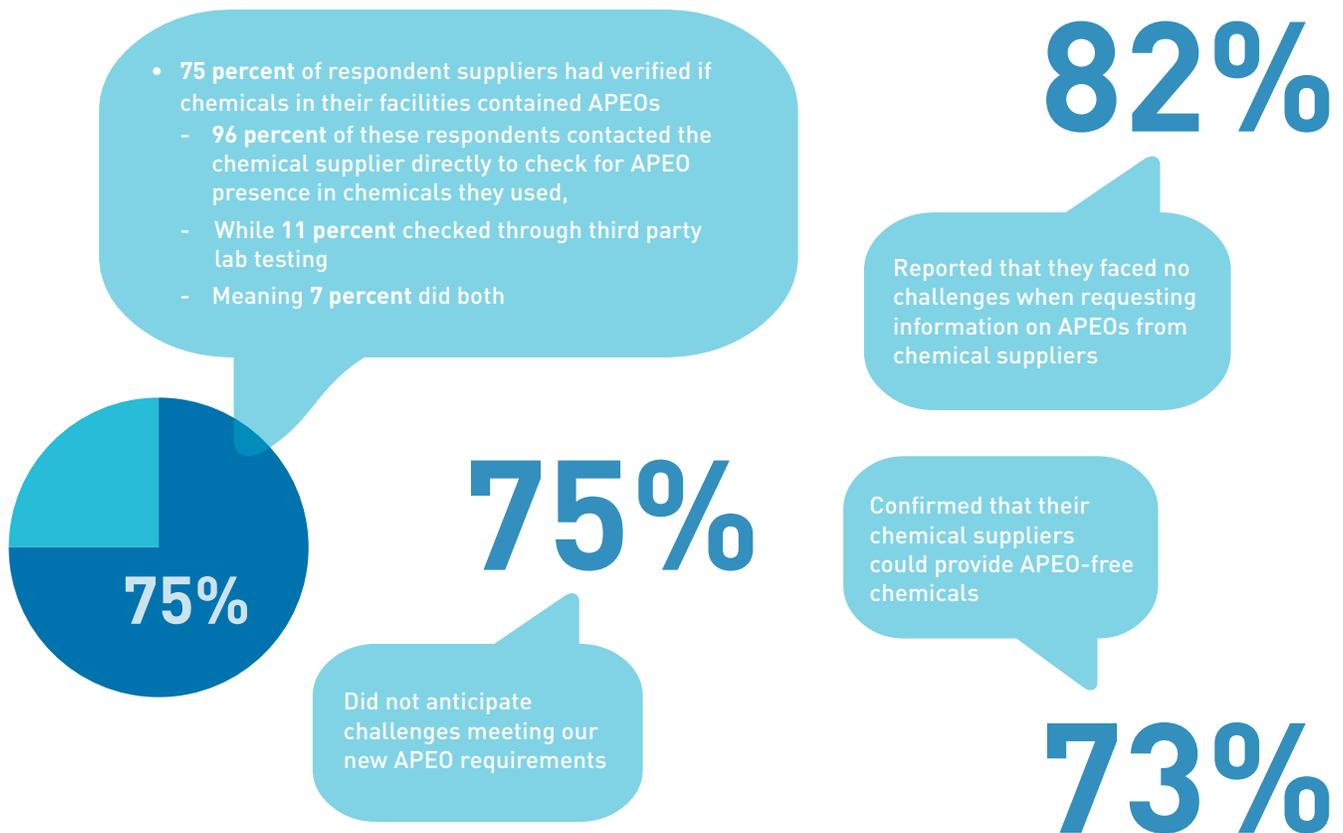
“Alkylphenol ethoxylates (APEOs): APEOs may be found in detergent, soap or chemical mixtures as surfactant. APEO-free detergents or chemical mixtures are available in most areas of the world. Each product manufacturer should contact their chemical suppliers to understand if APEOs are present in currently used chemicals and to inquire about APEO-free alternatives”

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## LEVI STRAUSS & CO.'S PHASE OUT OF ALKYLPHENOL ETHOXYLATES (APEOS)

In 2010, wanting to further deliver on our phase-out, Levi Strauss & Co. completed a global survey to assess: (1) the status of APEO awareness with our manufacturing partners and (2) its usage within our supply chain. A large majority of our global suppliers responded to the survey and the majority of these participants indicated they were in favor of implementing a phase-out policy.

Some key findings from this 2010 survey included that:



Questions from the 2010 survey and the response summary are included in the annex of this report.

Additionally, Levi Strauss & Co. has been monitoring the phase-out of APEOs within supply chain by organizing random sample testing since 2009. Sample selection was based on market as well as on manufacturing locations. The testing conducted from 2009 to 2011 indicated a positive response from the supply chain, with mostly undetected or trace levels of APEO.

In the 2012 update of our RSL, Levi Strauss & Co. implemented a full APEO usage ban, which applies to all Levi Strauss & Co. finished products, in addition to all materials, parts, chemicals and other goods and sundries used in the production of Levi Strauss & Co. products.

**LEVI STRAUSS & CO.'S  
PHASE OUT OF ALKYLPHENOL  
ETHOXYLATES (APEOS)**

**2013 LEVI STRAUSS & CO. RESTRICTED SUBSTANCES LIST (RSL)**

**N. ALKYL PHENOLS AND ALKYL PHENOL ETHOXYLATES (APs & APEOs)**

CHEMICAL SUBSTANCE	CAS NUMBER	LIMIT VALUE FINAL PRODUCT (MG/KG)	TEST METHOD
NP & OP	Various incl. 104-40-5 & 140-66-9	Usage Ban (TR = 50 (sum of all))	Extraction in Methanol; detection and quantification by LC-MS
NPEO & OPEO (EO) <sub>1-15</sub>	Various	Usage Ban (TR = 250 (sum of all))	

At the time of this usage ban, we surveyed our suppliers and found that APEO usage traced back to a very low percentage of laundries and mills within our supply chain. We also followed up with clear communication to all of our manufacturing partners, including updated Master Supply Agreements, to officially confirm these updates and expectations. To further reinforce the APEO ban, new contract language is being included in the RSL Compliance Agreement, which we are sending to suppliers with the April 2013 update of the RSL.

**CONCLUSION**

This report serves as a historical look at our continuing efforts to eliminate APEOs and investigate progress on our APEO phase out. We have now issued another report (following pages) with an investigation into compliance with current APEO usage ban, including baseline analysis of water discharge data for APEOs at

a number of our supplier sites. The information in this report will shape and educate our response plan to ensure that only APEO-free chemical formulations are used in our supply chain.

Levi Strauss & Co. (LS&Co.) is committed to minimizing the environmental impacts of its clothing manufacturing process. In line with the [Joint Roadmap Toward Zero Discharge of Hazardous Chemicals](#) and the precautionary principle, LS&Co. is committed to the goal of zero discharge of hazardous chemicals from all its products across all pathways of release in our supply chain by 2020.

Stringent requirements for chemical compliance have been an integral part of LS&Co.'s production process. In 2000, LS&Co. was one of the first companies to establish a [Restricted Substances List \(RSL\)](#), identifying chemicals that are prohibited in the manufacturing of our products.

## RESEARCHING PROGRESS ON APEO PHASE OUT

As we advance our commitment to zero discharge of hazardous chemicals, LS&Co. is piloting a study of chemical use and discharge of 11 priority groups of chemicals<sup>1</sup> from 16 supplier facilities located in key production markets (i.e., Bangladesh, Cambodia, China, India, and Mexico).

The results will help to establish a baseline understanding of chemical use and discharge in order to focus capacity building, process change, and policy change with suppliers toward the goal of zero discharge of hazardous chemicals. This pilot study will also play an important role in our continuing efforts to improve supplier transparency.

As part of the pilot study, we looked specifically at alkylphenol ethoxylates (APEOs)<sup>2</sup> use and discharge in our supply chain. The elimination of APEOs across our supply chain is a key success metric for Levi Strauss & Co.'s individual action plan toward zero discharge of hazardous chemicals. Levi Strauss & Co. is sourcing from about 630 facilities in 45 countries globally, so this is a significant commitment and a challenge to ensure compliance and understanding by suppliers when the regulatory environment in all these countries does not align with Levi Strauss & Co.'s prohibition on APEO use.

The first part of this report, published in April 2013, details the historical efforts taken by LS&Co. to phase out APEOs in our supply chain. In this second part, the findings from water testing and chemical use data collection at the 16 factories are summarized.

The methodology used in the investigation is detailed in the annexes.

### DATA REGARDING WATER TESTING AND CHEMICAL USAGE DATA COLLECTION

LS&Co. prepared and provided a chemical use data collection form to the 16 supplier facilities to gather data on the existence of the 11 priority chemical groups, including APEOs, in chemical products and preparations used on site for process, maintenance, laboratory, and cleaning activities. LS&Co. requested the supplier facilities to forward the form for completion by their chemical suppliers. The third and fourth columns of the following chart summarize APEO data from the chemical data collection forms.

We also piloted water testing at the 16 supplier facilities to gather data on the existence of the 11 priority chemical groups, including APEOs, in the facilities' influent and effluent water. The four columns to the right on the chart below summarize the results.

NimkarTek Technical Services, a service provider focusing on ecological solutions to the textile supply chain, was retained as an external consultant for management and analysis of the data. The water samples were collected and tested by Bureau Veritas (for Bangladesh, Cambodia, China and India) and SGS Laboratories (for Mexico).

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<sup>1</sup> The 11 priority hazardous chemical groups are: 1. alkylphenols, 2. phthalates, 3. brominated and chlorinated flame retardants, 4. azo dyes, 5. organotin compounds, 6. perfluorinated chemicals, 7. chlorobenzenes, 8. chlorinated solvents, 9. chlorophenols, 10. short chain chlorinated paraffins, 11. heavy metals such as cadmium, lead, mercury and chromium [VI].

<sup>2</sup> Alkylphenol ethoxylates (APEOs – often called alkylphenols or alkylphenyls) are a class of chemicals commonly used as surfactants, which have an emulsifying and dispersing action, so they have good wetting, penetration, emulsification, dispersion, solubilizing and washing characteristics. A common subset of APEOs are nonylphenol ethoxylates (NPEs), a non-ionic surfactant that has been used for the past 50 years in laundry, ware-washing, hard surface cleaners and floor care products. About 90 percent of APEOs used in the textile and leather industry are NPEs. Nonylphenols (NPs), a byproduct of NPEs, have been detected widely in wastewater around the globe. They have been determined to be persistent, bioaccumulative and toxic to aquatic life. Additionally, in some studies NPs are considered to be an endocrine disruptor due to their ability to mimic estrogen.

## RESEARCHING PROGRESS ON APEO PHASE OUT

### CHEMICAL DATA COLLECTION FORM

### WATER REPORTS

COUNTRY	FACTORY	TOTAL FORMS RECEIVED	CONFIRMATION OF AP/APEO	INFLUENT		EFFLUENT	
				NP (PPB)	NPEO (PPB)	NP (PPB)	NPEO (PPB)
Bangladesh	BA1	8	0	ND	ND	ND	ND
Bangladesh	BA2	12	0	ND	ND	ND	ND
Cambodia	CA1	7	0	ND	ND	ND	ND
Cambodia	CA2	2	0	ND	ND	ND	ND
China	CH1	13	0	<b>1.82</b>	<b>5.06</b>	<b>1.88</b>	ND
China	CH2	13	0	ND	ND	ND	ND
China	CH3	8	<b>1</b>	ND	ND	<b>6.68</b>	ND
China	CH4	4	0	ND	ND	ND	ND
China	CH5	2	0	ND	ND	<b>4.12</b>	<b>5.11</b>
China	CH6	7	0	ND	ND	ND	ND
India	IN1	3	0	ND	ND	ND	ND
Mexico	ME1	31	0	ND	ND	<b>147</b>	<b>85</b>
Mexico	ME2	19	<b>1</b>	ND	ND	<b>8.63</b>	ND
Mexico	ME3	10	0	ND	ND	<b>31</b>	ND
Mexico	ME4	13	0	ND	ND	<b>5.23</b>	ND
Mexico	ME5	12	0	ND	ND	<b>161</b>	ND
		<b>164</b>	<b>2</b>				

ND - Not Detected

PPB - Parts Per Billion

## RESEARCHING PROGRESS ON APEO PHASE OUT

### OBSERVATIONS ON THE DATA

The values of the APEOs detected are at extremely low levels (parts per billion or ppb). This indicates that intentional addition of APEOs in the production stages is unlikely. Any presence of APEOs appears to be from contamination or residue. This is also confirmed by the fact that only 2 out of 164 chemical use data collection forms declare the presence of APEOs. Corrective actions will require a root cause analysis study at the factories where APEO has been detected in the effluent.

APEOs are not regulated in the pilot countries as a priority substance.<sup>3</sup>

### FOLLOW-UP ACTIONS

Subsequent to compiling and reviewing the water testing data, LS&Co. engaged with the 16 pilot supplier facilities to obtain additional information regarding how and where APEOs may be entering the factory's processes and to outline remediation plans.

The data obtained from this investigation will shape our response plan to ensure that our factories understand and are complying with LS&Co.'s APEO usage ban. Medium and long-term action plans will be discussed with the supplier facilities, and remedial measures will be selected and implemented jointly with them. Some of the remedial measures are:

- 1. Random sampling of inputs and finished articles, followed by root cause analysis to identify and substitute the APEO-containing input.**

This method helps in tracking the root cause of APEO in the factory in a scientific and structured manner.

- 2. Training workshops to build knowledge and create awareness.**

We will develop, ideally with industry partners, common materials and tools to educate our supply

chain business partners through in-person and web-based training, covering all aspects of APEOs such as:

- Basic chemistry;
- Properties and uses;
- Potentially harmful effects;
- Sources in textiles; and
- Implementing an APEO compliance strategy at a factory.

- 3. Implementation of chemical compliance systems**

We will look at the current chemical compliance systems at the factories (in terms of their purchase policy, documentation, supplier declarations, waste management systems and storage and handling of chemicals), and benchmark these to identify areas of improvement. Actions will be initiated to implement a robust APEO compliance system.

### CONCLUSION

It is expected that this APEO project will provide information useful in developing a global compliance program. We understand that there are multiple supply-chain pathways for potential APEO contamination (including chemical formulations) and we are committed to enhancing both training and auditing of our supply chain to help ensure that our suppliers have the latest information on APEOs and that our suppliers take appropriate steps to protect against APEO contamination of chemical formulations.

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<sup>3</sup> In July 2003, the EU passed a [directive \(2003/53/EC\)](#), which restricts the marketing and use in Europe of NPEs or NPs in higher concentrations than 0.1 percent in product formulations. This applies to many industries, including the textile and leather processing industries. This EU Directive came into force in 2005.

# ANNEX I: 2010 LEVI STRAUSS & CO. SURVEY ON APEO USAGE IN THE SUPPLY CHAIN

1. HAVE YOU CHECKED IF THE CHEMICALS IN YOUR FACTORY CONTAIN APEO?



2. HOW DO YOU CHECK IF THE CHEMICALS CONTAIN APEO?

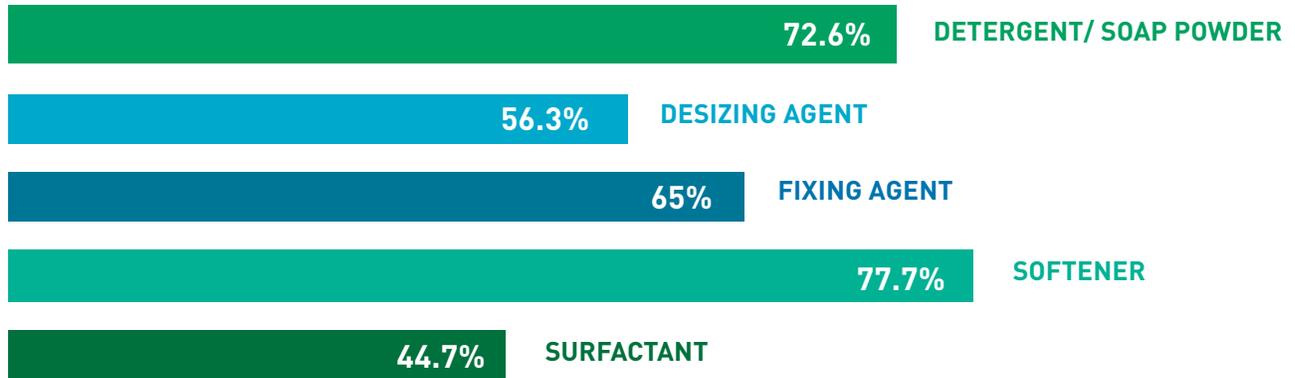


3. HAVE YOU FACED ANY CHALLENGE WHEN REQUESTING CHEMICAL SUPPLIER TO PROVIDE INFORMATION ON APEO?

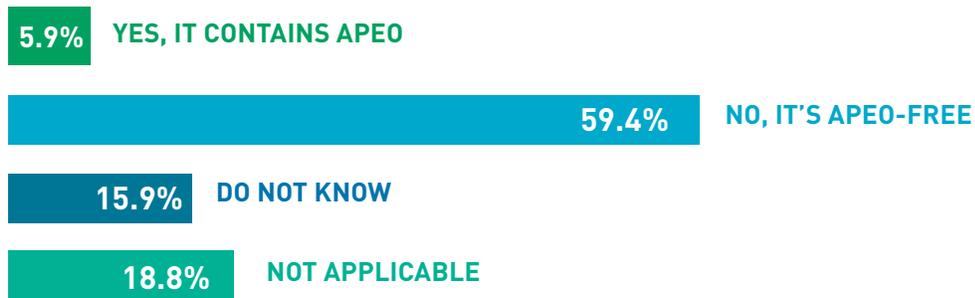


# ANNEX I: 2010 LEVI STRAUSS & CO. SURVEY ON APEO USAGE IN THE SUPPLY CHAIN

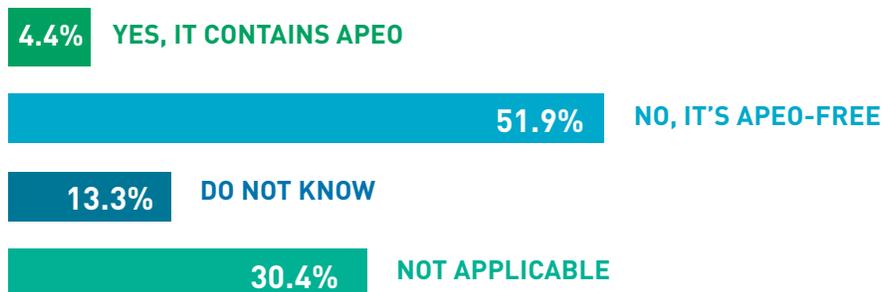
## 4. WHICH TYPE(S) OF CHEMICAL(S) DO YOU USE IN YOUR FACTORY ?



## 5. IS APEO PRESENT IN THE DETERGENT/SOAP POWDER WHICH IS CURRENTLY IN USE IN YOUR FACTORY?

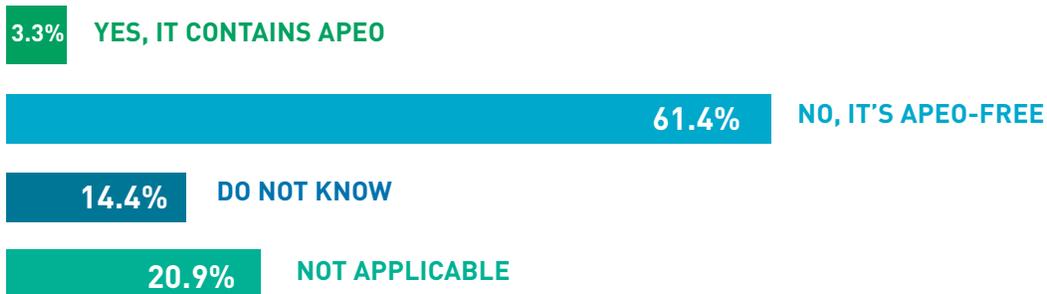


## 6. IS APEO PRESENT IN THE DESIZING AGENT WHICH IS CURRENTLY IN USE IN YOUR FACTORY?



# ANNEX I: 2010 LEVI STRAUSS & CO. SURVEY ON APEO USAGE IN THE SUPPLY CHAIN

7. IS APEO PRESENT IN THE FIXING AGENT WHICH IS CURRENTLY IN USE IN YOUR FACTORY?



8. IS APEO PRESENT IN THE SOFTENER WHICH IS CURRENTLY IN USE IN YOUR FACTORY?





# ANNEX III:

## WATER INFLUENT AND EFFLUENT SAMPLING AND TESTING GUIDANCE

### LABORATORY REQUIREMENTS

Laboratories chosen must:

- Have ISO 17025 or equivalent (e.g. NELAC) certification and submit their quality assurance plan for review
- Submit all reporting limits and detection limits for review (Table 1)
- Submit all quality control (QC) results upon request
- Have written, approved procedures in place for all analytical methods
- Ensure that any testing sent to another lab must be communicated to the project team
- Ensure all method QC requirements are met

### Quality Control Elements Collected or Sent to the Field

#### 1. Trip Blank for Volatile Organic Compounds (VOCs)

The trip blank is a preserved VOA vial (44-mL) filled with organics free water at the lab facility which accompanies the VOAs used for sample collection from the lab to the sampling site, then back to the laboratory for analysis.

#### 2. Matrix spike/Spike Duplicate

Two extra aliquots must be collected in the field for any class of compounds run as MS/MSD pairs. The following classes should have MS/MSD pairs collected: APEOs, azo dyes, phthalates, and PFCs. Only the effluent samples need to be collected for MS/MSD pairs, and only once (such as the effluent sample).

### Water Sample Collection Guidance for Sampler

Samples should be collected following the general guidance in Standard Methods for the Examination of Water and Wastewater, 21st edition, Method 1060, published by American Public Health Association, American Water Works Association, and Water En-

vironment Federation. There are several important points to remind the laboratory:

- Do not rinse bottles/containers that have the preservative already added.
- Use bottles/containers that are pre-cleaned and certified by the manufacturer for collection of each sample type.
- Use glass bottles/containers whenever possible as a dipper to collect water samples.
- New, clean, food-grade plastic polyethylene buckets may be used for mix/homogenize. A new bucket should be used for each sample location. (Glass is better if possible as there is a chance organic chemicals in the water will absorb to the walls of the bucket.)
- Teflon® (PTFE) must not be used or come into contact with PFOS/PFOA samples.
- The volatile organic samples require zero head-space (no bubbles). Minimize headspace (airspace in bottle) for all samples.
- Sample bottles/containers and sampling devices used to collect APEO samples must not be exposed to soaps or detergents.
- All samples must be stored at 4°C from the time of collection to the time of preparation and analysis.

### Sample Receipt by the Lab

1. Maintain appropriate documentation
2. Store all samples at required temperatures until analysis
3. Report any issues to the project team

### Sample Preparation by the Lab

1. Document all preparatory steps
2. Communicate any issues with the project team

# ANNEX III: WATER INFLUENT AND EFFLUENT SAMPLING AND TESTING GUIDANCE

## Data Reporting by the Lab

1. All samples must be reported in hard copy and electronic data format (spreadsheet)
2. Spreadsheet must include:
  - a. Site Name (Factory name)
  - b. Location
  - c. Country
  - d. Lab Name
  - e. Designated sample ID
    - i. **Influent** (for water coming to the facility for processing) Example: Influent 1001
    - ii. **Effluent Direct Discharge** (water being discharged after wastewater treatment to environment) Example: **Effluent direct discharge 1002**
    - iii. **Effluent Publicly Owned Water Treatment (POTW)** (water being discharged without treatment to POTW) Example: **Effluent POTW 1003**
3. Matrix (water, wastewater, sludge)
4. Lab Sample ID (influent, effluent)
5. Analysis Method (Table 1)
6. Sample Date
7. Sample Time
8. Received Date at the Lab
9. Sample Volume
10. CAS Number
11. Analyte
12. Result
13. Reporting Unit
14. Detection Limit
15. QC reports must be submitted for blanks, matrix spikes, LCS / LFB / blank spikes in the eDdata and hard copy.

COMPOUND NAME	CAS NUMBER	DETECTION LIMIT	TEST METHOD	SAMPLE SIZE	ANALYSIS RESULT INFLUENT ug/L	ANALYSIS RESULT EFFLUENT ug/L
Nonylphenol	104-40-5	5 ug/l	ASTM D7065	2L/Brown Glass bottle w/Teflon lid		
Nonylphenol monoethoxylates, NP1EO		5 ug/l	ASTM D7065			
Nonylphenol, (NP)	Various	1 ug/l	ASTM D7065			
Octylphenol (OP)	Various	1 ug/l	ASTM D7065			
Nonylphenoethoxylates, (NPEOs)	Various	1 ug/l	ASTM D7065			
Octylphenoethoxylates, (OPEOs)	Various	1 ug/l	ASTM D7065			
perfluorooctane sulfonate (PFOS)	Various	0.01 ug/l	LC-MS			