

# Recent Developments in Cleaner Production and Environment Protection in World Leather Sector

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**Abstract:** The International Union of Environment (IUE) Commission of IULTCS has gotten 40 technical representatives from 26 member countries and invitees from United Nations Industrial Organization (UNIDO), European Union and other relevant organizations. IUE has developed technical guidelines and documents on viable cleaner production and environmental protection aspects based on the waste generation from different processes, environmental regulations in member countries and experience in field practices. The environmental issues and the technological developments to address the issues are regularly updated and disseminated through IUE Documents, IULTCS Website, regional and international congresses. The IUE commission report contains eleven documents covering all salient aspects, including cleaner technologies for leather production, tannery solid waste generation and byproduct management, total dissolved solids issue, management of chromium-containing wastes, pollution control regulations and management in various countries, and occupational health and safety measures. The IUE documents have been translated in Spanish, Turkish, Portuguese and other regional languages. The recent environmental regulations and technological developments in world leather sector including India, China, South American countries and European countries are detailed in the paper.

**Key words:** IUE, IULTCS, Environment, CETP

## 1 Introduction

The International Union of Environment IUE Commission is a vibrant wing of IULTCS with about 40 technical members from 26 countries and invitees from United Nations Industrial Organization (UNIDO) and other relevant organizations. The Chairman of the IUE Commission is Dr. S. Rajamani from India and Secretary is Mr. Thierry PONCET from France. The IUE Commission regularly meets every year in one of the member's countries. The meeting for the year 2008 was held during October at Rio de Janeiro along with XVII Latin-American Congress of Leather Technicians and Chemists. The meeting for the year 2009 is organized in October 2009 at Beijing along with XXX IULTCS Congress. The Chairman interacts regularly with IUE members and IULTCS as an executive committee member. The lists of IUE members are given in Table 1.

**Table 1 Members of IUE Commission**

SL. NO.	Name of The Country	Representatives
	ARGENTINA	Ms Patricia CASEY / Mr Carlos CANTERA
	AUSTRALIA	Ms Catherine MONEY
	AUSTRIA	Dr Hans ANDRES

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	BRAZIL	Ms. Katia Fernanda STREIT
	CHINA	Mr Chen Zhanguang / Madam Zhang Shuhua /Mr Su Chaoying / Dr SHI BI
	COLOMBIA	Mr Juan Manuel SALAZAR
	CROATIA	Mr Jakov BULJAN
	CZECH REPUBLIC	Prof. Dr. Karel KOLOMAZNIK
	DENMARK	Mr Johannes O. Borge
1.	FRANCE	Mr Thierry PONCET/Mr Marc Folachier
2.	GERMANY	Dr Heinz Peter GERMANN
3.	GREECE	Mr Pantelis PANTELARAS
4.	INDIA	Dr S. Rajamani
5.	ITALY	Dr. M. Tomaselli /Dr.Gianpiero Comite
6.	JAPAN	Mr. Tetsuo Imai
7.	MEXICO	Jesus Angel Alvarez Martinez
8.	NEWZEALAND	Ms. Ngaire Foster
9.	POLAND	Dr Maciej URBANIAK
10.	SLOVENIA	Dr Anton GANTAR
11.	SPAIN	Mr. Daniel Sanchez Esteve
12.	SWITZERLAND	Dr Campbell page / Dr Jens FENNEN
13.	TUNISIA	Dr Abdessatar
14.	TURKEY	Dr Volkan CANDAR / Dr Murat TOZAN
15.	UNIDO, Vienna	Mr Ivan Kral (Invitee)
16.	UNITED KINGDOM	DrWolfram SCHOLZ
17.	UNITED STATES	Dr Nicholas CORY / Mr E Hurlow
18.	URUGUAY	Ing. Quim Stella Cristobal

## 2 Waste Discharges and Viable Environmental Management

The capacity of world leather process is 15 million tons of hides and skins per year. The average wastewater discharge is more than 15,000 million litres/day. Solid waste generation from tannery process is estimated as 6 million tons/year. The disposal of large quantity of sludge which is about 4.5 million from effluent treatment plants is one of the major issues.

Guidelines on best practices in leather production and viable environmental management for liquid, solid and other emissions have been developed and updated in the IUE documents. The guidelines and activities are disseminated through IULTCS website, member country websites, circulation among members, translation in local languages such as Spanish, Portuguese, Turkish etc., presentation in IULTCS Congress, regional Congress publications in Leather journals. Specific technical advice and guidance are provided to member associations/ countries to suit local conditions.

The IUE commission has developed 11 documents. The guidelines and practices adopted in cleaner production, environmental regulations and management in liquid, solid and other emissions are updated periodically. The updated IUE documents with number and title are given in Table 2.

**Table 2 List of IUE Documents**

SL. NO.	DOCUMENT NUMBER	TITLE
	IUE 1	Recommendations on cleaner technologies for leather production
	IUE2	Recommendations for tannery solid by-product management
	IUE 3	Document on total dissolved solids in tannery effluent
	IUE 4	Assessment for chromium containing waste
	IUE 5	Typical performance for tannery wastewater treatment
	IUE 6	Typical pollution values related to conventional tannery processes
	IUE 7	Chargeable effluent parameters in various countries
	IUE 8	Recommendations for odour control in tannery
	IUE 9	Recommendations for sewer adapted for tannery effluents
	IUE 10	Guidelines for restricted products in leather
	IUE 11	Recommendations for occupational safety and health aspects

### 3 Recent Developments in the Field of Environment

Almost all the countries including developing countries have introduced pollution control standards similar to the standards adopted in United States, United Kingdom, European Union and other developed countries. In view of the serious environmental issues, cleaner production and implementation of Common Effluent Treatment Plants (CETPs) in tannery clusters, relocation of tanneries from urban towns to designated industrial areas with major investment on environmental protection had been done in countries such as Spain, Turkey, India, China etc. Many countries including Bangladesh, Egypt are planning to relocate the tanneries from the cities to new industrial zones with CETPs. The sustainability of the small-scale units has become a serious issue in leather sector and about 400 small-scale units have been closed in China during 2007 & 2008. Currently environment is the major area of Research carried out by the leather research institutes and universities. More than 40% the research publications in the leather sector are dealt with cleaner production & waste management, which is a major issue for the sustainability of the leather sector.

The salient recent developments in cleaner production and waste management in selected member countries are given in Table 3.

**Table 3 Research & Development in Environmental Protection**

SL. NO.	COUNTRY	RESEARCH & DEVELOPMENT
	ARGENTINA	R & D on Cleaner production, Establishing standard procedures in analysis and publication, Environmental Regulations through commission of Ecology control, Sustainable development through CICA, Biological treatment/composting of solid organic waste are recent developments.
	BRAZIL	Photo Electro Oxidation and Electro dialysis for water recovery and reuse. R&D activities in the Federal University of Rio Grande do Sul. Incineration of chromium tanned wastes. Constructed wetlands used in effluent treatment in some tanneries (pilot scale). Enzymatic hydrolysis of chromium tanned wastes for reuse in the leather process. R&D activities in the SENAI Leather Center in partnership with enterprises.

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CHINA	Closure of about 400 small tanneries without effective wastewater treatment system during 2007 / 2008. Currently there are 788 tanneries. Till now, about 12 CETPs are in operation, Some more are under planning. The Research Institutes and universities in China are carrying R&D activities on cleaner protection, waste management including water recovery. Planned to reduce volume and pollutional load at source.
DENMARK, NORWAY, SWEDEN	Establishment of new Biological Treatment Plant including, Nitrification for a capacity of 1250 m <sup>3</sup> /day, which is biggest of its kind in the region.
FRANCE	Tallow extracted from fleshing converted into alternative energy source, Reed bed system is installed for effluent treatment.
INDIA	Zero liquid discharge Membrane system for recovery of water from tannery effluent - 120 Individual Units and 14 Common Effluent Treatment Plants. Establishment of decentralized secure landfill system linked with CETPs for leather sector has been implemented in many tannery clusters. (First of its kind in the world). R & D activities on bioprocessing is under progress.
NEW ZEALAND	Enzymes and unhairing process is becoming more popular. Chrome recovery, pickle recycling are adopted by 50 % tanneries. Elimination of salting of skins by introducing chilling process in selected areas, Sulphide oxidation, pH & settleable solids control and discharge of effluent into public sewer system
POLAND	Processing of organic materials and converting into fuel called as bio-coal, Co-fermentation of chromium-free tannery wastes with municipal sewage sludge and conversion into fertilizer
SOUTH AFRICA	Studies on “Enzymatic saving unhairing process – Bio-transformation of hair waste” ‘Epidermis injury’ to promote the diffusion process, through bovine epidermis of unhairing agents
SPAIN	Modern Common Effluent treatment plant at Igualada with odour control. Membrane Bio reactor with reverse osmosis for water recovery at Lurca CETP.
TUNISIA	Integrated cleaner production for 12 vegetable tanneries, Research & Development on solid sludge
TURKEY	Istanbul (Tuzla) and Izmir have common effluent treatment plants, for tanneries resettled in industrial zones. R &D activity on cleaner production Sludge disposal is a major problem
UNITED KINGDOM	Bio-diesel from tallow, Bio-ethanol from proteinised wastes, Short-term preservation of raw hides, Technical assistance on cleaner production, adoption of membrane system etc. to other countries.

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#### 4 Environmental Aspects and Sustainability

The leather production activities especially raw to semi-finished leather are being shifted from the developed nations such as United States, West European countries, to North African, Asian and South American countries. The major leather producing countries such as China, India, Brazil etc. are facing problems due to enforcement of stringent regulations. It is interesting to note that the other environmental regulations and standards in the developing countries are similar to the regulations in the developed countries. Certain parameters such as BOD, COD and Total Dissolved Solids (TDS) are more stringent in developing countries when compared to the developed countries. The sustainability of the small-scale

units is becoming a serious issue to meet the environmental requirements. Major investment is being made for the environmental protection and resettlement of tanneries from the urban areas to the industrial parks with common effluent treatment plants. New regulations such as ban on use of certain chemicals, salinity and water recovery under zero discharge concept, disposal/ management chromium containing sludge etc. envisage continued Research & Development activity. IUE Commission of IULTCS in collaboration with R & D institutions is expected to play a major role in environment aspects of world leather production and sustainable development.

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