



Back to Basics: Environmental - Part 1 of 10

There are people in the leather sector who are not directly involved with environmental matters, but who might benefit from a better understanding of the subject.

There are others who will perhaps find this overview of value as it may provide a different perspective on a complex subject. Whatever the interest, welcome to Back to Basics: Environmental, a concise ten-part work which, over the coming months, will bring together the major areas concerning leather manufacture and waste generation, discuss the effects of the various components of pollution, and the methods used to address these problems.

Leather manufacture and the environment

Environmental matters cannot be taken in isolation from leather making, as every facet of pollution or residual material is a direct function of manufacture. The waste produced from the conversion of raw hides and skins into finished leather - and the impact of that leather at the end of the product life - is a direct result of the raw materials and chemicals used and the technology applied. From the environmental viewpoint, waste management and responsibilities are as tightly interwoven with manufacture as, say, retanning and fatliquoring are within leather manufacture. This is, however, not always taken into account. When setting up new tanneries, how often are the borrowings and capital expenditure for plant and machinery increased by perhaps 30% or more to ensure that the waste is treated responsibly?

Addressing pollution at source

Most components found in tannery waste-waters can be reduced to acceptable limits using existing technology. Problems may arise from auxiliaries containing components that only degrade to a certain extent, then remain persistent. Nevertheless, there are often alternatives, and the chemical sector is active in reducing the impact of its products.

All environmental problems arise from manufacture, and treatment is expensive. It is therefore most effective to minimise pollution at source. Fewer chemicals are wasted, and there are lower costs arising from waste-water treatment. The key is correct selection of materials, good application, and close control for targeted uptake of chemicals within the substrate.

Products that are perceived as environmentally difficult are better segregated and treated separately. For example, low volume and relatively uncontaminated used chrome liquors are easier to address than after inter-reaction and dispersion within a high volume effluent.

Changes within the approach to manufacture

Changes within the manufacturing process can also dramatically lower the pollution generated. Prime examples include a change to hair saving processes, the substitution of ammonium compounds within deliming, and the regeneration and reuse of chrome. And changes in manufacturing sequence may be possible; for example, considerable chemical savings are possible by lime splitting as opposed to splitting in the wet blue. A combination of pre-tanning systems, splitting and shaving, can also ensure that only the substrate required is processed.

Plant and equipment is also critical. Today's fleshing machines and handling systems allow the removal of flesh before processing - if the hides are clean and dung free. Precision splitting at the selected stage and accurate substance measurement, both linked with state of the art data interpretation, provide a strong base to minimise the waste of both chemicals and substrate.

However, a mass balance of leather manufacture presents an uncomfortable picture of problematical raw materials, carefully manufactured solid waste, and capricious volumes of contaminated process waters for treatment.

The structure of 'Back to Basics: Environmental'

The feature is being presented in ten two-page parts, and the content of the remaining parts develops as follows:

MATERIALS CONSUMED AND WASTE GENERATION (Part 2)

This is in the form of a flow chart, illustrating the materials consumed in leather making, and the waste products as both effluent and solids from the major manufacturing stages.

In addition, the composition of effluents received by Common Effluent Treatment Plants (CETP) and their performance is

presented. The strength of effluents received largely supports the waste-water generated as shown in the flow chart, and the discharge values indicate what is being achieved.

COMPONENTS WITHIN WASTE-WATER, THEIR CHARACTERISTICS AND ENVIRONMENTAL EFFECTS (Parts 3, 4 & 5)

The flow chart shows where the major effluent components categorised by waste-water definition are generated and their composition. In this section, the nature and effects of these

**Panel I****Limits for the discharge of effluents**

Limits to Discharge are set by Governments and Local Authorities to control the discharge of industrial effluent. The polluter often does not understand the effect of exceeding these limits, and authorities may set limits, which do not appear appropriate to the situation.

Sometimes discharges are to sewerage systems where there may be comprehensive treatment before return to the environment via surface waters. In these cases, the standards are dependent on the dilution with other effluents and domestic sewage, the capabilities of the treatment plant, and problems that might be experienced in the management or maintenance of the plant and equipment. The limits to discharge for the tanner may therefore be lower than when discharge is to surface waters.

In this situation the on-site treatment may be less, often avoiding the biological stage. However, factors, such as the disposal of final sludges, and discharge limits for the treated effluent that might be imposed on the sewage treatment authority also have to be taken into account.

Where effluent discharge is directly into streams and rivers, the effluent needs to be of higher quality as the environment is sensitive and readily damaged. The greater the volume of the effluent compared with the volume of surface water, then the higher the quality required of the treated effluent to avoid both local or wider impact.

There are two basic ways that can determine acceptable levels of the different effluent components:

- Situations when a mass-balance is applied. In this method the quality of the water upstream is determined, and the quality

requirements of the water downstream i.e., for industry or potable use. The difference between the two figures is calculated setting the tolerance levels at the point of discharge.

- Based on data, which has been applied and found generally acceptable in a wide range of global situations.

The first approach can take the individual site factors into consideration. Logically, a small established tannery with a high dilution factor should be viewed more favourably than a large volume effluent source where there is relatively low dilution.

However, limits tend to be imposed by authorities using the broader approach. This can mean that either the load from a large tannery or group can cause considerable damage, or that the small tannery with good treatment facilities and scope for high dilution factor be unduly penalised.

The limits always relate to the volume and strength of effluent to account for the total weight of pollutants. On this basis, if better housekeeping reduces the volume of water used, thus increasing the concentration, then logically there is good reason for a relaxation concerning concentration. However, this is seldom experienced in practice.

Even when controls are well managed by the authorities, the balance between commercial and social interests, and the wider ecology will always be contentious. Once set, limits seldom take into account the individual situation, or are relaxed. On the other hand, the effects of overload as a result of poor legal enforcement or lip-service paid by the processors are well known, and can be severe in both the local and wider environment.



components on the local and wider environment are discussed, and where they relate within effluent treatment.

TREATMENT OF TANNERY WASTE-WATERS AND SLUDGES

(Parts 6, 7, 8 & 9)

Conventional primary and secondary effluent treatment, the management of sludges, and variations found within common and individual effluent treatment plants are discussed. The descriptions link an effluent and sludge management schematic with text, photographs, diagrams and technical captions.

SOLID WASTE MANAGEMENT (Part 10)

The techniques available for treating waste solids from both leather manufacture and effluent treatment are discussed in this section.

THE ANNEX

Over and above matters central to this overview, other areas - such as clean technology, by-products as new raw materials, and maximising resources - merit expansion. Nevertheless, this feature needs to fit within a practical size and time-frame, so an Annex will follow [Part 10](#).

This will provide reference to previously published information in *World Leather* that can both substantiate this overview, and take these other pertinent areas into account. The Annex will be set out in groups of like-subject matter, and each group will be provided with a synopsis. This will provide the opportunity to follow and review any technology in greater depth.

Panel 2

Salinity: the major problem

Common salt is unaffected by practical effluent treatment and is causing massive environmental problems.

Regarding the leather sector, salt from processing - pickle, tannage and auxiliaries - can probably be reduced significantly, but salt associated with hides and skins is a far more serious matter. This is largely outside the tanner's direct control: drastic changes are required in linkages between slaughter houses and tanners, new techniques for environmentally friendly preservation, or relocation of tanneries for saline discharge to the sea.

Back to Basics: Leather Manufacture

A study covering the fundamentals of leather manufacture has already been published in *World Leather*. Originally called Back to Basics, this ran as a nine-part series from April 2002 to April 2003 inclusive, and is now available in book form having been translated into Chinese, French, German, Italian and Spanish.

If the reader is not familiar with the conversion of raw hides and skins into leather, Back to Basics: Leather Manufacture would be useful so that the linkages between manufacture and environmental matters can be better related. In particular, there is information concerning clean technology and the environment, and a schematic linking the production flow with materials used, potential by-products and waste generation.

Richard Daniels

Part 2: November 2003