EXAMPLES OF IMPLEMENTATION OF PPOs

HAIR RECOVERY FROM THE LIMING PROCESS IN CATTLE HIDES

- Savings in chemicals: 23% of the weight
- Savings in water used for washing: 28%
- Reduction of COD by 40% and suspended matter by 60% in the wastewater
- Possibility of using hair as an agricultural fertilizer
- Reduction of wastewater requiring treatment by 8.5%
- Possibility of using hair as an agricultural fertilizer

**BenEFITS**

Investment (for 13 tanneries): 600,000 €  Savings: 371,664 €/y  Payback period: 19 months

A tannery that performs chrome tanning of 600,000 sheep skins per year:

**BenEFITS**

Recycled effluents containing chrome by installing a storage tank to which the tanning bath is pumped after filtering and to which one third of new tanning solution is added.

- Reduction of wastewater requiring treatment by 8.5%
- Reduction of toxic salts with chrome to be discharged by 55%
- Reduction of effluents from dyeing baths by 25%

**BenEFITS**

Liquors should be carefully collected in order to avoid mixing with other wastewater.

- Use of electronic scales or scales set for each item to be weighed is recommended.
- Personnel should be trained to promote wise use of water.

BENEFITS

13 tanneries processing 2,000 t/month of cattle hides installed a closed system of collection aimed at the liming baths and a 1-mm rotary filter in order to reduce pollution load of the effluents and recover solid waste hair for use as a fertilizer.

**BenEFITS**

Recycled effluents containing chrome by installing a storage tank to which the tanning bath is pumped after filtering and to which one third of new tanning solution is added.

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- Personnel should be trained to promote wise use of water.
Pollution prevention opportunities in the Tanning industry within the Mediterranean region

The Ministry of the Environment of Spain and the Mediterranean Action Plan (MAP) have identified pollution control opportunities in the tanning industry (chiefly leather tanning) within the Mediterranean region.

The main pollution sources in the tanning industry are:

- Wastewater washing: 28% of the weight of the leather washed
- Suspended wastewater: 10% of the weight of the leather washed
- Watering: 28% of the weight of the leather washed
- 1 ton of wastewater for 1 ton of leather produced
- 1 kg of chrome to be added in dyeing baths
- Sodium sulphide

Period: 19 months

Ministry of the Environment of Spain

Regional Activity Centre for Cleaner Production (RAC/CP)

Paris, 184, 3a planta - 08036 Barcelona (Spain)
Tel.: +34 93 415 11 12 - Fax: +34 93 237 02 86
E-mail: cleanpro@cema-sa.org
http://www.cema-sa.org

CD

English
Castellano
Français

Government of Catalonia
Ministry of the Environment

Period: 3 months

ES

NOM

Pollution prevention
opportunities in the
Tanning industry
within the Mediterranean region

For example:
- 1 ton of wastewater for 1 ton
- 1 kg of chrome to be added
The Regional Activity Centre for Cleaner Production (RAC/CP) of the Mediterranean Action Plan has prepared this brochure to present several pollution prevention opportunities (PPOs) for optimization of production processes in the tanning industry, which recycles a by-product of slaughterhouses (chiefly cattle and sheep hides) in order to transform it into tanned leather, a material used to prepare many useful objects.

The most widely used tanning methods are mineral, which uses trivalent chrome salts, and vegetable, which is based on the tanning power of vegetable extracts from wood or bark of several trees.

For example,
- 1 ton of salted cattle hide yields about 250 kg of finished and dry leather, 500 kg of wet by-products and 500 kg of sludge from treatment of the wastewater.
- 1 ton of Spanish medium-quality dry sheep skin yields about 250 kg of finished leather, 170 kg of trimmings, 200 kg of wool and 400 kg of waste and sludge from treatment of the wastewater.
### Wet waste generated during the tanning process:

<table>
<thead>
<tr>
<th>Cattle hide (% in relation to weight of hide)</th>
<th>Sheep skin (% in relation to weight of wool)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2% cuttings with hair</td>
<td>15-17% cuttings with wool</td>
</tr>
<tr>
<td>14-18% wet hair</td>
<td>18-20% dry wool</td>
</tr>
<tr>
<td>25-30% fleshings</td>
<td>5-10% fleshings</td>
</tr>
<tr>
<td>10-20% flesh splits</td>
<td></td>
</tr>
<tr>
<td>6-12% shavings</td>
<td>10-15% shavings</td>
</tr>
<tr>
<td>0.5-1% dust from hide</td>
<td>1-2% dust from skin</td>
</tr>
<tr>
<td>40-50% wet sludge from treatment of wastewater</td>
<td></td>
</tr>
</tbody>
</table>

### Pollution of effluents during the tanning of cattle or sheep hides without hair (% of the total):

<table>
<thead>
<tr>
<th>SS</th>
<th>COD</th>
<th>TKN</th>
<th>Cl-</th>
</tr>
</thead>
<tbody>
<tr>
<td>85%</td>
<td>75%</td>
<td>85%</td>
<td>70%</td>
</tr>
</tbody>
</table>

The beamhouse process creates more than 75% of the organic pollution load, largely because of the nature of hides.

### Opportunities to prevent pollution and optimize production processes:

**Storage**
- Shaking of salted hides

**Beamhouse**
- Introducing green fleshing
- Segregation of sulphides from the effluents

**Liming**
- Hair recovery from the liming process
- Segregation of sulphides from the effluents

**Dелиming**
- Reduction of the use of ammonium in deliming

**Degreasing**
- Substitution/recovery of the degreasing bath

**Pickling**
- Recycling of the pickling liquors
- High chrome exhaustion

**Tanning**
- Precipitation and recovery of chrome
- Re-use of chrome liquor
- Recycling of vegetable tanning liquors

**Sammying**
- Recycling of the sammying liquors

**General**
- Determination of correct weights
- Monitoring use of water

**Consumption**
- Water
- Chemicals
- Waste
- Solids

**Generation**
- Water
- Chemicals
- Waste
- Solids

**Notes:**
- The sludge from treatment of wastewater and waste from the beamhouse process represent more than 80% of the total waste created.

**Abbreviations:**
- SS: Suspended Solids
- COD: Chemical Oxygen Demand
- TKN: Total Kjeldahl Nitrogen
- Cl-: Chlorides