CEB Generic Occupational Exposure and Environmental Releases for the Leather Tanning and Dyeing Industry

Leather Tanning

In the leather tanning industry, there are approximately 188 tanneries of which about 150 perform dyeing operations. There are nine distinct combinations of leather tanning operations. These nine combinations are: 1 - Hair Pulp/Chrome Tan/Retan-Finish; 2 - Hair Save/Chrome Tan/Retan-Wet Finish; 3 - Hair Save or Pulp/Non-Chrome Tan/Retan-Wet Finish; 4 - Retan/Wet Finish (Sides); 5 - No Beamhouse; 6 - Through-the-Blue; 7 - Shearling; 8 - Pigskin; and 9- Retan/Wet Finish (Splits).

All of these processes, except number 3, involve in one way or another, the tanning of leather, or retanning, with trivalent chromium sulfate. Some of these operations involve processing the raw hide into the finished leather product, some take it through the tanning process called through-the-blue, and others process the "wet blue" grain sides into the finished leather product.

The tanning agents used in this industry are chromium compounds, cresols, formaldehyde, and phenol. Other primary chemicals used are sulfuric acid, paranitrophenol, and 2-phenylphenol.

Chrome leather tanning makes up greater than 95% of the market while there are only a few leather tanneries that use the vegetable tanning process. Since a majority of the listed process operations involve tanning of the leather, whether it is the initial tanning or the re-tanning, occupational exposure to any new chemicals will be very minimal since chromium compounds is listed as having an OSHA PEL of 1 mg/m^3 as chromium. However, a majority of the PMN's, if they are solids, are distributed in solutions, which would minimize particulate exposure.

Dermal exposure is expected to be very minimal based on the fact that chromium and formaldehyde are suspected human carcinogens. Also, because the tanning solution is maintained at a pH of less than 2.8 in order for the chromium to penetrate the leather, potential dermal exposure would be intermittent and range from 650-1950 mg/day.

Estimates of environmental releases are based on the effluent guidelines for the leather tanning industry and are as follows:

1.) BOD_5 - 40 mg/l,

2.) TSS - 60 mg/l,

Note: If use rate is <54 kg PMN/day: default to Textile Scen for inhalation

3.) Oil and Grease - 20 mg/l,

4.) Total Chromium - 1 mg/l, and

5.) pH - within the range of 6.0 to 9.0

Discharge flow rates will vary depending on the leather tanning process and they range from 3 up to 5380 m^3/day.

For the leather tanning process, the tanning agents themselves are the only compounds exhausted from the tanning solution. Therefore, environmental releases could potentially be 100% of the production volume of the PMN.

I. Number of Sites and Use Rate

a. Number of Sites: Assume up to 200

b. Number of days per year: assume up to 350

II. Occupational Exposure

a. Inhalation

1. All operators up to 8 hrs/day
2. Exposure levels up to 1 mg/m^3 × (MW PMN ÷ MW Chromium)
   MW Chromium = 52

b. Dermal

1. All operators 650-1950 mg/day

III. Environmental Releases

1. Container residue - 0.1% of PV to landfill.
2. Water releases - up to 100% of PV.
   (100% PV) ÷ (# sites) ÷ (days/yr) = kg/site/day.