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Effluent Guidelines, Leather Tanning, and Pollution Prevention:

A Retrospective Study

An Industrial Pollution Prevention Project (IP3) Study

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Introduction

This study was undertaken to learn:

- O in what ways and for what reasons a specific industry in the past already was implementing pollution prevention in order to comply with existing effluent guidelines; and

- O to what degree the effluent guideline development document for that industry had already previously projected that outcome.

The industry selected for this study was the leather tanning industry. The leather tanning effluent guidelines were promulgated in 1982. This study looks at the steps taken in the past to comply with those guidelines. Because of the confidentiality of the data obtained in this study, this report will describe and present the findings in a general way that will not compromise confidentiality.

It is important to note that this study is intended to serve as a case study within the leather tanning industry and not as a study of the leather tanning industry as a whole.

Findings

1. Process changes and material substitutions were as important in meeting the guideline requirements as end-of-pipe treatment.

   For example, in meeting chromium limitations a major step taken was to modify the chrome tanning process to get more of the chrome into the tanned leather and leave less of it in the tanning wastewater. This was done through using different and more expensive chromium formulations as well as higher temperature, longer times, and less water in tanning baths. Through these measures, the amount of chromium fixation was increased from about 50% to about 90%.

   As another example, carbon dioxide was being used on a pilot basis as a substitute for ammonium sulfate in the deliming process. This was considered primarily as a cost reduction measure. But, if the change to carbon dioxide is successful, it will substantially reduce discharge of ammonia and biochemical oxygen demand (BOD).

As a third example, a technique was adopted whereby different agents were substituted for some of the sodium hydrosulfide used in the unhairing operation. This reduced marginally the amount of sulfide in the wastewater.

2. Recycling was done to meet effluent guideline requirements. Several waste streams were segregated so that portions of each could be recycled.

   For example, there was recycling of some of the spent chrome tanning liquor. It was collected, screened, and filtered, then recirculated back to provide acidity and some initial chromium in the pickling process.

   As another example, there was recycling of the spent unhairing liquor. After being screened, settled, and skimmed for removal of solids and grease, about 20% of the spent liquor is then withdrawn from the middle of the settling tank and recirculated back to the unhairing process. This reduced by somewhat less than about 20% the amount of sulfide and other compounds needed for unhairing.

3. Measures were adopted to reduce water use by about 50%. These measures included:

   - adoption of "closed-door" batch washing of skins rather than constant flow washing;
   - changing the drums used for unhairing and tanning from manually operated to automated;
   - recycling some of the wastewater from the final treatment plant to various points in the production process;
   - recovery of waters from pasting and vacuum drying for reuse;
   - recycling of cooling water used in refrigeration and air compressors.

4. Pollution prevention was adopted and implemented primarily because of the effluent limitation requirements, even though there were other benefits as well such as improved product quality, improved process efficiency, and reduced costs of water supply, wastewater treatment, and sludge disposal.

5. The effluent guideline development document was generally quite accurate in its projections. However, two major pollution prevention measures that were implemented (the first two in 1. above) were not referenced in the development document.

Conclusions

1. The industry was implementing pollution prevention in the past to meet the effluent guideline requirements.

2. The effluent guidelines were the driving force behind the implementation of pollution prevention, even if not the only reason.

3. The effluent guideline development document projections, while quite accurate generally in the areas of end-of-pipe technologies, did not forecast all the aspects of the pollution prevention creativity that was exercised by the industry.