

## ABSTRACT

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Effluents from textile mills may colour watercourses despite treatment and the public assumes that they are observing raw, untreated pollution and thus, complain. Modern dyes have been synthesised to be resistant to biodegradation and thus refractive in biological treatment facilities. The Pinetown Colour Removal Committee was convened to address complaints arising from colour in the Umbilo River, which arises from textile dyeing effluent discharged from the Umbilo Wastewater Treatment Works. The Committee consists of representatives from the authorities and the Pinetown textile industry and decolourisation technologies are being tested, for implementation on-site or at the Umbilo Wastewater Treatment Works.

European legislation is becoming more strict and may result in the closure of many textile mills, unable to meet these requirements, especially with respect to colour limitations. The Americans have adopted a more pragmatic approach to colour discharged to watercourses and have left it to the local authorities to deal with, if and when it becomes a problem. Textile industries tend to be regionally aggregated, thus if mills have to close, unemployment will have an effect on the economy as a whole. The textile industry (including South Africa's) is under stress world-wide, due to low-cost imports from undeveloped countries which pay low wages.

The effects of coloured effluents in aquatic environments are not only aesthetic, as they can interfere with the transmission of sunlight and this manifests itself in the river, in a reduction in self-purification ability and a decrease in the numbers and biodiversity of flora and fauna. The latter phenomenon cannot be exclusively attributed to coloured effluents, as the silt load of the river and colourless, toxic constituents of discharged effluents must play an important role in reducing the quality of the aquatic environment.

Some dyestuffs have been determined to be hazardous and the risks involved are forming the basis of ongoing investigations. The hazard may not manifest itself in the dyestuff alone, but in the cocktail of chemicals and the processes with which it is involved. At the concentrations of dyes discharged to sewer from the Pinetown textile industry, which are then diluted with sewage, the toxicity risk may be negligible, but this requires further research.

An assessment was made of why complainants found colour in the Umbilo River offensive and most felt that it was toxic and responsible for degrading the environment. Those interviewed were unwilling to pay more for potable water to ensure that the Works decolourised the effluent, as they felt the polluter must pay. The complainants were encouraged by the formation of Committee, but were not included in the proceedings, which may cause problems at a later stage. Public participation in the Committee is essential to ensure that a solution to the problem of colour in the Umbilo River is resolved to the satisfaction of all interested and affected people.

Inclusion of the dye manufacturers in the Colour Removal Committee is essential, as their international parent companies have access to research on minimisation of coloured effluents. This includes new, improved dyes, dyeing techniques and decolourisation technology, in keeping with the philosophy of duty of care, which is now guiding environmental legislation in South Africa.

A colour limit of 80 Hazen units, which has been set for discharging effluent into the Umbilo River, is too stringent, as it relates to the colour of tap water. Visual determination of colour saturation in textile wastewater was found to differ from analytical results for different dye types and thus a single colour limit for all dye classes is unsuitable. Textile effluents are discharged to the Umbilo Purification Works in peaks of colour and volume and the treatment processes were found to reduce the colour to within a certain range, irrespective of incoming colour values.

The use of dilution, by coinciding discharge of highly coloured effluent with peak flows into the Works, is the most effective option for initial decolourisation. Chlorination, used to disinfect the final effluent at the Umbilo Purification Works, does not reduce colour of the wastewater and most of the colour removal occurred in the trickle filters and clarifiers.

The South African textile industry is important in terms of job opportunities and its contribution to the economy. If increased environmental standards are applied, the cost will probably be offset by retrenchments. South Africa is suffering from the problem of unemployment, but environmental degradation cannot be allowed to continue unchecked, so finding a compromise is essential.