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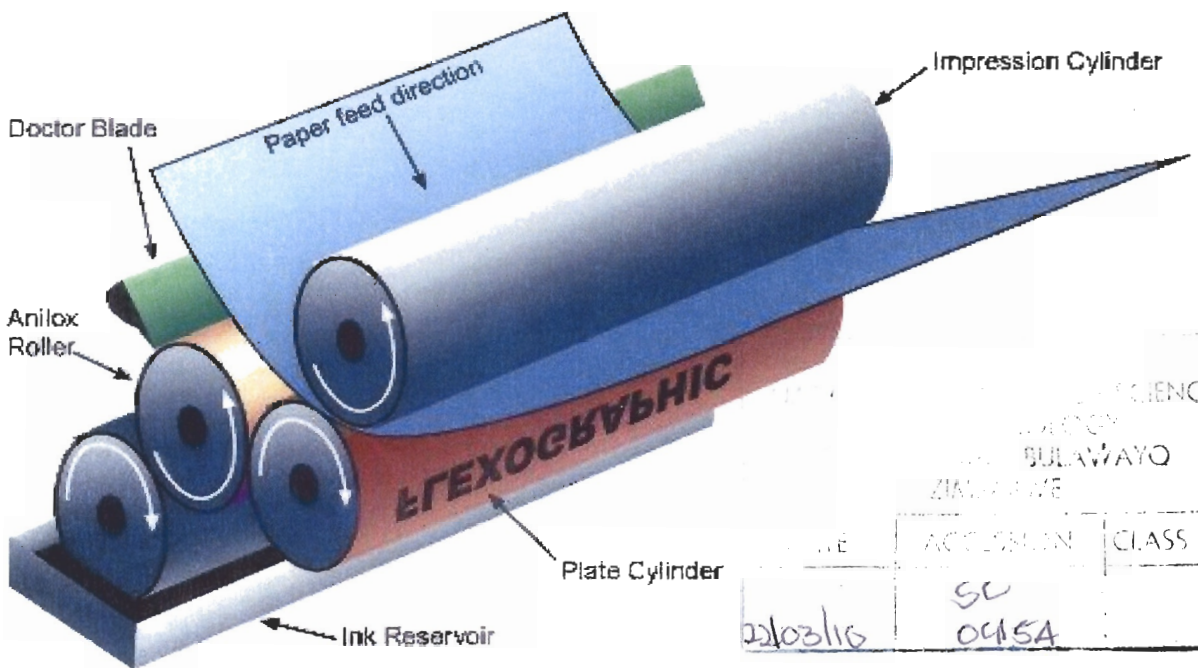
"Think in other terms..."



National University of
Science and Technology



DEPARTMENT OF ENVIRONMENTAL SCIENCE AND HEALTH



DEPARTMENT OF ENVIRONMENTAL SCIENCE AND HEALTH NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY P.O. BOX 30732 DIPLOMA IN ENVIRONMENTAL SCIENCE AND HEALTH ZIMBABWE		
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TITLE

Analysis of the consumption efficiency of flexographic inks at Hunyani Corrugated Products and the associated impacts in the aquatic environment using zebrafish (*Danio rerio*).

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A dissertation submitted in partial fulfillment of the requirements of Bachelor of Science (Honours) Degree in Environmental Science and Health.

ABSTRACT

A consumption efficiency study of flexographic was conducted at Hunyani Corrugated Products Bulawayo Branch over a twelve-month period by comparing the amount of ink issued from central stores for printing purposes and the amount of ink transferred onto final products by machinery (based on print area calculations). The average machine efficiency was calculated to be 88.80% whilst the overall consumption efficiency over the twelve months was found to be 88.12% falling short to meet the set Hunyani standard of 92.5%. This inefficiency led to about 1151 litres of ink to be lost into the aquatic environment over the twelve-month period costing the division about \$40 000 at present value and further polluting the environment. The effluent disposal stream (Mazai River) leads to the Umguza River and ultimately to Umguza Dam. A fish embryo toxicity test (FETT) was conducted to investigate the acute toxicity of flexographic ink on zebrafish (*Danio rerio*) embryonic development. Day old zebrafish embryos were exposed to different concentrations of green flexographic ranging from 0.0002%, 0.002%, 0.004%, 0.01% and 0.02% ink concentration respectively. Different toxicological endpoints such as coagulation of the eggs, heart rate, spontaneous movement and mortality were examined during the development of the embryos using a stereo microscope from 24 hours post fertilization to 144 hrs post fertilization. From the experiment it was noted that flexographic ink toxicity to zebrafish increase with the concentration, a concentration of 0.02% causing 83% mortality, lower concentrations caused conditions like oedema and spinal cord deformations. This suggested that flexographic ink of the same concentrations can cause similar effects to other similar fish species and possibly to other aquatic species.