



## HEAVY METALS CONTAMINATION ASSESMENT OF KANHARGAON DAM WATER NEAR CHHINDWARA CITY

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### ABSTRACT

A study was carried out to assess the concentration of 6 heavy metals namely (Cr, Cu, Fe, Pb, Mn and Zn) in water Kanhargaon dam near Chhindwara city. Atomic absorption spectrophotometer was used for estimation of heavy metals. These are within the limits as prescribed, by WHO and ICMR.

**Key words:** Heavy metals concentration, Drinking water, Kanhargaon dam.

### INTRODUCTION

Industrialization is believed to cause inevitable problem of pollution in water soil and air based on the types of industry, nature of raw materials and types of equipments used. Kanhargaon dam is 15 Km away from the Chhindwara city in M.P. The water available to man for his personal requirement is not absolutely pure. Heavy metals are one of the pollutants which inflict disorder in aquatic life. Heavy metal contamination may cause changes in the physicochemical composition of the water and finally become unsuitable for human consumption.

### EXPERIMENTAL

#### Material and methods

Water samples were collected monthly from different sample-station of the Dam in Oct. 2007, Nov. 2007, Dec. 2007 and Jan. 2008 in 500 mL polythene bottles and acidify with nitric acid to bring down the pH up 2.0. The samples for heavy metals analysis were collected separately and acidified immediately. Metals like Cr, Cu, Fe, Pb, Mn and Zn were analyzed by Perkin-Ealmer Flame AAS (Model 2380) using standard methods. All water samples were analyzed in Jan. 2008.

### RESULTS AND DISCUSSION

Analytical results of trace elements in various samples of dam water obtained from different samples station of Kanhargaon Dam near Chhindwara city are given in Table 1.

**Table 1: Heavy Metal contamination assessment of Kanhargaoon dam water near Chhindwara city during different months**

| Parameters     | Unit | Oct. 2007 | Nov. 2007 | Dec. 2007 | Dec. 2008 |
|----------------|------|-----------|-----------|-----------|-----------|
| Pb (Lead)      | mg/L | 0.03      | 0.041     | 0.03      | 0.016     |
| Cu (Copper)    | mg/L | 0.13      | 0.08      | 0.09      | 0.110     |
| Fe (Iron)      | mg/L | 0.118     | 0.114     | 0.080     | 0.124     |
| Zn (Zink)      | mg/L | 0.07      | 0.09      | 0.04      | 0.155     |
| Cr (Chromium)  | mg/L | 0.05      | 0.07      | 0.03      | 0.07      |
| Mn (Manganese) | mg/L | 0.01      | 0.05      | 0.01      | 0.03      |

**Lead:** Lead enters in drinking water from industrial effluents, different wastes and household sewage. Toxic level of lead in human body is 500 ppm beyond which it causes anemia, brain damage and vomiting<sup>1</sup>. The maximum permissible concentration of lead in drinking water is 0.1 ppm according to WHO<sup>2</sup> and ICMR<sup>3</sup>. The value of lead content in all water samples is higher than the maximum permissible level according to WHO (1996) norms.

**Copper:** The copper levels were found in the range 0.08 to 0.13 mg/L. The maximum permissible concentration of copper in drinking water is 1.0 ppm according to WHO (1996). The value of copper content in all water samples were 33% below, 64% optimum and 3% water samples is higher than maximum permissible level according to WHO (1996). Copper accumulates in liver and brain. Copper toxicity is a fundamental cause of Wilson's disease<sup>4</sup>

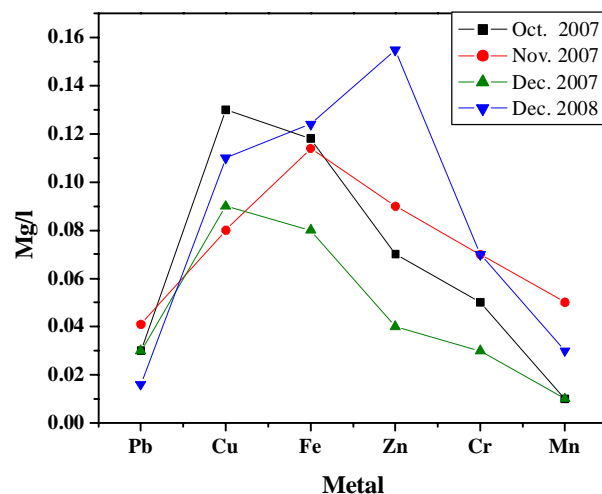
**Iron:** Iron in drinking water is present as Fe<sup>2+</sup> or Fe<sup>3+</sup> in suspended form. It causes staining in clothes and imparts a bitter taste. It comes into water from natural geological sources, industrial wastes, domestic discharge and also from byproducts. Excess amount of iron (more than 10 mg/kg) causes rapid increase in pulse rate and coagulation of blood in blood vessels, hypertension and drowsiness. The maximum allowed concentration of iron in drinking water is 1.0 mg/L according to WHO report. It was found that the value of iron in all water samples are 50% below, 23% optimum and 27% higher than maximum permissible limits according to WHO (1996) norms.

**Zinc:** Zinc is very essential micronutrient in human being and only at very high concentration; it may cause some toxic effect. Zinc compounds are astringent corrosive to skin, eye and mucous membrane. They cause special types of dermatitis known as "Zinc pox". Zinc is also irritating to digestive tract causing nausea and vomiting. The maximum permissible concentration of zinc in drinking water is 15 ppm according WHO. The values of zinc content in all water samples were 33% below, 57% optimum, and 10% water samples were higher than maximum permissible limit according to WHO (1996) norms.

**Chromium:** Chromium is also essential for organism as a micronutrient in traces from fat and carbohydrate metabolism. Chromium is also more harmful in its lower oxidation state (III). Chromium and chromates are potential carcinogens. The limit of chromium in drinking water is 0.01 ppm according to WHO. The values of chromium content in all water samples were 43% below, 37% optimum, and 20% water samples higher than maximum permissible level according to WHO (1996) norms.

**Manganese:** Manganese concentration in the dam water was found in range of the 0.01 to 0.05 ppm. The maximum permissible concentration of manganese in drinking water is 0.05 ppm according to WHO

(1996). The value of Mn content in all water samples were 53% below, 27% optimum and 20% higher than maximum permissible level according to WHO (1996) norms.



**Fig. 1: Concentrations of different heavy metals in different time periods**

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