



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2017; 5(6): 2417-2419

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Received: 22-09-2017

Accepted: 25-10-2017

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Evaluation of heavy metals in River Kabul at Khazana Sugar Mill Peshawar Khyber Pakhtunkhwa, Pakistan

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Abstract

The aim of the current study was to estimate the amount of these health hazards metals. For this investigation a study was conducted in River Kabul at Khazana Sugar Mill Peshawar Khyber Pakhtunkhwa, Pakistan. Water sampling were carried out and subjected to the heavy metals analyzer (atomic absorption spectrophotometer) at PCSIR laboratories Peshawar. Heavy metals concentration obtained from the present study was Zn 1.13-201 ppm; Cu 0.55-0.9 ppm; Cd 0.02-1.22 ppm; Pb 1.23-1.84 ppm; Cr 0.21-1.2 ppm and Mn 0.02-0.05 ppm respectively. In this survey only Cu, Cd, Pb and Cr were found above the permissible limits. From the present investigation it can be concluded that discharge of Khazana Sugar Mill Peshawar was contaminated with toxic heavy metals.

Keywords: River, Kabul, Khazana, Peshawar, Heavy Metals, ppm.

1. Introduction

Rapid urbanization and industrial development during last decade have provoked some serious concerns for the environment. Heavy metals contamination in river is one of the major quality issues in many fast growing cities, because maintenance of water quality and sanitation infrastructure did not increased along with population and urbanization growth especially for the developing countries [1-4]. Trace metals enter in river from variety of sources; it be can be either natural or anthropogenic [5-8]. Usually in unaffected environments, the concentration of most of the metals is very low and is mostly derived from the mineralogy and the weathering [9]. Main anthropogenic sources of heavy metal contamination are mining, disposal of untreated and partially treated effluents contain toxic metals, as well as metal chelates from different industries and indiscriminate use of heavy metal-containing fertilizer and pesticides in agricultural fields [10-13]. Metals enter into river water from mining areas through various ways such as mine discharge, run-off, chemical weathering of rocks and soils, wet and dry fallout of atmospheric particulate matter [14-18]. The mine water, runoff from abandoned watersheds and associated industrial discharges are the major source of heavy metal contamination, total dissolved solid (TDS) and low pH of streams in mining area [19, 20, 21, 22]. The aim of the research work was to find out the evaluation of heavy metals in River Kabul at Khazana Sugar Mill Peshawar Khyber Pakhtunkhwa, Pakistan.

2. Materials and Methods**2.1 Study Area**

Khazana Sugar Mill Peshawar is located in Khyber Pakhtunkhwa, Pakistan. It is one of the most popular and big Mill of the Sugar. It is located in the Charsadda road Peshawar. Its cover an area of total 850 Kanal. A huge amount of contaminated influents are discharged by Khazana Sugar Mill Peshawar and discharge into the water. As a result water quality disturbed and affect on all aquatic flora and fauna.

2.2 Sampling of water

Water samples were stored in clean and dry plastic bottles with screw caps and labeled. The freshly collected samples were analyzed for Heavy metals analysis at PCSIR Peshawar by using sophisticated instruments especially atomic absorption [23].



Fig 1: Khazana Sugar Mill Peshawar discharges KP, Pakistan.

2.3 Method for preparation of stock solution

The stock solution was prepared as 1000 ppm = 1000 mg/l. Then 100 ppm solution was prepared from stock solution using serial dilution equation of $C_1V_1 = C_2V_2$

2.4 Determination of heavy metals in water

The water samples were first filtered with the help of filter paper and then taken in 250 ml of glass bottles and subjected to the atomic absorption spectrophotometer (Zn, Cu, Cd, Mn Cr, Pb) (Model: Z-2000; Hitachi, Tokyo, Japan) which gives direct results of heavy metals on computerized system [23].

3. Results and Discussion

Aquatic environment are badly affected by the contamination of heavy metals such as (Zinc, Copper, Cadmium, Lead, Chromium and Manganese) respectively. When these toxic metals accumulated in the tissues of fishes as a result they enter to our bodies by consuming fishes. For this purpose the present investigation was design to find out the concentration of heavy metals. Results of the heavy metals were Zn 1.13-201 ppm; Cu 0.55-0.9 ppm; Cd 0.02-1.22 ppm; pb 1.23-1.84 ppm; Cr 0.21-1.2 ppm and Mn 0.02-0.05 ppm respectively. In the present study four heavy metals were found exceeded the recommended level. These heavy metals were Cu, Cd, Pb and Cr respectively. The current study revealed that

Table 1: Concentration of heavy metals (ppm) in River Kabul at Khazana Sugar Mill Peshawar KP, Pakistan.

S. No.	Metals	U.S	M.P	D.S	Permissible limits
1	Zn	1.13	2.01	1.26	5.0 mg/l
2	Cu	0.55	0.9	0.78	0.05 mg/l
3	Cd	0.02	1.22	0.05	0.05 mg/l
4	Pb	1.23	1.84	1.34	0.05 mg/l
5	Cr	0.21	1.2	0.46	0.05 mg/l
6	Mn	0.02	0.05	0.03	50-70 mg/l

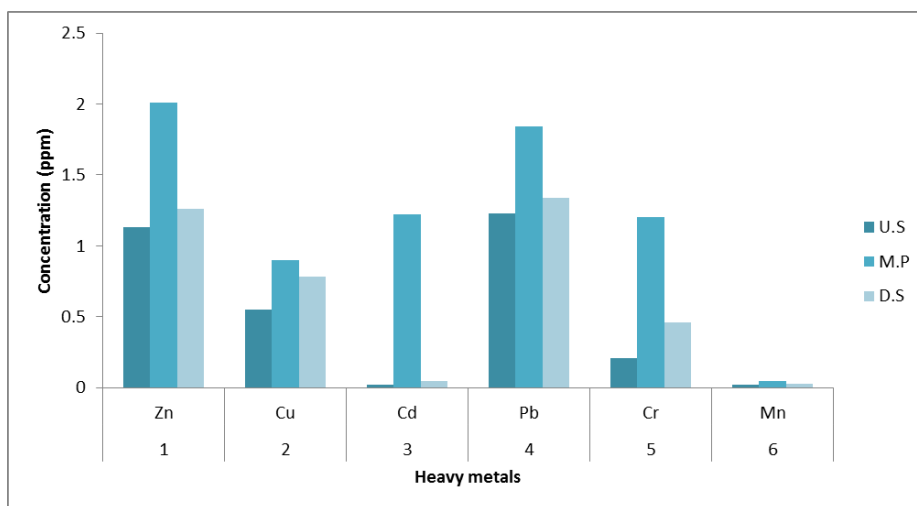


Fig 2: Concentration of heavy metals (ppm) in River Kabul at Khazana Sugar Mill Peshawar site KP, Pakistan. U.S (Upstream); M.P (Mid point); D.S (Down stream)

Khazana Suger Mill Peshawar released lot of heavy metals contaminated influents and enter to the river water without treatment. The mount of trace metals was analyzed by Usaman *et al.* in River Kabul Khyber Pakhtunkhwa, Pakistan. All the metals were found out by digital computerize machine (Atomic Absorption Spectrophotometer). In this study trace metals were detected in the water of River Kabul. Except Mn (0.06-2.11 ppm) all the trace metals were found above the normal range (Pb 0.06-4.41 ppm; Zn 4.11-7.11 ppm; Cd 0.42-1.46 ppm; Cu 1.07-3.86 ppm; and Cr 0.05-2.11 ppm). From this study it can be concluded that water of River Kabul is neither suitable for irrigation nor for the aquatic life [23]. In another study toxic heavy metals were studied by Hassan *et al.* at River ToiKohat. The heavy metals recoded during the period of 6 months from 3 selected site were lead (0.33, 0.40 and 0.55 mg/L), zinc (0.34, 0.60 and 0.53 mg/L), cadmiu m (0.03, 0.08 and 0.13 mg/L), arsenic (0.29, 0.63 and 0.51 mg/L), copper (0.04, 0.04 and 0.03 mg/L) and nickel (0.00, 0.01 and 0.01 mg/L). In this study it was concluded that River

ToiKohat water quality is not suitable. Furthermore, This River was considered one of the polluted one among all the small Rivers situated in the Kohat District. This River was also affected by the tourism activities [24]. There was variation in the both studies. The variation may be due to change of river and their water quality. Secondly reasom may be that the present study area was situated in the industrials zone while the previous one stusy area having no industrials contamination. Besides all these factors there may be some other resources through variation occur like dense populated area. The previous study conducted in River Toi Kohat was not too much dense populated site while the present research area i.e. Khazana Suger Mill Peshawar was found too much dense populated.

4. Conclusion

The results revealed that Khazana Suger Mill Peshawar daily released a huge amount of heavy metals contaminated influent. So one can say that Government of Kgyber

Pakhtunkhwa should want to take serious action to stop the discharge of heavy metals contaminated influent in to the River Kabul Water.

5. Acknowledgement

I am greatly thankful to Hameed Ur Rehman (Department of Chemistry) and all the group members of PCSIR. I am also thankful to my brother Dr. Wahid Raza (Department of Management Sciences ICUP) who helps me throughout in water sampling collection.

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