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Assessment In Water Related To Public, Bilaua, Gwalior M.P. India

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Abstract
Water analyzed in granite mining sites at Bilaua to check the current status of heavy metal ions and their sources. Samples of groundwater where collected from various mining sites as well as from residential sites for analysis. In study areas near by 18 crushers were running. Three samples were collected from each mining and residential areas at various distances. Pb, Zn, Cu, Ni, and Mn heavy metal concentrations have been analyzed in groundwater. The results shows all the parameters are more or less within permissible limits of WHO.
Keywords: *Heavy metal concentration and water*

1- INTRODUCTION

Water is the most vital resource for life. Approximately 97.2% water lies in oceans as salt water. While 2.15% in frozen ice from and the remaining 0.65% remain as fresh either on surface or ground water. Available fresh water resources are very limited. The demand for fresh water has increased day by day and will increase with the rapid growth of population, agriculture and industry. As a result the fresh water reserve depletes day by day too. The requirement of clean water per person is about 2.7 lit per day, thus the global requirement is about 5 billion cu. m. only for drinking purpose. Agriculture is also one of the major consumers of fresh water resources. Water as resource is under relentless pressure due to population growth, rapid urbanization, large scale industrialization and environmental concern (Rai and Pal, 2002). It is one of the most important commodities which man has exploited than any other resource for the substance of his life (Mathur and Maheshwari, 2005). Water pollution has now reached a crisis point specifically in developing world. Almost every water body is polluted to an alarming level. Thus, estimation of quality of water is extremely important for proper assessment of the associated hazards (Warhate et al., 2006). In societies like our India with developing economics, the optimum development, efficient utilization and effective management of their water resources should be the dominant strategy for economic growth. But in recent years unscientific management and use of this resources for various purpose almost invariably has created undesirable problems in its wake, water logging and salinity in the case of agriculture use and environment pollution of various limits as a result of mining, industries and municipal use (Kumar et al., 2008).

2- MATERIALS AND METHODS

Sample Container: Plastic bottles were used for sampling process. Before starting sampling, plastic bottle have been soaked in HCl and rinsed with double distilled water. The bottle necks were sealed tightly.

Sample Collection: Before starting sampling, the sampler bottle has been rinsed 2 to 3 times for the sample which has to be examined. Samples were collected from different three sites of mining and residential area. All samples are collected from hand pump which are used for drinking water, situated in different three sites of study area. The complete information was recorded about the source and the condition under which the samples were collected.

Water Analysis: During the present study ground water sample were collected and analyzed for different heavy metal concentrations to determine the characteristics of the ground water of all the samples were examined to find out Cu, Pb, Zn, Ni, and Mn Concentration.

3- RESULTS AND DISCUSSION

Copper: Copper is a vital trace element with a maximum daily oral intake of 1-2 mg per individual. Naturally occurring copper concentrations in groundwater are without any health significance and scatter mostly around 20 µg/l. If drinking-water drawn from groundwater contains elevated levels, in most situations corrosion of copper pipes is the primary source. Liver cirrhosis occurs in babies when average concentration exceeds the limits of 2 mg/l in drinking water. The prevalent endpoint of acute copper toxicity by time, concentration and dose is nausea. The health based guideline value for copper in drinking water is 2 mg/l . In the human metabolism copper is also a vital element and is generally considered to be non- toxic for man at the levels encountered in drinking water. The occurrence of Cu in a water supply, even though not considered as a health hazard, may obstruct with the intended domestic uses of the water. Copper in public water supplies add to the corrosion of galvanized iron and steel fittings. At levels above 5 mg/l, if also imparts a color and an undesirable bitter taste to water. Staining of plumbing fixtures and laundry occurs at Cu concentration above 1.0 mg/l. Copper is extensively used in domestic plumbing systems, and levels in taped-water can therefore be considerably higher than the level present in water entering the distribution system. The guideline value of 1.0 mg/l 4 is recommended for drinking water quality based on its laundry and other staining properties. The results of this study, shows that all the samples concentration of copper are well within the permissible limits of WHO guidelines. The maximum value is 0.023 ppm and the minimum values are 0.001 ppm The above study shows the concentration of copper are desirable in ground water and it is not contaminated by anthropogenic sources but it can come to soil by a variety of anthropogenic sources: mining and smelting activities; other industrial emissions and effluents; fly-ash; traffic; dumped waste materials; contaminated dust and rainfall; sewage and sludge; pig slurry; composted refuse; and agriculture fertilizers, pesticides, and fungicides . Lead: The mining-related heavy metals as lead may originate in runoff from city streets, industrial dischargers, leachate from landfills, mining activities and a variety of other sources. Lead is toxic chemical, which are generally persistent in the environment, can cause reproductive failure or death in fish, shellfish and wildlife. In addition, lead can accumulate in animal and fish tissue, be adsorbed in sediments, or find their way into drinking water supplies, posing long term health risks to humans10. Lead is a general toxicant that accumulates in the skeleton as well as Infants; children up to 6 years of age pregnant women are most susceptible to its adverse effects. Lead also interferes with calcium metabolism, both directly and by interfering with vitamin D metabolism.

Lead is exceptional in that, most lead in drinking water arises from fittings containing lead and plumbing11. In the study areas we found the concentration of lead is very high which a very severe problem. The concentration varies from 0.082 mg/l to 0.247 mg/l where as the WHO a guideline is 0.01mg/l, so the all the above samples are exceeded the permissible limits which may attribute by the various above human activities. Mineral matter in coal, primarily with sulphides such as galena (PbS), clausthalite (PbSe) and pyrite, as well as alumina silicates and carbonates generally associated with lead. It was also suggests that lead may also be associated with organic matter, most likely in the lower ranked coals.

Zinc: Usually zinc is found in abundance in earth crust in the ore form (sphalerite – ZnS) with the associates of lead element. It is found in soil, water, air and in all food items. The process by which zinc comes in environment includes the human activity as well as natural phenomenon. The various human activities which led to entrance of zinc elements in the surrounding environment are mining, purifying of zinc, cadmium, and lead ores, coal burning, steel production, and burning of wastes. Most of the zinc in water bodies, such as lakes or rivers, settles on the bottom. However, a small quantity may remain either dissolved in water or as fine suspended particles. As the acidity of water rises the level of dissolved zinc in water may enhance. Most of the zinc in soil is bound to the soil and does not dissolve in water. However, depending on the characteristics of the soil, some zinc may reach groundwater. Zinc is an essential element in human nutrition. The daily requirement is 4-10 mg depending on age and sex. Food provides the most important sources of zinc. All samples concentration of zinc in groundwater is well within the permissible level of WHO 84 3.0mg/l. In the study areas zinc, is found at minimum concentration of 0.009 mg/l and maximum concentration is 0.184 mg/l which are very low. Zinc is a vital element in all living organisms. Almost 200 zinc-containing enzymes have been recognized, including many dehydrogenises, aldolases, peptidases, polymerases, and phosphatases14. Nutritional zinc deficiency in humans has been found in a number of countries. Drinking-water usually makes a insignificant input to zinc intake unless high concentrations of zinc occur as a consequence of corrosion of piping and fittings. Under assured conditions, tap water can give up to 10% of the daily intake.

Nickel: The soil utilization, pH and depth of sampling affect the concentration of nickel in groundwater. WHO permissible limits is 0.02mg/l, so each sample is within the permissible limits of WHO. Mobility of nickel in the soil enhanced by acid rain which leads to increase its concentration in groundwater. With pH less than 6.2 in groundwater the nickel concentration recorded up to 980 ppm . In the polluted region it has been found that nickel concentration increased in ground water and municipal tap water19. The fittings used in plumbing system having nickel content shows concentration of 490 ppm when water left standing for overnight. Chromium–nickel stainless steel pipe shows the passive leaching of nickel but not of corrosive origin of nickel ions in pipe line water. The effect of nickel is not fatal as it does not affect the function of liver severely in human beings. The Serum nickel concentrations ranges from 13 and 1340 ppm in human shows following symptoms like shortness of breath, diarrhoea, nausea, vomiting, giddiness, headache and lassitude.

Manganese: In our earth crust manganese metal is found in plenty with iron ore therefore it is not found in pure form but as constituent of more than 100 minerals. It is a necessary element for the appropriate working of both animals and human beings because it is an important mineral for the functioning of different types of cellular enzymes. The existence of manganese is generally found in 11 oxidative states. Mn2+, Mn4+ or Mn7+ are the most environmentally and biologically significant compound of manganese. In surface and ground water manganese are found naturally. Presence of manganese in soil can leach in water sources. At various region contamination of manganese in water sources are International Science Congress

Association 5 attributed by human actions. Manganese concentration in ground water is more as compare to surface water by data provided by National Water Quality Assessment Program. WHO guidelines for manganese in drinking water is 0.5 mg/l whereas the all the sampling areas manganese concentration are well within the limits that's shows the ground water of sampling areas are up to the mark. The upper limit level of manganese is about 0.079 mg/l and the lowest concentration is 0.004 mg/l. The hazard produced by overexposure to manganese must be weighed beside the necessity for some minimum quantity of manganese in the diet, since manganese is an essential nutrient, performing as a component of numerous enzymes and a contributor in a number of significant physiological processes. Manganese intake from drinking-water is normally substantially lower than intake from food. Manganese lack in humans appears to be rare, because manganese is found in many general foods. Animals experimentally maintained on manganese-deficient diets exhibit impaired growth, skeletal abnormalities, reproductive deficits, ataxia of the newborn and defects in lipid and carbohydrate metabolism. The greatest exposure to manganese is generally by the food. Adult persons take manganese between 0.7 and 10.9 mg/day in the diet. The higher intake reported being associated with some vegetarian diets.

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