

**PHYSICO-CHEMICAL STUDIES OF WATER FOUND IN THE  
SURROUNDING AREA OF STONE CRUSHER PLANT  
IN TANGI (ODISHA)**

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RECEIVED : 6 June, 2016

Physico-chemical studies of water were made in the locality of stone crusher plant and in its surroundings. The five surrounding villages were chosen for study. This paper deals with the analysis of physical and chemical parameters of underground water and surface water of above mentioned spots. The samples were analysed for pH value, EC, hardness, DO, BOD, COD, sulphate, chloride, nitrate, phosphates etc. The results observed are discussed in this paper. The ground water of this area is found alkaline and it is due to presence of enormous lime stone rocks found in this region.

**KEY WORDS** : Physico-chemical, Stone crusher plant, mines, limestone, Ground water, Surface water.

## **INTRODUCTION**

The stone crusher plant is situated at Tangi, a village about 25 kms far from Bhubaneswar city. The area experience a tropical climate with maximum temperature of 42°C during in peak summer and mercury drop below 15°C in December during winter. This area receives an average rainfall about 1250 mm. The study deals with assessing the impact of mining activity on water quality of nearby villages. The water requirement of crusher plant and adjoining villages are fulfilled by making dug wells and bore wells. At Madhavgarh an intake well is built for water supply to Tangi. The crusher plant has acquired 300 hectares land in which 9 bore wells and 8 open wells are made. This area is used for crusher plant and mines which were previously being used by the farmers for cultivation. This shows a considerable reduction in the irrigation area of this region. The actual under ground water, which was being used by the farmers before the acquisition by stone crasher plant, is not available as such now. Therefore this is evident that the huge dewatering by the farmers has considerably reduced The mining at this area for lime manufacturing has effected water quality status of several villages adjacent to this plant. In present scenario, it is worthwhile to monitor the status of water quality in this locality. In order to achieve the goal, authors have analysed various parameters to assess the quality of under ground water and surface water. These parameters

are, pH value, Electrical conductance, Total hardness, Iron, Calcium, magnesium, Mercury, Cadmium Arsenic zinc, Chloride, Sulphate, Nitrate, DO, BDO, COD etc.

**Hydrology** : The some part of rainfall percolates into fractures found in the surface and in the underlying rocks, resulting an increase in ground water level. The limestone rock has cavemous nature which facilitate easy percolation of water into the ground. Shale having high porosity which acts as impermeable zone to the water bearing strata, therefore the ground water of this area occurs under semi- confined and confined condition. The ground water flows toward NE and it generally follows the surface topography. The flow direction also appears to be towards Bhubaneswar. The under ground water is found to very close to the limestone rocks and in shale contact.

The samples were collected from bore wells of crusher plant and from surrounding villages. The information from the resident of these villages are also collected for assessing the effect in their bore well, sand open wells before and after established of crasher plant. The water levels of all bore wells and open well were measured by the battery operated water level instrument having graduated cable and a suitable electrode. Water samples were collected once every month from different bore wells to analyse the ground water. The surface water samples from different villages were also taken in same pattern. The samples were collected in acid cleaned, non-reactive plastic bottles. The study period is in between Feb.14 to Jan.15 covering premansoon, mansoon and postmansoon period in duration of a year. pH values were measured in situ. Other parameters were analysed by standard methods (Grasshoff, 1983, Trivedy and Goel 1986 and APHA, 1992).

## RESULTS AND DISCUSSION

**T**he results of various parameters for ground water and surface water are shown in Table 1. The pH values were found in range of 7.3 to 8.6 indicating the alkaline nature of water, which is due to limestone aquifer and dolomite overlying strata. The average of pH values of twelve month is taken into consideration and these values are found with in the limits recommended by ICMR, (1975) and WHO (1985), UPSH (De 1999). The high pH recorded at few station, is due to rock influence. The total dissolved solids were found in between 362 to 503 mg/lit. The presence of Calcium and Magnesium is also can be described by the presence of limestone and dolomite rocks in this region. The chloride concentration varies from 21 to 38 mg/l. Calcium and Magnesium are easily leached from limestone and dolomite respectively and dissolved in the water. The water of this region is hard, total hardness is found in between from 389 to 465 mg/l. Dissolved oxygen is found in range of 2.3 mg/l to 8.00 mg/l. The DO is found satisfactory in river water. The high value of DO is due to the impact of rainwater, directly goes to river (Hannan, *et al.*, 1928, Hannan 1979, Mahadev *et al.* and Krishnaswamy 1983, Jebanesan, *et al.*, 1987 and Abbasi, *et al.*, 1997, Mathur Koshy and Nayar 1999).

The low DO is observed during premansoon may be due to decomposition of organic matter and restricted flow of river water (Gonzalves and Joshy, 1946, Badge and Vern., 1985) Lower DO was reported for a number of polluted rivers. Biochemical oxygen demand (BOD) is found in range of 2.6 to 25.0 mg/l. During post mansoon in the month of October and onwards, the BOD values are found lower which may be due to the removal of oxygen demanding organic wastes accumulated during the summer by the flood water. The sample collected at Tangi village, shows high BOD value of 3.3 mg/l during premansoon, it may be due to the accumulation of dead organic matter in the water bodies. Higher BOD values have been reported by Srivastava (1998) and Avasan Maurthy, *et al.* (2000). The phosphate, nitrate and sulphate were found well with in permissible limit.

## CONCLUSION

In general all parameters were found within limits of standard values prescribed by various agencies. High BOD and COD values observed during premonsoon period, indicate pollution up to some extent. The water quality of mines (formed due to mining of stone) and bore wells are found satisfactory for human consumption. The water of this region is found moderately hard and it is due to limestone rocks prevailing in large quantity. The hardness of ground water is more than river water.

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