Environment Conservation Journal 8 (1-2) 31-36, 2007
(ISSN 0972-3099)

Impact of stored effluents of slaughter houses on ground water quality of hand pumps situated nearby slaughter house at Khurja town, District- Bulandshahar (U.P.) India

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Abstract

Khurja is a tehsil of district Bulandshahar (U.P.) India which is famous for manufacturing of crockery products. There is a large scale slaughter house at Mundakhera road which discharges its blood red effluents in nearby ponds having area more than 5 acre. The city Khurja is situated on G.T. road between Aligarh and Bulandshahar cities and approximately 75 km away from Delhi towards south. This paper presents a case study of water quality of hand pumps situated around the ponds which receives more than 80% blood red effluents of slaughter house. The study reveals that the ground water quality of hand pumps selected within range of 2 km. from slaughter house is not suitable for drinking purpose with respect to colour, odour, pH, TDS, conductivity, hardness, DO, BOD and chloride at sampling points 1-3 while at sampling point 4 and 5 the parameter colour, odour, pH, hardness, BOD and chloride were found within limit of drinking purpose where as TDS, conductivity, and DO were observed beyond the limit.

Keywords: *Conductivity, TDS, Hardness, DO and BOD.*

Introduction

Khurja is a tehsil of district Bulandshahar (U.P.) India which is famous for crockery manufacturing industries. This town is situated on G.T. road between Bulandshahar-Aligarh and approximately 75 km away from Delhi. It has more than 2 lakh population of different communities. There is a big slaughter house between Mundakhera road and Bulandshahar road from where a large quantity of blood red effluents are discharge into near by ponds. The pond covers an area of 5-6 acres. More than 2 thousand animals are slaughtered in open area everyday and red effluents as well as their wastes are discharged into this pond. This pond is named as, Khooni Talaab by the people. This slaughter house comes under the Jurisdiction of Nagar palika but it seems that Government has never looked into the matter.

Inhabitants of the vicinity of the slaughter house are facing many problems due to highly polluted pond causing pungent, untolerable, bad smell and also ground water of hand pumps situated around this slaughter house. Therefore, it was proposed to assess the impact of stored effluents of slaughter house on ground water quality of hand pumps situated in the vicinity of slaughter house in respect of physico-chemical characteristics.

Several researchers/ workers have carried out studies on water of different sources in respect of physico-chemical parameters (Vaishya and Agarawal 1993, Abbasi *et al.* 1999, Soren and Julian 1977, Pande and Hasan 1979, Singh *et. al.* 1988, 1989, 1991, 1993 and 1994 and Khanna *et al.* 2003). So far it is reviewed that no such rype of investigations have been conducted to assess the impact of stored effluents of slaughter house on ground water quality of hand pumps situated near slaughter house. Hence, a study has been

carried out to assess the water quality of hand pumps selected in the vicinity of slaughter house in terms of physico- chemical characteristics and to forecast impact of such polluted water on human beings. Study has been made in the month of August-2005.

Material and Methods

The ground water samples were collected in a neat clean two liter capacity white plastic Jericanes for general parameters and samples for DO were taken in 300 ml capacity borosil glass bottles and DO was fixed by using $MnSO_4$ and alkaline azide reagents. Methods of analysis, sampling and preservation of samples were adopted as per standard methods of APHA-AWWA-WPCF, (1992), Trivedi and Goel, (1984), Kotiah and Kumaraswamy, (1994).

Parameters studies were colour, odour, pH, conductivity, dissolved solids, DO, BOD, total hardness, calcium hardness, magnesium hardness and chloride.

Slaughter house situated on Mundakhera road and its pond of stored effluents also touches the main GT road Khurja- Bulandshahar, Hand pumps were selected to collect the samples of ground water situated within the range of 2 Km. at diferent locations and distances from the slaughter house. Sampling sites were selected as per following points and map (fig.-1).

1. Hand pump situated adjacent to Slaughter house at plot of Mr.Padmi, Mundakhera road Khurja, district- Bulandshahar (U.P.). This sampling point is represented as -A.

2. Hand pump situated at 100 metre away from slaughter house at Khurja-Bulandshahar (U.P.) This sampling point is represented as -B.

3. Hand pump situated 1.0 Km. away near house of Mr. Mahendra Singh, Murari nagar from Khooni Talab (redish pond of slaughter house), Mundakhera road, Khurja, district Bulandshahar (U.P.) This sampling point is represented as -D

4. Hand pump situated 2.0 km. away at Khurja- Bulandshahar road from Khooni Talab Mundakhera road, Khurja, district- Bulandshahar (U.P.). This sampling point is represented as-E. All above hand pumps have been installed at depth of 30-45 feet approximately.

Results and Discussion

During the study period, five samples were collected from selected sites of hand pumps and analysed the parameters. The data obtained are shown in Table-1 and prescribed limit of BIS-(1991) and CPCB- (1997) have been given in Table-2 to compare the results of studies characteristics with respect to drinking purpose.

As it is clear from the results that the values of studied parameters ranged as pH 7.2-9.04, conductivity 1.08-2.95 μmhos/cm, DO 1.9-5.8 mg/I, BOD 0.0 - 3.9 mg/I, Total hardness 263-710 mg/I, Calcium hardness 170-420 mg/I, Magnesium hardness 88-356 mg/I, Chloride 134-679 mg/I, and Total Dissolved Solids 689-2913 mg/I, within the study area. Minimum values of these parameters obtained at sampling point-E except DO and Magnesium hardness where as maximum values of the characteristics were observed at sampling point -A except DO, and Total hardness. Minimum value of DO and Mangesium hardness were found at sampling point-A and while maximum value of DO and Total hardness observed at sampling point- E and

C (Table 1.) The parameters of colour, odour, pH conductivity, DO, BOD, Total Hardness, Calcium Hardness, Magnesium Hardness and Total Dissolved solids were not found as per prescribed standard of drinking purpose at sampling points-A, B and C as compared to other points but values of conductivity, DO and Total Dissolved Solids were also observed beyond the prescribed limit of drinking purpose BIS-(1991) and CPCB (1997) at all sampling points which may be due to contamination of ground water quality through percolation of stored effluents of slaughter house. However, the ground water quality of sampling points-D and E is far better than other sampling points with respect to colour, odour, pH, BOD, Total hardness and chloride which may be due to no much contamination of ground water quality percolation of stored effuents of slaughter house. Second reason may be distance factors of situated hand pumps location. It is evident from the Table-1 that as distance of the sampling points increases from the slaughter house, the values of the studied parameters also decreases besides DO. While an enhancement in DO is obtained. However it is not found as per standards limit. Therefore, ground water quality of selected hand pumps is alkaline in respect of pH and most contaminated ground quality was found at sampling points-A,B and C which may be due to seepaging of stored effluents of slaughter house. Ground water rich in carbonic acid and dissolved oxygen usually possesses a high solubilizing potential towards soil or rocks that contain appreciable amount of minerals calcite, gypsum and dolomite and consequently hardness level may increased

Table -1

Results of physico-chemical characteristics of ground water quality of hand pumps situated near slaughter in Khurja Town, District- Bulandshahar (U.P.) India.

Parameters	Date of sample collection	Sampling point (A)	Sampling point (B)	Sampling point (C)	Sampling point (D)	Sampling point (E)
Colour	17.8.2005	Straw	Straw	Light straw	Colourless	Colourless
Odour	17.8.2005	Untolerable	Untolerable	Unpleasant	No specific	Odourless
pH	17.8.2005	9.04	8.91	8.80	7.4	7.2
Conductivity µmhos/cm)	17.8.2005	2.95	2.62	2.01	1.68	1.08
TDS (mg/l)	17.8.2005	2913	2604	2438	910	689
DO (mg/l)	17.8.2005	1.9	2.4	2.3	5.4	5.8
BOD (mg/l)	17.8.2005	3.9	3.5	3.5	0.8	00
Total Hardness (mg/l)	17.8.2005	710	681	744	286	263
Calcium Hardness (mg/l)	17.8.2005	420	390	388	198	170
Magnesium Hardness (mg/l)	17.8.2005	290	291	256	88	93
Chloride (mg/l)	17.8.2005	679	312	366	143	134

(WHO 1984). That's why the values of conductivity, TDS and DO were observed beyond the limit of drinking purpose (Table-2) at all sampling points. Hence, the ground water quality of selected hand pumps situated within 500 metre range from slaughter house are not at all suitable for drinking purpose. Ground water quality of selected hand pumps situated beyond is 500 metre- 2 Km range i.e. Sampling points-D and E from slaughter house is better than other points because BOD values obtained at these points are found negligible. It is necessary to protect such contaminations which are polluting ground water quality.

Table - 2: Standards of water quality for drinking purpose in terms of physico- Chemical characteristics (BIS-1991 and CPCB-1997)

Parameters	Standard limits
Colour	Colourless
Odour	Odourless
pH	6.5-8.5
TDS (mg/l)	500.0
Conductivity (mmhos/cm)	1.0
DO (mg/l)	>6.0
BOD (mg/l)	2.0
Total hardness (mg/l)	300.0
Calcium hardness (mg/l)	200.0
Magnesium hardness (mg/l)	100.0
Chloride (mg/l)	250.0

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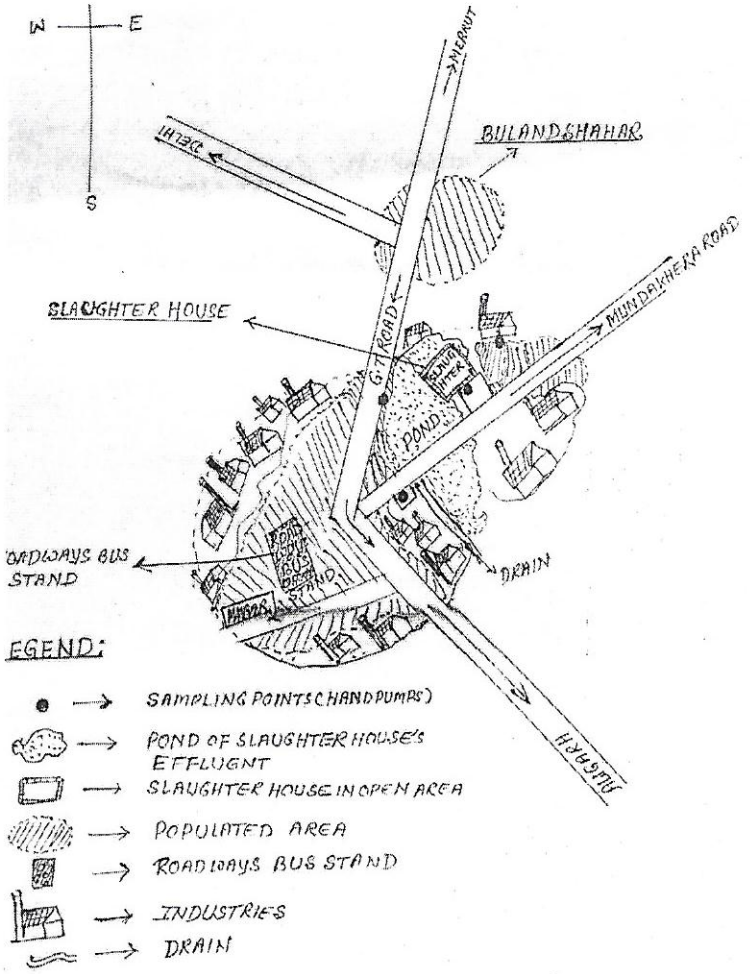
Fig. 1:-Map Showing Situation of sampling points (Handpumps) in the Vicinity of Slaughter House at Khurja, District-Bulandshahar (U.P.)



Legend :-

Sampling Points (handpumps)

Pond of Slaughter House's effluent

Slaughter House in open area

Populated Area

Road ways Bus stand

Industries

Drain