T(1)-2679/2020/DGW

Directorate of Ground Water Department,
JalavijnanaBhavan, Ambalamukku,
Kowdiar P.O, Thiruvananthapuram.
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Dated : 03.12.2020

From

The Director.

To

Member Secretary,
Kerala State Pollution Control Board,
Pattom.P.O.,
Thiruvananthapuram – 695004.

Sir,

Sub:- Ground Water Department – Hydrogeological study at Ollur Industrial Estate, Thrissur – Report forwarding - Reg.

Ref:-
1. That office letter No. PCB/HO/EE4/NGT/OA. No. 20/2016 (SZ), dated 06.10.2020.
2. OA No. 20/2016 filed by Sri. Santo P L before Hon'ble NGT.
3. Letter No. DGT/1259/2020, dated 24/11/2020 from District Office, Groundwater Department, Thrissur.

Inviting kind attention to the references cited, I am enclosing herewith the hydrogeological study report of Industrial Estate, Ollur, Thrissur, submitted by District Officer, Groundwater Department, Thrissur. This is for your favour of information and further necessary action.

Yours faithfully,

Director

A(hp)-03.12.2020

HYDROGEOLOGICAL STATUS OF OLLUR INDUSTRIAL AREA AND SURROUNDINGS

Introduction

Ollur industrial estate in Thrissur District is located in the Thrissur Corporation area and is comprised of different industrial units which are manufacturing various diverse products. Estate is situated in an area of around 28 acres with a total number of 147 industrial units. Type of activities include rubber & plastic products manufacturing, general engineering works, electroplating, dies & moulds etc. and the products from these units include plastic bottles, jars, cans, pots, other house hold items, imitation gold jewelry, thread rubber, dies & moulds etc.

Thirteen units in the estate are manufacturing/working in the field of electroplating related activities for the manufacture of imitation jewellery items. The main contention of the present litigation is on the pollution/chance of pollution caused due to the functioning of these electroplating related units.

In continuation to the direction by Hon'ble NGT, South Zone, Chennai against the OA No. 20/2016 (SZ), and subsequent direction from the Director, Ground Water Department, this office conducted a detailed study in the area. Based on the field study and succeeding interpretation of the water sample analysis data of the samples collected from the industrial area and neighbouring area, following observations are being been made.

Physiographical Setup

The industrial estate is situated in a slightly elevated terrain with the maximum elevation near to the centre part of the estate and is dissected by roads. The centre part is relatively flat and the terrain has a slopping nature towards the boundary area, from the highest elevated area. Though it doesn't have a distinct slopping nature at all points, the general nature of the terrain is observed as a slightly undulating flat topped mount. As far as the general slope pattern is concerned, the maximum slope is noticed in the south eastern part of the area.

Hydrogeological setup of the area

The surface material of the area is laterite and the thickness of the lateritic horizon varies from 6 to 8 meters in the area. The well inventory and lithology observation in the

available open wells indicate that the laterite horizon is followed by a thin layer of lithomargic clay followed by weathered crystalline rock and finally to hard crystalline rock of gneissic nature.

Due to the limited thickness of the lateritic formation and also due to the elevated nature of the terrain, the base flow from the area to the flanks of the hill is comparatively more and slightly faster than the adjoining areas.

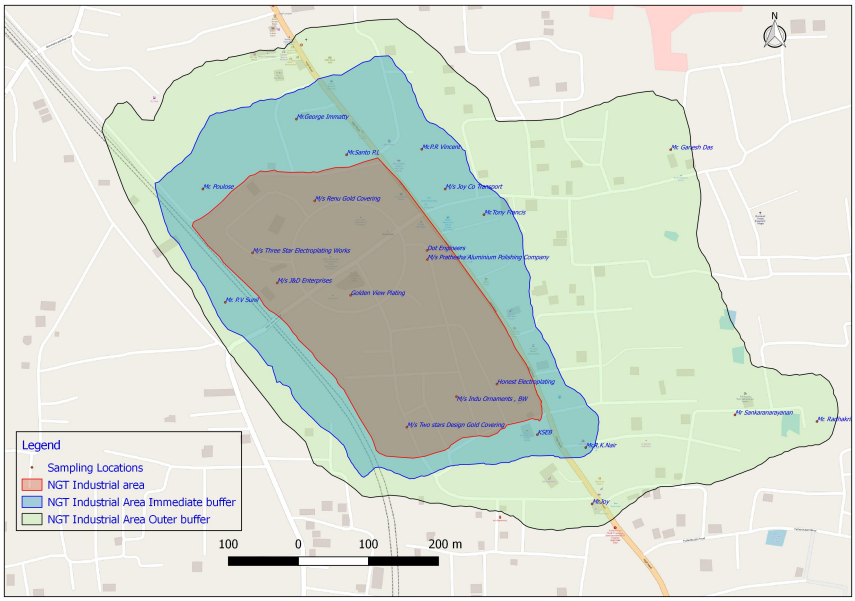


Fig1: Sampling locations

At certain locations the open wells are perennial, whereas at some parts of the estate open wells are not yielding water round the year. Structural setup and well inventory obtained from the bore well constructed in the area indicate that the basement crystalline rock fractured and is yielding water. Due to this nature of the terrain both open wells and bore wells are present in the estate compound.

The area around the industrial area is having relatively low slope and the thickness of the lateritic horizon varies from 7 to 11 mtrs in the area. The open wells in the area are of perennial type with the thickness of the lithomargic clay horizon varies from .25 to .5mtrs. In the extreme east part of the study area, the terrain is relatively flat and merges with the adjacent valley portion. Average water level in the area is 3 mbgl and in the extreme east part of the study area the fluctuation is minim and is well within 2.5 meters.

Water Quality Sampling

The samples for water quality study was collected from different locations including the selected industrial units which are primarily conducting electroplating related works , selected domestics wells in the vicinity of the industrial area. The samples were collected in the last week of September 2020, after a short spell of rain. Details of the water quality analysis are appended separately.

Observation

Hydrogeological setup of the area is congenial to groundwater base flow to the adjoining areas, since the terrain has a mount like topography. As reported by the representatives of the selected industrial units, the effluent generated during the production process will be of acidic nature and the effluent will be treated to make it to the standards fixed by Pollution Control Board. Two representative samples collected from the effluent clearly indicate that the pH value is well within the alkaline limit. It was also reported that the solid waste generated in the units are disposed Kerala Enviro Infrastructure Ltd (KEIL), Ambalamugal, Eranakulam.

The hydrogen ion concentration in a solution is referred as pH of the solution and is the measure of the acidity or alkalinity of a solution. The analysis of water samples for the general parameters indicates that the pH values are showing acidic nature in the immediate vicinity of the industrial area and also in the ground water samples from the estate compound. Since the industrial estate is a mount like landform and due to the topographical and hydrogeogical setup of the area groundwater base flow is expected in all directions. Maximum base flow of ground water is expected in the south eastern part of the area, because of the hydrogeological features existing in the area.

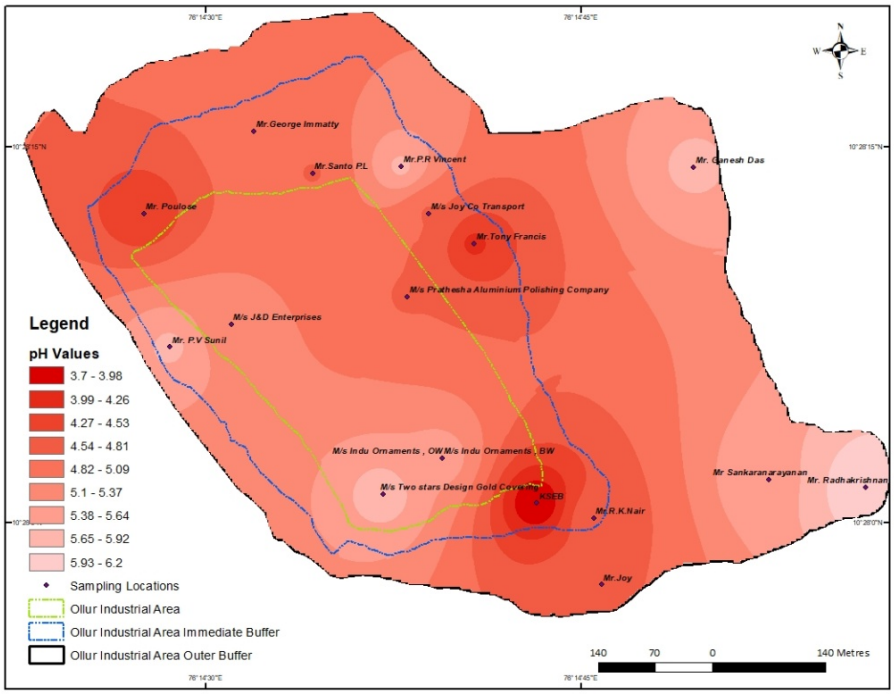


Fig 2: pH concentration map

Lowest pH value is observed in the KSEB open well in the south eastern part of the study area and the pH concentration increases as we move away and is clearly indicated in

the inverse distance weighted interpolation map (fig2) generated from the pH concentration obtained from different samples.

The samples collected from the industrial estate close to the electroplating units are showing higher pH values, ie of lesser acidic nature. Whereas the samples collected from the open wells outside the industrial area and close to the boundary of the estate are showing higher acidic nature. Hence sampling during peak summer season and also the study heavy metal concentration in the ground water source will provide much more refined information on the ground water quality. In order to arrive at a realistic conclusion on the pollution caused by the electroplating related industries in the estate and also to establish base flow direction from the industrial area, a detailed study using tracer techniques or similar advanced methods should have to be engaged through competent agencies.

Digitally signed by
Thomas Scaria

DISTRICT OFFICER

Report on water quality of groundwater sources in and around the Industrial Estate, Ollur, Thrissur- Preliminary observations

Survey has been conducted by the officials of Groundwater Department (District Officer, Thrissur and Junior Chemist, Regional Analytical Laboratory, GWD, Ernakulam) and Kerala Pollution Control Board on 30/ 09/2020 as per the direction from Directorate of Groundwater, Thiruvananthapuram. During the survey 20 water samples were collected, out of which two were effluent samples of M/s. Three star electroplating work (E1) and M/s. Renu gold covering. Four open well samples (OW1, OW2, OW3 & OW4) and one bore (BW1) were collected from the premises of the industrial estate. The remaining 13 samples were collected from the open wells of private owners residing near the site.

Water samples were collected for physico-chemical, bacteriological and heavy metal analysis as per standard protocol. The samples were transported to Regional Analytical Laboratory, Groundwater Department, Ernakulam for physico-chemical and bacteriological parameters. All samples were then immediately analysed for pH and Electrical conductivity. The other parameters were analysed subsequently.

The preliminary observation of the groundwater quality based on the analytical results of physico-chemical and bacteriological parameters is presented below in Table.1. The analytical data were compared with drinking water quality standard of Bureau of Indian Standards (BIS) 2012.

1. Quality of effluent

Effluent samples from two industries *viz*, M/s. Three star electroplating works (E1) & M/s. Renu gold coverings (E2) were analysed. The pH of both samples was alkaline, 8.4 and 8.3 respectively. Total dissolved solids (TDS) of

those samples were 342 mg/ and 2900 mg/L. The effluent collected from M/s. Renu gold coverings (E2) was high sodium and sulphate content. Effluent samples were not analysed for Coliform bacteria.

2. Water quality of Open wells in industrial area

Four samples were collected from the open wells located in the premises of industrial area. pH of those samples were ranged from 4.8 to 5.8 with an average of 5.33. Total dissolved solids (TDS) of the samples were varied from 47 to 168 mg/L. All parameters of water quality except pH were within the desirable limit for drinking purpose. Total coliform and faecal coliform bacteria were detected in open well located in industrial premises, except in open well of M/s. Indu Ornaments.

3. Water quality of bore well in industrial area

One bore well sample was collected from the industrial area. The sample has acidic pH (5.7) and TDS 288 mg/L. This sample has relatively high sulphate (158 mg/L) and nitrate –N (4.2 mg/L) content. Bacterial contamination was not detected in bore well sample.

4. Water quality of Open wells located near to industrial area

Thirteen water samples were collected from open wells of local residents near to industrial area. These wells are drinking water sources of those people. pH of those samples was acidic and has been ranged from 3.7 to 6.2. TDS was also been varied from 65 mg/L to 504 mg/L with an average of 133.2 mg/L. The

open well in KSEB has very acidic and high TDS, total hardness, Magnesium, Sulphate and Nitrate –N content. Water quality of other sources was similar, except for OW15 (13.6 mg/L) and OW16 (11.4 mg/L) with respect to nitrate –N content. Sulphate content in open well samples from out skirts of industrial area was ranged from 0.8 mg/L to 248 mg/L, while the average value was 25.5 mg/L. Generally, low pH, excess quantity of sulphate and nitrate –N contents indicate groundwater pollution. Bacterial contamination was not found in OW6, OW11 and OW14. Severe contamination was noted in OW5 & OW7. Bacterial contamination is not associated with effluent properties.

Figure.1. Graphical representation of Total Dissolved Solids (TDS) and Sulphate content

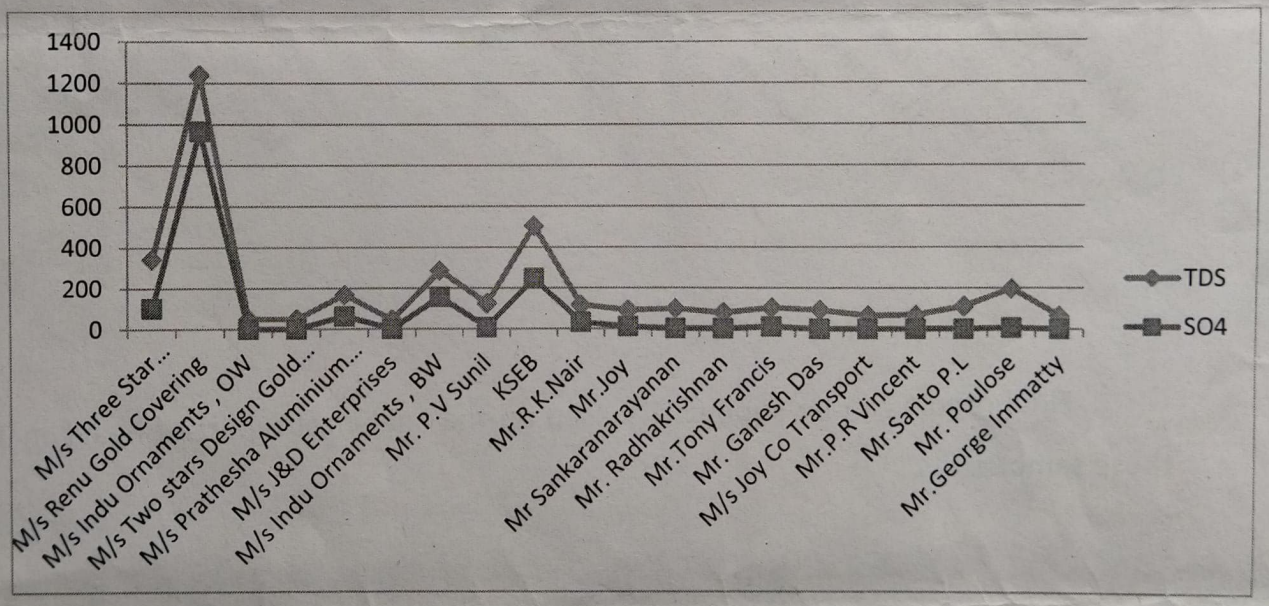
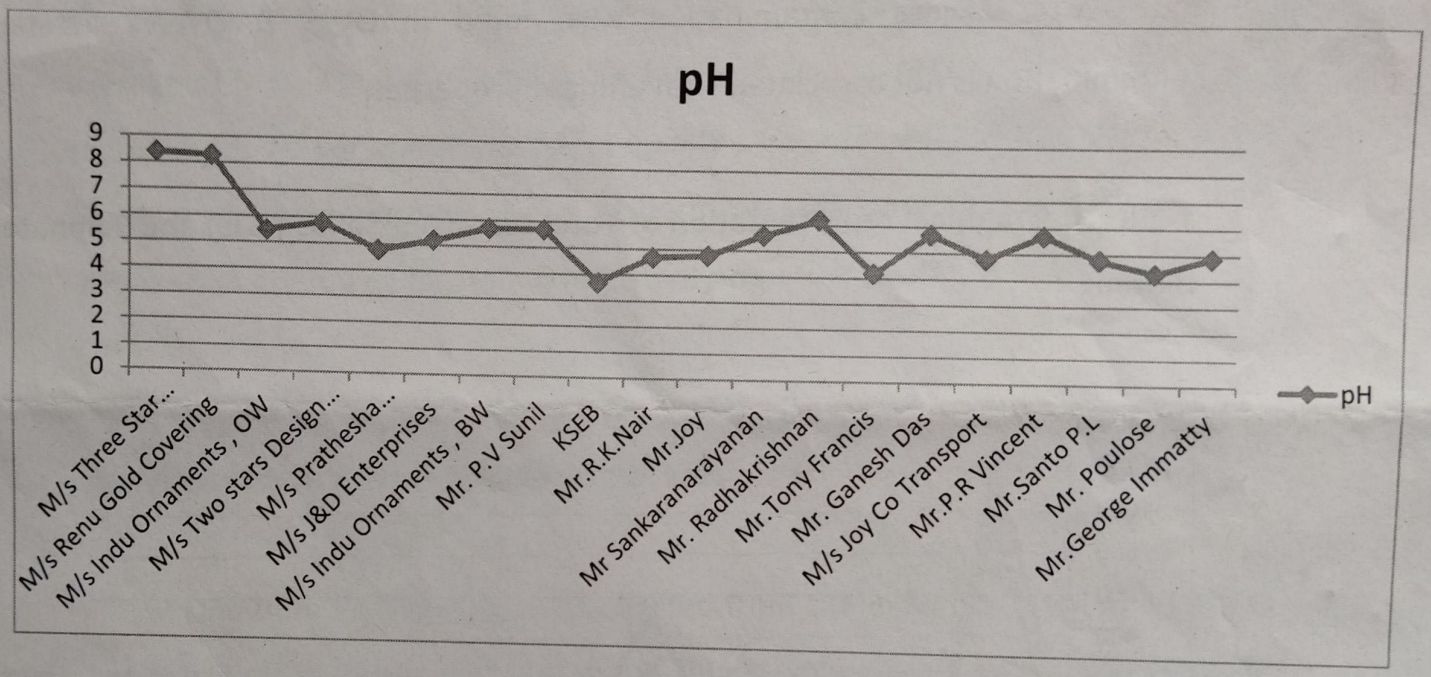


Figure.2.Graphical representation of pH of the groundwater samples



Final report can be submitted based on the analytical report of heavy metals in these samples.

REGIONAL ANALYTICAL LABORATORY (LEVEL-III) RDPC BUILDING GROUND WATER DEPARTMENT ERNAKULAM-682 030

20/10/2020

Executive Chemist

EXECUTIVE CHEMIST
REGIONAL ANALYTICAL LABORATORY
GROUND WATER DEPARTMENT
RDPC BUILDING, KAKKANAD
ERNAKULAM-682 030

LE 2.ANALYTICAL RESULTS

Sl No	Lab No		pH	EC	TDS	TH	Ca 2+	Mg 2+	Na+	K+	TA	CO32-	HCO3-	Cl-	SO42-	NO3-N	Fe2+	TC	FC
					mg/L	CaCO3/L	mg/L	mg/L	mg/L	mg/L	CaCO3/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	MPN	MPN
Desirable limit			6.5-8.5	--	500	200	75	30	--	--	200	--	--	250	200	10	0.3	Nil	Nil
Permissible limit			6.5-8.5	--	2000	600	200	100	--	--	600	--	--	1000	400	NR	NR	Nil	Nil
Effluent																			
1	802	E1	8.4	570	342	40	6	6.1	101	5	104	9.6	107	31	103	7.1	0.02	NA	NA
2	803	E2	8.3	2900	1240	35	12	1.2	710	6	108	9.6	112	195	967	0.6	BDL	NA	NA
Industrial Primises																			
3	797	OW1	5.5	83	50	35	2	7.3	5.5	1.4	6	0	7.3	11	1.2	2.3	0.29	Nil	Nil
4	799	OW2	5.8	83	50	15	2	2.4	6.5	1.2	8	0	9.8	14	1.3	2.4	0.27	500	500
5	800	OW3	4.8	280	168	90	16	12.2	12.7	2.3	4	0	4.9	20	63	6.9	0.05	240	240
6	801	OW4	5.2	78	47	20	6	1.2	4.4	0.9	6	0	7.3	12	0.9	3.4	0.04	≥1600	1600
Average			5.33	131.00	78.75	40.00	6.50	5.78	7.28	1.45	6.00	0.00	7.33	14.25	16.60	3.75			
Bore Well																			
7	798	BW1	5.7	480	288	165	40	15.9	29	10.2	14	0	17.1	23	158	4.2	0.12	Nil	Nil
Private Open Well																			
8	804	OW5	5.7	210	126	30	8	2.4	13.3	2.9	10	0	12.2	21	7.9	7.4	0.04	1600	900
9	805	OW6	3.7	840	504	300	30	55	55.5	17	0	0	0	43	248	8.5	0.14	Nil	Nil
10	806	OW7	4.7	197	118	50	12	4.9	11.7	3.9	6	0	7.3	22	34	4	0.06	≥1600	500
11	807	OW8	4.8	153	92	45	6	7.3	12.7	3.7	6	0	7.3	19	10.8	4.1	BDL	240	2
12	808	OW9	5.6	166	100	25	6	2.4	19.6	3.5	10	0	12.2	31	2.9	5.1	0.01	500	30
13	809	OW10	6.2	133	80	30	10	1.2	11.9	1.7	30	0	37	23	2.9	0.4	0.28	110	Nil
14	810	OW11	4.2	174	104	25	8	1.2	13.3	3.2	8	0	9.8	21	12.1	6.7	0.05	900	Nil
15	811	OW12	5.7	157	94	30	8	2.4	15	6	16	0	19.5	25	1.1	6.3	0.02	Nil	Nil
16	812	OW13	4.8	112	67	20	4	2.4	8.8	5.7	6	0	7.3	20	1.3	3.9	0.04	500	130
17	813	OW14	5.7	118	71	40	6	6.1	8.9	3.9	12	0	14.6	18	2	4.7	0.02	Nil	Nil
18	814	OW15	4.8	186	112	25	8	1.2	25.5	3.1	4	0	4.9	23	1.7	13.6	0.09	280	220
19	815	OW16	4.3	330	198	80	20	7.3	20.6	5.4	4	0	4.9	62	6.6	11.4	0.02	50	11
20	816	OW17	4.9	109	65	20	4	2.4	11.2	1.7	8	0	9.8	16	0.8	5.1	BDL	110	50
Average			5.0	221.9	133.2	55.4	10.0	7.4	17.5	4.7	9.2	0.0	11.3	26.5	25.5	6.2			

with the officials at KSPCB, they have informed that detailed

by them. Only hydrogeological studies is expected from

20/X/2020
EXECUTIVE CHEMIST
REGIONAL ANALYTICAL LABORA