International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 09 | Sep 2021 www.irjet.net p-ISSN: 2395-0072

Incorporation of Dilution Method (Natural) for Disposal of Wastewater of Nadargunj Industrial Area of Lucknow

Avnish Srivastava[1], Dr. A.K. Shukla[2]

[1]M. Tech, Environmental Engineering, Institute of Engineering and Technology, Lucknow, U.P, India
[2]Professor, Department of Civil Engineering Department, Institute of Engineering and Technology, Lucknow, U.P, India

---

Abstract - *Nadargunj Industrial effluents originate from all multiple industries situated over. Nadargunj is located in Lucknow district U.P. near Amausi. The world is facing problems with a wide variety of waste water pollutants such as Organic, Solid, Nutrient & Physical qualities. Wastewater treatment is a journey to treatment and return to the environment. One of the major concerns after wastewater treatment is its disposal. In Nadargunj, the effluent is treated then dumped into local sewer which then connects to a running canal which is later connected to Gomti River in Lucknow. Nadargunj Industrial area in Lucknow city of Uttar Pradesh lies between 80.86670 to 80.87120 N latitude 26.77656 to 26.77544 E longitudes. The parameters in the wastewater of industrial area were assessed to know about the wastewater quality in its catchment area. We present this variation through the graphs.*

Keywords: Industrial Area Nadargunj, Wastewater parameters, Dilution, Canal, Gomti River, BOD, DO

1. INTRODUCTION

The disposal of sewage effluent is the last stage of getting rid of sewage after subjecting it to various steps of processes (i.e.) treatment of converting the sewage into almost fresh water which is not or minimal harmful and also satisfies the standard norms of sanitization and health. The degree of treatment and the quantity of treatment is given to sewage such that it depends upon the source of its disposal as well as its capacity to assimilate the impurities present in the sewage without itself getting polluted or less useful. The main objective of controlling disposal of sewage are

- To remove the danger of contamination in water supplies
- To implement the sewage inoffensive
- To eliminate the danger from aquatic life in streams

2. METHODOLOGY

There are generally thee methods of wastewater disposal

- Natural Method
- Artificial Method
- Combined Method

In Nadargunj Industrial Area, Natural method is opted for wastewater disposal,

The natural method can also be of two types

- Dilution or disposal into water i.e. into sea, lakes or rivers
- Disposal on land or land treatment i.e. sewage farming and irrigation

Dilution method is implemented here at the site, as the area comprises of various different types of industries, a combined Effluent Treatment Plant is not possible so according to Government policies, each of the industry has to install its own ETP plant according to their waste types and the waste volume, and then the effluent is disposed to a local sewer which is followed by a running canal and then connecting to Gomti River in Lucknow.

Dilution technique is also used here after analyzing concentrations of multiple parameters combined at the local sewer. Including the temperature, pH, TDS, BOD_5, COD, Phosphorus, Nitrite, Ammonia, and Oil & Grease & Nitrogen which are the most important characteristics of a wastewater.

2.1 Site Description

The study area covers the Nadargunj Industrial area near Amausi, Kanpur road, Lucknow Uttar Pradesh. Site lies between 80.899893 to 80.908044 N latitude 26.886799 to 26.858943 E longitudes. To thoroughly investigate the Wastewater Physical and organic Parameters in the Nadargunj Industrial area. 5 different sites are further selected for sampling purposes and analysis such that it covers complete circular area of the Nadargunj Industrial area. Sampling sites do take care that it covers upstream, downstream and canal flow of the waste water sewage. The site comprises of composite variety of industries

including Textile, Dairy, Steel, Paper pulp, metal plating, leather manufacturing, etc. The waste coming out of all the industry is collected at a sewer system then to a ponding area followed by a canal system. Samples are collected and analyzed from the proposed locations once a month for 2 months (January-February).

Table-1 Location of Sampling points

S.No.	Locations	Latitude	Longitude
I.	Near PH Safetech Ltd	X:80.899893	Y:26.886799
II.	Flowing Canal	X:80.911987	Y:26.874454
III.	Near Amar Ujala	X:80.920119	Y:26.871519
IV.	Awadh rail infra ltd.	X:80.935602	Y:26.858943
V.	Fastener manufacturing Co.	X:80.948044	Y:26.862579

Fig -1: Selected Sampling sites on Map

3. MODELING AND ANALYSIS

Dilution is a prominent method of natural disposal, consists of discharging the wastewater into receiving water body. This is done considering that the sufficient DO is available in the water body and also so that the BOD is satisfied. If, the diluting water is not sufficient to supply the biochemical oxygen demand to oxidize the entire microorganism present, there will be nuisance of foul odour and unsightly islands of half-digested floating, putrefying matter at the surface. Also addition to this problem, the depletion of oxygen will result in by killing the aquatic life, and if the downstream dilution water is used for the purpose of drinking, then it will cause danger to the public health. The discharged wastewater effluent or discharged wastewater is purified, in a particular period of time, by the so called self-purification process of natural streams. The maximum amount of effluent discharge and the treatment degree of wastewater depend upon the self-purification capacity of natural waters as well as the intended use of the water body at the downstream end.

After analyzing the wastewater samples collected, the sewage is found to be have favorable conditions so that Dilution technique can be adopted. The conditions observed are-

- Sewage was fresh and was discharged within 3-5hrs of disposal
- Floating and settling solids were eliminated by primary treatment before disposing
- Diluting water had high DO, so not only BOD is satisfied but enough DO left for aquatic life
- At the downstream of the canal, water supply is available nearby
- Canal later connects to the Gomti river of Lucknow

4. RESULTS & ANALYSIS

Following are the result graph that have been observed from the five samples collected at five different sites for seven different parameters.

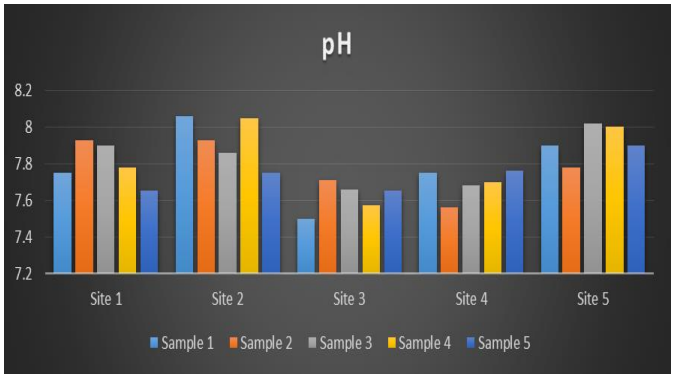

Fig -2: Result of pH

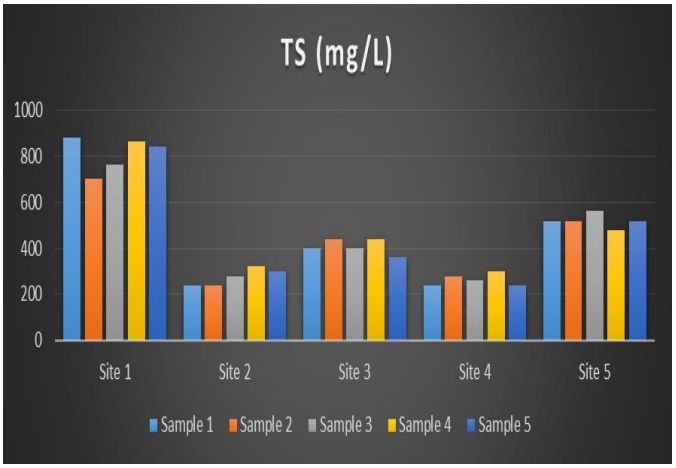

Fig -3: Result of TS

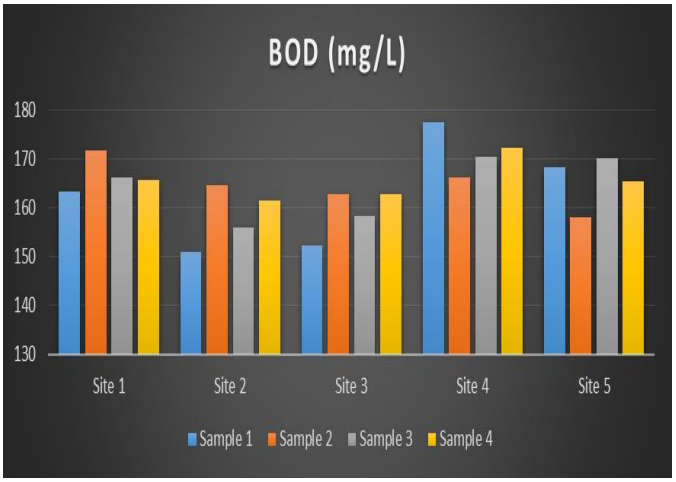

Fig -4: Result of BOD

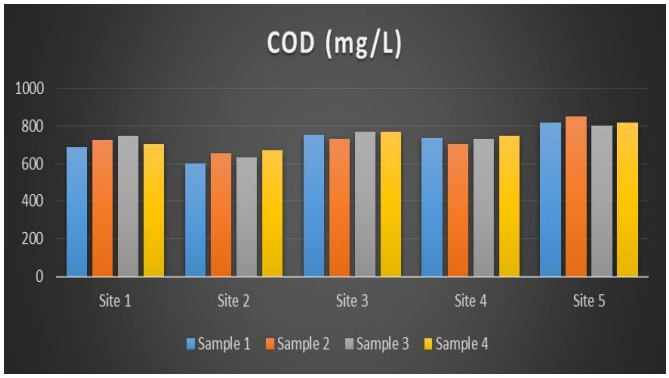

Fig -5: Result of COD

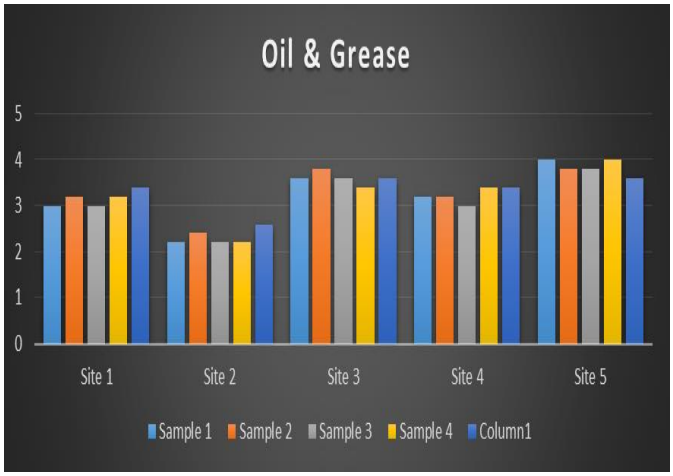

Fig -6: Result of Oil and Grease

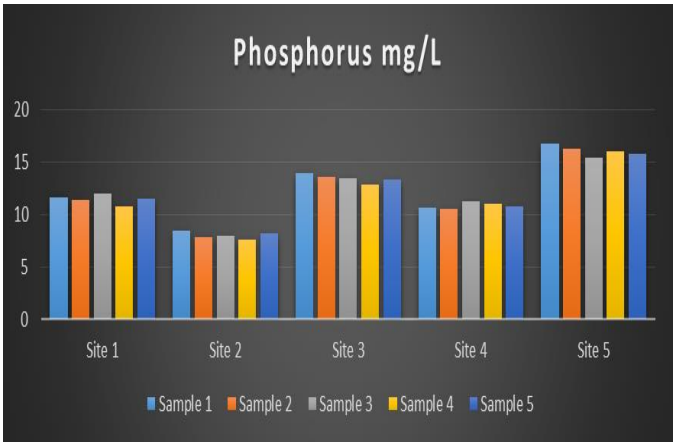

Fig -7: Result of Phosphorus

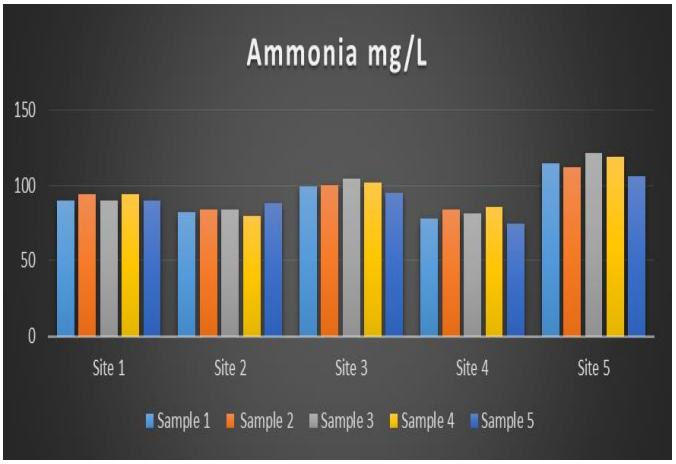

Fig -8: Result of Ammonia

Following is a table which categorizes the components in particular zones and if the effluent can be disposed by dilution technique or not.

Table-2, Range of parameters in mg/L

	Weak	Medium	Strong
Total solids	350	700	1200
Dissolved solids (TDS)	250	500	850
Suspended solids	100	200	350
Nitrogen (as N)	20	40	85
Phosphorus (as P)	6	10	20
Chloride	30	50	100
Grease	50	100	150
BOD_5	100	200	300

As per the above table, the resulted parameters lie in safe zone for Dilution i.e. from medium to weak zone. pH is ranging from 6.5 to 8.5, BOD and COD ratio is 1:3 which is healthy for diluting purposes. Total Solid for first site is little high but other sites are well under control. Phosphorus ranging from 9-16 mg/L whereas Ammonia is ranging between 75 and 120mg/L which can be said to be under weak or medium zones and don't tend to cause much problems in Dilution.

5. CONCLUSIONS

After the introduction of wastewater into the available water, the concentration of organic matter also decreases and the associated stress may also decrease as mixing occurs.

If C and Cr (sewage and river filtration) are the focus of any pollutants such as organic content, BOD, solid solids in the field and river with Qs and Qr levels (Sewage and river discharge) respectively, lead concentration 'C 'combination provided by

$$C = \frac{QrCr + QsCs}{Qr + Qs}$$

When the purification rate is very high, a large amount of DO remains available which will reduce the chances of decay and the effects of contamination. Four key pollution areas should also be considered for distribution. (i) Damage zone, where solid solid decomposition occurs and anaerobic decomposition occurs and DO is reduced to 40% of the total concentration. (ii) Active decomposition where active anaerobic decomposition occurs by the occurrence of methane, hydrogen sulphide, carbon dioxide and nitrogen and DO concentration decreases to almost zero. (iii) Recovery environment, active anaerobic decomposition occurs with the emergence of methane, hydrogen sulphide, carbon dioxide and nitrogen as a result of which most stable organisms remain as sludge, BOD collapses and DO content rises above the number of 40%. (iv) The clear water area where the water is clear again, the DO rises to a fuller level and is much higher than the BOD and Oxygen balance.

6. REFERENCES

[1] APHA, AWWA, WPCF (2005). "Standard Methods for the Examination of Water and Waste-water. 23rd Edition. American Public Health Association, Washington D.C

[2] BIS (2012). Indian Standards Specification for drinking Water, B.S. 10500. Government of India.

[3] Chaudhary, V. and Satheeshkumar, S., 2018. Assessment of groundwater quality for drinking and irrigation purposes in arid areas of Rajasthan, India. Applied Water Science, 8(8), pp.1-17.

[4] Jha, M.K., Shekhar, A. and Jenifer, M.A., 2020. Assessing groundwater quality for drinking water supply using hybrid fuzzy-GIS-based water quality index. Water research, 179, p.115867.

[5] T. Mohana Priya, Dr. M. Punithavalli & Dr. R. Rajesh Kanna, Machine Learning Algorithm for Development of Enhanced Support Vector Machine Technique to Predict Stress, Global Journal of Computer Science and Technology: C Software & Data Engineering, Volume 20, Issue 2, No. 2020, pp 12-20

[6] Ganesh Kumar and P.Vasanth Sena, "Novel Artificial Neural Networks and Logistic Approach for Detecting Credit Card Deceit," International Journal of Computer Science and Network Security, Vol. 15, issue 9, Sep. 2015, pp. 222-234

[7] Gyusoo Kim and Seulgi Lee, "2014 Payment Research", Bank of Korea, Vol. 2015, No. 1, Jan. 2015.

[8] Chengwei Liu, Yixiang Chan, Syed Hasnain Alam Kazmi, Hao Fu, "Financial Fraud Detection Model: Based on Random Forest," International Journal of Economics and Finance, Vol. 7, Issue. 7, pp. 178-188, 2015.

[9] Hitesh D. Bambhava, Prof. Jayeshkumar Pitroda, Prof. Jaydev J. Bhavsar (2013), "A Comparative Study on Bamboo Scaffolding And Metal Scaffolding in Construction Industry Using Statistical Methods", International Journal of Engineering Trends and Technology (IJETT) – Volume 4, Issue 6, June 2013, Pg.2330-2337.

[10] P. Ganesh Prabhu, D. Ambika, "Study on Behaviour of Workers in Construction Industry to Improve Production Efficiency", International Journal of Civil, Structural, Environmental and Infrastructure Engineering Research and Development (IJCSEIERD), Vol. 3, Issue 1, Mar 2013, 59-66