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Service Station Wastewater Analysis in Kolhapur City Area

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Abstract - *Management of water works residues is a well-known environmental concern all over the world. In India, all the public water supply systems are being maintained by the government authorities. Responsibility of water utilities is not only limited to the production of safe drinking water, but also efficient and safe disposal of WTP waste. In India, in order to keep the public tariff as low as possible, professional and environmentally safe disposal options are not practiced. The cheapest coagulant, 'alum' is widely used instead of more efficient coagulants due to cost factors. Since the costs of handling enormous quantities of sludge can account for a significant part of the overall operating cost of the water treatment plants, huge volumes of sludge are dumped into water courses, as it is the cheapest mode of disposal. So far, this method has been practiced widely without attracting any objection from the environmentalists.*

As a result, huge volume of water is wasted along with sludge. It is not fair to continue the practice, since the characteristics of the raw water will degrade downstream. Due to lack of regulations, operation and maintenance (O&M) agency is unaware of the volume of sludge generated in the plants and potential hazards caused due to their discharge into the water bodies. With sludge disposal options, there are many practical constraints with existing methods such as land availability, transportation costs, difficulty in handing sludge in the liquid form, long term effect of heavy metal Concentration of soil and other environmental factors.Although extensive previous research has been carried out on the efficacy of several coagulants, such as turbidity reduction and minimization of total suspended solids (TSS), little attention has been given to quantifying sludge production. Further, most of previous studies were based on experiments conducted in a laboratory setting rather than in a fully operational plant of all the methods suggested for sludge disposal in the previous studies, utilization of sludge for manufacture of construction materials is the most Sustainable and safest method of disposal. There have been many studies investigating the usage of sludge in brick making at different sludge proportions and firing temperatures. Since the characteristics of sludge are unique for each WTP, the results from the previous studies specific to a WTP may not hold good for another WTP. The waste water from carwash is one of a wide number of highpollution wastewater categories with many sources of waste water. Sands and particulates, oil and fat, surfactants, detergents, phosphates and hydrofluoric acid have been created and the degradation of natural water by direct wastewater discharge is stepped up.

In today's world, oil released into the atmosphere is a wellknown issue. In the atmosphere as well as human beings, the polluted oil water affects many species of plants and animals.A big component of the service sector is the automotive workshops.Inclusion of used engine oil and water into the soil is the most significant environmental effect linked to the workshops in place. Contamination of the earth with oil leads to the depletion of useful properties such as fertility, water preservation, authorizing and binding ability.

Key Words: **Car wash, sand particles, oil & grease, detergents, urban area.**

1. INTRODUCTION

Wastewater disposal is a forwardlooking approach to minimize contamination of industrial or urban wastewater. Automotive service station and car washing are one of thesefields. Some current oil pumps are facilitated by car washing at fuel service stations.Inorder to provide the required wastewater treatment, the large Car Washing Pools of garages and service stations are insisted on by the respective pollution control boards. Professional car wash systems contain waste water, which, if not properly handled and discharged, can have a significant environmental effect.Wash runoff pollutants include tar or straw, detergents, phosphates, hydrofluoric acid, ABFs, etc. Dust, oil and detergents can also be toxic to animals, including biodegradable detergents.On the other hand, Phosphates, which are plant nutrients, can cause excessive growth of nuisance plantain water bodies. Hydrofluoric acid, ammonium bi-fluoride products are harmful to living organisms.

A significant number of automated car washing plants in Göteborg, Sweden performed waste water effluent analyzes showed a fairly small organic pollutants quality. Oil wastes comprise only three components: the dispersed phase, several emulsifying agents and a third external phase, which represent the emulsion of oil into water. Chemical, electrical or physical methods can break emulsion. Chemical methods are in widest use for treatment of oily wastewaters. Kurian and Natarajan

(1997) analyzed 40 samples from 10 car washing service station with a total of 610-4950 mg/L, 75-570 mg/L, 270-1640mg/L and 14-420 mg/L suspended solids, BOD, COD, grease amount respectively.

Disposal efficiency adequate for disposal in public sewers culminated in chemicaltreatments of a representative sample of this waste water utilizing alum and chitosan Growth of urban population has increased the demand for fresh water sources and its rapid depletion has been a concern to ecologists. Rapid urbanization has led to hasty growth of service station in urban areas and this has necessitated the need to have automobile service centers at regular intervals. Service stations range from authorized service stations to small scale service centers, which undertake repair, washing and servicing of vehicles. According to the report provided by International Car Wash Association, a home car wash can go through 300 to 530 liters of water, whereas a wash at the garages will take about 115 to 170 liters and after the wash of vehicles, some water will also be used to wash floor and washing equipment's. This wash water contains paint, oil and grease, detergents, phosphates, hydrofluoric acid, ammonium bi-fluoride products and heavy metals.

Organic toxic waste (oil and grease (O&G)) causes ecological harm to aquatic animals and to plants and animals and similarly, mutagenic and carcinogenic waste to human beings, from various sources, which forms a layer at the surface of the waters which reduces the dissolved oxygen.

By nature, oil and grapes are not water soluble. In case the quantities are small, the effluent includes oil and grease as microtroplets or minute suspended flakes. The higher analyst rates in the study are typically seen on top of the water as an individual sheet. The word "free commodity," especially when oilhydrocarbons are present, is also used to define this state. The coating will vary from floating semisolid grate bits on the surface to petrollike sheen. While oils and grades are correlated with materials on the top of the watercolumn more commonly, this is not always the case.Oils and fats are thicker than liquids and sink to the bottom of the tub. Halogenated solvents and other products often consist of thick oils and grease.

Car washing is one of the activities which consume large quantity of water approximately 150 to 350 liters. If it is released in environment without treating it, naturally environment pollution gets increased. If it is treated and recycled in the car washing or landscape irrigation it augment valuable water resources, diminishes water or land pollution. Membrane technology is the latest and recent technology well-established for wastewater treatment and reuse for recreational use.

A membrane technology is receiving special recognition as alternatives to conventional wastewater treatment and as a means of polishing treated wastewater effluent for reuse applications, it also reduces BOD and COD of wastewater to some extent.

2. RESEARCH OBJECTIVES & MEHODOLOGY:-

1) To study the quantity of wastewater generated from service station in Kolhapur city area.
2) To carry out characterization study of service station wastewater.
3) To compare quality of service station wastewater with the standards of wastewater outflow as per MPCB/CPCB.

To achieve above objectives following methodology is followed:-

1) At the primary stage, a literature study is carrying out on the parameters of wastewater quality and also on the quantity of disposal at the service station.
2) There are 5 wards in the Kolhapur city, where Jayanti nala and Dudhali nala flow as a main stream to the Panchaganga River.We should determine the study area/datacollection based on nala/stream and with the aid of KMC registered service station list.
3) The sample is collected from service station point sources and combined sources. Then the collected sample will be tested in departmental laboratory.(Point source is a source in which the sample is collected at service station out flow and combined source is a source in which the sample is collected where the service station wastewater and domestic wastewater flowing towards the nala/stream.)
4) Sample is analyzed for following experimental test listed below:

Sr. No.	Test	Unit of measurement	Methods
1	pH	-	pH by electrometric method
2	TDS	mg/lit	Gravimetric analysis method
3	TSS	mg/lit	Gravimetric analysis method

4	BOD	mg/lit	Winkler method
5	COD	mg/lit	COD digester with refluxing flask method
6	Oil and Grease	mg/lit	Separating funnel method

3. SAMPLE COLLECTION:-

In the Kolhapur city area 7 service stations was located for sample collection. Jayanti nala plays major role in water pollution so that 6 service stations are from the region of Jayanti nala flow and another 1 sample is from the Dudhali nala flow. These service stations are listed as below:-

A) Shree Mahalaxmi car/bike wash servicing center
B) Shree Datta servicing center
C) Shetkari auto servicing center
D) KMT workshop
E) ST workshop
F) Riverside Honda
G) Shivaganga Suzuki

Station A is located at Dudhali nala flow and others are located at Jayanti nala flow. Photographs of the sample collected for the studies are shown as below:

4. RESULT & DISCUSSION:-

Following test results are obtained by testing service station wastewater in departmental laboratory:

1) For Point source

Sr. No.	Location	Test Results					
		pH	TDS	TSS	Oil & grease	BOD	COD
1	Shree Mahalaxmi car/bike wash servicing center	6.90	179	700	6.31	40	180
2	Shree Datta servicing center	7.59	996	540	8.4	150	220
3	Shetakari auto servicing center	8.05	584	480	7.18	110	180
4	KMT workshop	7.91	2550	500	11.2	290	330
5	ST workshop	8.48	200	1900	15.96	240	440
6	Riverside Honda	7.9	1850	750	10.62	160	350
7	Shivaganga Suzuki	8.15	1150	1700	10.95	150	360

2) For combined source

Sr. No.	Location	Test Results					
		pH	TDS	TSS	Oil & grease	BOD	COD
1	Shree Mahalaxmi car/bike wash servicing center	6.58	454	420	6.57	80	260
2	Shree Datta servicing center	6.86	1160	760	10.39	70	140
3	Shetakari auto servicing center	7.72	576	620	7.37	60	120
4	KMT workshop	7.55	800	1000	10.8	200	360
5	ST workshop	8.57	1000	300	10.56	420	360
6	Riverside Honda	7.10	1100	350	8.75	80	200
7	Shivaganga Suzuki	6.86	1160	760	10.39	70	140

This test results are compared with the standard values of wastewater outflow as per MPCB/CPCB. These standards are shown below:

Parameter	STANDARDS			
	Inland Surface water	Public sewers	Land for irrigation	Marine coastal areas
pH value	5.5 - 9.0	5.5 - 9.0	5.5 - 9.0	5.5 - 9.0
Total Dissolved Solids, mg/l, max.	2100	-	-	-
Total Suspended Solids, mg/L, max.	100	600	200	a) For process waste water-100 b) For cooling water effluent 10% above total suspended matter of effluent
Oil and grease, mg/L, max.	10	20	10	20
Biochemical Oxygen Demand (5 day at 200), mg/L max. (BOD5)	30	350	100	100
Chemical Oxygen Demand (COD)	250	-	-	250

5. SUMMARY & CONCLUSION:-

From these above analytical study conclude that the percentage of each parameter is greater than the standard value. Hence this requires a special treatment plant to control the water pollution created by the service station or car/bike washing centers. The amount of oil and grease content in wastewater remains as it is and flows along with the river water and riverside water gets polluted due to high amount of TDS and TSS there is formation of clogging in the drainage line so this makes environment stench. For that proper screening at service station is required also reuse or recycle methods should be adopted at each service station.

6. FUTURE SCOPE:-

Analysis helps towards automobile service station waste water quality and to treat that quality of resultant waste water for possible reuse or discharge to municipal sewer. An economical solution to treat the service station wastewater is also an important aspect towards the prediction. Large amount water is used at service station proper management of this water is also necessity. Grease trap helps to reduce pollutant in wastewater which will be used at each service station.

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