

## **Determination of Raw Water Quality Parameters and Reasons for Failures in Hantana Sewerage Treatment Plant, Sri Lanka**

H.M.T.S. Ritigala

*Uva Wellassa University, Badulla, Sri Lanka*

*and*

S.K. Weragoda and S. Kodhithuwakku

*National Water Supply and Drainage Board, Kandy, Sri Lanka*

### **Introduction**

Many health hazards in developing countries and transition-economic countries are related to poor water quality and limited water quantity (Vandeweerd et al., 1997). According to Vandeweerd et al. (1997), more than 90% of sewerage in the developing world is discharged directly into rivers, lakes, and coastal waters without any treatment. Sri Lanka also faces a number of water and wastewater issues and water related health hazards (WHO, 2000). The large cities such as Colombo, Galle, Jaffna and Kandy have serious problems disposal of sewerage, industrial effluents and industrial and of domestic solid waste, as they generate large quantities but have no facilities for their treatment and/or proper disposal (Bandara, 2003). Moreover, Kandy suffers from a serious problem of wastewater disposal which contributes to the pollution of Mahaweli River. There is no proper system of wastewater disposal, and about 80% of used water is released as wastewater (Thrikawala et al., 2008). In addition, highly polluted water is carried by tributaries like Meda-ela, Pussellawa Oya, and Pinga Oya, which connect to Mahaweli River (Dayawansa, 2006). Pussalla Oya catchment was the main source area for the "Hepatitis A" outbreak recorded in Gampola in May 2007 (Abeysinghe, 2007). Due to lack of the knowledge of health hazards by wastewater or scarcity of resources, sewerage treatment and/or improved sanitation were not given due attention by most communities. According to Gijzen (2001) there have been substantial developments in wastewater management and treatment technology. As a solution to the discharge of untreated wastewater, sewerage treatment plants (STPs) have been constructed especially in rapidly urbanizing cities. Main purposes of this research are study the system and find out the reasons for failures and defect identification in Hantana STP. Determination of the raw water quality parameters, propose the alternatives for occurring issues and waste discharge per day are also considered in this study.

### **Materials and Methodology**

The grab samples were collected at the inlet of Hantana STP and collected wastewater samples were preserved and analyzed according to the standard method (APHA, 1992; APHA, 1995) in Regional laboratory in Sarasavi uyana. For parameters pH, BOD, COD and SS of influent monitored two times in every month.

Temperature was measured by a thermometer at the sampling point. pH was measured by a pH meter at the sampling spot. Suspended Solids (SS) was measured using dry oven at 105°C. Chemical Oxygen Demand (COD) was measured by closed reflux method. Biochemical Oxygen Demand (BOD<sub>5</sub>) was measured five day BOD<sub>5</sub> test.

## Results and Discussion

One of the research aims is to evaluate the behavior of raw sewage characteristic of Hantana STP through analyzing the raw sewage samples. The BOD, COD, SS, pH, were chosen as parameters to reflect the raw water quality of the plant (Figure 1). The measurements were taken for the period of six months from December 2011 to May 2012.

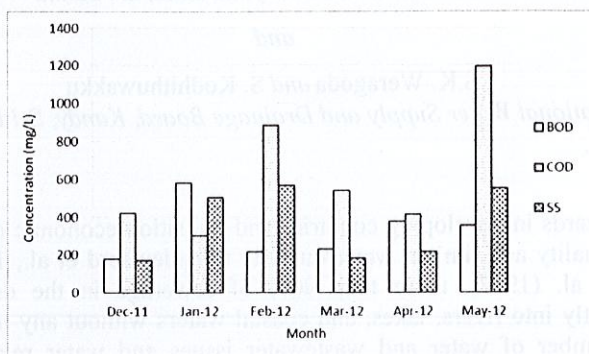


Figure 3: Concentration Variation of BOD, COD and SS

To characterize the quality of raw sewage average, standard deviation as well as maximum and minimum value were calculated from the data during period of data collection from December 2011 to May 2012 are given in Table 1.

Table 1: Characteristics of the Raw Sewage.

Parameter	Maximum	Minimum	Average	StDev
BOD	660	150	321.3	152.1
COD	2100	200	739	621
SS	566	70	307	181.6
pH	8.9	7.6	8.033	0.382

### Waste Discharge Frequency

According to data, the average wastewater discharge through the gully was 1423900L/month. This wastewater comes mainly from Kandy Municipal Council, Abans Pvt Ltd, Kandy Police Station, Gampola Municipal Council. More than 1000000 L/month is coming from the Kandy Municipal Council. According to the system study and results of laboratory test identified the problems in Imhoff tank, trickling filters, sand beds and sludge beds.

Operating problems in Imhoff Tanks are floating sludge, black and odorous sludge, scum overflow and poor suspended solids removal efficiency. Operating problems in trickling filters are odor, filter ponding, clogging of distributors – arm offices and malfunctioning of distributors.

### Conclusions

In Hantana STP Food/Mass ratio was change because of direct unloading of huge amount of digested raw sewage. Foods was increased while mass was constant. Hence sewerage

treatment processes has become complex and over loaded. According to data the average wastewater discharge through the gully is 1423900 L/month and wastewater comes from Hantana housing scheme is nearly 400000 L/day. Field observation and information gathered from the residents in the area reveal that the bad odor is the major problem that the community is facing due to the STP.

### **Recommendations**

It is important to select the design and treatment process to meet the required effluent quality which will be discharged to the environment.

1. Flow Equalization (to obtain a preferred flow rate): Principal treatment technologies in Hantana STP are trickling filters and imhoff tanks. Generally biological process needs relatively high retention time but in here low retention time therefore effluent water quality is poor. Therefore need to be increase the retention time in imhoff tank and trickling filter. It can be achieved constructing equalization tank. By introducing flow equalization can be improve whole STP effluent water quality.
2. Good Sludge treatment process.
3. Well-functioning slow sand filters.

### **References**

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