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RESEARCH ARTICLE

EXAMPLE OF A WASTEWATER TREATMENT PLANT AND PHYSİCO-CHEMİCAL PARAMETERS (TURKEY)

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ABSTRACT

The water resources of İstanbul, which is the biggest city in Turkey, confront environmental problems brought about by the increasing population, urbanization and industrialization. Particularly, the change in urban population affects water resources as well. Water resources for sustainable life are of great importance ecologically, economically and sociall. Treatment of industrial wastewater before being discharged into the receiving environment is one of the essential factors for sustainable environmental management. In this study, COD, pH, Suspended solids and BOD data of water samples taken from treatment plant of wastewater produced in Kız Kulesi was evaluated. As a result of the research, treatment plant in food sectors was determined to be below the limit values given within the scope of the Water Pollution Control Regulation and it was determined to be appropriate for water discharge.

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INTRODUCTION

Along with the population growth and the development of industrialization in big cities, the amount of waste water used is increasing each passing day. The increase in the amount of waste water as a result of industrialization, population, production and consumption activities brings about environmental problems as well. In the areas with limited water resources potential, it is necessary to allocate budgets for waste water treatment of the municipality and the private sector using water. In other words, the use, treatment and recycling of water to the aquatic ecosystem is quite important for life. The characteristic of waste water varies by the domestic, industrial and commercial/institutional water consumption in the residential area. The characteristic of waste water is determined by analyzing the monitoring/measurement records for the flow rate and pollution parameters at the inlets of existing waste water treatment plants. Waste water characteristics consists of minimum, average and maximum dry weather flows, peak wet weather flows, periodic maximum flows and primary pollutant parameters (BOD, COD, Suspended solids, pH, P, toxic chemicals, etc.), (Koyuncu et al., 2013; Anonymous, 2013). In Turkey, several regulations regarding the protection of groundwater and surface water resources potential, optimization of them, prevention of water pollution, treatment and transference of water to the receiving environments in accordance with the sustainable development goals were published. 'Water Pollution Control Regulation', which is one of these regulations, was published in the Official Gazette dated 31.12.2004 and numbered 25687 and put into practice (http://www.csb.gov.tr.). In our country, there are studies on waste water and treatment plants and the number of researches is increasing day by day. (Kemiksiz and Elmacı,2004; Öbek et al. 2005; Tunçsiper and Akça 2006; Üstün and Solmaz 2007; Çolak Sabancı and Koray 2007; Ünal 2011; Dere and Nacar Koçer,2013; Topal and Arslan Topal, 2014; Morkoyunlu Yüce and Yeken 2016). In this study, the waste water originated from the firm engaged in food industry in the private sector, located in the Maiden's Tower, in the district of Üsküdar in the province of İstanbul was evaluated within the scope of the relevant regulation in terms of the discharge criteria.

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MATERIALS AND METHODS

The province of İstanbul, located in Marmara Region, is between 28° 01' and 29° 55' east longitudes and 41° 33' and 40° 28' north latitudes and covers the 0.7% of our country's land with its surface area of 135.712 km^2 (GIS 2015). In this study, the package biological treatment plant used for the domestic waste in the facility, the water quality values required for discharge (COD, pH, Suspended solids, BOD) and the environmental and tourism aspect of the facility were examined. In this context, the analyses of water samples taken

from the treatment plants in the sector according to the standard techniques and methods in triple sampling were performed in accredited laboratories according to standard techniques and methods (APHA, AWWA, WPCF 1998). In addition, the plants were evaluated within the scope of the Water Pollution Control Regulation and the research area was given in Figure 1.

Figure 1. The Research Area

RESULTS AND CONCLUSION

Waste Water Resources

In the firm, where customer capacity is maximum 240 people and the number of employees is 50, the domestic wastes with 49.50 m^3/day flow rate are treated in the package biological waste water treatment plant.

Waste Water Treatment Plant

The domestic waste water generated in the firm is treated in the existing package biological waste water treatment plant with a capacity of 49,50 m^3/day. Activation of existing organism is provided by giving oxygen to the water coming to the system for 2 hours, it is left to rest for 3-4 hours and waited for the sludge to settle. At the end of this period, the upper clear phase is discharged through a pump.

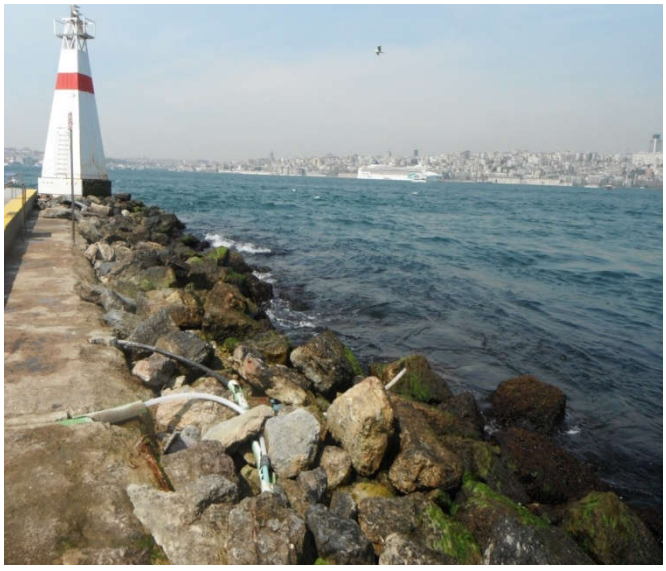

Figure 2. The Treatment Plant and Discharge Pipeline

The sludge formed in the system is transferred to an electric container through the pump at certain intervals and it is waited for the sludge to dry. Leaking water is collected and pumped into the treatment system through the pump and enabled to be treated. Dried sludge is stored separately and given to the municipality to be disposed. The photograph of the treatment plant in the Maiden's Tower is Figure 2.

Water samples

The mean values of the results of 3 analyses of water taken from the outlet of The Biological Waste Water Treatment Plant, The Standard Values To Be Provided Projected For The Relevant Sector and The Measurement and Sampling Range are given in Table 1-3. The determined parameters were found to be below the limit values given in The Water Pollution Control Regulation Table 21.1 Sector: Domestic Waste Water (Class 1: Pollution Load as Raw BOD is 5-120 Kg/Day, Population= 84 - 2000). The treated waste water is discharged into the sea as a receiving environment.

Table 1. The measurement values of the treatment plant

Parameter	Sampling Date and Analysis Results			Arithmetic mean	Table 21.1 Limit Values	Result
	13.04 .2009	08.05 .2009	15.05 .2009		(Composite Sample 2 hours)	
KOİ	49,44	170	140	119,81	180	suitable
pH	7,00	7,50	6,20	6,9	6-9	suitable
AKM	49,71	43,75	34,68	42,71	70	suitable
BOİ	13,05	41,60	44,30	32,98	50	suitable

Table 2. The standard values to be provided projected for the relevant sector

Parameter	Unit	Composite sample 2 hours	Composite sample 24 hours
KOİ	(mg/lt)	180	120
pH	-	6-9	6-9
AKM	(mg/lt)	70	45
BOİ	(mg/lt)	50	45

Table 3. The Measurement and Sampling Range (marked with X)

Flow (m^3/day)	Flow Measurement	Sampling frequency
≤ 50	Once a year	X
> 50-200	Once in 3 months	
> 200-1000	Once in a month	
> 1000-10000	Once a week	
> 10000	Everyday	

The values determined for the Deniziçi Tarihi Kızkulesi waste water treatment plant belonging to Hamoğlu Turizm Ve Otelcilik San. Ve Tic. A.Ş. located opposite Salacak coast in the district of Üsküdar in the province of İstanbul were found to be within the limits of the scope of the regulation. The waste water generated as a result of the treatment process is discharged from the waviest part of the sea through pipes. The water discharged in accordance with the criteria, due to the surrounding of the Maiden's Tower being open to the winds and the sea water constantly moving, gets involved in the cycle in the ecosystem. During the research, no significant pollution was encountered on the surface of the sea and on the shores. In the area where the Maiden's Tower is located, macro algae belonging to Chlorophyta members show distribution on the surface of the stones. Consequently, establishment of appropriate treatment plants for the facilities which are

important in terms of tourism and nature, management of them efficiently and regular performance of their environmental auditing are essential factors for the sustainable aquatic life.

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