

Containerized water treatment plant for contaminated water and oil

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Abstract:

In this paper it is emphasized the importance of mineral and organic oil removal from waste water.

In European Union and also in Romania, wastewaters must perform qualities conditions imposed by standards before evacuation in sewerage or in emissary.

Keywords: pH, water treatment plant, oil, sludge

1. INTRODUCTION

In Romania, the values of waste water quality indicators in the control section are given in "Norms for discharge of wastewater conditions in the sewage of the population centers" - NTPA 002

Control section is considerate the sewage network discharge which is the last manhole of interior sewer usage (subscriber) or enclosure channeled before evacuation.[1], [5]

Among the substances that are not permitted in wastewater discharged to the sewerage and found organic fats and oils and mineral oils and hydrocarbons.

This, in large quantities, generates a series of disadvantages such as:

- forming a film on water surface which can stop the aeration also produces filter clogging or inhibit biological processes of anaerobic fermentation tanks;
- generate of adherent on the walls of the sewer which caused areas of buildup and deposits
- forming an explosive mixtures

One of the simplest solutions that allow separation and removal of these substances from wastewater treatment involves local waste water treatment using fat separators respectively mineral oils and hydrocarbons. [6]

It is obvious that the main source of fat and vegetable oils found in food industry.

Food manufacturing processes, from operations in small restaurants and ending with the industrial sector, it is the main producer of vegetable fats and oils which makes these units is always in attention of governments and environmental agencies. Regarding the separation of mineral oils and hydrocarbons, we approach to the industrial and

commercial areas as automotive or the distribution of petroleum products. Since the cars are no longer a luxury for a long time and have become a necessity in daily life of people and their number is increasing it is obvious the importance of the mineral oils and hydrocarbons separators.

In the plant for separating fats, oils and hydrocarbons, natural flotation process applied.

Fats and oils with lower density than water it raises to the surface such a film, which are collected and discharged by different systems.

Construction of the separator must provide a retaining time for water inside to allow the lifting at the surface and separation of fats and oils from wastewater.[2], [4]

It also includes a basic condition for ensuring the natural flotation in separator basin is to not appear phenomenon of turbulence that can lead to fat particles and subsequently to its bottom outlet pipe treated wastewater.

2. CASE STUDY

Case study was done on a factory tires from Timisoara. After some sample test of water was found that mineral oil is 40%, waste water in 50% and 10% in proportion of suspense.

Monthly water flows that must be treating are:

| Nr. crt. | Months | Quantities (mc) |
|----------|----------|------------------|
| 1 | January | 161.5 |
| 2 | February | 133 |
| 3 | March | 186 |
| 4 | April | 143 |
| 5 | May | 194 |
| 6 | June | 160 |
| | Average | 162.61 mc/months |

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Functional description of chosen solution

The water provide from condense and also the oil resulting from technological losses are collected in a system of channels, one central and six longitudinal cross.

Through two submersible pumps located in central channel and another twelve in longitudinal channel is collected the oil in mixed with water and stored in the first tank. Each of pumps is action by a local panel order screen and could work in manual regime but also automatic regime.

The mixture of condense water and oil are let a period of time for separation.

It was resulted three areas of separation as follow:

- 40% oil in top

- 50% waste water in middle

- 10 % sludge in bottom.

Will be commanded the opening of valve V3 which allowed the evacuation of median layer from settling tank. The evacuation of water will stop when a sensor measure the transparency of water will notify that oil is at the right of him.

Next will be command the action of pumps and also the opening of electrical valve EV1 and in this moment the oil will go in the right of overflow and will pass in the second reservoir (oil reservoir). (Fig.1)

The oil from this reservoir is sell to a petroleum company.

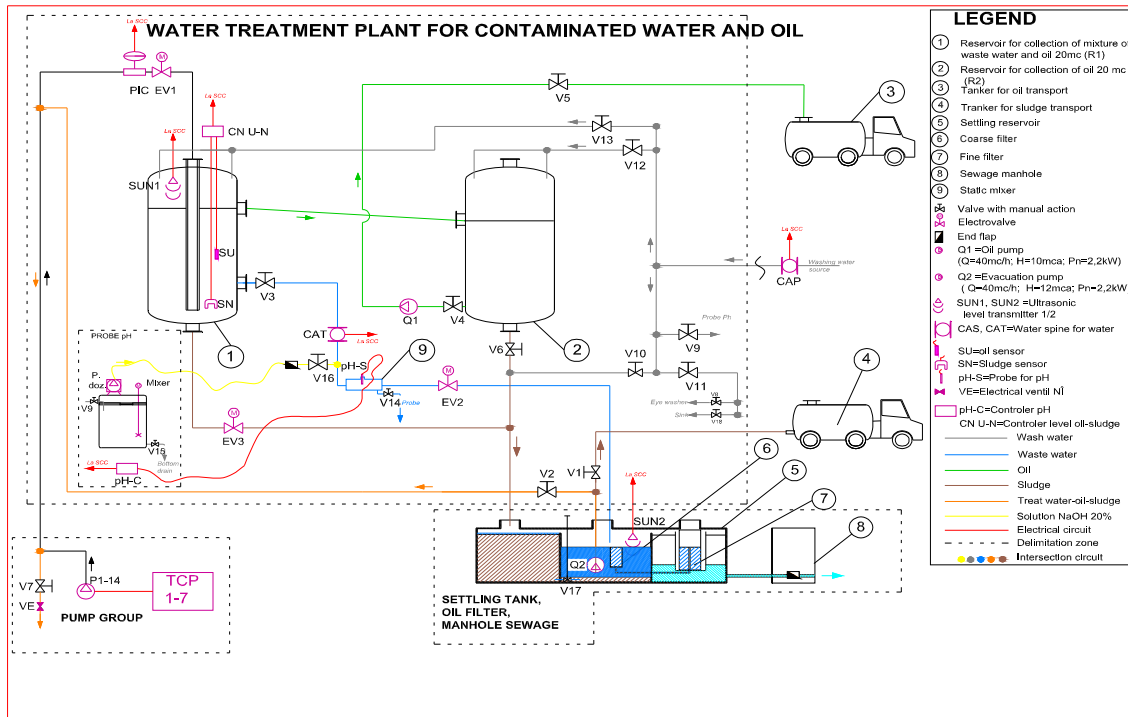


Fig.1. Water treatment plant

The water is treating with solution NaOH 12% for pH compensation. NaOH solution is prepared with an installation composed by:

- a reservoir which has a capacity by 1 mc
- a dosing pump Q= 12 l/h
- electrode for pH measuring
- static mixer

- pressure regulator
- injector
- controller

The water is filtered in two stages in an underground concrete basin which has three compartments. In first compartment of this basin will be store the sludge provides from the reservoir number 1. This compartment will be emptied using tanker Fig.2

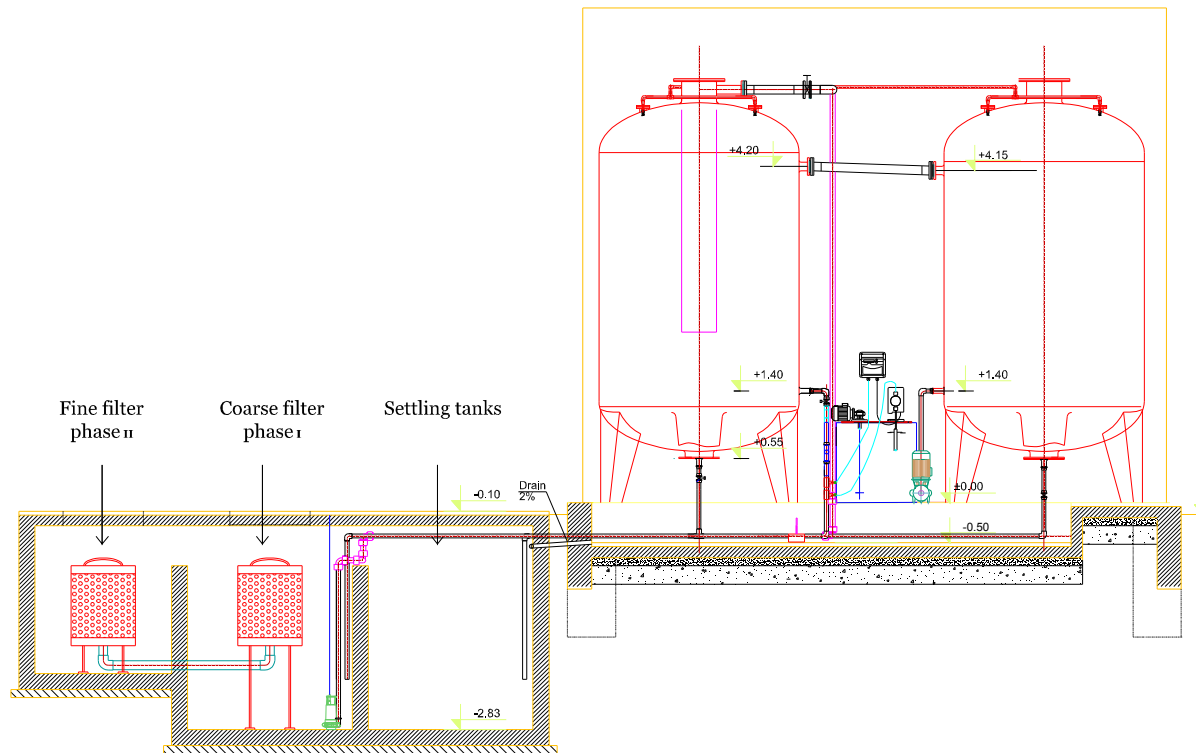


Fig. 2. Section through water treatment plant

The second compartment represent first step of filtration and the third compartment represent the second step of filtration. The filtration is done using polyethylene granules.

In case of some damages which could lead to leakage of water in plant than the mixture of water could be evacuate in the concrete basin. The level sensor will signal the increase of water level and will activate and emergency signal.

The operator will interfere and will do the allowing actions:

- open the electrical valve EV2
- open valve V6
- start the pump Q2

The pump Q2 which is situate in concrete basin will transfer the water in channels until the remediation of damages.

In case of some major damages has provide the opportunity to compensate the pH without to separate the oil.

The tanks will be periodically empty for washing. The washing will be done using the sprinklers which are placed on top of tanks.

Before putting in operation this treatment plant the value for pH it was under the admission value after HG 352/2005 this means that was fewer than 6.5. Fig.3

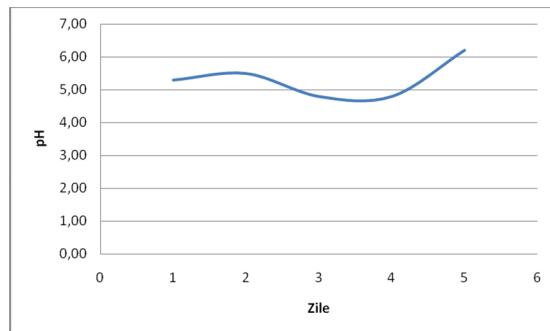


Fig. 3. pH value before starting the treatment plant

In the picture number 4 we can see that the pH values are over 8.5 this means that respect the law HG 352/2005 and normative NTPA 002.

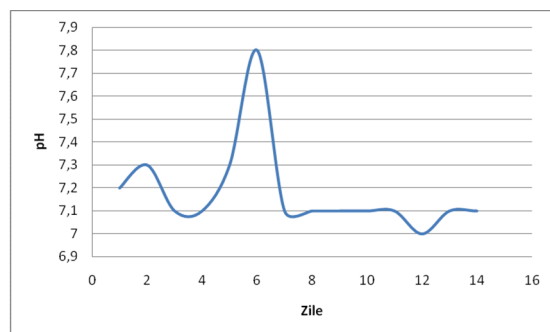


Fig.4. pH value after starting the treatment plant

3. CONCLUSION

In conclusion it is very important to pay attention for separation of oil, hydrocarbons and fats from waste water because must respect some quality norms before evacuation in sewerage.

It was chose a containerized treatment plant to separate the oil and not a simple separator oil because the waste water flow are big and also the pH must be compensate. The quantities of oil result from the separation are selling for a petroleum company. This kind of treatment plant could be chose also for a residential zone or for hotels because it is automated and can be control by distance using a SCADA program.

4. OTHER RECOMMENDATIONS

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