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TERRITORY TOBACO PRODUCTION FACTORY RUNOFF INFLUENCE ON ENVIRONMENT

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Abstract. *The stormwater and meltwater from the territory of the cities are a source of pollution of the environment, especially water bodies. This article presents a survey analysis of the tobacco production facility and conclusions on the effect of surface runoff from the production-site on the sanitary condition of the natural environment.*

Key words*: stormwater, environment pollution, pollution indicators, beam.*

ВПЛИВ ПОВЕРХНЕВОГО СТОКУ, З ТЕРИТОРІЇ ПІДПРИЄМСТВА ВИРОБНИЦТВА ТЮТЮНОВОЇ ПРОДУКЦІЇ, НА ОТОЧУЮЧЕ ПРИРОДНЕ СЕРЕДОВИЩЕ

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НАУКОВО-ДОСЛІДНА УСТАНОВА «УКРАЇНСЬКИЙ НАУКОВО-ДОСЛІДНИЙ ІНСТИТУТ ЕКОЛОГІЧНИХ ПРОБЛЕМ»

Анотація. *Стічні і талі води з територій міст, є джерелом забруднення навколишнього природного середовища, зокрема водних об'єктів. У даній статті наведено аналіз результатів обстеження території підприємства виробництва тютюнової продукції та зроблені висновки щодо впливу поверхневого стоку з території підприємства на санітарний стан навколишнього природного середовища.*

Ключові слова*: дощові стічні води, забруднення навколишнього середовища, показники забруднень, балка.*

Qualitative and quantitative runoff formation, on the production-site territory include lot factors – the surface slope, soil infiltration, quantity water-repellent surfaces, stormwater sewer and systems removal stormwater from columbine, production technology, territory cleanliness and lots other[2]. The qualitative composition and the impact of runoff on the environment from various industrial enterprises have not yet been studied well. There are not many long term researches of stormwater quality from the territory of production facilities of different industries, had done by this time[1].

The Sector of urban and industrial wastewater SRI "USRIEP", in 2014, at the contract, examined the territory manufacturing plant (tobacco production). The goal of this study was to determine the effect of stormwater from the production site to the ecological condition of watershed the Udy river.

The territory of the production facility is a rectangle, area of 31.5 hectares, in north-west bounded by the ring road, in south-west and south-east of the testing ground on which testing the tractor factory production, from northeast bounded the driveway. Most of the territory is the main building of the "n" – shaped form, beside it there are a number of small technical buildings, the rest area covered with grass and young tree seedlings. The territory is constantly cleaned and maintains in clearness. The relief of production site have slope on south-west to the beam Dolgy log. Engineering-geological structure of the production-site presented: soil bulk density within the roads, soil and topsoil, loam light brown, sandy loam and sand.

The stormwater that forms in the production-site can be divided by two categories. The first one is the stormwater that falls on the production-site territory and filtrates through the surface of plant litter, the second category is the water that comes to the storm sewer. The storm sewer consists of pipes PE-VD type "Spiro” ∅ 1200 cm, which installed at a depth of 1.70 to 2.50 m from the ground. The storm sewer projected in accordance with the specifications SCE "KharkivKomunOchystVod» №232 / PTO from 22.02.2002. The stormwater after

treatment in the local wastewater treatment plant drops into the beam Dolgy log. The wastewater treatment plant represent by the detention basin, skimmer, oil separator and filters tertiary stormwater treatment. The samples was took before and after the treatment plant. The values of the effluent quality after the treatment plant, in the winter-spring period of the year, presented in the table 1.

Table 1

Quality stormwater indicators in winter-spring season

Indicators	Period February-April
pH	6,42
Suspendid solids, mg/dm^3	21
ChOC, mg O/dm^3	60
BOC, mg O/dm^3	17,8
Oil,mg/dm^3	2,1
Total bacterial count (february), sell/sm^3	$7{,}35 \cdot 10^3$
Total bacterial count (april), sell/sm^3	$3{,}37 \cdot 10^5$
Patogen enterobachter sell/dm^3	Presence
Colyfags, plaque/dm^3	Not identified
Viaable helmints eggs egg/dm^3	Not identified

According to the table, in the winter-spring period the concentration of oils, ChOC and suspended solids exceeds the standard stormwater drops into the water body [3]. The stormwater bacteriological indicators pollution in february, much less than in april, which may be due to fact that in the winter season the stormwater accumulation in the reservoir takes place not as active as in the warmer months and the main accumulation in the collector is due melting snow and ice, while short-term temperature rise. Discgarge from the reservoir during wintertime doesn’t

occur, however there is a stagnation due to the accumulation of stormwater in the reservoir, which influences to the microbiological indicators. There is no viable helminth eggs, the parasitological analysis showed, obviously, it is associated with low activity vectors of helminths at low temperatures and the purity of the territory [2]. Increasing the concentration of oils after the winter period could be explain that the accumulation of this pollutant aerosols on snow and ice surface during the cold period of the year, so when temperature begin rise their concentration in the effluent increases. The runoff in the cold season is insignificant, the main accumulation in the detention basin forms of periodic melting of snow and ice.

There is a water pond, at the drop point stormwater from the production territory, length 100 m and a width 50 m in the middle. The water pond is formed by a stream that begins from the Vostochny district and passes through the beam all over. Discharge the stormwater directly into the pond from the concrete pipe diameter 100 sm, mounted on the drain collector, the distance from the bottom of the pipe to the bottom of the beam 50 cm. From south pond bounded the causeway. It should be also noted that the stormwater from the production-site are not forms this water body and just only maintains it.

The samples were took during the warmer months after heavy rains. The samples were took at the drop point to the beam, 40 m below the drop point on the right bank of the beam and at a distance of 400 m above the drop point, from the stream, on the left bank of the beam. The results of chemical and microbiological analysis presented in the table 2.

According to the table, chemical indicators in the water above the drop point 400 m (control sample) and the water quality of the beam, which is below the drop point at 40 meters is not much different, but still exceed the standards for the recreational water use. The water at the drop point on the content of organic matter, suspended solids and surfactants exceeds the standards for water recreational use, but the analysis of the sample below drop point showed that concentration of these indicators are aligned to the values of the control sample. It

should be noted that increasing the concentration of stormwater pollution, which drops to the beam, apparently caused by more polluted water dupmping to the stormwater sewer from the neighboring facilities.

Table 2

Quality stormwater indicators in warm season

Indicators	Sampling locations			Requirements for quality and properties water in areas of drinking and cultural community water use [1]
	400 m above drop point (control sample)	Drop point	40 m below drop point	For swimming, sport and recreation
pH	7,84	7,79	7,80	8,5
ChOC, mgO/dm^3	40	60	40	30
BOC, mgO/dm^3	3,2	3,8	3,0	6,0
Suspended soils, mg/dm^3	17,0	44,0	18,0	0,75
Phosphates, mg/dm^3	0,84	0,3	0,45	-
Surfactants, mg/dm^3	<0,01	0,05	<0,01	-
Total bacterial count	$4{,}4\cdot10^6$	$10.4\cdot10^6$	$4.9\cdot10^6$	10^6 -10^7
Escherichia coli Ec/dm^3	140000	140000	190000	Not upper 10000
Entherobacter cloacae, cell/dm^3	Presence	Presence	Presence	Not identified
p. Salmonella	Presence	Presence	Presence	Not identified
Colyfags plaque/dm^3	less 500	750	less100	Not upper 100

The results of sanitary-bacteriological and parasitological analysis showed that the water in the beam significantly polluted by microorganisms characteristic of the anthropogenic influence. The indicator viral pollution - coliphages - found only in the sample below the drop point. In the all samples revealed a considerable number of E. coli lactose, which is an indicator of the fecal pollution. The concentration in 1 cm^3 exceeds the allowable standard values in 14-19 times. There are viable helminth eggs identified in the sample below drop point. The water quality that has been analyzed does not comply with SanPiN 4630-88 [4].

The stormwater samples, in autumn season, were took after intense rains in september and october. The samples were took after the wastewater treatment plant at the control well on the production-site. The results of analyzes presented in the table 3.

Table 3

Quality stormwater indicators in autumn season

Indicators	Period February-April
pH	6,42
Suspendid solids, mg/dm^3	21
ChOC, mg O/dm^3	60
BOC, mg O/dm^3	17,8
Oil,mg/dm^3	2,1
Total bacterial count (february), sell/sm^3	$7{,}35 \cdot 10^3$
Total bacterial count (april), sell/sm^3	$3{,}37 \cdot 10^5$
Patogen enterobachtersell/dm^3	Not identified
Colyfags, plaque/dm^3	Not identified

Viaable helmints eggs egg/dm^3	Not identified

According to the table the results of analyzes runoff after wastewater treatment plant for pollution indicators is almost identical with those in summer and winter seasons.

The runoff from the production-site is not permanent, as in the hot and in the cold season. Accordingly, influence on the sanitary condition of the beam can be called periodical. And, as have been established, the most active influence is from april to september. The data received during the beam survey allow to conclude that the beam is not just a dry natural depression, it have right in the thalweg (the lowest point of the beam) the stream on all its length. It follows that drop into the beam must be considered not like on rough terrain but as well as in natural water body. Accordingly, the sanitary requirements to the stormwater must be presented as the drop into the water body [4].

Conclusion

1. The industrial-site keep in clearness and constantly cleaning, which is important for the quality of the stormwater. Although the indicators such as suspended solids, ChOC and oils exceeded standards, what may indicate not enough effective work of local wastewater treatment plant.

2. The stormwater, which drops to the beam Dolgy log from the industrial-site, is seasonal. The main runoff forms in the warm season from april to september, during the period of heavy rains. In the cold season the runoff is virtually absent. There is not many the runoff accumulation in the detention basin in cold season.

3. The composition of the stormwater, after wastewater treatment plants, at some indicators (ChOC, suspended solids, oils), does not comply with the standards to drop water into the water pond and require additional treatment. This applies particularly to the stormwater quality for microbiological and

parasitological parameters. As already mentioned, these indicators of water quality are the evidence about not such effective work of the local treatment plant.

4. The indicators for chemical pollution, in the samples below the drop point of the stormwater do not differ from the control sample (above the drop point at 400 m). What can be concluded that the excess of regulatory requirements in the stormwater, which drops to beam, insignificant.

5. The water pond, where is drops runnoff from the production-site, have not uses for the recreational or any other purposes (watering, irrigation). Therefore, the influence on the ecological condition of the watershed area of the river Udy, should be considered from the perspective of the ground concentrations. The stormwater drop, the from the territory of the enterprise, does not have a negative impact on the ecological state of the watershed area for chemical indicators, however, have a negative impact on the sanitary condition of water and soil. Accordingly, it is necessary to provide for decontamination of stormwater that discarges from the site.

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