STUDIES ON POLLUTION OF SURFACE WATERS IN THE TOWN SUPLACU DE BARCĂU

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Abstract

The main source of pollution of surface waters in the area of the Suplacu de Barcău process water is contaminated with oil extracted from oil extraction activities carried on offshore drilling and production of S.C . Petrom S.A. Suplacu de Barcău . Residual waters are undergoing a process of sewage treatment plants and discharged in to surface waters. Following the analysis in water before and after treatment was found inefficiency. By analyzes perimeter surface water upstream mining, sewage treatment plant upstream, downstream purification station downstream mining perimeter and quantification results are found to contain pollutants and major overruns in accordance with existing legal norms.

Key words: affluent, effluent, waste, sewage, impact, spill

INTRODUCTION

This paper aims to estimate the quality and quantity of emissions of pollutants in surface waters as a result of oil exploration activities in the area Suplacu de Barcău and estimation issues of non-compliance in accordance with national legislation. . To quantify the results of chemical analyzes were performed rezultaze sewage water before and after treatment and surface waters upstream mining perimeter, treatment plant upstream, downstream purification station, operating downstream perimeter.

MATERIAL AND METHOD

Research physico - chemical water main objectives were to:

- determining the concentration of pollutants in the waste stream.

-determination of residual effluent pollutant load.

-obtaining data on the correct operation of wastewater treatment plants.

-verify whether pollutant concentraţion legal limits of STAS existing force

Sampling and preservation of water samples

Was performed according to the existing methodology in force (ISO-SR) as follows:

• sampling of water from rivers and streams, according to ISO-5667-6 SR

• sampling of wastewater, according to ISO SR-10

Thus water samples were collected medium point of the following locations:

• from wastewater before entering the treatment plant

• the waste water treatment plant out of the river and discharge Barcău

• the river boat downstream of the discharge point

• Valley of the Beautiful and Porumlaca streams downstream of oil exploitation

Analysis of physico-chemical parameters of the water, methods of analysis:

For the analysis of physico-chemical parameters of water, was chosen to perform the next set of analyzes and methods of analysis:

Total mineralization: the calculation, after the determination of dry residue at 105 ° C (evaporation) of the fixed residue at 180 ° C (using the oven, at a temperature of ° C) and the residue calcined at 525 ° C (calcination furnace calcination at 525 ° C).

The residue fix: by drying at 180 ° C to dry residue, followed by weighing

Of total materials in the suspension: the method is used to separate the particles from the slurry by filtration, followed by weighing.

Current acidity: potentiometric method.

The calcium content of the water: complexometric method.

Magnesium content: by calculation using values of 0.01 M complexone III used to determine the total hardness and the calcium content of the water.

Sulfate ion content: gravimetric method.

The content of chlorides: Mohr method .

Chemical oxygen demand: permanganometric method.

The amount of oxygen dissolved in water: Winkler suitable method.

The concentration of sulfur and hydrogen sulfide: iodometric method.

Nitrogen content: photometric.

Ammonia nitrogen content: photometric.

Phosphorus content: spectophotometric method.

Oil content: gravimetric method (SR 7877-1).

The content of phenolic compounds: spectophotometric method (ISO: 2003)

The content of extractables in petroleum ether: gravimetric method.

Biochemical oxygen demand: the difference between the amount of oxygen dissolved in water at the time of sampling and the amount of oxygen determined 5 days after collection (determination by the Winkler method).

RESULTS AND DISSCUSIONS

The main source of contaminated water is the water extracted from the work with oil production, made up of formation water and condensed water in the reservoir after cyclic steam injection.

Reservoir waters are Cl and Ca type, with a salinity of 25 kg / wagon, with the following characteristics:

- mineralization - 1.25 mg / l, pH - 7.5
- NaCl - 65 mg / l
- phenol - 0.05 mg / l

Industrial waste waters resulting from the process of exploitation of oil reservoir is treated and treated in wastewater treatment plants. After wastewater is discharged in to the river Barcău.

Before waste water Suplacu de Barcău structure of the following characteristics Barcău physicochemical environments:

- suspension - values between 140-720 mg / l
- filterable residue - values between 1688-1968 mg / l.
- 395-598 mg / L chloride, 31-49 mg / l sulfate, 18 to 23.4 mg / l NH4 +, nitrates from 0.17 to 0.26 mg / l, nitrogen 5.35 to 6.87 mg / l , sulfur and H2S from 0.34 to 2.12, total iron 0.3 mg / l, phosphorus from 0.13 to 0.17 mg / l
- naphthenic acids, - less than 0.4 mg / l. phenols - between 3.27 and 3.5 mg / l
- emulsified oil - between 115 and 235 mg / l
- extractables in petroleum ether - between 30-286 mg / l
- neutral pH to between 6.4 to 6.8
- COCr organic load is between 1177-1484 mgO_2 / l
- C BO_5 - 371-483 mg / l

After the industrial water treatment process at the outlet of the treatment plant before discharge into the river Barcău. The following are values of physico-chemical parameters:

- pH neutral water has values between 7.3-7.8 and 7 (permissible value 6.5-8.5)
- water film has no oil and no iridescent
- extractables with values between 10-90 mg / l, ie by an average of 65-75% compared to untreated water.

• organic load drops significantly in relation to entry, COCr has values between 877-1143 mg / l (permissible value 15 mg / l)

• presence of petroleum products 14-19 mg / l (value is exceeded 1 mg / l imposed by the Romanian Waters opinion).

• suspensions - values over 260 mg / L (limit of 40 mg / l)

• phenol values of 2.3 and 2.9 mg / l (the allowed limit 0.05 mg / l)

• filterable residue - values between 1220 and 2440 mg / l (the allowed limit 1,200 mg / l)

• chloride 338-389 mg / l sulphates 113-126 mg / l, NH 4 + from 10.8 to 14.5 mg / l nitrite from 0.07 to 0.15 mg / l, nitrate 1,66-3.42 mg / l, sulfides from 0.13 to 1.2 mg / l ,total iron from 0 to 0.15 mg / l, phosphorus 0,08-0,02mg / l, CBO_5 show values between 272 and 343 mg / l,

Physico-chemical characteristics of the river and streams Barcău , Valley Beautiful and Borumlaca are shown in Tables. 1, 2, 3.

Table 1

Physico-chemical characteristics of the waters of the river Barcău

Nr. crt.	Indicator	U.M	Upstream mining perimeter	Upstream purification station	Downstream purification station	Perimeter downstream operation	Permissible operating limits STAS 4706-88
1	**ph**	**-**	**7,1**	**7,2**	**7,4**	**7,4**	**6,5-8,5**
2	**CCOCr**	**mg/l**	**26**	**32**	**49**	**62**	**30**
3	**CBO_5**	**mg/l**	**8**	**16**	**19**	**24**	**12**
4	**Rez. fixed**	**mg/l**	**376**	**460**	**482**	**498**	**1200**
5	**Clorides**	**mg/l**	**31**	**73**	**79**	**85**	**300**
6	**Sulphates**	**mg/l**	**52**	**64**	**72**	**82**	**400**
7	**Phenols**	**mg/l**	**0,002**	**0,032**	**0,046**	**0,053**	**0,05**
8	**Oil**	**mg/l**	**0**	**0,41**	**0,54**	**0,59**	**0,10**
9	**NH_4^***	**mg/l**	**2,3**	**3,9**	**4,7**	**6,8**	**10**
10	**Phosphorus**	**mg/l**	**0,06**	**0,12**	**0,16**	**0,22**	**0,1**
11	**Sulphides and H_2S**	**mg/l**	**0,04**	**0,06**	**0,07**	**0,09**	**0,1**
12	**Ca^{2*}**	**mg/l**	**35,2**	**38,4**	**39,8**	**46,2**	**300**
13	**Mg^{2*}**	**mg/l**	**8,6**	**9,4**	**10,2**	**11,6**	**200**

Table 2

Physico-chemical characteristics of the stream Valley Beautiful

Nr. crt.	Indicator	U.M	Upstream mining perimeter	Effluent storage potential drain valve **(16)**	Confluence downstream creek valley Foglaş	Upstream creek confluence Botumlaca	Permissible operating limits STAS 4706-88
1	**ph**	**-**	**7,1**	**7,2**	**6,8**	**7,3**	**6,5-8,5**
2	**CCOCr**	**mg/l**	**32**	**468**	**39**	**37**	**30**
3	**CBO_5**	**mg/l**	**17**	**169**	**19**	**16**	**12**
4	**Rez. fixed**	**mg/l**	**420**	**1380**	**690**	**1060**	**1200**
5	**Clorides**	**mg/l**	**59**	**348**	**119**	**260**	**300**
6	**Sulphates**	**mg/l**	**84**	**39**	**64**	**86**	**400**
7	**Phenols**	**mg/l**	**0,00**	**0,9**	**0,04**	**0,00**	**0,05**
8	**Oil**	**mg/l**	**0**	**2,2**	**1,3**	**1,9**	**0,10**

9	**NH_4^***	**mg/l**	**2,6**	**10,6**	**4,7**	**5,2**	**10**
10	**Phosphorus**	**mg/l**	**0,2**	**0,09**	**0,19**	**0,16**	**0,1**
11	**Sulphides and H_2S**	**mg/l**	**0,0**	**0,16**	**0,07**	**0,2**	**0,1**
12	**Ca^{2*}**	**mg/l**	**34,2**	**-**	**34,9**	**37,8**	**300**
13	**Mg^{2*}**	**mg/l**	**9,2**	**-**	**10,9**	**12,8**	**200**

Table 3

Physico-chemical characteristics of the water stream Borumlaca

Nr. crt.	Indicator	U.M	Perimeter upstream operating	Upstream creek confluence Valley Beautiful	Permissible operating limits STAS 4706-88
1	**ph**	**-**	**7,1**	**7,1**	**6,5-8,5**
2	**CCOCr**	**mg/l**	**76**	**1620**	**30**
3	**CBO_5**	**mg/l**	**19**	**480**	**12**
4	**Rez. fixed**	**mg/l**	**680**	**1120**	**1200**
5	**Clorides**	**mg/l**	**64**	**147**	**300**
6	**Sulphates**	**mg/l**	**190**	**176**	**400**
7	**Phenols**	**mg/l**	**0,00**	**0,1**	**0,05**
8	**Oil**	**mg/l**	**0,04**	**O,14**	**0,1**
9	**NH_4^***	**mg/l**	**4,2**	**184**	**10**
10	**Phosphorus**	**mg/l**	**0,06**	**1,4**	**0,1**
11	**Sulphides and H_2S**	**mg/l**	**0,06**	**0,32**	**0,1**
12	**Ca^{2*}**	**mg/l**	**33,7**	**57,5**	**300**
13	**Mg^{2*}**	**mg/l**	**8,6**	**13,7**	**200**

CONCLUSIONS

Reporting the results of the analysis of treated water to the maximum limits of authorization Water Management (issued by the Romanian Waters - Oradea Branch) on Barcău River drainage have found that:

• pH is neutral and fits within permissible limits

• the values of the filtrate residue is 0.3-0.5 times

• significant exceedances were recorded for the following parameters: suspension of 2-8 times, petroleum products 14-19 times 45-58 times phenols, organic matter CBO_5: from 17 to 22 times

Based on research conducted and the results presented, the impact of treated water discharged into the river and boat major flora and fauna is being discharged daily 4,000 cubic meters, about 1.46 million cubic meters annually. Pollution of surface water with oil were observed valleys and streams Borumlaca, Beautiful Valley, manifested by iridescent oil stains and water surface.

After comparing the data obtained experimentally (table no. 1, 2, 3) with the existing rules in effect on the quality of the three rivers revealed exceedances (STAS 4706-88) the following indicators:

• the river Barcău COCr and CBO_5 organic substances, phenols, oil products.

• for brook Borumlaca: COCr and CBO_5 organic substances, phenols, petroleum products, ammonia, phosphorus, sulfur, hydrogen sulfide.

• for Beautiful Valley Stream: COCr and CBO_5 organic substances, petroleum, sulfur, hydrogen sulfide.

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