

STUDIES ON AIR QUALITY IN THE TOWN SUPLACU DE BARCĂU

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Abstract

The main source of air pollution in the area of the town Suplacu de Barcău, combustion gases are discharged through the work of exploitation of oil extraction platforms and complete the form condensable gases, CO₂ and N₂ or incomplete, CO, saturated hydrocarbons and unsaturated volatile aldehydes, ketones, phenols, aerosols oxidizing nature (exhaust gas emitted from the batteries of the boilers as a result of the supply of steam injection wells cyclic), in order to estimate the quantitative and qualitative parameters were analyzed and were air chemical highlighted the issues of non-compliance in accordance with national legislation.

Key words: air pollutant, emissions, fuel concentration, sanitary, dispersion

INTRODUCTION

The research was conducted in order to estimate the quality and quantity of pollutant emissions into the atmosphere as a result of oil exploration activities in the area town Suplacu de Barcău and estimation issues of non-compliance in accordance with national legislation. Quantitative and qualitative estimation of pollutant emissions represented by the full form of non-condensable gases, CO₂ and N₂ or incomplete, CO, hydrocarbons, saturated or unsaturated volatile aldehydes, ketones, phenols, aerosols nature oxidant (flue gas emitted from the boiler batteries as therefore the supply of cyclic steam injection wells) was performed according to methods and rules existing STAS.

MATERIAL AND METHODS

Air Sampling was carried out according to STAS 10331-1989. Depending on the nature of the pollutant and the possibilities of harvesting were used three sampling methods, sampling suction in closed bottles collection, sampling by sedimentation

ANALYSIS OF AIR CHEMISTRY, ANALYTICAL METHODS

To identify contaminating substances in the atmosphere (conf. STAS 12574-1987), qualitatively and quantitatively, the next set of analyzes was conducted and methods of analysis:

- the content of sulfur dioxide (SO₂) – nefelometric method
- the content of hydrogen sulphide (H₂S) – photometric
- the content of nitrogen dioxide (NO₂) - by spectroscopy

The content of oxygen (O₂) - the method comprises determining the oxygen in the sampled air by means of pyrogallol, followed by carrying out the difference between the initial amount of the air analyzed by determining the remaining amount of oxygen.

- the content of carbon dioxide (CO₂) - interferometry method
- the content of carbon monoxide (CO) – spectroscopy
- the content of hydrogen (H₂) - colorimetric method
- the content of hydrocarbons - chromatographic method
- methane content - by the use of stationary analyzer
- dust content - reflectometry method

RESULTS AND DISCUSSION

Combustion gases are the main atmospheric pollutant and complete the form condensable gases, CO₂ and N₂ or incomplete, CO, saturated or unsaturated volatile hydrocarbons, aldehydes, ketones, phenols, aerosols nature oxidant (flue gas emitted from the battery boilers due to supply steam injection wells cyclical, chemical composition in% volumetric combustion gases is:

- carbon monoxide CO: 0.5-1.2%
- carbon dioxide CO₂: 12-14%
- oxygen O₂: 0.5-1%
- N₂: 77-84%
- hydrocarbons: 0.6%

Because the underground combustion process has a steady progress in time and space, specific gas emissions are not constant qualitatively and quantitatively different from a probe reaction to another. Based on the analyzes performed, were found on average: oxygen O₂: 3-5% carbon dioxide CO₂: 9-12%, carbon monoxide CO: below 0.3%, hydrocarbons: 1.15 to 1, 28%

In the whole structure of Suplacu de Barcău quantities of flue gas emissions into the atmosphere as a result of the activity of oil extraction wells are approximate cyclic injection of 693,560 thousand Nm³ / year.

For wells where oil extraction is performed by underground combustion, combustion gas dispersion is carried out at a height of 90 m through chimneys.

Assessment of air quality is based on the limits imposed by STAS 12574/1987 (Air in protected areas).

As a result of air quality measurements and correlate data provided by the Environmental Protection Agency Oradea, have surpassed the limits of existing STAS effect on nitrogen dioxide and carbon monoxide.

In Figs. 1-6 is shown dispersion in the atmosphere of nitrogen dioxide and carbon monoxide, pollutants exceeding limits.

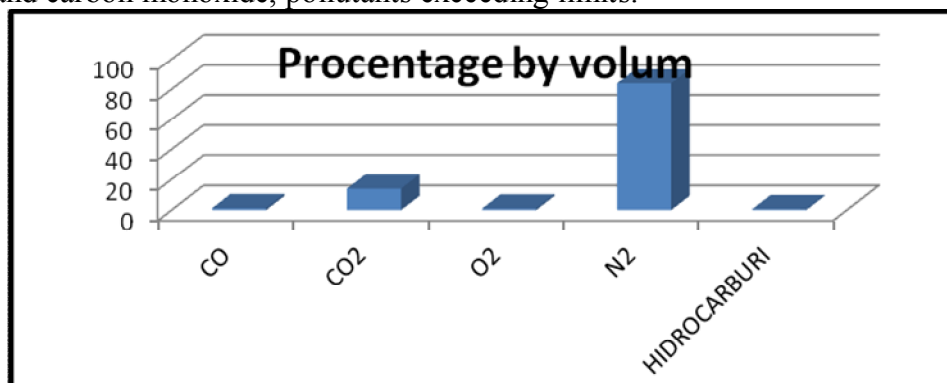


Fig. 1. The average values of the chemical composition of the combustion gas

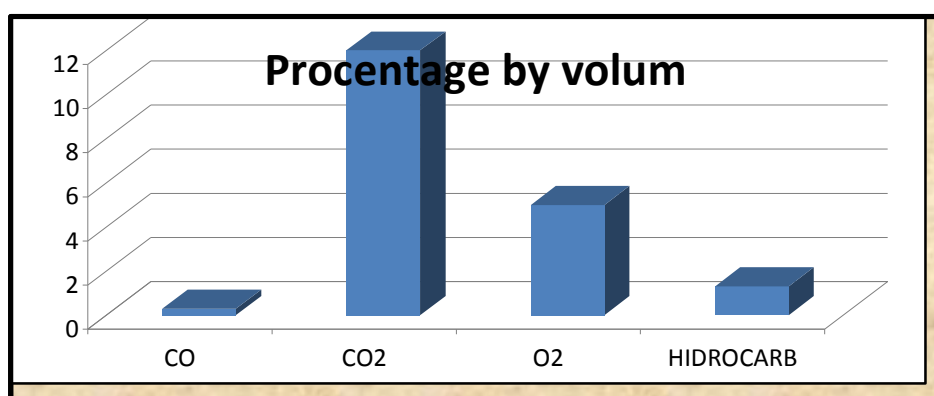


Fig. 2. Average values of the chemical composition of combustion gases structure Suplacu de Barcău (partipation volume%).

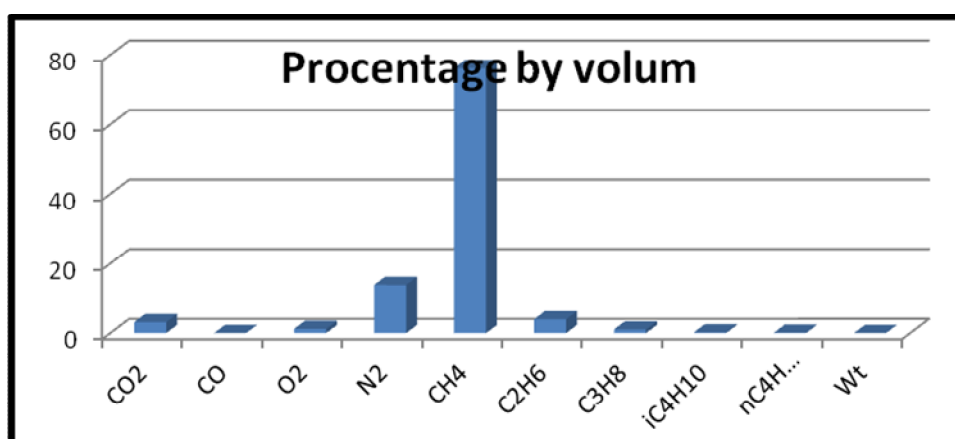


Fig. 3. The chemical composition of the combustion gases to a boiler battery, used as a standard (participation volume%).

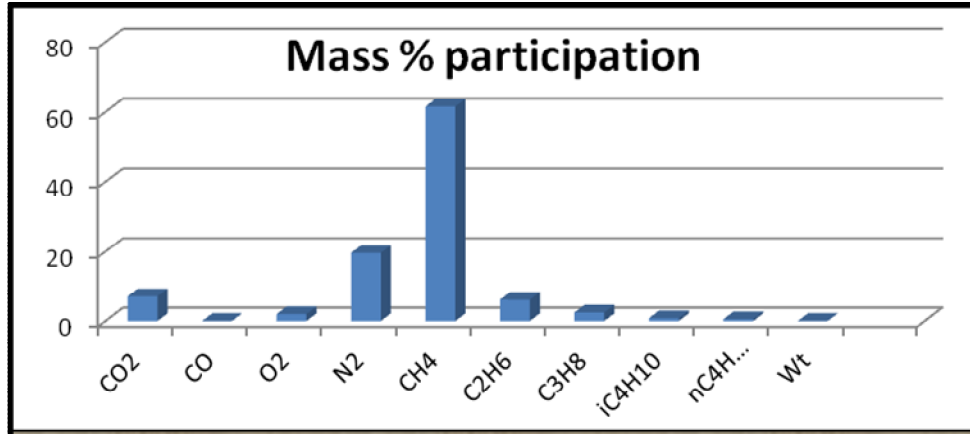


Fig. 4. Chemical composition of combustion gases from a battery of boilers used as a standard (mass% participation)

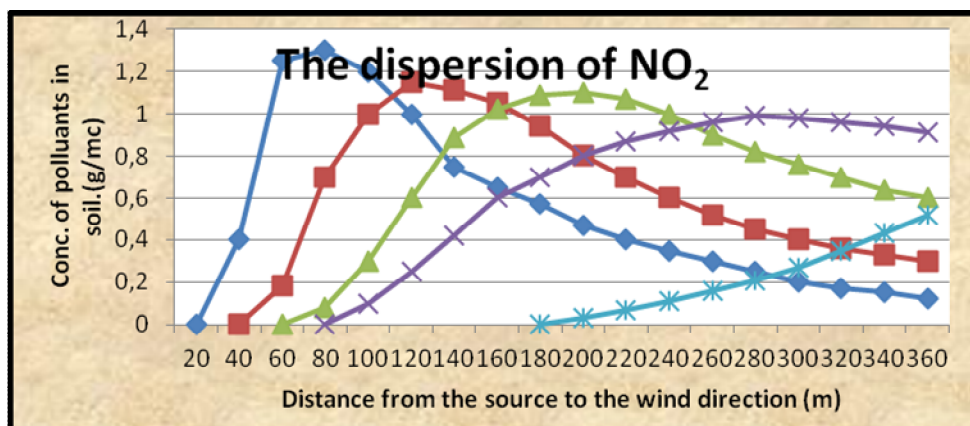


Fig. 5. Dispersion of nitrogen dioxide in the atmosphere

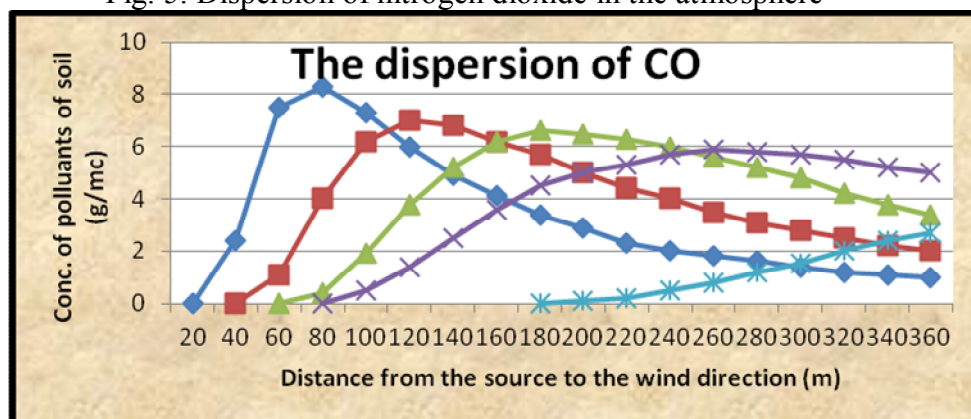


Fig. 6. The dispersion of carbon monoxide in the atmosphere

CONCLUSIONS

Following studies on emissions into the atmosphere as a result of oil extraction activities on oil rig S.C. Petrom S.A. Suplacu de Barcău, were found the following nonconformities in compliance with environmental legislation:

Carbon-monoxide concentration CO in air:

- values of $7.5 \text{ mg} / \text{m}^3$ in oil fields, thus exceeding the maximum permissible concentration of $6 \text{ mg} / \text{m}^3$.
- values greater than $1.3 \text{ mg} / \text{m}^3$, recorded at close range outside the oil fields, the dominant wind direction in the localities Foglaş, Leşmir, Şumal, Porţi.
- frequencies exceeding the maximum permissible concentration per 30 minutes are low both in area and value ($\approx 5\%$ of the time).

CH₄ methane-air concentration:

- present value $\approx 3 \text{ mg} / \text{m}^3$ the locality Suplacu de Barcău and values between 1 and $3 \text{ mg} / \text{m}^3$ in adjacent areas Suplacu de Barcău. There is sanitary.

The concentration of nitrogen dioxide in the air-NO₂:

- maximum permissible values were recorded up to $0.4 \text{ mg} / \text{m}^3$ directions EV in northern Suplacu de Barcău (30 minutes maximum permissible concentration is $0.3 \text{ mg} / \text{m}^3$)
- permissible limit is not exceeded annual average concentrations ($0.04 \text{ mg} / \text{m}^3$).

The concentration of particulate matter:

- there were no exceedances of health rules

The air concentration of volatile organic compounds, hydrocarbons

- were recorded values of $\approx 12 \text{ mg} / \text{m}^3$ in area Suplacu de Barcău, but values of $3\text{-}5 \text{ mg} / \text{m}^3$ in areas adjacent Suplac village, west and northwest of the village of Valea Cerului and Leşmir.

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