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THE EXTENSIVE USE OF THE INTERNAL COMBUSTION ENGINE - MAJOR CAUSES OF POLLUTION IN HUNEDOARA AREA

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ABSTRACT

The paper presents a study focused on the road traffic evolution in the last years on the section of national road in the vicinity of Hunedoara City.
First, we present the cars from the point of view of the impact that they have upon the medium, through the pollution with noxious chemical substances.
The traffic evolution in the last 11 years and the situation of the traffic in this area, on the representative years, are presented, in statistical and graphical mode.

KEYWORDS:

road traffic, statistical mode, graphical mode, impact, pollution

1. INTRODUCTION

Through this paper we present a study regarding the road traffic evolution in the last years, on the section of the Romanian National Roads near Hunedoara, and the effects upon the medium and the air quality.

In the general context of problems concerning environment pollution, we can rightfully state that cars, generally, are one of the greatest sources of nature pollution. In this sense, the internal combustion engines are admittedly the strongest pollution agents not only because of their way of functioning, but mainly for the great (and continuously increasing) number of cars existing in traffic and equipped with such engines.

The main pollution substances emitted through the burning of hydrocarbons in internal combustion engines are: CO_2, NO_x, CO, oxides of the sulphur (SO_2 and SO_3), H_nC_m type hydrocarbons due to incomplete burning, as well as solid particles.

It is difficult to establish the limit for the quality of air, on one side because we have insufficient information, and on the other side because of the specific geo-climatic conditions of each particular area. For example, if on a highly circulated road, the concentration of noxious gases may reach very high values, at only 50…60 minutes distance, the limits

may be below the standard admitted ones. The problem of air quality norms is linked also to the admitted limits for the noxious gases, for different vehicle types.

It is obvious that modern technologies, through direct actions upon the production and later processing of exhaustive gases, may act towards a limitation of pollution caused by internal combustion engines. But as the legislation of our country, regarding the import of cars that respect the Europeans safety norms, was recently ratified, we can say that the Romanian Auto Park holds in quite high percentage vehicles of great.

It is established that for a vehicle covering a distance of 30000 km, with a medium consumption of 7.5 litres/100km – thus 2250 litres final consumption – the consumption due to the losses, respectively due to the pollution with equivalent hydrocarbons, is:

H_nC_m – through vaporisation – 90 litres,
H_nC_m – through crankcase gases – 25 litres,
H_nC_m – through exhaustive gases – 60 litres,
CO – from crankcase gases – 275 litres,

A total of 450 litres results, which means that, practically, a 25% of the acquisitioned fuel is wasted, causing pollution. The content of the emitted noxious gases corresponding to one vehicle in a detailed plan in FIGURE 1.

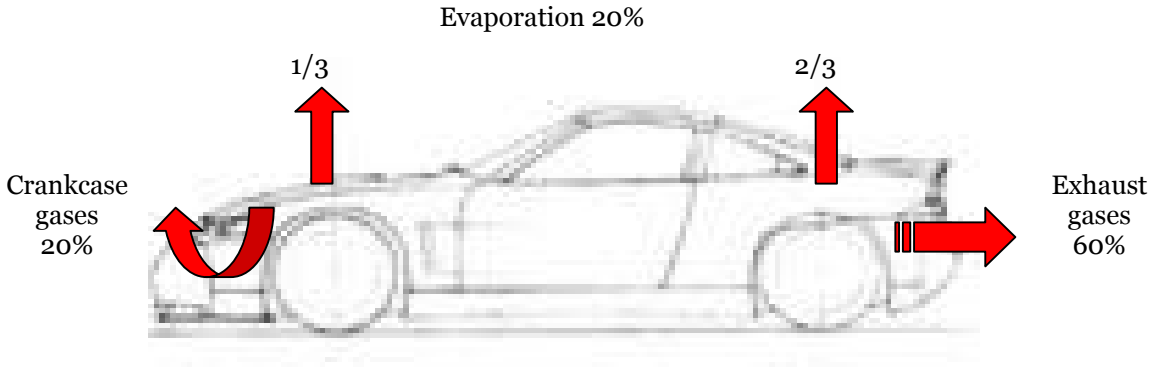

FIGURE 1. SOURCES FOR THE ESCAPING OF NOXIOUS GASES FOR ONE CAR

2. STUDY CONTENT. RESULTS AND CONCLUSIONS

The present study is focused on a sector of a Romanian national road (DN 68B), which constitutes the most important link of Hunedoara with the rest of the country care (in FIGURE 2 is presented this sector of road). The monitoring of traffic was done at kilometre 6 + 500, in Peştiş, while the National Road Department in Deva provided the data.

First, FIGURE 3 presents the evolution of traffic intensity in the respective area, expressed by the term *Annual Daily Average – ADA (Medie Zilnică Anuală – MZA)*, for a period of 11 years, starting with the year 1991. The values from FIGURE 3 stand for the daily average of measured vehicles corresponding the respective year.

It is to be noticed an almost continuous rise of traffic up to the year 1998 (including this year), followed by a sudden decrease in 1999, while for 2000, a new increase of traffic intensity is on the figure.

If we follow the evolution of traffic intensity during one year (FIGURE 4 and FIGURE 5) on the road section in question, we can underline the following aspects:

- The highest values of traffic intensity – expressed by the term *Monthly Daily Average MDA (Media Zilnică Lunară – MZL)* – were recorded in June, July and August, while the lowest values were noticed at the beginning and at the end of the year (January and December);
- There are, however, exceptions. For example, the year 1997 (represented in FIGURE 4), when, in November, the traffic suddenly decreased, followed by a rise in December up to the maximal values registered at the middle of the year.

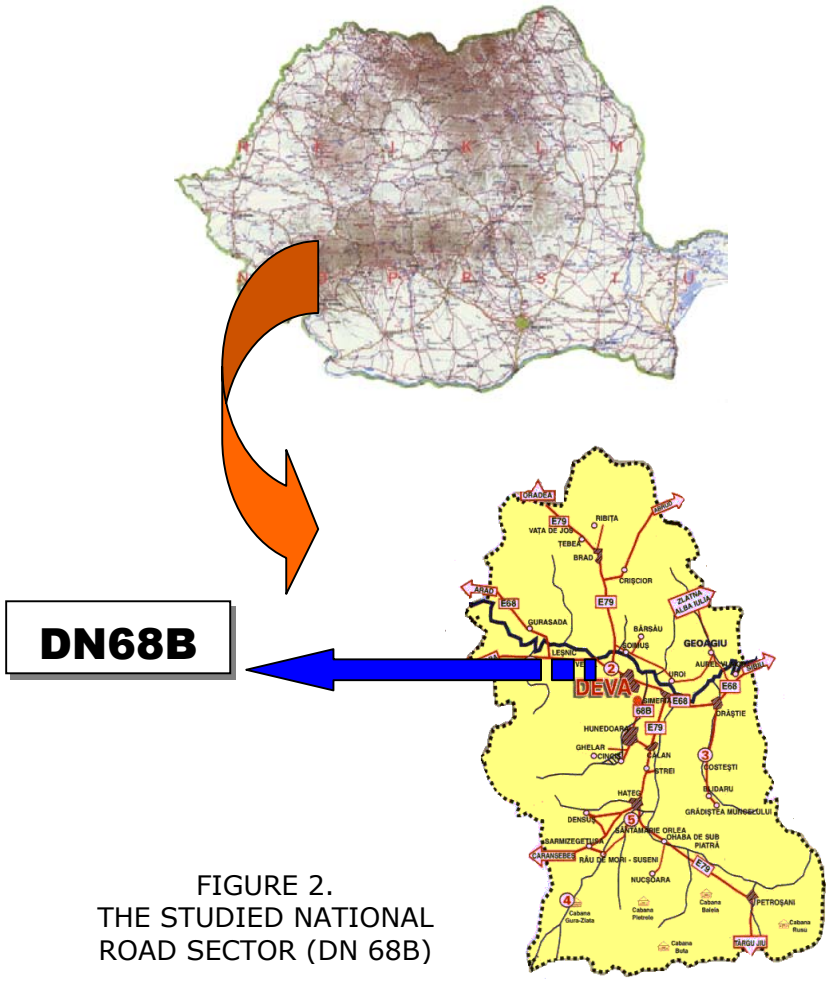

FIGURE 2.
THE STUDIED NATIONAL ROAD SECTOR (DN 68B)

One of the explanations regarding such an evolution could be given by the weather conditions in the respective geographical area, conditions that during the cold season (in wintertime) may hinder traffic. In the case of a more gentle winter, the traffic takes place as usual. Reaching values that can be compared with those of summertime.

Another explanation of the evolution tendency of traffic during a year may be also given considering the fact that for the period of winter feasts, the industrial activity reduces noticeably, consequently the traffic values reach the minimal levels.

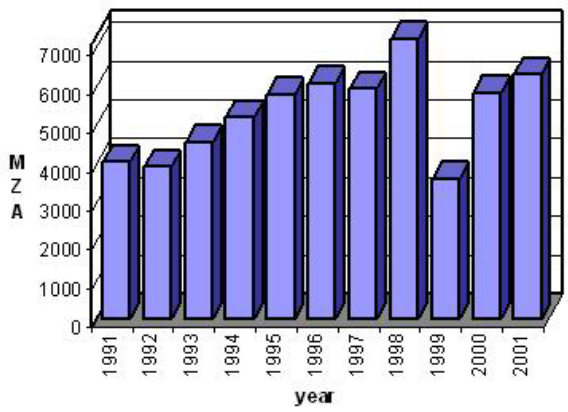

FIGURE 3.
THE TRAFFIC EVOLUTION
IN THE LAST 11 YEARS

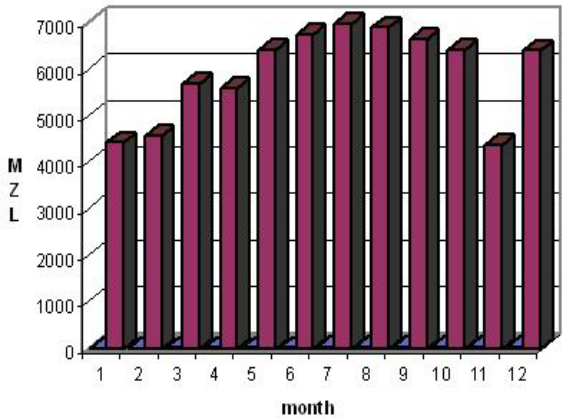

FIGURE 4.
THE TRAFFIC EVOLUTION IN 1997

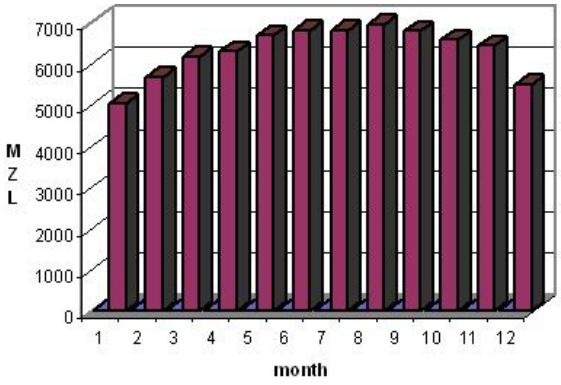

FIGURE 5.
THE TRAFFIC EVOLUTION IN 2001

REFERENCES

[1] * * * : Arhive – Secţia Drumuri Naţionale Deva
[2] NEGREA, V. D.: Poluarea motoarelor cu ardere internă, curs lito, UPTVT, 1993
[3] * * * : Revista Drumuri şi Poduri, noiembrie – decembrie, 2001
[4] TUDOR, D., ş.a.: Combustibili şi instalaţii de alimentare a motoarelor cu aprindere prin scânteie, Editura AGIR, Bucureşti, 1999.