

**PLOIEȘTI OIL AND GAS UNIVERSITY**

***HABILITATION THESIS***

***RESEARCH ON THE OPTIMIZATION OF  
PROCESSES IN THE TRANSPORT AND STORAGE  
OF OIL, PETROLEUM PRODUCTS AND GASOLINE***

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## **ABSTRACT**

Academic career involves a wide range of activities (didactic, research and administrative) with the ultimate goal of ensuring the training of students at the highest educational standards.

In terms of didactic activity, I have contributed to the formation of many generations of students in the oilfield (petroleum and petrochemical), mechanical (harbor and onshore equipment) and maritime (Modern Marine Structures).

Since the beginning of my teaching career, I have been keen to provide courses and seminars as interactive debates with many industry examples (having more than 25 years of experience in oil engineering).

Thus, the knowledge transmitted was the basis for the elaboration of many bachelor and dissertation papers (which I coordinated as a tutor).

I also managed to direct six graduates of the Master's Degree Program (Technology and Management in Petroleum Processing and Petrochemistry) PhD in the Chemical Engineering.

In the last period of time there is a desire of the students and the graduates of higher education to continue their professional training, by graduating from the doctoral program, most of them guided by me to other doctoral masters and especially the current students, reproaching me that I am not also empowered to lead this academic program.

Having the stages of promotion in higher education (head of papers, lecturer) and also fulfilling the minimum requirements for obtaining the title of university professor, I think I am prepared to pass this exam (having a rich pedagogical, scientific and research activity) in order to be able to guide the future PhD students in the field of Mine, Oil, Gas, Geological Engineering, especially for Oil and Gas Specialization.

After graduating from the Faculty of Drilling and Exploitation of Petroleum and Gas Fuel at the Petroleum and Gas Institute of Ploiesti, I continued my professional training with a master's degree program and also attended several training courses.

As far as the scientific activity is concerned, I have been involved in various research and development projects since the beginning of my career as an engineer, the fields of study

being the protection of water quality and of the environment affected by the oil industry, the rehabilitation of the polluted environment with petrochemicals, development of new ecological sorbents for limiting chemical pollution, optimization of crude oil, gasoline and petroleum products pipelines, optimization of technological processes in the petrochemical industry.

An important area of scientific research was the influence of the environment on the oil installations, the subject of the doctoral thesis I choose (Contributions to the Study of Flexible Marine Pipelines) being the first work that approached this field in our country.

In the doctoral thesis I studied the numerical modeling of the behavior of marine pipelines affected by the whirlpool phenomenon.

I also analyzed the risk in the operation of these oil installations, the methodology I used being the world's first work in this type of analysis.

At the same time, as an employee of the petroleum, gasoline and ethane transport operator in Romania (CONPET SA), I faced the need to optimize the technological processes in this field, the present paper being focused on the three main issues present in industrial activity:

- a. Decontamination of the environment affected by accidental pollution and optimization of the intervention for damages,
- b. Optimizing pipeline transport and making optimal oil blends for transportation and processing,
- c. Quantification of fugitive emissions in the transport by main pipelines (to substantiate real technological consumption).

I took into consideration that the empowerment thesis should presents my achievements in all three areas, because these will be the future development themes for the doctoral thesis I will coordinate.

The present paper is structured in three parts and comprises:

- a. Description of didactic, scientific and professional activity,
- b. Optimizing the processes in the oil, gasoline and petroleum products industry.
- c. Career development plan in the future

The first part of the thesis presents the synthesis of didactic, scientific and professional results obtained during the academic career as well as elements related to the national and international visibility.

I also presented my concerns for documentation and training in the fields of didactic, research and especially professional activities.

Part II of the empowerment thesis consists in describing the results obtained in the research activities, being divided into three chapters, during which I presented the theoretical bases and the elements of analysis, research and interpretation of the results obtained from laboratory simulations and industrial phenomena studied within the chosen theme.

The first chapter is dedicated to the analysis of natural sorbents used in the decontamination of the environment affected by accidental pollution (so present in the national crude oil transport system).

Also presented is a numerical model for determining the area and volume of soil polluted by the breakage of a crude oil pipeline.

The second chapter analyzes a pipeline transport optimization model based on the requirements of the beneficiaries and the amount of crude oil available to suppliers.

I also analyzed the evolution of the properties of blends of crude oil (blending techniques) to create oil recipes useful in both pipeline and refinery transport.

Chapter Three explores the effect of fugitive emissions on the environment and, in particular, the evolution of crude oil emissions from fugitive emissions.

The first subchapter is devoted to presenting how to establish legally (through norms and ministerial orders) the loss of petroleum products in the use of these processes.

This subchapter is rather introductory, its role being the legal ruling ~~questioning~~ of the accounting determination of the quantity of petroleum products considered technologically consumed in the technological processes

The second subchapter identifies fugitive emissions, their chemical quality and how they are calculated.

There are presented the methods developed by the American Petroleum Institute (API) and GOST (Russian Federation Standards), which are used worldwide to quantify these types of fugitive emissions. There are also presented the ways to quantify fugitive emissions in the oil, gasoline and petroleum products companies in Romania and other countries (Russia, the United States of America, the European Union).

Sub-paragraph 3 presents the results of the fate-mathematical modeling of the national crude oil and gasoline transport system.

They also describe the effects of these emissions on the environment, analyzing their effect on the health of people working or living around oil and oil storage facilities.

At the same time, a numerical model for determining these emissions is described.

There are shown the results obtained within the simulation performed within the company CONPET S.A. Ploiesti.

Part III of the empowerment thesis consists in presenting the development plan of the teaching and research career, as well as defining the research directions within the doctoral thesis.

In this part are presented the objectives of didactic activity, mentoring of Ph. D. students.