UDK 519.711.2

Modelling and technologies for restoration of oil polluted soils and water bodies

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Summary – D**evelopment and creation a tool set of modeling (forecast and foresight) and highly environmentally friendly technologies to prevent and eliminate pollution of soil and water areas by xenobiotics (oil, petroleum products, pesticides) are presented.**

Keywords – **foresight, forecast, modeling, scenario analysis, microbial technology, oil-polluted ecosystems.**

I. INTRODUCTION

The paper present development of integrated tool set of modeling and microbiological technologies for restoration of oil-polluted soils and water bodies, technological principles for obtaining of carbon bioactive materials of bio-destructive type and application for clearing of soil and water bodies from oil and oil products, and also scientific ground of expedience of application of bioactive materials in this region on the basis of the technological foresight system methodology.

II. STATEMENT AND REALIZATION PROBLEM

The basis of tool set of modeling methodology is the systematic technology foresight in the context of sustainable development, being developed in the form of soft information platform, system analysis, without analogues in the world [1]. Consider the characteristics of the investigated oil contaminated region concerning their conduction in the future there should be taken very definite solutions in the form of scenarios and strategies for their development. The construction of these scenarios is provided by means of a universal set of tools and approaches, called the methodology of scenario analysis. The methodology of scenario analysis is based on a consistent implementation of the main stages of the technological foresight. In the first phase the problem and the object of prediction are studied In the first phase it is studied the problem and the object of forecast using the methods of qualitative and quantitative analysis, then the qualitative and quantitative information is given to a single platform. The sequence of individual methods is determined and the relationship between them is established. This allows us to continue building a holistic process of foresight and developing a group of future scenarios for the object of foresight. In this case, evaluation of alternative options for scripting can be done on the comparison of multiple criteria (economic, environmental, political, social, etc), as well as the situational, unpredictable, unavoidable and other risks.

Analyzing the characteristics and features of each of the developed scenarios, a group of people who make strategic decisions, select the interested scenario, develop a plan of action concerning to the object of foresight and ensure the implementation of this plan.

Modeling of microbial technology of oil-polluted soils and water bodies restoration is based on the methodology of estimation the environmentally hazardous processes of different nature, which occurred in two environments (groundwater and soil), on the basis of a priori existing monitoring data, expert assessments and technology foresight. Interaction and interdependence of the same type and different types of processes are identified and taken into account.

Merits of the project lies in the fact that a solution for the problem of bioremediation of oil-polluted ecosystems, using oil-absorptive materials of biodegradable type, is proposed. It is essential to create biodegradable materials, where microorganisms-destructors are fixed on the carrier unit, not inert, and sorption-active to the pollutant, and to the very microorganisms-destructors. Making such bio-sorptive complexes in the ground will allow implementing the closest spatial orientation of the oil-oxidizing micro-organisms and petroleum hydrocarbons, sorptionly connect a significant part of residual oil in the ground, and completely eliminate its toxic adverse effect by increasing the destructive capacity of the biological component of the material.

Created carbon sorbates, based on vegetable raw materials, bio-activated by natural association of oil-oxidizing micro-organisms, meet this case, they are effective for the purification of ecosystems from oil pollution, do not require removal from the field of processing and recycling. Making such bio-sorptive complexes in the ground will allow implementing the closest spatial orientation of the oil-oxidizing micro-organisms and petroleum hydrocarbons, sorptionly connect a significant part of residual oil in the ground, and completely eliminate its toxic adverse effect by increasing the destructive capacity of the biological component of the material.

III. CONCLUSION

In the result of project realization the issues of development competitiveness will be solved: modeling of microbial technology in the context of sustainable development; evaluation of strategic options for making decisions, based on the methodology of technology foresight.

REFERENCES

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