

Environment risk assessment and issues with hydrocarbon and geotoxicological factors

Trinh Quoc Vinh, Sergey Yakutseny

Gubkin Russian State University of Oil and Gas: Moscow, RU

Received: 25 Sep 2022; Received in revised form: 15 Oct 2022; Accepted: 22 Oct 2022; Available online: 28 Oct 2022

©2022 The Author(s). Published by Infogain Publications. This is an open access article under the CC BY license

(<https://creativecommons.org/licenses/by/4.0/>)

Abstract— Our scientists recognize a disaster ecosystem as a result of changes in The geochemical composition of the Earth's biosphere. The paper aims to figure out What are issues of hydrocarbon and **Geotoxicology** and environment risk. By using descriptive method for primary model, synthesis methods and process analysis and analysis of difficulties and discussion, The study of this problem to some extent facilitates the extensive, although scattered and extremely heterogeneous analytical material in terms of the content of impurity elements in crude oil, refined products and gases accumulated over the years of exploration, production and disposal of hydrocarbons.

Keywords— hydrocarbon, analysis, risk, environment, geotoxicological factors.

I. INTRODUCTION

Nowadays, one must understand that fuel and energy supply is a vital the need of today's industrial and post-industrial society, therefore unjustified restrictions in the development and consumption of hydrocarbon raw materials are impossible.

Research questions:

Question 1: What are related studies on hydrocarbon and **Geotoxicology**?

Question 2: What are issues of hydrocarbon and **Geotoxicology** and environment risk?

Next, Dmitrieva and Romasheva (2020) pointed that Currently, the Russian oil and gas industry is characterized by significant reserves depletion and the late stage of development of most fields. At the same time, new fields that are brought into industrial development, in the majority of cases, have hard-to-recover reserves. Furthermore, most prospective oil and gas deposits are located in the Arctic and its offshore territories and their development is much more complicated due to regional peculiarities. This substantiates the necessity of a special approach to the development of the oil and gas potential of the Arctic, based on innovation. The goal of the paper is to reveal the role of innovation activity in the sustainable development of the oil and gas potential in the Arctic and its offshore zone. The paper briefly presents the main urgent factors of Arctic development, which highlight the necessity of innovation for its sustainability. Then, it introduces the methods used for the research: the Innovation Policy Road mapping

(IPRM) method in accordance with Sustainable Development Goals (SDGs) concept for clarifying how innovations will lead to sustainable development. In terms of results, this paper presents an innovation policy roadmap for the sustainable development of oil and gas resources of the Russian Arctic and its shelf zone and identifies the role of innovation within this development.

Then, Tynkkyinen (2019) bring together the features of the Russian hydrocarbon culture and the practices of Putin's fossil-inspired geo-governmentality in the context of a changing global climate. Putin's Russia continues the centuries-old practices of an empire that is violent towards its own people and the outside world and is simultaneously unable to utilize the bountiful resources that Russia possesses, which can be part of the solution of a healthy planet. This vision stems not only from the same geographical realities as the criticized geo-governmentality of the Putinite hydrocarbon culture, but also from a knowledge of the Russian national identity and culture. The task of unleashing the spatial and societal processes that will turn Russia into an internally strong and internationally respected player is difficult, but certainly not impossible. This requires a rethinking of the objectives and rules of the game in both domestic and cross-border contexts: how will Russians foster the necessary change from within, and how can Russia's partners enhance this through their efforts in the spheres of business and politics?

II. METHODOLOGY

Authors have used qualitative and analytical methods, descriptive method for primary model, synthesis and discussion methods in this paper.

We also used historical materialism method.

III. MAIN FINDINGS

The key problem :

In 1980, in the city of Dzerzhinsk (Volga region), mass poisonings were registered among TPP workers, similar to poisoning with arsenic compounds. Conducted research

showed that the cause of poisoning is the hurricane content of vanadium in fuel oils obtained from oil from one of the fields in the Volga region. Toxic lesions in Komi and Dzerzhinsk

identified exclusively at the medical level on the basis of mass specific diseases.

In those cases where the toxic impurity does not cause such an impressive effect or medical statistics archaic

impact is usually hidden. Hidden Defeat continues indefinitely, expressed in an increased, outwardly unmotivated morbidity in people. For example, in the province of Ontario (Canada) in a number of regions increased incidence of Alzheimer's disease. Reason after analysis turned out to be unexpected - in tap water, the aluminum content exceeded the MPC by 10 times.

Aluminum compounds, aluminum chloride, aluminum hydroxochloride and other widely are used as part of coagulants in secondary oil recovery methods, for example, reservoir flooding.

Sometimes the connection of human diseases with the development of hydrocarbon raw materials is so veiled that the identification of this relationship requires special biomedical research. Yes, after discovery and start of development of the Astrakhan gas condensate field containing composition of gases by 25% CO₂, and H₂S, a new type of heavy, often lethal diseases called Astrakhan fever. For the first time Astrakhan fever was registered in 1983.





Fig.1 - Astrakhan gas chemical plant. (Photo by Anatoly Kalachev map service Google Maps)

It was believed that it was connected with the construction of a gas chemical complex and pollution environment. However, later Academician I.V. Tarasevich together with the French scientists found that the causative agent of Astrakhan fever is a new species microorganisms

close to the causative agent of Mediterranean spotted fever, and carrier - dog ticks. Astrakhan Gas Condensate Plant emits atmosphere with large amounts of carbon dioxide. Gas concentration in the surface layer attracts ticks, and ticks find their hosts, including among people.

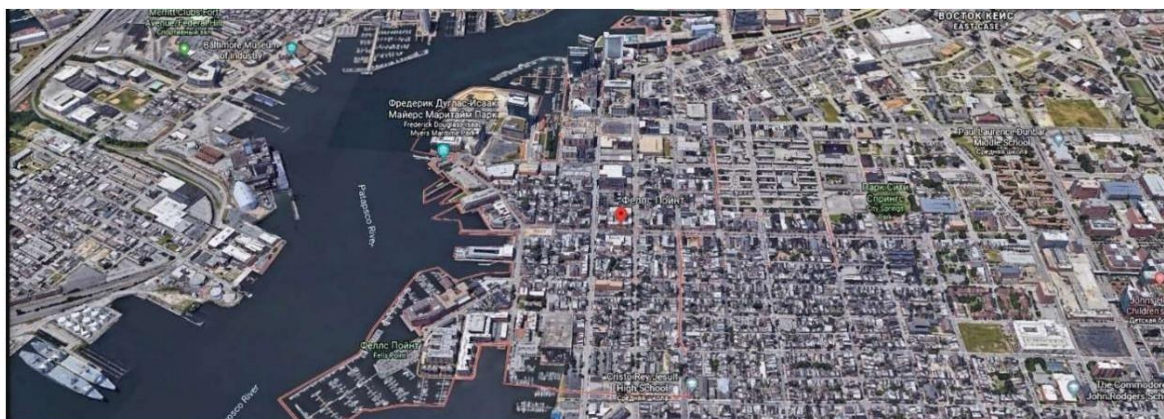


Fig.2 - Fell's Point, Baltimore, USA. Area of the former Baltimore Chrome Works. (mapping service Google Maps)

An example with similar consequences is Baltimore (USA). medical statistics identified a territory on the port outskirts of the city, where the death rate of citizens from lung cancer was 4.3 times higher than in the city. Incidence of lung cancer in former workers factories are 14 times higher than the average for the city. It turned out that this was the territory of the former chrome ore processing plant Baltimore Chrome Works, which produced compounds chromium and arsenic. The plant worked for 172 years, from 1813 to 1985, and was closed on demand US Environmental Protection Agency (EPA). A 20-acre (81,000 m²) site was subjected to toxic damage. From 1986 to 1999, thirteen years old, receiver company

Baltimore Chrome Works - Allied Chemical, court-ordered cleaning area to an acceptable level. The cost of cleaning up the Baltimore plant site amounted to 110 million US dollars.

Arsenic is an active carcinogen regularly observed in fuel raw materials - oil, gases and coals. There is no need to continue listing such examples. Together with industrial development of regions is also deteriorating the ecological situation, most of all in the areas of processing raw materials. Hydrocarbons play an important role in this kind of environmental pollution. both natural and processed products. Despite the lack of knowledge of this problem, there obvious positions. For example, according to the degree of prevalence and secrecy of the impact the most

dangerous, especially when consumed, are processed products (fuel oil) of heavy sour oil enriched in metal complexes, massively produced in the European part RF. The share of heavy oil production in the Russian Federation does not exceed 23% (2016), however, within the densely populated Volga region is at least 40% (2010) and the volume of production is constantly growing.

IV. DISCUSSION AND CONCLUSION

The study of this problem to some extent facilitates the extensive, although scattered and extremely heterogeneous analytical material in terms of the content of impurity elements in crude oil, refined products and gases accumulated over the years of exploration, production and disposal of hydrocarbons.

At present, the active development of mankind deposited in mineral resources, including the organic matter of toxicants, leads to the manifestation of negative biological activity of the dispersion products of toxoelements in the environment. changing geochemical appearance of entire regions of the planet.

At the same time, a dilemma arises - which development scenario will we consciously choose.

REFERENCES

- [1] Bauer, P., Dueben, P. D., Hoefler, T., Quintino, T., Schulthess, T. C., and Wedi, N. P. (2021a). The Digital Revolution of Earth-System Science. *Nat. Comput. Sci.* 1, 104–113. doi:10.1038/s43588-021-00023-0
- [2] Beloglazov I et al. (2020). The concept of digital twins for tech operator training simulator design for mining and processing industry, *Eurasian Mining*, 3. DOI:10.17580/em.2020.02.12
- [3] Boschert, S.; Rosen, R. Digital Twin-The Simulation Aspect. In *Mechatronic Futures*; Hehenberger, P., Bradley, D., Eds.; Springer: Berlin/Heidelberg, Germany, 2016; pp. 59–74.
- [4] BTT Hang, DTN Huy, PT An, NTB Ngoc, HTM Duyen. (2020). Current situation of Bitcoin management and use: perspectives from the world and recommendations for vietnam, *Management* 24 (2)
- [5] Haag, S.; Anderl, R. Digital twin-Proof of concept. *Manuf. Lett.* 2018, 15, 64–66.
- [6] DeFelipe & Alcalde. (2022). Towards a Digital Twin of the Earth System: Geo-Soft-CoRe, a Geoscientific Software & Code Repository, *Frontiers in Earth Science* 10:828005. DOI:10.3389/feart.2022.828005
- [7] DeFilipe I et al. (2022). Towards a Digital Twin of the Earth System: Geo-Soft-CoRe, a Geoscientific Software & Code Repository, *Front. Earth Sci.*, 2022, Sec. Geoscience and Society. <https://doi.org/10.3389/feart.2022.828005>
- [8] DTN Huy. (2015). The critical analysis of limited south asian corporate governance standards after financial crisis, *International Journal for Quality Research* 9 (4),
- [9] DTN Huy. (2012). Estimating Beta of Viet Nam listed construction companies groups during the crisis, *Journal of Integration and Development* 15 (1), 57-71
- [10] DTN Huy, DTN Hien. (2010). The backbone of European corporate governance standards after financial crisis, corporate scandals and manipulation, *Economic and business review* 12 (4)
- [11] DTN Huy, TH Le, NT Hang, S Gwoździewicz, ND Trung, P Van Tuan. (2021). Further researches and discussion on machine learning meanings-and methods of classifying and recognizing users gender on internet, *Advances in Mechanics* 9 (3), 1190-1204
- [12] DT Tinh, NT Thuy, DT Ngoc Huy. (2021). Doing Business Research and Teaching Methodology for Undergraduate, Postgraduate and Doctoral Students-Case in Various Markets Including Vietnam, *Elementary education Online* 20 (1)
- [13] D Thi Ngu, DT Huong, DTN Huy, PT Thanh, ES Dongul. (2021). Language teaching application to English students at master's grade levels on history and macroeconomic-banking management courses in universities and colleges, *Journal of Language and Linguistic Studies* 17 (3), [1457]-1468
- [14] Do Thu Huong, Dinh Tran Ngoc Huy, Nguyen Thi Hang ,Pham Thi Huyen Trang ,Duong Thi Ngu. (2021). Discussion on Case Teaching Method in a Risk Management Case Study with Econometric Model at Vietnam Listed Banks – Issues Of Economic Education for Students, *REview of International Geographical Education*, 11(5).
- [15] DVT Thuy, DTN Huy, VTK Anh, NN Thach, HT Hanh. (2021). Quality of education of ethnic minority communities in vietnam-problems and recommendations, *Elementary Education Online*, 20 (4)
- [16] DTN Huy, DTN Hien. (2010). The backbone of European corporate governance standards after financial crisis, corporate scandals and manipulation, *Economic and business review* 12 (4)
- [17] Dmitrieva & Romasheva. (2020). Sustainable Development of Oil and Gas Potential of the Arctic and Its Shelf Zone: The Role of Innovations, *J. Mar. Sci. Eng.* 2020, 8, 1003; doi:10.3390/jmse8121003
- [18] Official website of the Ministry of Energy of the Russian Federation. Oil production raw materials. In the link: URL <https://minenergo.gov.ru/node/1209>
- [19] G. K. Bismukhametova, A. I. Abdullin, E. A. Emelyanycheva, R. I. Sibgatullina, L. I. Mullakhmetova, A. M. Mustafina / Natural bitumens. Prospects for use. *Herald technological university*. - 2016. - V.19, No. 18, S.31 - 36.
- [20] G Shen, J Manafian, DTN Huy, KS Nisar, M Abotaleb, ND Trung. (2022). Abundant soliton wave solutions and the linear superposition principle for generalized (3+ 1)-D nonlinear wave equation in liquid with gas bubbles by bilinear analysis, *Results in Physics* 32, 105066
- [21] Hodgkinson, J.H, & Elmoultie, M. (2020). Cousins, Siblings and Twins: A Review of the Geological Model's Place in the Digital Mine, *Resources* 2020, 9(3), 24; <https://doi.org/10.3390/resources9030024>
- [22] Huy, D. T.N., Loan, B. T., and Anh, P. T. (2020). 'Impact of selected factors on stock price: a case study of Vietcombank in Vietnam', *Entrepreneurship and Sustainability Issues*,

- vol.7, no.4, pp. 2715-2730.
[https://doi.org/10.9770/jesi.2020.7.4\(10\)](https://doi.org/10.9770/jesi.2020.7.4(10))
- [23] Huy, D. T.N., Dat, P. M., và Anh, P. T. (2020). 'Building and econometric model of selected factors' impact on stock price: a case study', *Journal of Security and Sustainability Issues*, vol.9(M), pp. 77-93. [https://doi.org/10.9770/jssi.2020.9.M\(7\)](https://doi.org/10.9770/jssi.2020.9.M(7))
- [24] Huy D.T.N., Nhan V.K., Bich N.T.N., Hong N.T.P., Chung N.T., Huy P.Q. (2021). 'Impacts of Internal and External Macroeconomic Factors on Firm Stock Price in an Expansion Econometric model - A Case in Vietnam Real Estate Industry', *Data Science for Financial Econometrics-Studies in Computational Intelligence*, vol.898, Springer. http://doi-org-443.webvpn.fjmu.edu.cn/10.1007/978-3-030-48853-6_14
- [25] H Van Pham, HX Nguyen, DTN Huy. (2020). Impact of corporate entrepreneurship and organizational culture on business performance: The role of supply chain management, *Int. J Sup. Chain. Mgt Vol 9 (3)*,
- [26] HX Nguyen, DTN Huy, H Van Pham. (2020). Supply Chain Agility and Internal and External Process Connectivity: The Impact of Supply and Product Complexity, *Int. J Sup. Chain. Mgt Vol 9 (2)*,
- [27] I Patra, DTN Huy, F Alsaikhan, MJC Oplencia, P Van Tuan (2022). Toxic effects on enzymatic activity, gene expression and histopathological biomarkers in organisms exposed to microplastics and nanoplastics: a review, *Environmental Sciences Europe 34 (1)*, 1-17
- [28] Ivanov V.V. (1994). Ecological geochemistry of elements. Reference book in 6 volumes, 1994, M. "Nedra".
- [29] J Refonaa, DTN Huy, ND Trung, H Van Thuc, R Raj, MA Haq, A Kumar. (2022). Probabilistic methods and neural networks in structural engineering, *The International Journal of Advanced Manufacturing Technology*, 1-9
- [30] Kalidindi S.R et al. (2022). Digital Twins for Materials, *Front. Mater.*, 2022, Sec. Computational Materials Science <https://doi.org/10.3389/fmats.2022.818535>
- [31] Lari, K.S et al. (2022). Towards a digital twin for characterising natural source zone depletion: A feasibility study based on the Bemidji site, *Water research*, 208. <https://doi.org/10.1016/j.watres.2021.117853>
- [32] Litvinenko, V.S. (2020). Digital Economy as a Factor in the Technological Development of the Mineral Sector, *Natural Resources Research volume 29*, 1521–1541
- [33] M Fannakhosrow, S Nourabadi, DT Ngoc Huy, N Dinh Trung. (2022). A Comparative Study of Information and Communication Technology (ICT)-Based and Conventional Methods of Instruction on Learners' Academic Enthusiasm for L2 Learning, *Education Research International 2022*
- [34] Mei, H., Haider, M., Joseph, R., Migot, A., and Giurgiutiu, V. (2019). Recent Advances in Piezoelectric Wafer Active Sensors for Structural Health Monitoring Applications. *Sensors* 19 (2), 383. doi:10.3390/s19020383
- [35] ND Trung, DTN Huy, M Jade Catalan Oplencia, HA Lafta, AM Abed. (2022). Conductive Gels: Properties and Applications of Nanoelectronics, *Nanoscale Research Letters* 17 (1), 1-21
- [36] ND Dat, NTN Lan, DTN Huy, LL Yen, NT Dung, PM Dat. (2020). Plans for better business performance of Sony in Japan-and suggestions for management and financial accounting transparency, *Management* 24 (2)
- [37] ND Trung, DTN Huy, TH Le. (2021). IoTs, Machine Learning (ML), AI and Digital Transformation Affects Various Industries-Principles and Cybersecurity Risks Solutions, *Webology*, 18
- [38] NTT Phuong, DTN Huy, P Van Tuan. (2020). The evaluation of impacts of a seven factor model on nvb stock price in commercial banking industry in vietnam-and roles of Discoloure of Accounting Policy In Risk Management, *International Journal of Entrepreneurship* 24, 1-13
- [39] NN Thach, HT Hanh, DTN Huy, QN Vu. (2021). technology quality management of the industry 4.0 and cybersecurity risk management on current banking activities in emerging markets-the case in Vietnam, *International Journal for Quality Research* 15 (3),
- [40] N Thi Hang, D Thi Tinh, DT Ngoc Huy, PT Hong Nhung. (2021). Educating and training labor force Under Covid 19; impacts to meet market demand in Vietnam during globalization and integration era, *Journal for educators, teachers and trainers*, 12(1)
- [41] NT Hang, DTN Huy, TH Le, S Gwoździewicz, NTP Thanh, NT Dung. (2022). Further Analysis on Internet of Things (IOT) Applications in Emerging Markets and Vietnam, *Ambient Communications and Computer Systems*, 407-416
- [42] ND Trung, NT Hai, DTN Huy, P Van Tuan, NT Hoa, NT Dung. (2021). Recommendations for TQM in Manufacturing Companies with Pyrolysis Technology in Emerging markets and Meanings of Capital Financing–Case in Viet Nam, *Advances in Mechanics* 9 (3), 1376-1389
- [43] NT Hang, DTN Huy, DT Hien, VQ Nam. (2021). IOT Impacts and Digital Transformation at Listed Vietnam Banks, *Webology*, 18
- [44] ND Trung, DTN Huy, T Van Thanh, NTP Thanh, NT Dung. (2021). Digital transformation, AI applications and IoTs in Blockchain managing commerce secrets: and cybersecurity risk solutions in the era of industry 4.0 and further, *Webology* 18
- [45] NT Hoang, DTN Huy. (2021). Determining factors for educating students for choosing to work for foreign units: Absence of self-efficacy, *JETT* 12 (2), 11-19
- [46] Pronin A.P., Golevoy R.V. (2009), "Gas respiration of the Earth and its global ecological consequences", *Chistaya Voda: problems and solutions*, Publisher: JSC "Institute Microeconomics" (Moscow), No. 1, 2009, pp. 37-40
- [47] PT Anh, DTN Huy, BTT Loan. (2020). Analysis of a Financial Model for Converting Industrial Waste Tires into Clean Energy for Environment Protection-A Model in Developing Countries, *Wseas Transactions on Environment and Development* 15, 447-454
- [48] P Van Tuan, DTN Huy, MBANT Hoa, DT Huong. (2021). Technology Applications, IT Effects on Marketing and Role of Digital Marketing In Stock Investment Industry-And Industrial Competitors Impacts On Business Risk Level, *Design engineering*, 1828-1843 VQ Nam, DTN Huy, NT Hang, TH Le, NTP Thanh. (2021). Internet of Things (IoT) Effects and Building Effective Management Information

- System (MIS) in Vietnam Enterprises and Human-Computer Interaction Issues in Industry 4.0, *Webology*, 18
- [49] PM Dat, ND Mau, BTT Loan, DTN Huy. (2020). COMPARATIVE CHINA CORPORATE GOVERNANCE STANDARDS AFTER FINANCIAL CRISIS, CORPORATE SCANDALS AND MANIPULATION, *Journal of security & sustainability issues* 9 (3)
- [50] TTH Ha, NB Khoa, DTN Huy, VK Nhan, DH Nhung, PT Anh, PK Duy. (2019). Modern corporate governance standards and role of auditing-cases in some Western European countries after financial crisis, corporate scandals and manipulation, *International Journal of Entrepreneurship* 23 (1S)
- [51] Tynkkynen (2019). The climate is changing Russia: from a hydrocarbon to an ecological culture, *Social and Political Science* 2019. DOI: <https://doi.org/10.4337/9781788978606.00012>
- [52] Z Wang, M Akhavan, MNI Kashkouli, MJC Opulencia, DTN Huy. (2022). Sustainable wastewater management from shale oil production wells: emerging opportunities and barriers, *Applied Water Science* 12 (7), 1-6