

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Timur Bulatov

PhD Program: Petroleum Engineering

Title of Thesis: Lithological and geochemical study of type I kerogen in the Bazhenov Formation in application to exploration and production of hydrocarbons

Supervisor: Professor Mikhail Spasennykh

Name of the Reviewer:

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| I confirm the absence of any conflict of interest (Alternatively, Reviewer can formulate a possible conflict) | Date: 04-10-2022 |
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The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.
- The relevance of the topic of dissertation work to its actual content
- The relevance of the methods used in the dissertation
- The scientific significance of the results obtained and their compliance with the international level and current state of the art
- The relevance of the obtained results to applications (if applicable)
- The quality of publications

The summary of issues to be addressed before/during the thesis defense

Mr. Timur Bulatov's thesis, entitled "The lithological and geochemical study of type I kerogen in the Bazhenov Formation in application to exploration and production of hydrocarbons" is generally well-written and its contents is logically consistently structured. There are minor editorial imperfections in the text those do not reduce the overall impression from the research.

The research is aimed at study of the kerogen of type I in the Bazhenov Formation. The manuscript is comprised of 7 chapters and Conclusions. In the 1st chapter Introduction the author formulates the objectives of the research and justifies their relevance. The 2nd chapter provides a comprehensive theoretical overview of the deposits, containing type I kerogen, and summarizes the main factors controlling the formation of the organic-rich deposits. Chapter 3 describes theory of laboratory techniques applied in the research, procedures used for samples preparations and analyses. Chapter 4 is devoted to lithological characterization of the alginite-rich layers. Chapter 5 discusses organic geochemistry and petrography of the alginite-rich deposits. Chapter 6 describes molecular parameters, stable isotope composition and depositional environment of the algiinite-rich sediments. Chapter 7 concerns modeling of thermal maturation and hydrocarbon generation of kerogen of type I. The chapter Conclusions summarizes the scientific results of the research.

The content of the work corresponds to the topic of the dissertation that is of high relevance for the formation reservoirs properties evaluation.

The scientific significance of the results as well as their compliance with the international level and current state of the art are supported by their publication in internationally recognized top-ranking scientific magazines. In total, the author has participated in 4 publications in peer-reviewed international journals, and 18 international conferences. These numbers fully satisfy formal Skoltech's requirements to PhD candidates with respect to publications.

In conclusion, I would like to highlight that Mr. Timur Bulatov's research confidently satisfies PhD thesis requirements and the candidate is qualified for a PhD degree.

Provisional Recommendation

I recommend that the candidate should defend the thesis by means of a formal thesis defense

I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report

The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense

