

## Jury Member Report – Doctor of Philosophy thesis.

**Name of Candidate:** Anuar Shakirov

**PhD Program:** Petroleum Engineering

**Title of Thesis:** Determining thermal properties of sedimentary rocks from well-logging data

**Supervisor:** Professor Yuri Popov

**Name of the Reviewer:** Alexey Cheremisin

I confirm the absence of any conflict of interest



**Date: 28-08-2011**

*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**

The research work is aimed at studying the thermal properties of the rocks of oil and gas fields, including unconventional reservoirs, such as the Domanik and Bazhenov formations.

Thermal properties are an essential characteristic of sedimentary rocks. Thermal properties are used for the correlation of the amount of organic matter, mechanical properties, and others. Thermal enhanced oil recovery methods (steam injection, SAGD, in-situ combustion) require reliable data on the profile of thermal properties for modeling the development and selecting an effective field development method.

Mr. Anuar used an optical rock thermal scanner, which allows the determination of the rock thermal properties profiles with high resolution. More than 5000 samples were used in the research.

The author used regression and machine learning methods to develop an algorithm for determining the thermal properties of sedimentary rocks from well-logging data.

The techniques developed by the author (together with the team) are patented and published in four articles (three published in Q1, one submitted to Q2 SCOPUS journals).

After thoroughly reading the text of the dissertation, I recommend finalizing the presented work in accordance with the following recommendations:

1. To compare the proposed methods for assessing the thermal properties of sedimentary rocks, indicating the comparison metrics and provide information in the conclusion section.
2. Provide data on the division of authors' contribution for works published as part of the dissertation work.
3. The thesis text contains multiple grammatical and syntactic errors; proofreading is required.

The work was performed at a high scientific level and certainly met the Ph.D. degree requirements despite the comments.

#### **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*