



**Kazakh National Research Technical University named
after K.I. Satpayev**

**Institute of Geology and Oil and Gas named after K.Turysov
Department of Hydrogeology, Engineering and Petroleum Geology**

**Educational program
7M07207 “Petroleum Geology”**

Collaboration with Nazarbayev University (NU)



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«25» 05 2021
№ 04-03/538

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Алматы, Казахстан

Уважаемый Талгат Енсеппаев!

Это письмо подтверждает, что Вы были номинированы в качестве научного соруководителя исследовательского гранта, финансируемого Назарбаев Университетом (далее - НУ). Команда исследователей из НУ во главе с Ассоциированным профессором Милован Фустич, руководителем проекта, будет исследовать тему: «Потенциал производства геотермальной энергии (ПГЭ), накопления энергии (НЭ) и накопления и секвестрации углерода (НСУ) в осадочных бассейнах Казахстана - фоновое геологическое исследование».

Трехлетний научный проект (2021-2023гг.) был выбран после тщательной проверки, проведенной Oak Ridge Associated Universities (ORAU) в США. Данный проект получил наивысший рейтинг из более чем 90 заявок со всех школ НУ.

Конечная цель данного исследования - проведение научного скрининга и оценки осадочных бассейнов Казахстана для определения потенциала внедрения ПГЭ, НЭ и НСУ для дальнейшего промышленного развития. Таким образом, эти аналогичные базовые геологические исследования могут сформировать основу для позиционирования Казахстана в качестве мирового лидера в области зеленой экономики, что, в свою очередь, позволит не только выполнить международные обязательства по сокращению выбросов парниковых газов (например, Парижское соглашение), но и создать множество рабочих мест по всей стране и улучшить экологические условия жизни населения.

Успешное использование технологий ПГЭ, НЭ и НСУ во многом зависит от геологических условий. Обязательным условием для возможного внедрения каждой из этих технологий являются латерально продолжительные породы-коллекторы, а также наличие непроницаемых покрышек. Таким образом, исследования и изучение ПГЭ, НЭ и НСУ могут выполняться одновременно.

Вы можете проверить подлинность электронного документа по ссылке:

<https://cabinet.idocs.kz/email-signing/429cda15-ae91-4812-c72d-08d91f279355/5a05fdb7-8e4b-498d-aa2f-08d82481304a/preview>



To Dr. Talgat Yenseppbayev
Head of Petroleum Geology
Satbayev University
Almaty, Kazakhstan

Dear Dr. Talgat Yenseppbayev,

This letter confirms that you have been nominated as a scientific collaborator on a Collaborative Research Grant funded by Nazarbayev University (hereinafter - NU).

A team of researchers from NU, led by Associate Professor Milovan Fustic, Principal Investigator, will research the topic: "Geothermal Energy Production (GEP), Energy Storage (ES), and Carbon Storage and Sequestration (CSS) Potential in Kazakhstan Sedimentary Basins – Geological Baseline Study"

The three year research project (2021-2023), was selected after a stringent review process by Oak Ridge Associated Universities (ORAU) in the US. This project received one of the highest rankings from over 90 applications across all schools at NU.

The ultimate aim of this study is to do a scientific screening and assessment of Kazakhstan's sedimentary basins and to identify GEP, ES, and CSS play fairways of high potential for further research and potential industrial-level development. As such, this, and similar baseline geological studies may form a foundation to position Kazakhstan as a world leader in green economies, which in return would not only allow for reaching international commitments for reducing GHG emissions (i.e. Paris Agreement), but also create numerous high quality job opportunities nationwide and secure a cleaner and healthier living environment.

The successful employment of GEP, ES, and CSS technologies highly depends on geological conditions. Conditions such as laterally extensive and good quality reservoirs with impermeable caprock are necessary for each one of them. Thus, exploration and characterization activities can be done simultaneously.

Although GEP, ES, and CSS potential of Kazakhstan's 13 sedimentary basins must be huge, none of these technologies have been tested or utilized yet. Additionally, multidisciplinary baseline geological and detailed site-specific characterization and feasibility studies are missing. The search for, and characterization of potential GEP, ES, and CSS subsurface sites is very similar to the search for and characterization of petroleum reservoirs. Thus, the best practices and exploration and development concepts are readily transferable. Innovative solutions such as proposed in situ CO₂ transformation to liquid needs to be evaluated in reservoir context.

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<https://cabinet.idocs.kz/email-signing/429cda15-ae91-4812-c72d-08d91f279355/5a05fdb7-8e4b-498d-aa2f-08d82481304a/preview>

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GEOHERMAL ENERGY PRODUCTION (GEP), ENERGY STORAGE (ES), AND CARBON STORAGE AND SEQUESTRATION (CSS) POTENTIAL IN KAZAKHSTAN SEDIMENTARY BASINS – GEOLOGICAL BASELINE STUDY

Principal Investigator: Prof. Milovan Fustic

School of Mining and Geosciences

Nazarbayev University

Nur-Sultan, 2021

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RESEARCH GROUP

Local:

Dr. Milovan Fustic, the Principal Investigator (PI) - clastic sedimentology, reservoir characterization, heat-flow, and geological controls on fluid flow in porous media for petroleum exploration, petroleum systems, and field development including multi-billion dollar SHELL, Nexen, and Statoil start-ups.

Dr. Talgat Yensepbayev, the Co-Principal Investigator (Co-PI) , a Head of Petroleum geology department, Kazakh National Research Technical University- sedimentology, paleogeography, paleo-tectonic and basin analysis, petroleum geology, and organic geochemistry including fluid inclusion studies.

Dr. Andrey Khalimon, Co-PI - inorganic/organometallic chemistry and catalysis, activation of small molecules and CO₂ utilization and Conversion of CO₂ to liquid fuels and chemical feedstock.

Dr. Randy Doyle Hazlett, Co-PI - 15 year career with Mobil R&D Corporation prior to the ExxonMobil merger, 10 years running his own research and consulting business, and 7 years of teaching and research in academia with the University of Tulsa- rock mechanics and discrete well modeling, reservoir modeling and well performance.

Dr. Emil Bayramov, Co-PI- an Assistant Professor in Geospatial and Remote Sensing Technologies at NU.

Dr. Ashirgul Kozhagulova- Postdoctoral researcher at NU- rock mechanics, petroleum related geomechanics.

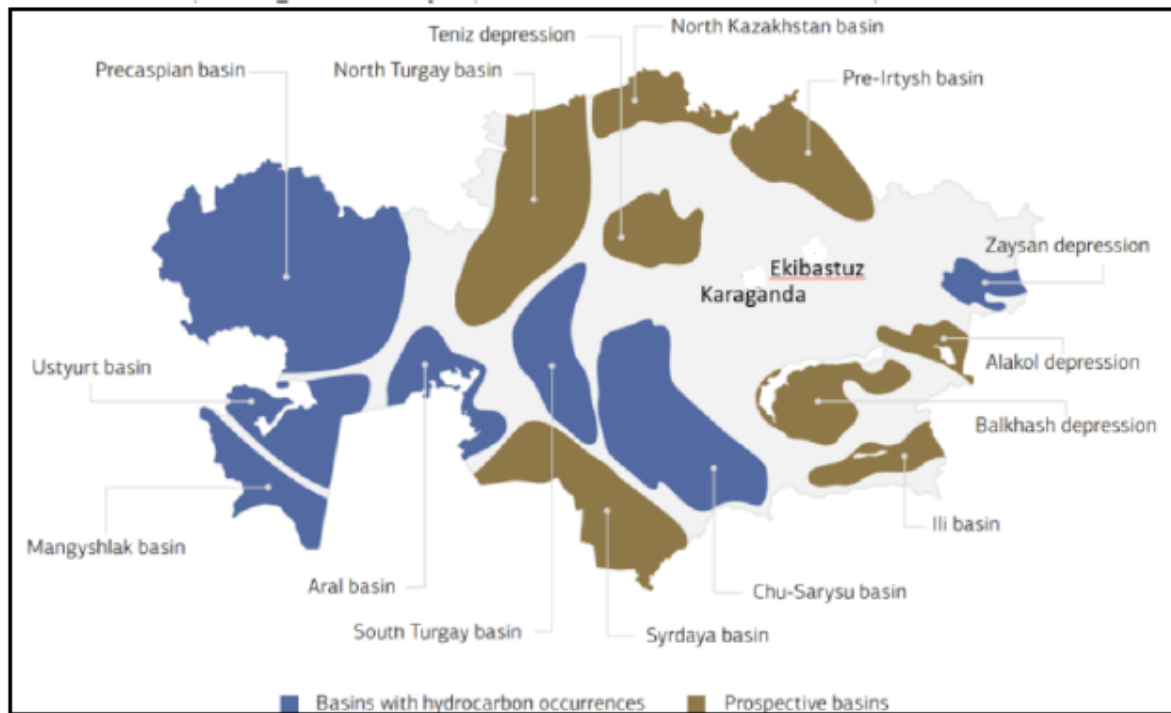
International:

Dr. John Holbrook, Co-PI is a Professor in the Department of Geological Sciences and Energy Institute at Texas Christian University, Fort Worth, USA - modern and ancient fluvial systems and physical stratigraphy, controls on permeability trends and connectivity of flow paths in sediments and its applications across geothermal, environmental, and petroleum issues.

Kirk Osadetz, the international visiting scientist / advisor, is an internationally recognized sedimentary basin geoscientist. - Canadian corporations dealing with carbon management and subsurface containment issues and requirements.

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GEOHERMAL ENERGY PRODUCTION



Location of sedimentary basins (after IHS Energy, KazEnergy)

Most common types of geothermal energy production :

<120°C - direct hot water production- for heating

>120°C - enhanced geothermal system (EGS) – energy transformation

For each **sedimentary basin steps** are:

- Acquiring well data – locations and bottomhole temperatures, associated stratigraphy
- Generating temperature maps
- Generating geothermal energy potential maps -> Estimate the potential of EGS





Thank you for attention