ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫ

Satbayev University

ХАБАРЛАРЫ

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ
НАУК РЕСПУБЛИКИ
КАЗАХСТАН
Satbayev University

N E W S

OF THE ACADEMY OF SCIENCES
OF THE REPUBLIC OF
KAZAKHSTAN
Satbayev University

SERIES

OF GEOLOGY AND TECHNICAL SCIENCES

3 (453)

MAY – JUNE 2022

THE JOURNAL WAS FOUNDED IN 1940

PUBLISHED 6 TIMES A YEAR

ALMATY, NAS RK

NAS RK is pleased to announce that News of NAS RK. Series of geology and technical sciences scientific journal has been accepted for indexing in the Emerging Sources Citation Index, a new edition of Web of Science. Content in this index is under consideration by Clarivate Analytics to be accepted in the Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index. The quality and depth of content Web of Science offers to researchers, authors, publishers, and institutions sets it apart from other research databases. The inclusion of News of NAS RK. Series of geology and technical sciences in the Emerging Sources Citation Index demonstrates our dedication to providing the most relevant and influential content of geology and engineering sciences to our community.

Қазақстан Республикасы Ұлттық ғылым академиясы «ҚР ҰҒА Хабарлары. Геология және техникалық ғылымдар сериясы» ғылыми журналының Web of Science-тің жаңаланған нұсқасы Emerging Sources Citation Index-те индекстелуге қабылданғанын хабарлайды. Бұл индекстелу барысында Clarivate Analytics компаниясы журналды одан әрі the Science Citation Index Expanded, the Social Sciences Citation Index және the Arts & Humanities Citation Index-ке қабылдау мәселесін қарастыруда. Webof Science зерттеушілер, авторлар, баспашылар мен мекемелерге контент тереңдігі мен сапасын ұсынады. ҚР ҰҒА Хабарлары. Геология және техникалық ғылымдар сериясы Emerging Sources Citation Index-ке енуі біздің қоғамдастық үшін ең өзекті және беделді геология және техникалық ғылымдар бойынша контентке адалдығымызды білдіреді.

НАН РК сообщает, что научный журнал «Известия НАН РК. Серия геологии и технических наук» был принят для индексирования в Emerging Sources Citation Index, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Известия НАН РК. Серия геологии и технических наук в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному контенту по геологии и техническим наукам для нашего сообщества.

Бас редактор

ЖҰРЫНОВ Мұрат Жұрынұлы, химия ғылымдарының докторы, профессор, ҚР ҰҒА академигі, Қазақстан Республикасы Ұлттық Ғылым академиясының президенті, АҚ «Д.В. Сокольский атындағы отын, катализ және электрохимия институтының» бас директоры (Алматы, Қазақстан) **Н = 4**

Ғылыми хатшы

АБСАДЫКОВ Бахыт Нарикбайұлы, техника ғылымдарының докторы, профессор, ҚР ҰҒА жауапты хатшысы, А.Б. Бектұров атындағы химия ғылымдары институты (Алматы, Қазақстан) **Н = 5**

Р е д а к ц и я л ы қ а л қ а:

ӘБСАМЕТОВ Мәліс Құдысұлы (бас редактордың орынбасары), геология-минералогия ғылымдарының докторы, профессор, ҚР ҰҒА академигі, «У.М. Ахмедсафина атындағы гидрогеология және геоэкология институтының» директоры (Алматы, Қазақстан) **Н = 2**

ЖОЛТАЕВ Герой Жолтайұлы (бас редактордың орынбасары), геология-минералогия ғылымдарының докторы, профессор, Қ.И. Сатпаев тындағы геология ғылымдары институтының директоры (Алматы, Қазақстан) **Н=2**

СНОУ Дэниел, Ph.D, қауымдастырылған профессор, Небраска университетінің Су ғылымдары зертханасының директоры (Небраска штаты, АҚШ) **Н = 32**

ЗЕЛЬТМАН Реймар, Ph.D, табиғи тарих мұражайының Жер туралы ғылымдар бөлімінде петрология және пайдалы қазбалар кен орындары саласындағы зерттеулердің жетекшісі (Лондон, Англия) **Н = 37**

ПАНФИЛОВ Михаил Борисович, техника ғылымдарының докторы, Нанси университетінің профессоры (Нанси, Франция) **Н=15**

ШЕН Пин, Ph.D, Қытай геологиялық қоғамының тау геологиясы комитеті директорының орынбасары, Американдық экономикалық геологтар қауымдастығының мүшесі (Пекин, Қытай) **Н = 25**

ФИШЕР Аксель, Ph.D, Дрезден техникалық университетінің қауымдастырылған профессоры (Дрезден, Берлин) **Н = 6**

КОНТОРОВИЧ Алексей Эмильевич, геология-минералогия ғылымдарының докторы, профессор, РҒА академигі, А.А. Трофимука атындағы мұнай-газ геологиясы және геофизика институты (Новосибирск, Ресей) **Н = 19**

АГАБЕКОВ Владимир Енокович, химия ғылымдарының докторы, Беларусь ҰҒА академигі, Жаңа материалдар химиясы институтының құрметті директоры (Минск, Беларусь) **Н = 13**

КАТАЛИН Стефан, Ph.D, Дрезден техникалық университетінің қауымдастырылған профессоры (Дрезден, Берлин) **Н = 20**

СЕЙТМҰРАТОВА Элеонора Юсуповна, геология-минералогия ғылымдарының докторы, профессор, ҚР ҰҒА корреспондент-мүшесі, Қ.И. Сатпаев атындағы Геология ғылымдары институты зертханасының меңгерушісі (Алматы, Қазақстан) **Н=11**

САҒЫНТАЕВ Жанай, Ph.D, қауымдастырылған профессор, Назарбаев университеті (Нұр-Сұлтан, Қазақстан) **Н = 11**

ФРАТТИНИ Паоло, Ph.D, Бикокк Милан университеті қауымдастырылған профессоры (Милан, Италия) **Н = 28**

«ҚР ҰҒА Хабарлары. Геология және техникалық ғылымдар сериясы».
ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)

Меншіктеуші: «Қазақстан Республикасының Ұлттық ғылым академиясы» РҚБ (Алматы қ.).

Қазақстан Республикасының Ақпарат және қоғамдық даму министрлігінің Ақпарат комитетінде 29.07.2020 ж. берілген **№ KZ39VPY00025420** мерзімдік басылым тіркеуіне қойылу туралы куәлік.

Тақырыптық бағыты: *геология, мұнай және газды өңдеудің химиялық технологиялары, мұнай химиясы, металдарды алу және олардың қосындыларының технологиясы.*

Мерзімділігі: жылына 6 рет.

Тиражы: 300 дана.

Редакцияның мекен-жайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл., тел.: 272-13-19
http://www.geolog-technical.kz/index.php/en/

© Қазақстан Республикасының Ұлттық ғылым академиясы, 2022

Типографияның мекен-жайы: «Аруна» ЖК, Алматы қ., Мұратбаев көш., 75.

Главный редактор

ЖУРИНОВ Мурат Журинович, доктор химических наук, профессор, академик НАН РК, президент Национальной академии наук Республики Казахстан, генеральный директор АО «Институт топлива, катализа и электрохимии им**.** Д.В. Сокольского» (Алматы, Казахстан) **H = 4**

Ученный секретарь

АБСАДЫКОВ Бахыт Нарикбаевич, доктор технических наук, профессор, ответственный секретарь НАН РК, Институт химических наук им. А.Б. Бектурова (Алматы, Казахстан) **H = 5**

Р е д а к ц и о н н а я к о л л е г и я:

АБСАМЕТОВ Малис Кудысович, (заместитель главного редактора), доктор геологоминералогических наук, профессор, академик НАН РК, директор Института гидрогеологии и геоэкологии им. У.М. Ахмедсафина (Алматы, Казахстан) **H = 2**

Ж**ОЛТАЕВ Герой Жолтаевич,** (заместитель главного редактора), доктор геологоминералогических наук, профессор, директор Института геологических наук им. К.И. Сатпаева (Алматы, Казахстан) **H=2**

СНОУ Дэниел, Ph.D, ассоциированный профессор, директор Лаборатории водных наук университета Небраски (штат Небраска, США) **H = 32**

ЗЕЛЬТМАН Реймар, Ph.D, руководитель исследований в области петрологии и месторождений полезных ископаемых в Отделе наук о Земле Музея естественной истории (Лондон, Англия) **H = 37**

ПАНФИЛОВ Михаил Борисович, доктор технических наук, профессор Университета Нанси (Нанси, Франция**) H=15**

ШЕН Пин, Ph.D, заместитель директора Комитета по горной геологии Китайского геологического общества, член Американской ассоциации экономических геологов (Пекин, Китай) **H = 25**

ФИШЕР Аксель, ассоциированный профессор, Ph.D, технический университет Дрезден (Дрезден, Берлин) **H = 6**

КОНТОРОВИЧ Алексей Эмильевич, доктор геолого-минералогических наук, профессор, академик РАН, Институт нефтегазовой геологии и геофизики им. А.А. Трофимука СО РАН (Новосибирск, Россия) **H = 19**

АГАБЕКОВ Владимир Енокович, доктор химических наук, академик НАН Беларуси, почетный директор Института химии новых материалов (Минск, Беларусь) **H = 13**

КАТАЛИН Стефан, Ph.D, ассоциированный профессор, Технический университет (Дрезден, Берлин) **H = 20**

СЕЙТМУРАТОВА Элеонора Юсуповна, доктор геолого-минералогических наук, профессор, член-корреспондент НАН РК, заведующая лаборатории Института геологических наук им. К.И. Сатпаева (Алматы, Казахстан) **H=11**

САГИНТАЕВ Жанай, Ph.D, ассоциированный профессор, Назарбаев университет (Нурсултан, Казахстан) **H = 11**

ФРАТТИНИ Паоло, Ph.D, ассоциированный профессор, Миланский университет Бикокк (Милан, Италия) **H = 28**

«Известия НАН РК. Серия геологии и технических наук».
ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)

Собственник: Республиканское общественное объединение «Национальная академия наук Республики Казахстан» (г. Алматы).

Свидетельство о постановке на учет периодического печатного издания в Комитете информации Министерства информации и общественного развития Республики Казахстан **№ KZ39VPY00025420,** выданное 29.07.2020 г.

Тематическая направленность: *геология, химические технологии переработки нефти и газа, нефтехимия, технологии извлечения металлов и их соеденений.*

Периодичность: 6 раз в год.

Тираж: 300 экземпляров.

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, оф. 219, тел.: 272-13-19

http://www.geolog-technical.kz/index.php/en/

© Национальная академия наук Республики Казахстан, 2022

Адрес типографии: ИП «Аруна», г. Алматы, ул. Муратбаева, 75.

Editorial chief

ZHURINOV Murat Zhurinovich, doctor of chemistry, professor, academician of NAS RK, president of the National Academy of Sciences of the Republic of Kazakhstan, general director of JSC "Institute of fuel, catalysis and electrochemistry named after D.V. Sokolsky» (Almaty, Kazakhstan) **H = 4**

Scientific secretary

ABSADYKOV Bakhyt Narikbaevich, doctor of technical sciences, professor, executive secretary of NAS RK, Bekturov Institute of chemical sciences (Almaty, Kazakhstan) **H = 5**

E d i t o r i a l b o a r d:

ABSAMETOV Malis Kudysovich, (deputy editor-in-chief), doctor of geological and mineralogical sciences, professor, academician of NAS RK, director of the Akhmedsafin Institute of hydrogeology and hydrophysics (Almaty, Kazakhstan) **H=2**

ZHOLTAEV Geroy Zholtaevich, (deputy editor-in-chief), doctor of geological and mineralogical sciences, professor, director of the institute of geological sciences named after K.I. Satpayev (Almaty, Kazakhstan) **H=2**

SNOW Daniel, Ph.D, associate professor, director of the labotatory of water sciences, Nebraska University (Nebraska, USA) **H = 32**

ZELTMAN Reymar, Ph.D, head of research department in petrology and mineral deposits in the Earth sciences section of the museum of natural history (London, England) **H = 37**

PANFILOV Mikhail Borisovich, doctor of technical sciences, professor at the Nancy University (Nancy, France) **H=15**

SHEN Ping, Ph.D, deputy director of the Committee for Mining geology of the China geological Society, Fellow of the American association of economic geologists (Beijing, China) **H = 25**

FISCHER Axel, Ph.D, associate professor, Dresden University of technology (Dresden, Germany) **H = 6**

KONTOROVICH Aleksey Emilievich, doctor of geological and mineralogical sciences, professor, academician of RAS, Trofimuk Institute of petroleum geology and geophysics SB RAS (Novosibirsk, Russia) **H = 19**

AGABEKOV Vladimir Enokovich, doctor of chemistry, academician of NAS of Belarus, honorary director of the Institute of chemistry of new materials (Minsk, Belarus) **H = 13**

KATALIN Stephan, Ph.D, associate professor, Technical university (Dresden, Berlin) **H = 20**

SEITMURATOVA Eleonora Yusupovna, doctor of geological and mineralogical sciences, professor, corresponding member of NAS RK, head of the laboratory of the Institute of geological sciences named after K.I. Satpayev (Almaty, Kazakhstan) **H=11**

SAGINTAYEV Zhanay, Ph.D, associate professor, Nazarbayev University (Nursultan, Kazakhstan) **H = 11**

FRATTINI Paolo, Ph.D, associate professor, university of Milano-Bicocca (Milan, Italy) **H = 28**

News of the National Academy of Sciences of the Republic of Kazakhstan. Series of geology and technology sciences.
ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)
Owner: RPA «National Academy of Sciences of the Republic of Kazakhstan» (Almaty).
The certificate of registration of a periodical printed publication in the Committee of information of the Ministry of Information and Social Development of the Republic of Kazakhstan **No. KZ39VPY00025420,** issued 29.07.2020.
Thematic scope: *geology, chemical technologies for oil and gas processing, petrochemistry, technologies for extracting metals and their connections.*
Periodicity: 6 times a year.
Circulation: 300 copies.
Editorial address: 28, Shevchenko str., of. 219, Almaty, 050010, tel. 272-13-19
http://www.geolog-technical.kz/index.php/en/
© National Academy of Sciences of the Republic of Kazakhstan, 2022
Address of printing house: ST «Aruna», 75, Muratbayev str, Almaty.

NEWS of the National Academy of Sciences of the Republic of Kazakhstan
SERIES OF GEOLOGY AND TECHNICAL SCIENCES
ISSN 2224-5278
Volume 3, Number 453 (2022), 89-100
https://doi.org/10.32014/2022.2518-170X.182

UDC 631.67; 631.42; 551.4.022

T.I. Espolov[1], A.G. Rau[1*], N.N. Balgabayev[2], E.D. Zhaparkulova[1], Josef Mosiej[3]

[1]Kazakh National Agrarian Research University NCJSC,
Almaty, Kazakhstan;
[2]Kazakh Scientific Research Institute of Water Economy LLP, Taraz,
[3]Kazakhstan;[3]Warsaw University of Life Sciences, Warsaw, Poland.
E-mail: alexyrau@gmail.com

GEOLOGICAL STRUCTURE OF ALLUVIAL SEDIMENTS OF RIVER TERRACES AND ENERGY EFFICIENCY OF IRRIGATION SYSTEMS

Abstract. The geological structure of the Syrdarya river basin of the Shardara irrigation system river terraces, where the studies were carried out, consists of Quaternary alluvial sediments, the upper layer of which is represented by loams and sandy loams up to 3 m., and the lower layer is by sandy deposits. The soils are alluvial light gray and desert-gray soils with a high content of coarse dust (0.05 - 0.01 mm) and fine sand (0.1 - 0.5 mm), porosity is 48-52%, bulk density is 1.2 - 1 .3 g/cm^3, specific gravity constitutes 2.6 - 2.67 g/cm^3, while humus is 1.1% (Kolomenskij, 1968).

Due to irrigation the arable and subarable soil layers are compacted and bulk density increases to 1.5 - 1.6 g/cm^3, and porosity decreases by 10%. The compacted arable layer of the soil in a state of difficult aeration causes restoration processes and oxygen deficiency in the soil, consequently, the nutritional regime deteriorates. To preserve and restore soil properties, and increase its fertility, alfalfa crop rotations should be increased. 50% of Alfalfa in cotton crop rotations enriches the soil with organic matter up to 12 t/ha, destroys the compacted soil layer, reduces the bulk density from 1.5–1.6 g/cm^3 to 1.3–1.4 g/cm^3, and increases the porosity by 5-8%.

Field studies were carried out in 2019-2021 on four peasant farms, with 63%, 54%, 50.3%, 37.5% of cotton crops and 37%, 46%, 49.3%, 46.5% of

alfalfa. The highest yield of cotton and alfalfa, 26.6 and 131 centners per hectare correspondingly, was obtained in Ali-Myrza farm, where the structure of sown areas for cotton and alfalfa constitute 50.3% and 49.7% respectively. The profit from cotton was 511,914 tenge/ha, and from alfalfa is 250,840 tenge/ha, while in other farms these figures are lower by 10 - 26%.

The results of the study can be scaled upfor cotton crop rotation on the area of 220 thousand hectares of irrigation systems.

Key words: geology, soil cover, soil fertility, irrigation systems, energy efficiency, sub-irrigation.

Т.И. Есполов[1], А.Г. Рау[1*], Н.Н. Балгабаев[2*], Е.Д. Жапаркулова[1], Josef Mosiej[3]

[1]Қазақ ұлттық аграрлық зерттеу университеті, Алматы, Қазақстан;
[2]Қазақ сушаруашылығы ғылыми-зерттеу институты, Тараз, Қазақстан;
[3]Варшава жаратылыстану ғылымдары университеті, Варшава, Польша.
E-mail: alexyrau@gmail.com

ӨЗЕН ТЕРРАСАЛАРЫНЫҢ АЛЛЮВИАЛДЫ ШӨГІНДІЛЕРІНІҢ ГЕОЛОГИЯЛЫҚ ҚҰРЫЛЫМЫ ЖӘНЕ СУАРУ ЖҮЙЕЛЕРІНІҢ ЭНЕРГИЯ ТИІМДІЛІГІ

Аннотация. Зерттеулер жүргізілген Шардара суару жүйесінің Сырдария өзені бассейнінің өзен террасаларының геологиялық құрылымы төрттік аллювиалды шөгінділерден, жоғарғы қабаты 3 м дейін саздауыт және құмдауыт, төменгі құмды шөгінділерден тұрады. Топырағы аллювиалды ашық сұр топырақты және құрамында ірі шаң (0,05-0,01 мм) және ұсақ құм (0,1 – 0,5 мм) көп, кеуектілігі 48-52%, көлемдік массасы – 1,2 - 1,3 г/см^3, меншікті массасы – 2,6 - 2,67 г/см^3, қарашірігі – 1,1% (Kolomenskij, 1968).

Суару нәтижесінде топырақтың жыртылған қабаты мен егу қабаттары тығыздалады. Көлемдік массасы 1,5 – 1,6 г/см^3-ге дейін артады, кеуектілігі 10%-ға төмендейді. Топырақтың тығыздалған егістік қабаты күрделі аэрация жағдайында, қалпына келтіру процестері дамиды. Бұл топырақта оттегінің жетіспеушілігін тудырады және қоректену режимі нашарлайды. Топырақтың қасиеттерін сақтау және қалпына келтіру, олардың құнарлығын арттыру үшін ауыспалы егістердегі жоңышқаны көбейту қажет. Мақта ауыспалы егістеріндегі 50% жоңышқа топырақты органикалық заттармен 12 т/га дейін байытады, топырақтың тығыздалған қабатын бұзады, көлемдік массаны 1,5 – 1,6 г/см^3-тен 1,3-1,4 г/см^3-ке дейін төмендетеді, кеуектілігін 5-8% - ға арттырады.

Тәжірибелік-эксперименттік зерттеулер 2019-2021 жылдары мақта егісі 63%, 54%, 50,3%, 37,5%, жоңышқа– 37%, 46%, 49,3%, 46,5% бар төрт шаруа қожалығында жүргізілді.Мақтаның ең жоғары өнімділігі – 26,6 ц/га, жоңышқа – 131 ц/га «Али-Мырза» шаруа қожалығында алынды, егістік алқаптарының құрылымы мақта 50,3%, жоңышқа – 49,7%. Мақтадан түскен пайда 511914 теңге/га, жоңышқадан 250840 теңге/гақұрайды. Басқа шаруашылықтарда бұл көрсеткіштер 10 – 26% - ға төмен.

Зерттеу нәтижелері 220 мың га алқапта суармалы жүйелердің мақта ауыспалы егісіне енгізілуі мүмкін.

Түйін сөздер: геология, топырақ жамылғысы, топырақ құнарлылығы, ирригациялық жүйелер, энергия тиімділігі, субирригация.

Есполов Т.И.[1], Рау А.Г.[1*], Балгабаев Н.Н.[2], Жапаркулова Е.Д.[1], Josef Mosiej[3]

[1]Казахский национальный аграрный исследовательский университет, Алматы, Казахстан;
[2]Казахский научно-исследовательский институт водного хозяйства, Тараз, Казахстан;
[3]Варшавский университет естественных наук, Варшава, Польша.
E-mail: alexyrau@gmail.com

ГЕОЛОГИЧЕСКОЕ СТРОЕНИЕ АЛЛЮВИАЛЬНЫХ ОТЛОЖЕНИЙ РЕЧНЫХ ТЕРРАС И ЭНЕРГОФФЕКТИВНОСТЬ ИРРИГАЦИОННЫХ СИСТЕМ

Аннотация. Геологическое строение речных террас бассейна р. Сырдарьи Шардаринской оросительной системы, где проводились исследования, состоит из четвертичных аллювиальных отложений, верхний слой до 3 м представлен суглинками и супесями, нижний песчаными отложениями. Почвы аллювиальные светлые сероземы и пустынно-сероземные с высоким содержанием крупной пыли (0,05 – 0,01мм) и мелкого песка (0,1 – 0,5 мм), порозность 48-52%, объемная масса - 1,2 – 1,3 г/см^3, удельная масса - 2,6 – 2,67 г/см^3, гумуса – 1,1% (Kolomenskij, 1968).

В результате орошения уплотняется пахотный и подпахотный слой почв. Объемная масса увеличивается до 1,5 – 1,6 г/см^3, порозность снижается на 10%. Уплотненный пахотный слой почвы находится в состоянии затрудненной аэрации, развиваются восстановительные процессы. Это вызывает дефицит кислорода в почве и ухудшается питательный

режим. Для сохранения и восстановления свойств почв, повышение их плодородия необходимо увеличить в севооборотах люцерну. Люцерна в хлопковых севооборотах 50% обогащает почву органикой до 12 т/га, разрушает уплотненный слой почвы, снижает объемную массу с 1,5 – 1,6 г/см^3 до 1,3 – 1,4 г/см^3, повышает порозность на 5-8%.

Опытно-экспериментальные исследования проводились в 2019-2021 гг. в четырех крестьянских хозяйствах, с посевами хлопка 63%, 54%, 50,3%, 37,5%, люцерны – 37%, 46%, 49,3%, 46,5%. Наибольшая урожайность хлопка – 26,6 ц/га, люцерны – 131 ц/га получена в крестьянском хозяйстве «Али-Мырза», при структуре посевных площадей хлопка 50,3%, люцерны – 49,7%. Прибыль от хлопка составляет 511914 тг/га, люцерны – 250840 тг/га. В других хозяйствах эти показатели ниже на 10 – 26%.

Результаты исследования могут внедряться на хлопковых севооборотах оросительных систем на площади 220 тыс.га.

Ключевые слова: геология, почвенный покров, плодородие почв, ирригационные системы, энергоэффективность, субирригация.

Introduction. In the 1970-90 s the irrigation systems were built on the alluvial sediments of the river terraces on the territory of 2.3 million hectares. Since 1991 the irrigation systems area has decreased by 38.5%, the yield of cultivated crops by 1.5 times. The irrigation systems area in Turkestan region has significantly decreased from 500.5 thousand ha to 395.0 thousand ha, including cotton from 220 thousand ha to 174.4 thousand ha (2020).

The reduction irrigation systems farmlands are mainly caused by lack of knowledge about the geological structure of river terraces soil-forming rocks, the characteristics of the genesis, regime and properties of alluvial deposits soils cover, which is characterized by poor resistance to external impacts. In the process of irrigation, many soil properties change, the bulk density increases, the porosity and filtration characteristics decrease, a formed compacted plow layer increases soil degradation, and reduces its fertility and the cultivated crops' yield, due to low productivity, the lands are abandoned and removed from agricultural circulation.

It is necessary to change the structure of crop rotation, irrigation parameters, specifying them to correspond to the soil genesis, ensuring the fertility reproduction, and profitable agricultural production on irrigation systems and their energy efficiency on these lands.

Irrigation systems constitute the second subsystem of the melioration system. Irrigation systems supply water to irrigated fields, converting the flow of water into soil moisture, providing optimal soil moisture for plant growth and development, increasing their productivity and economic performance (Kostyakov, 1960).

Improving the cotton crop irrigation systems energy efficiency is a priority task to solve a set of associated issues with energy, environment, economic and social (2020, 2008).

The study is aimed at establishing the energy efficiency of irrigation systems for cotton crop rotations, agricultural practices that increase soil fertility, crop yields, water saving and environmental safety of natural ecosystems.

Research materials and methods. The studies were carried out on the Shardara irrigation system with cultivating cotton crop rotation. When studying the soil fertility level, we considered the appropriate soil analogue of virgin land and cotton nine-field crop rotation scheme with 63% or six of fields by cotton and 37% or 3 fields by alfalfa, which is widespread in the cotton-growing farms of the Shardara irrigation system.

Experimental studies were carried out on four peasant farmlands with the parameters as follows: Didar farm 63% for cotton, alfalfa - 37%, Toyshi farm with 55% for cotton and 45% alfalfa, Ali-Myrza farm - 50.3% cotton and 49.7% alfalfa, and Dikhan farm with 37.5% for cotton, 46.5% for alfalfa and 16% for corn. In these peasant farms the accumulation of organic matter in soils, humus, the gross form of nitrogen, phosphorus and potassium, the yield of cultivated crops, the cost price, profit, and irrigation norms were measured.

Soil sampling to detect the content of humus, phosphorus, potassium and salts was conducted in spring before sowing and in autumn after harvesting (Dospekhov, 1985). For each farm, a technological map was developed, where all the costs for cultivating crops, and the energy efficiency of crops and the irrigation system were indicated.

Results. The agro-resource potential and climate conditions of the Shardara irrigation system are favorable for the cultivation of cotton crops. Natural conditions enable to maintain an automorphic reclamation regime of soils, ensuring the reproduction of fertility and high yields of cotton up to 35 centners per hectare and alfalfa up to 150 centners per hectare (Kemenger, 2020).

The soils salt regime with cotton crops develops favorably. The salt reserves in the meter layer before the development of virgin soils was 96 t/ha, but exploitation of soils for cotton crop rotations decreased the salt content to 16.5 t/ha. The sulfates content decreased from 0.3 to 0.02%, sodium from 0.12 to 0.016%. The decrease in chlorides was the most dynamic, as their content fell to 0.008%. As a result of irrigation, the total alkalinity increased to 0.09 - 0.1%. Such an increase in alkalinity is associated with reducing reactions involving anaerobic microorganisms.

Mineralization of groundwater prior to the development of the area was 2.9 g/l. Over the years of cotton cultivation, the mineralization of groundwater has decreased to 1.2 g/l.

Alfalfa on the irrigation system of the Shardara irrigation system is cultivated by itself or under the cover of barley. Alfalfa seedlings and crop density in areas of pure alfalfa sowing are 25-30% higher compared to areas of sowing under barley cover.

In Didar farm, Alfalfa share in the crop rotation is 37%; the accumulation of organic matter over 3 years of Alfalfa cultivation in the 0-20 cm soil layer was 27 c/ha, in the 0-100 cm layer - 50 c/ha (control). In the Toishy farm share of Alfalfa in the crop rotation is 45%, the root mass accumulation is respectively 32.4 centners per hectare and 57.77 centners per hectare. In the Ali-Myrza and Dikhan farms the share of Alfalfa is 49.7% and 46.5% respectively, while the root mass accumulation is 88.85 and 125.52, 39.86 and 67.13 centners per hectare correspondingly. Primarilyroot mass (60-70%) is accumulated in the 0-20 cm soil layer, with depth the root mass decreases and at a depth of 80-100 cm does not exceed 3.12 c/ha (Table 1).

Table 1. Accumulation of root mass of Alfalfa in the soil and gross forms of nitrogen, phosphorus and potassium

Farm housholds	Soil layer, sm	Root mass of Alfalfa, c/ha	Gross forms					
			N		P_2O_5		K_2O	
			%	kg/ha	%	kg/ha	%	kg/ha
1	2	3	4	5	6	7	8	9
1 Didar cotton 63%, Alfalfa - 37%	0-20	27.0	1.7	48.0	0.18	4.2	0.6	16.0
(Contol)	0-100	50.0	8,1	400	0.80	40.0	2.3	120
2 Toishy	0-20	32.43	2.1	68.0	0.21	6.8	1.0	32.0
Cotton - 54%, Alfaalfa - 46%	0-100	57.77	8.9	514.0	0.85	49.0	4.22	244.0
3 Ali-Myrza	0-20	88.85	2.8	249.0	0.21	19.0	1.0	89.0
Cotton- 50.3%, Alfalfa – 49.7%	0-100	125.52	12.3	1540	0.96	120.5	4.66	580.0
4 Dikhan cotton – 37.5%, Alfalfa – 46.5%,	0-20	39.86	2.4	96.0	0.30	12.0	0.88	35,0
grain corn – 16%	0-100	67.13	10.1	678.0	0.98	66.0	3.66	246.0

The gross ratio content of nitrogen in the root system of the 0-20 cm soil layer at Didar, Toishy, Ali-Myrza and Dikhan farms is 48.0 kg/ha, 68.0 kg/ha, 249.0 kg/ha, and 96 kg/ha, respectively; and the share of phosphorus and potassium on the same farms is indicated at 4.2 kg/ha and 16.0 kg/ha at Didar farm, 6.8 kg/ha and 32 kg/ha at Toishy farm, as well 19.0 kg/ha and 89 kg/ha at Ali-Myrza, and 12.0 kg/ha and 35.0 kg/ha at Dikhan farm, respectively. At Ali-Myrza farm, compared with the control Didarfarm, the root mass of alfalfa in the 0-20 cm soil layer increased 3.3 times, in the 0-100 cm layer - 25 times. The total nitrogen ratio went up 5.2 and 3.8 times, but phosphorus

and potassium 4.5 and 3.0 times, 5.6 and 4.8 times correspondingly. Such an accumulation of organic matter and nutrients in the soil of the Ali-Myrza farm improves the yield of cotton by 5.5 centners per hectare, and alfalfa by 17.4 centners per hectare.

At Didar farm with 63% of cotton and 37% of alfalfa in the crop rotation scheme the average cotton yield was 21.5 c/ha for 2019-2021, alfalfa hay yield was 113.9 c/ha, profit from cotton and alfalfawas 324,850 tg/ha, and 149,048 tg/ha respectively, average profit from area was 277,467.6 tg/ha. The energy efficiency of the irrigation system reached 1.67. At Ali-Myrza farm with 50.3% of cotton 49.2% of alfalfa in the crop rotation scheme, cotton yield was 26.6 centners per hectare, alfalfa yield was 131.3 centners per hectare. The profit from cotton and alfalfa crop rotation accounted to 511,914 tg/ha and 250,840 tg/ha, respectively, and average profit from area was 383,517 tg/ha. The energy efficiency of the irrigation system was highest and reached 2.25 (Table 2, figure 1).

Table 2. Energy efficiency by the Shardara irrigation system

№	Farm households	crops, %	Area, ha	Crop productivity,c/ha	Production cost, tg/ha	Crop Profit, tg/ha	Average profit, tg/ha	Energy efficiency of	
								crops	Irrigation systems
1	2	3	4	5	6	7	8	9	10
1	Didar (control)	Cotton plant 63% Alfalfa, 37%	29.0 10.7	21.5 113.9	14890 2588	324850 149048	277467.6	2.01 1.3	1.67

Table 2 continue

1	2	3	4	5	6	7	8	9	10
2	Toishy	Cotton plant 55% Alfalfa, 45%	13.7 6.3	24.8 124.4	11637 2329	445414 201906	368709	2.6 1.5	2.02
3	Ali -Myrza	Cotton plant 50.3% Alfalfa, 49.7%	15.5 15.0	26.6 131.3	10755 2087	511914 250840	383517	2.7 1.7	2.25
4	Dikhan	Cotton, 37.5% Alfalfa, 46.5% Grain corn, 16.0%	15.7 17.0 8.1	25,7 126.0 75.0	11232 2419 4123	482336 235236 215800	326462.4	2.65 1.5 2.36	1.88

The crops energy efficiency in irrigation systems with cotton crop rotations indicates a high profitability of cotton crops, when the gross income of cotton exceeds the cost by 2.01-2.7 times, alfalfa by 1.3-1.7 times.

At the Didar farm household irrigation norms for cotton plant, Alfalfa and average comprised 8,860 m^3/ha, 7,348 m^3/ha, and 8,453 m^3/ha correspondingly. The specific irrigation water consumption for cotton is 412 m^3/c. At the Toishy farm the corresponding figures are 8,384 m^3/ha and 357 m^3/c, 59 m^3/c, while at the farm Ali-Myrza the same indicators are 8,116 m^3/ha and 333 m^3/ha, and 56 m^3/c correspondingly. And at Dikhan farm the indicators are as follows: 8,568 m^3/ha and 345 m^3/c, 58 m^3/c and 141 m^3/c. With cotton crop rotation scheme, cotton is 50.3%, alfalfa is 49.7%, the irrigation rate from the crop rotation area is 4% lower, the specific water consumption per centner of the crop is 15-20% (Table 3, Figure 1).

Table 3. Irrigation rates for crops in cotton crop rotation on the Shardara irrigation system

№	Farm households	Crops in crop rotation	Crop productivity, c/ha	Irrigation rate, m^3/ha		Specific water cost per crop unit, m^3/c
				% crops	Crop rotation area	
1	Didar (control)	Cotton plant– 63%	21.5	8860	8453	412
		Alfalfa – 37%	113.9	7348		64.51
2	Toishy	Cotton plant– 54%	24.8	8860	8384	357
		Alfaalfa – 46%	124.4	7348		59
3	Ali-Myrza	Cotton– 50.3%	26.6	8860	8116	333
		Alfalfa – 49.7%	131.3	7348		55.96
4	Dikhan	Cotton – 37.5%	25.7	8860	8568	345
		Alfalfa – 46.5%	126.0	7348		58
		Corn grain – 16%	75.0	10563		141

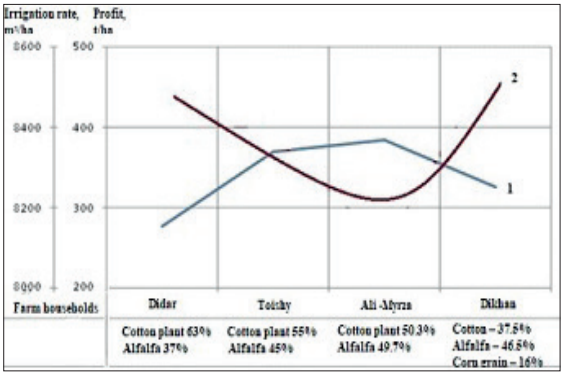

Figure 1. Dependence of profit and irrigation norms on cotton crop rotations
1 – profit, 2 – irrigation rate

Discussion. The reduction in cotton sowing on irrigation systems by 20% and in the cultivated crops declining yield by 1.5 times is associated with a drop in soil fertility and deterioration of its water-physical properties, as well with unreasonable crop rotation. In irrigation systems, there was a decrease in the share of fodder crops by 20%, which caused a sharp drop in cotton yields by 29%, cereals by 48% in the structure of sowing crops.

On virgin lands of 1970 humus comprised 1.1% in the arable 0-20 cm soil layer, in recent years there has been a decrease to 0.8%. Significant changes have occurred in the reserves of gross nitrogen, before the land development nitrogen share was 0.08% in the 0-20 cm soil layer, while at present it decreased to 0.05%.

In connection with the ongoing oxidative processes, a change in the water-physical properties of soils is observed, the arable and subsurface layers are compacted, the bulk density increased from 1.2 to 1.6 g/cm^3, and the porosity decreased by 5–10%. The compaction is caused by the movement of silt particles with a downward current of moisture, and gley-forming process happening, as a result of which the number of colloidal particles increased (Sokolov, 1968). The compacted soil layer in a state of difficult aeration evokes restoration processes and oxygen deficiency, and worsening of water and nutrient regime of soils (Sokolov, 1968; Wang et al., 2009).

The studies conducted in China (Wang et al., 2006; Wang et al., 2009; Ali et al., 2021) show that soil moisture below the compacted layer is inaccessible to tomatoes, potatoes, cereals and legumes. The scientists recommend crop rotation schemes with alfalfa, the root system of which destroys the compacted layer, so, the soil becomes loose, enriched with organic matter, humic acid, and fertility increases.

In cotton crop rotations, it is necessary to increase the alfalfa sowing area to 50% to preserve and restore soil fertility, as alfalfa enriches the soil with organic matter, nitrogen, and decreases the incidence of cotton wilt: the harmfulness of wilt drops by 3-4 times, and with a systematic alternation of cotton crops, it is suppressed almost completely (Golodkovskij et al., 1937; YUdahin, 1975).

Introducing Alfalfa in crop rotations enables to increase not only soil fertility, but also the phytosanitary condition, reduce the consumption of mineral fertilizers and chemical plant protection products, and protect soil, water bodies, flora and fauna from pollution with pesticides. The advances by scientists from Canada, America, Germany, and Denmark evidenced these facts (Samaddar et al., 2021; Bell et al., 2012; Rau et al., 2020; Khakbazan et al., 2019).

Conclusion. 1. On the irrigation systems of the river basin of Syrdarya the soils are alluvial light gray soils and desert-gray soils with a high content of

coarse dust (0.05 - 0.01 mm) and fine sand (0.1 - 0.5 mm), and on nine-field crop rotation areas with 63% for cotton, 37% for alfalfa arable and subarable soil layers are compacted during irrigation. The bulk density increases from 1.3 g/cm^3 to 1.5 g/cm^3, the porosity decreases from 50% to 44%. Air, water and nutrient regime of the soil deteriorates, restoration processes develop, and the crop productivity of cotton and Alfalfa decreases to 15-20 c/ha and 80 - 100 c/ha respectively.

2. At the six-field crop rotation scheme, where cotton is 50.3%, and alfalfa is 49.7%, the accumulation of organic matter in the soil, compared to the nine-field crop rotation scheme, increases by 7.5 t/ha, nitrogen by 1,140 kg/ha, phosphorus by 80.5 kg/ha, potassium by 126 kg/ha. The root mass of Alfalfa destroys the compacted subsurface layer of soils, the air, water and nutritional regime of soils improves, the yield of cotton increases to 26.6 c/ha, but of alfalfa to 131.3 c/ha.

3. An increase in the alfalfa planting area in cotton crop rotations by 50% compared to the control, where alfalfa is 37%, the cost of cultivated crops for cotton is reduced by 4,135 tg/c, alfalfa by 501 tg/c, profit increases by 106,050 tg/ha, and energy efficiency of irrigation systems improves by 34%.

Funding: *The research was carried out within the framework of the BR10764920 project entitled Irrigation Technologies and Techniques During Putting New Irrigation Lands, Reconstruction and Modernization of Existing Irrigation Systems funded by the Ministry of Agriculture of the Republic of Kazakhstan*.

Information about authors:

Tlektes Espolov – Doctor of Economics. Vice President, Academician of the National Academy of Sciences of the Republic of Kazakhstan, Kazakh National Agrarian Research University, Almaty, Kazakhstan; https://orcid.org/0000-0002-5202-5037;

Alexey Rau – Doctor technical science, Professor of the Department of "Water resources and melioration", Kazakh National Agrarian Research University, Almaty, Kazakhstan; alexyrau@gmail.com; https://orcid.org/0000-0001-5209-1424;

Nurlan Balgabayev – Doctor of agricultural sciences, Academician of the Academy of Agricultural Sciences of the Republic of Kazakhstan and the International Academy of Agricultural Education, General Director of the Kazakh Scientific Research Institute of Water Economy, Taraz, Kazakhstan; iwre@bk.ru, https://orcid.org/0000-0003-1645-6283;

Ermekkul Zhaparkulova – Candidate of Agricultural Sciences, Professor of the Department of "Water resources and melioration", Kazakh National

Agrarian Research University, Almaty, Kazakhstan; ermekull@mail.ru, https://orcid.org/0000-0002-5593-0016;

Mosiej Józef – Doctor of Agricultural Sciences, Professor, Warsaw University of Life Sciences, Warsaw, Poland; jozef_mosiej@sggw.pl; https://orcid.org/0000-0002-8040-7032.

REFERENCES

Agroclimatic essay based on the results of an agrochemical survey of soils. (2020). Kemenger [Agroklimaticheskij ocherk po rezul'tatam provedeniya agrohimicheskogo obsledovaniya pochv]. (in Russ).

Ali G., Wang Z., Li X., Jin N., Chu H. & Jing L. (2021). Deep soil water deficit and recovery in alfalfa fields of the Loess Plateau of China. Field Crops Research, 260. https://doi.org/10.1016/j.fcr.2020.107990 (in Eng.).

Assessing farming systems: a system-energy approach. (2008) Astrakhan. (in Russ).

Bell L.W., Sparling B., Tenuta M. & Entz M.H. (2012). Soil profile carbon and nutrient stocks under long-term conventional and organic crop and alfalfa-crop rotations and re-established grassland. Agriculture, Ecosystems and Environment, 158, 156-163. https://doi.org/10.1016/j.agee.2012.06.006 (in Eng.).

Dospekhov B.A. (1985) Field experiment methodology. Agropromizdat. (in Russ).

Draft concept of the state program of water resources management in Kazakhstan. (2020) Ministry of Ecology, Geology and Natural Resources of the Republic of Kazakhstan. Nur-Sultan. (in Russ).

Golodkovskij L.I., Golodkovskaya L.L. (1937) Root system of alfalfa and soil fertility. Tashkent. (in Russ).

Information about the ameliorative state of irrigated lands. (2020) Ministry of Agriculture of the Republic of Kazakhstan. Nur-Sultan. (in Russ).

Jun Wang, Feng-Min Li & Yu Jia (2006) Responses of Soil Water, Nitrogen, and Organic Matter to the Alfalfa Crop Rotation in Semiarid Loess Area of China, Journal of Sustainable Agriculture, 28:1,117 -130, DOI: 10.1300/J064v28n01_10 (in Eng.).

Khakbazan M., Mohr R.M., Huang J., Xie R., Volkmar K.M., Tomasiewicz D.J. Nelson A. (2019). Effects of crop rotation on energy use efficiency of irrigated potato with cereals, canola, and alfalfa over a 14-year period in Manitoba, Canada. Soil and Tillage Research, 195. https://doi.org/10.1016/j.still.2019.104357 (in Eng.).

Kolomenskij I.V. (1968) General methodology of engineering-geological studies. Nedra [Obshchaya metodika inzhenerno-geologicheskih issledovanij]. (in Russ).

Kostyakov A.N. (1960) Fundamentals of land reclamation. Nauka. (in Russ).

Rau A.G., Kadasheva Z.K., Rau G.A. & Meranzova R. (2020). Natural features and rational use of water resources in rice irrigation systems of Kazakhstan. In IOP Conference Series: Earth and Environmental Science (Vol. 548). IOP Publishing Ltd. https://doi.org/10.1088/1755-1315/548/2/022061 (in Eng.).

Samaddar S., Schmidt R., Tautges N.E., & Scow K. (2021). Adding alfalfa to an annual crop rotation shifts the composition and functional responses of tomato rhizosphere microbial communities. Applied Soil Ecology, 167. https://doi.org/10.1016/j.apsoil.2021.104102 (in Eng.).

Sokolov A.A. (1968) Natural zones of Kazakhstan. Agrochemical characteristics of soils of the USSR: Kazakhstan and Chelyabinsk region. Nauka [Prirodnye zony Kazahstana.

Agrohimicheskaya harakteristika pochv. SSSR. Kazahstan i CHelyabinskaya oblast'] (in Russ).

Wang M.Y., Li J., Sun J., Wang X.C., Fang X.Y. & Ren J.J. (2009). Soil desiccation characteristics of alfalfa grasslands and soil water restoration effects in alfalfa-grain crop rotations on the semi-arid areas of the loess plateau. Shengtai Xuebao/ Acta EcologicaSinica, 29(8), 4526-4534. (in Eng.).

Xiao-Ling Wang, Yu Jia, Xiao-Gang Li, Rui-Jun Long, Qifu Ma, Feng-Min Li, Ya-Jie Song. Effects of land use on soil total and light fraction organic, and microbial biomass C and N in a semi-arid ecosystem of northwest China. Geoderma. Volume 153, Issues 1–2, 15 October 2009, Pages 285-290https://doi.org/10.1016/j.geoderma.2009.08.020 (in Eng.).

YUdahin N.G. (1975) Crop rotation factor for increasing the yield of cotton. Agriculture of Kyrgyzstan. (in Russ).

МАЗМҰНЫ-СОДЕРЖАНИЕ-CONTENTS

R.A. Abdulvaliyev, M.N. Kvyatkovskaya, L.M. Imangalieva, A.I. Manapova
KAOLINITE RAW MATERIALS OF KAZAKHSTAN AND THE METHOD OF THEIR BENEFICIATION.....6

A.E. Abetov, Sh.B. Yessirkepova, J. Curto Ma
GRAVITY FIELD TRANSFORMS AT THE EXPLORATION FOR HYDROCARBON FIELD IN THE SOUTHERN PART OF THE USTYURT REGION.....17

E.B. Abikak, B.K. Kenzhaliev
DEVELOPMENT OF AN INTEGRATED TECHNOLOGY INTENDED TO PROCESS PYRITE SLAG USING CHEMICAL PRE-ACTIVATION.....32

R.Zh. Abuova, D.K. Suleyev, G.A. Burshukova
STUDY OF DAMPING PROPERTIES OF ALLOYED STEELS WITH CERAMIC-METALLIC NANOSTRUCTURED COATING FOR CRITICAL PARTS.....52

N.R. Akhundova
CHANGE OF HYDRODYNAMIC PRESSURES IN THE WELLBORE OF INCLINED-HORIZONTAL WELLS DURING DRILLING MUD CIRCULATION.....66

M. Bissengaliev, R. Bayamirova, A. Togasheva, A. Zholbasarova, Zh. Zaydemova
ANALYSIS OF COMPLICATIONS ASSOCIATED WITH THE PARAFFINIZATION OF BOREHOLE EQUIPMENT AND MEASURES TO PREVENT THEM.....76

T.I. Espolov, A.G. Rau, N.N. Balgabayev, E.D. Zhaparkulova, Josef Mosiej
GEOLOGICAL STRUCTURE OF ALLUVIAL SEDIMENTS OF RIVER TERRACES AND ENERGY EFFICIENCY OF IRRIGATION SYSTEMS.....89

Y.M. Kalybekova, A.K. Zauirbek, I.S. Seitasanov, U.Q. Onglassyn*
INCREASING WATER PRODUCTIVITY IN IRRIGATION WITH REGARD TO GEOLOGY AND HYDROGEOLOGICAL CONDITIONS.....101

Z.S. Kenzhetaev, T.A. Kuandykov, K.S. Togizov, M.R. Abdraimova, M.A. Nurbekova
SELECTION OF RATIONAL PARAMETERS FOR OPENING AND DRILLING OF TECHNOLOGICAL WELLS UNDERGROUND URANIUM LEACHING.....115

R.A. Kozbagarov, K.K. Shalbayev, M.S. Zhiyenkozhayev, N.S. Kamzanov, G.T. Naimanova
DESIGN OF CUTTING ELEMENTS OF REUSABLE MOTOR GRADERS IN MINING.....128

T.A. Kuandykov, T.D. Karmanov, E.I. Kuldeyev, K.K. Yelemessov, B.Z. Kaliev
NEW TECHNOLOGY OF UNCOVER THE ORE HORIZON BY THE METHOD OF IN-SITU LEACHING FOR URANIUM MINING.....142

E. Orymbetov, G.E. Orymbetova, A.E. Khussanov, T.E. Orymbetov, B.E. Orymbetov
SECTIONING OF PETROLEUM GAS ADSORPTION DRYING.....155

A.M. Serikbayeva, M.S. Kalmakhanova, H.T. Gomes, B.B.Shagraeva, N.T.Shertaeva
METHODS OF PREPARATION AND PHYSICO-CHEMICAL CHARACTERISTICS OF ORGANIC MODIFIED CLAYS WITH GRAFTED ORGANOALOXIDES.....166

Zh. Zhantayev, D. Talgarbayeva, A. Kairanbayeva, D. Panyukova, K Turekulova
COMPLEX PROCESSING OF EARTH REMOTE SENSING DATA FOR PREDICTION OF LANDSLIDE PROCESSES ON ROADS IN MOUNTAIN AREA.....181

S.A. Istekova, A.K. Issagaliyeva, M.M. Aliakbar
BUILDING THE ONLINE GEOLOGICAL AND GEOPHYSICAL DATABASE MANAGEMENT SYSTEM FOR HYDROCARBON FIELDS IN KAZAKHSTAN.....198

R.E. Lukpanov, A.S. Yenkebayeva, D.V. Tsygulyov, Y.Y. Sabitov, D.S. Dyussembinov
ASSESSMENT OF ASH-STORAGE COOLECTOR STABILITY USING GEOSYNTHETIC REINFORCEMENT ELEMENTS BY TRAY TESTING AND NUMERICAL MODELING.....212

T.K. Salikhov, D.K. Tulegenova, Zh.G. Berdenov, R.S. Sarsengaliyev, T.S. Salikhova
STUDY OF THE SOIL COVER OF ECOSYSTEMS OF THE CHINGIRLAUS DISTRICT OF THE WESTERN KAZAKHSTAN REGION ON THE BASIS OF THE APPLICATION OF GIS TECHNOLOGIES.....226

A.R. Fazylova, G. Balbayev, B. Tultayev
SYSTEM OF SHORT-TERM FORECASTING OF WIND TURBINE OUTPUT POWER CONSUMPTION.....243

O.G. Khaitov, A.A. Umirzokov, E.N. Yusupkhojaeva, S.P. Abdurakhmonova, N.G. Kholmatova
ASSESSMENT OF THE DENSITY OF THE WELL GRID IN THE SOUTHEASTERN PART OF THE BUKHARA-KHIVA REGION.....253

K.T. Sherov, S.O. Tussupova, A.V. Mazdubay, M.R. Sikhimbayev, B.N. Absadykov
INCREASING DURABILITY OF THERMO-FRICTION TOOLS BY SURFACING.....265

Publication Ethics and Publication Malpractice
in the journals of the National Academy of Sciences of the Republic of Kazakhstan

For information on Ethics in publishing and Ethical guidelines for journal publication see http://www.elsevier.com/publishingethics and http://www.elsevier.com/journal-authors/ethics.

Submission of an article to the National Academy of Sciences of the Republic of Kazakhstan implies that the described work has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see http://www.elsevier.com/postingpolicy), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. In particular, translations into English of papers already published in another language are not accepted.

No other forms of scientific misconduct are allowed, such as plagiarism, falsification, fraudulent data, incorrect interpretation of other works, incorrect citations, etc. The National Academy of Sciences of the Republic of Kazakhstan follows the Code of Conduct of the Committee on Publication Ethics (COPE), and follows the COPE Flowcharts for Resolving Cases of Suspected Misconduct (http://publicationethics.org/files/u2/New_Code.pdf). To verify originality, your article may be checked by the Cross Check originality detection service http://www.elsevier.com/editors/plagdetect.

The authors are obliged to participate in peer review process and be ready to provide corrections, clarifications, retractions and apologies when needed. All authors of a paper should have significantly contributed to the research.

The reviewers should provide objective judgments and should point out relevant published works which are not yet cited. Reviewed articles should be treated confidentially. The reviewers will be chosen in such a way that there is no conflict of interests with respect to the research, the authors and/or the research funders.

The editors have complete responsibility and authority to reject or accept a paper, and they will only accept a paper when reasonably certain. They will preserve anonymity of reviewers and promote publication of corrections, clarifications, retractions and apologies when needed. The acceptance of a paper automatically implies the copyright transfer to the National Academy of Sciences of the Republic of Kazakhstan.

The Editorial Board of the National Academy of Sciences of the Republic of Kazakhstan will monitor and safeguard publishing ethics.

Правила оформления статьи для публикации в журнале смотреть на сайтах:
www:nauka-nanrk.kz
http://www.geolog-technical.kz/index.php/en/
ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)

Редакторы: *М.С. Ахметова, А. Ботанқызы, Р.Жәлиқызы, Д.С. Аленов*
Верстка на компьютере *Г.Д.Жадыранова*

Подписано в печать 15.06.2022.
Формат 70x90$^{1}/_{16}$. Бумага офсетная. Печать – ризограф.
17,5 п.л. Тираж 300. Заказ 3.

Национальная академия наук РК
050010, Алматы, ул. Шевченко, 28, т. 272-13-19