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**OIL PRODUCTION AT SPECIALLY PROTECTED NATURAL AREAS:
THE NATIONAL PARK «BUZULUKSKIY BOR», ORENBURG REGION**

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The article addresses to the problems related to the renewal of oil production at a specially protected natural area of the National Park «Buzulukskiy Bor» located in Orenburg region. Due to the oil spill and fires caused by major accident at one of the wells in 1971 there was a resolution of the Government on termination of state oil companies' activity and conservation of 164 oil wells in total in the territory of the Buzulukskiy Bor. However, the oil production was restarted at the end of the year 2018.

The Buzulukskiy Bor is the largest woodland among the steppe zone of 111 thousand hectares located on the area between Orenburg and Samara regions. The pinery occupies 86.6 hectares of its territory and the rest part is covered by broad-leaved tree species. The National Park «Buzulukskiy Bor» has been established with its preserved, protected, recreational and another zones in order to preserve the unique woodland. There were discovered seven multilayered fields including the «Mogutovskoye», the «Gremyachevskoye» and the «Vorontsovskoye» in the consequence of geological exploration for oil and gas in the relevant place locality carried out from 1953 to 1970. As a result of that activity 62 wildcats and 102 stratigraphic wells were drilled. There are the oil and gas pools within the perimeter of the «Borovskoye» forestry. They stretch out underground of «Buzulukskiy Bor». In 1973 the operation of actual oil fields was stopped and the majority of the wells were terminated or suspended. Nevertheless, now and before an odor of gas, oil seep and carbon concentrations exceeding the MAC in the air, soil and water have been observed in the number of sections of the woodland. Actual adverse environmental conditions and some factors are in the large part due to unexplored shallow oil and gas fields in the subsoil of the National Park. A number of researchers including the experts from «Geoecology» the Integrated Research and Development Center, LLP assume that oil seep and carbon concentration exceeding the MAC in the air and water are only caused by well sealing failure. Their reconversion or termination will make solving current environmental problem possible.

Thus concentration of oil products in the natural environment of «Buzulukskiy Bor» does not depend on oil spill much. Therefore well termination or conservation is only a part of solution of the problem of pollution by oil products. It is obvious that the air, soil and water pollution in «Buzulukskiy Bor» is related to natural emanation of hydrocarbon through the rock formation covering oil fields. Such phenomenon might occur at shallow hydrocarbon fields with seam pressure exceeding normal hydrostatic pressure and if there are faults and porosity of cap rocks. This fact explains significant exceeding the MAC of hydrocarbon in the air above oil fields at places of fractures and faults on Borovka and Karachayev Mushtai rivers. The relief of pressure in upper producing layers under the hydrostatic one by extracting oil and gas in modern environmentally friendly ways might be an aid in solving the problem of pollution by hydrocarbon.

It is necessary to conduct integrated research of geological environment and to analyze content and concentration of hazardous substances in the air, soil and water in order to identify the causes and to develop recommendations to cope with the problems of the National Park «Buzulukskiy Bor».

Keywords: Buzulukskiy Bor, Orenburg region, the National Park, oil production, well, pollution by oil products, oil spill.

INTRODUCTION

For a very long time, the issue of assigning Buzuluk bor to national parks was resolved. This is a very honorable status for him, and for this, the forest has many ecological, historical, scientific, aesthetic properties.

By order of the Government of the Russian Federation dated December 29, 2007 No. 1952-R «Buzuluksky Bor», the status of the National Park was granted.

The total area of the national park is 106,788 hectares, including:

- in the Orenburg region – 55.5 thousand ha.
- in the Samara region – 51.288 thousand hectares

The national park was formed in order to preserve and restore unique and typical natural complexes, including the only forest in the steppe Zavolzhye.

The main objectives of the national park are:

– preservation of natural complexes, unique and standard natural areas and objects of flora and fauna;

- preservation of historical and cultural sites;
- environmental, historical and cultural education of the population;
- creating conditions for regulated tourism and recreation;

Development and implementation of scientific methods of nature conservation and environmental education;

- implementation of environmental monitoring;
- restoration of disturbed natural and historical-cultural complexes and objects.

The National Park «Buzuluk Bor» is located on the territory of two regions of Orenburg and Samara and on the territory of four districts of Buzuluk, Bogatovsky, Borsky, Kinel-Cherkassky. In accordance with the legislation, the lands of the national park are divided into functional zones (Fig. 1).

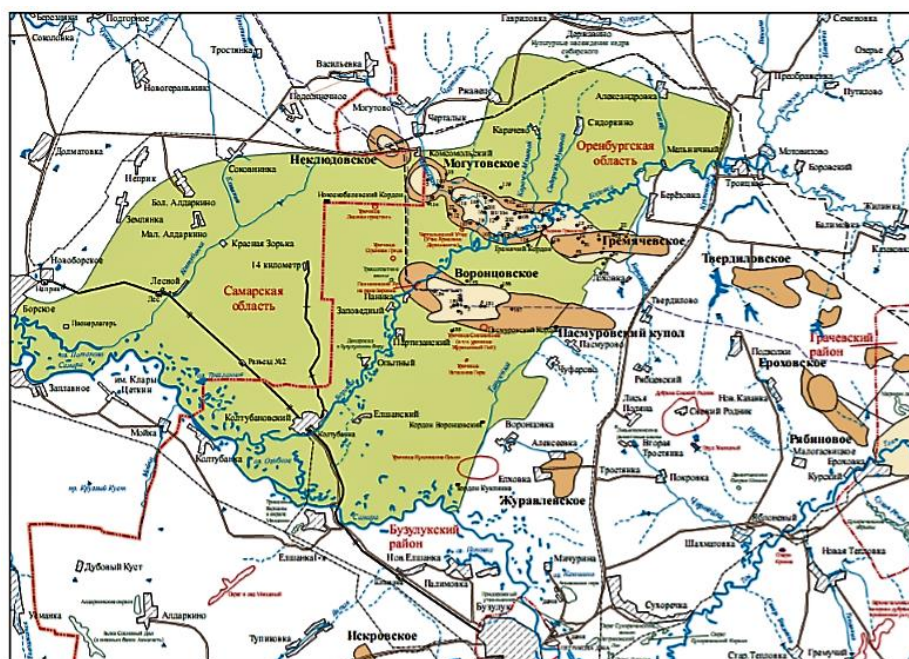


Fig. 1. Overview map-scheme of the forest of Buzuluksky forest [4].

The Buzuluksky Bor National Park, established in 2007, has territories with total oil reserves of up to 80 million tons. The coniferous forest of Buzuluksky forest itself covers about 80 thousand hectares in the territory of two constituent entities of Russia. Since 1953, geological exploration has been carried out on the territory of boron to search for oil and gas deposits. As a result, seven such deposits were discovered: Mogutovskoye, Vorontsovskoye, Gremyachevskoye – on the territory of the Orenburg region, Neklyudovskoye, Koltubanovskoye, Dolmatovskoye and Borskoye – on the territory of the Samara region.

STATEMENT OF BASIC MATERIAL

By physical and geographical location, the Buzuluk boron belongs to the southeastern part of the Russian Plain, occupying a vast area in the western part of the All-Srt-Pre-Ural elevated steppe province. Bor is entirely located in the steppe zone and is surrounded on all sides by steppe communities developing on ordinary chernozem. The territory of the boron itself is within the geographic coordinates of 53°19'–52°53' N. and 51°05'–52°51' E. The main forest monolith has the shape of a triangle, stretching along the latitude of 53 km, and along the longitude – 34 km. Taking into account the scatteredness of numerous pegs, which are part of the Forestry Administration, the total area of boron coverage is about 350 thousand hectares, while the total area of the forest fund is 111.118 thousand hectares.

On the territory of boron, molasse deposits are widespread, which include the red-colored sandstones, conglomerates and mudstones of the Tatar layer of the Permian system and the Blumenthal Formation of the Lower Triassic. These rocks make up the watershed and watershed slopes surrounding the natural basin occupied by the forest proper.

The main part of Buzuluk boron occupies the hypsometric level from 70 to 160 m above sea level. The highest elevations are of syrtovye oak forests in the Borovka – Kutuluk and Kutuluk – Bolshoi Kinel interfluves – up to 220–230 m. Borovki at the confluence of the river Samaru is 53 m, and the river Samara above s. Rich – 44 m above sea level. m

The hydrographic network of the Buzuluksky boron and its environs forms the Samara River with the Borovka tributary and the Kutuluk tributary of the Bolshoi Kinel river. Her floodplain is full of lakes, oxbows.

In accordance with the scheme of physical-geographical zoning, the Buzuluksky forest is located in the All-Sirtovo-Preduralsky elevated steppe province and is included in the Borovsk-Prisamarsky syrtovo-valley region, forming an independent Buzuluk-Borsky sand and terrace subdistrict.

There are three main types of terrain on the territory of the national park:

- syrtovo–wowy;
- flooded–terraces hilly–sandy pine forest;
- floodplain.

A rich original flora with a significant number of plant species rarely found in the steppe zone was formed in Buzuluk boron, which is possible only if the habitats of species

with the whole complex of environmental conditions are preserved. The regime of the reserve zone of the national park can play a big role in solving this problem [2].

When organizing a national park in 2007 from the forest land of Buzuluksky boron with an area of 111.1 thousand hectares, the land of the national park did not include land plots occupied by settlements, transport highways, industrial and military facilities, exploration wells.

Forest land plots not included in the land plots of the national park, on which oil and gas wells are located, are located on the territory of the Borovsky District Forestry Department of the Ministry of Forestry and Hunting Economy of the Orenburg Region. The impaired integrity of the geological sphere in the undeveloped oil and gas fields is a potential source of environmental and technological hazards. Canned wells are outside the area of subsoil use and, in practice, are not responsible for their condition. In the area of the mouths of a number of wells, oil and gas shows are noted, creating a real threat of environmental pollution.

A number of researchers, including those from the Geoecology Research and Development Center LLC, suggest that the cause of oil and gas occurrences and maximum permissible concentrations of hydrocarbons in the air and water is associated only with the leakage of wells, and their re-preservation or elimination will solve the existing environmental problem [5].

Under these conditions, the issue of organizing complex geo-environmental monitoring of the environment and the subsurface, conducting scheduled maintenance and liquidation work of wells [6], is becoming increasingly topical.

The current attempt to organize oil production in Buzuluksky boron is far from the first – after the collapse of the USSR, various oil companies unsuccessfully tried to get permission for this. A new round of talk about the arrival of the oil industry began in mid-2014. The first confirmation of this was the meeting of prosecutors of the Orenburg and Samara regions, law enforcement and regulatory agencies on issues of the functioning and protection of the national park «Buzuluksky Bor» in the context of a developing fuel and energy complex.

In 2018, oil production began in Buzuluksky Bor. The fields of Buzuluk boron are being prepared for commissioning by the company Novy Potok.

Oil Company Novy Potok LLC, a producing company of the Novy Potok group of companies, is preparing the Mogutovsky, part of the Vorontsovskoye and Gremyaskoye fields in the Orenburg Region, for commissioning. At present, design and survey work is underway, environmental monitoring is organized, contractors are determined to perform the relevant functionality. In particular, VolgoUralNIPigaz LLC, a subsidiary of Gazprom Dobycha Orenburg, develops design and survey documentation.

The company's primary task is to secure the territory in which the work will be carried out as much as possible. In accordance with the license obligations, a company that has obtained the right to extract oil is obliged to take over technical control all the wells existing in the license area that were drilled in the 1950s and 1970s. Their number is 68, but 11 of them will be found, because any documentation on them is missing [1].

By the beginning of 2019, 25 priority wells have been identified for which re-irrigation or re-preservation is planned. Under the elimination refers to the installation of a

cement bridge and concrete pedestals. Thus, all wells will be sealed to avoid any negative environmental impact.

The oil company Novy Potok has already re-preserved and reclaimed seven wells from the Vorontsovskoye, Gremyachevskoye and Mogutovskoye fields. Works are carried out within the framework of the agreement on oil production in the national park «Buzuluksky Bor». In the near future, well #15 of the Mogutovskoye field will be reclaimed. It is located on the banks of the Borovka River.

In Buzuluksky boron, for the resumption of oil production at wells No.115, the oil workers of Novy Stream have already cut down several hectares of elite and valuable forest and the young spruces were piled up for removal from the boron. New wells will be drilled in the second quarter of 2019. Then they will equip them there.

A number of technical and technological solutions have been adopted within the framework of the program for the construction of wells and field facilities based on modern international practices, which will improve the environmental safety of work, eliminating the main risks in oil production.

Pipelines with thickened walls of high-alloyed and corrosion-resistant steels will be laid on the territory of Buzuluk boron. The company will use automatic well control systems. This technology will allow in the event of an emergency situation to quickly close the locking device on the wellhead fittings of wells and precast pipelines [3].

FINDINGS

In 2015, the company «New Stream» received the right to use subsoil for 20 years. Productive areas are located on the territory of Buzuluk boron, but are not part of the national park. The pipeline will be brought outside of boron. The maximum production level is planned in the amount of up to 4.8 million tons. The first exploration well started operating at the Gremyachevsky field at the end of September 2018, which is 50 tons per day, the first carriage has already been sent to the Antipinsky Oil Refinery (Tyumen Region). The first significant batches of petroleum products at the Antipinsky Oil Refinery are expected in 2020. It is assumed that production in the field in five years will be about four million tons.

The main threats to the extraction of oil in Buzuluksky forest can be attributed to the following:

1. The deterioration of groundwater. Before the development of oil fields in the boron there were many lakes, springs and even swamps. Now there are no marshes, there are few springs, and many lakes have dried up. It is especially a pity the lake Lebyazhye, it was a favorite place of wild birds, swans, now it is not there, and in its place is a wasteland. It is believed that the cause of the deterioration of the state of groundwater in oil production in the 50–70s of the last century.

2. Any production is the risk of an oil spill, the risk of an emergency similar to that in 1969, when the tower burned down and an oil spill occurred. There are also risks of losses during the transportation of oil, all this is a threat to the environment. Note that in the field of oil production, despite the large time period, coniferous culture does not grow.

3. The possibility of fires. A fire on a windy day is a threat to the forest.

I would not like the topic of oil production in Buzuluksky forest to become only a means of increasing the political rating of any forces. The questions are really serious and require objective and comprehensive discussion.

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РАЗРАБОТКА НЕФТЯНЫХ МЕСТОРОЖДЕНИЙ В ОСОБО ОХРАНЯЕМЫХ ПРИРОДНЫХ ТЕРРИТОРИЯХ: НАЦИОНАЛЬНЫЙ ПАРК «БУЗУЛУКСКИЙ БОР», ОРЕНБУРГСКАЯ ОБЛАСТЬ

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Рассматриваются проблемы, связанные с возобновлением добычи нефти на особо охраняемой природной территории национального парка «Бузулукский бор» в Оренбургской области. В связи с серьезной аварией, произошедшей в 1971 году на одной из нефтедобывающих скважин, которая привела к разливу нефти и пожарам, правительством страны принято решение о прекращении деятельности государственных нефтяных компаний, ликвидации и консервации всех 164 нефтяных скважин в Бузулукском бору. Однако в конце 2018 года добыча нефти в Бузулукском бору была возобновлена.

Бузулукский бор – самый крупный в степной зоне островной лесной массив площадью более 111 тыс. га, расположенный на границе Оренбургской и Самарской областей. Его сосновые древостои занимают 86,6 тыс. га, а на остальной части преобладают широколиственные древесные породы. В целях сохранения уникального лесного массива создан Национальный парк «Бузулукский бор», в котором выделены заповедная, особоохраняемая, рекреационная и другие зоны. С 1953 по 1970 гг. в Бузулукском бору проводились геологоразведочные работы на нефть и газ, в результате которых в его недрах было открыто семь многопластовых месторождений, в том числе крупные Могутовское, Гремячевское и Воронцовское. За время работ на территории Бузулукского бора пробурены 62 поисково-разведочные и 102 структурные скважины. Нефтегазоносные пласты находятся в

границах Боровского лесничества и распространяются под территорией Национального парка «Бузулукский бор». В 1973 г. эксплуатация разведанных месторождений остановлена, и большинство скважин ликвидировано или законсервировано. Сложившаяся в бору неблагоприятная экологическая обстановка наряду с другими факторами в значительной степени обусловлена наличием в его недрах невыработанных неглубоких месторождений нефти и газа. Ряд исследователей, в том числе из ООО «КНИВЦ «Геоэкология», предполагают, что причиной нефтегазопроявлений и превышений ПДК по содержанию углеводородов в воздухе и воде связано только с нарушением герметичности скважин, а их переконсервация или ликвидация позволит решить сложившуюся экологическую проблему.

Таким образом, уровень содержания нефтепродуктов в природной среде Бузулукского бора мало зависит от нефтегазопроявлений скважин. Поэтому выполнение работ по ликвидации и консервации скважин лишь частично решит проблему его загрязнения нефтепродуктами. Вероятно, загрязнение атмосферного воздуха, почвы и воды в Бузулукском бору связано с естественной эманацией углеводородов через горные породы, перекрывающие месторождения. Такое явление возможно на неглубоко залегающих месторождениях углеводородов с пластовым давлением, превышающем нормальное гидростатическое при наличии тектонических нарушений и пористости покрышек. Этим объясняется многократное превышение ПДК по содержанию УВ, находящихся над месторождениями в зонах разломов и тектонических нарушений рек Боровка и Карачаев Муштай. Решение экологической проблемы Бузулукского бора, связанной с его загрязнениями углеводородами, возможно путем снижения давления в верхних продуктивных пластах ниже гидростатического посредством добычи нефти и газа современными экологически чистыми методами.

Для выявления причин и разработки рекомендаций по решению проблем национального парка «Бузулукский бор» необходимо комплексное исследование геологической среды, анализа содержания вредных веществ в почве, воде и воздухе.

Ключевые слова: Бузулукский бор, Оренбургская область, национальный парк, добыча нефти, скважина, загрязнение нефтепродуктами, нефтепроявления.

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