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IMPROVING THE QUALITY OF THE ENVIRONMENT BY RECYCLING OIL WASTE

Sarabekova U.Zh.[1], PhD, associate professor
ulbolsyn.sar@mail.ru, https://orcid.org/0000-0001-9548-8333
Raimbekova S.R.[1], 3rd year student of the EP 6B11279 «Life safety and environmental Protection»rashidovna0604@gmail.com, https://orcid.org/0009-0003-3816-8546
Kaskyrbekkyzy K.[2], 3rd year student EP 6B07321 «Structural Analysis and Design of Buildings and Structures», kkaskyrbekkyzy@bk.ru, https://orcid.org/0009-0009-2329-9512

[1]*Korkyt Ata Kyzylorda University, Kyzylorda, Kazakhstan*
[2]*International Educational Corporation (KazGASA Campus), Almaty, Kazakhstan*

Annotation. This article proposes to develop a plan of phased processes for Labor expertise in the organization and measures to ensure production safety at an oil and gas enterprise. The article analyzes the development of asphalt concrete technology based on solid oil residues in the form of asphalt-resin paraffin deposits of the Kumkol field of Kyzylorda region in order to protect the environment from pollution by oil waste. In the course of the work, complex processes are considered in the management of labor protection, the health of employees, Environmental Protection at the oil refinery and ways to reduce injuries at the production site to a minimum, as well as measures to improve the state of production and labor protection to prevent accidents at work, occupational diseases and industrial accidents and incidents.

The main reason for premature damage to coatings is the long-term durability and operational properties of the bitumen used. Road bitumen produced by oil refineries does not correspond in their properties to the climatic conditions in which the coating operates. As a result, there is a need to create viscous substances aimed at increasing the resistance and strength of asphalt concrete coatings to Frost, shear, scratch, using energy-intensive methods and technologies. The authors have done extensive research for this purpose. The article develops computational work and graphic work that formulates the main direction of the article.

Keywords: asphalt-resinous paraffin deposits, oils, resins, bitumen, asphaltenes, elasticity.

Introduction. We all know that the Republic of Kazakhstan is one of the top ten in the world in terms of the volume of fossil resources and reserves of oil raw materials. Along with the benefits, the harmful effects of oil and gas production on the environment are not small. The consequences of natural or man-made disasters occurring during oil production, transportation and processing operations, in turn, contribute to the deterioration of the ecological situation of oil regions. It is clear that oil and oil residues spilled on the ground, torches for burning associated gases pollute the air, water, soil, harm not only flora and fauna, human health, but also contribute to the extinction of some living things. During the production process, the oil production industry contributes to the accumulation and formation of solid waste based on asphalt-resinous paraffin sediments, which are close in chemical composition to the main composition of the asphalt concrete mixture of the road surface and are a binder. By replacing commercial bitumen by using man-made deposits, which contribute to reducing the environmental impact of accumulated oil waste on the environment based on data from oil fields in the Kyzylorda region.

In modern times, oil is produced on 15% of the upper surface of the globe, including more than 1/3 of the dry land. There are more than 40 thousand oil fields in the world – potential foci of influence on natural Geosystems. Currently, from 2 to 3 billion US dollars are spent annually in the world.oil is produced up to , and according to approximate estimates, the upper surface of the globe is about 30 million tons annually. T. is polluted by oil, which is equivalent to the loss of one large oil field by mankind. The problems of oil pollution of the environment are becoming more and more complex every year and are becoming more and more relevant in the world.

Modern approaches to the use of oil waste concentrated in waste collection warehouses over a long period of operation of oil fields provide for the extraction of hydrocarbons and the restoration of their marketable properties from the high oil part of the warehouses. Processing of the lower layers of warehouses and recoverable oil waste is a complex technical task, which is often solved by destructive methods that do not allow oil products to be returned to the warehouse. This method is ineffective because solid oil residues contain highly molecular impurities that have valuable properties and can be returned to the Reserve cycle.

In addition, despite the extreme diversity of existing methods of neutralization and use of oil waste, the choice of technologies is carried out empirically (from the consumer properties of waste) or based on the technical capabilities of the technology, that is, insufficiently justified. There is no single complex creterium of the choice of technology for the use of petroleum products. This will allow us to approach the solution of common tasks to reduce the man-made load on natural Geosystems by maximizing the involvement of solid waste from the extraction and production of a number of products, the solution of which is required by individual tasks. At the enterprises of the oil production industry, waste is formed during the production, field preparation and transportation of oil at mine pumping stations. The main sources of oil waste formation: – Abandoned during oil production-industrial layer (promsloy) (currently absent or their volume is not increasing); -Cleaning of man-made equipment (bullits located at additional compression pumping stations); cleaning of oil storage tanks, sewage wells located at pre-oil treatment facilities (MDS) and cleaning of oil production territories from oil-contaminated soil.

Materials and methods. The main direction of development of production and industry in the country is the development and effective use of raw materials and fossil resources in the bowels of the Earth. Including oil and gas production has its own special place [1].

The volume of oil and gas production in Kazakhstan is growing rapidly every year. The main oil and gas basins of the country include the Caspian lowland, Bozashchi usturty, Mangyshlak, Shu-Sarysu and South-Turgai lowland. According to the Geological Survey, the total oil reserves in the South Turgai lowland are 140-160 million tons. It is considered to be about a ton [2-4]. Currently, the number of newly discovered oil and gas fields located on the territory of the South Turgai lowland exceeds ten [5].

On the territory of Kyzylorda region, the volume of oil waste – oil sludge and oil soil, according to Statistics, has reached one hundred thousand tons.

According to the location of oil waste on the territory of Kyzylorda region, all objects located have a temporary status, which can be conditionally divided into three:

- emergency technological warehouses;
- places for storage of solid oil residues in finished gravel quarries;
- underfloor torches [6].

To date, measures are being taken to increase the environmental safety of oil-producing enterprises in the region, reducing the volume of oil waste and the number of warehouses for their storage. Further accumulation of oil waste, with the release of harmful components, causes significant damage to the environment [7].

Because of this, the environment cannot regenerate on its own due to the accumulation of oil waste. Therefore, in order to reduce technogenic factors affecting the environment, it is necessary to reclamation oil-damaged areas and restore soil fertility [8] (Table 1).

Due to the content of substances with toxic elements characteristic of regions of countries, there is a regional background, which is numerically taken as value 1.

Value 2, a sign that the amount of pollution is high, requiring control of the dynamics of pollution and elimination of the causes of pollution. Above this magnitude, polluting soils are considered "very dirty".

Table 1 – Comparative characteristics of oil-containing, polluted soils in different quantities

Degree of contamination	Oil content in soil (dry soil), mg / kg	
	Mineral part of the soil	Organic part of the soil
Light-one-to-one: if no measures are taken, plant growth slows down; the soil property temporarily deteriorates.	5000÷20000	40000÷150000
Moderate - moderate: only some plants develop smoothly, retain their green state if they are carefully adjusted; the soil can be restored in three years; recultivation-recovery without delay takes 2-3 times longer.	20000÷50000	150000÷750000
High-very high: oil is absorbed into the soil to a depth of 10 cm; only one or two plants-sweat are preserved; proper reclamation-LANs the soil will regenerate in 3-5 years; without it, recovery will take 20 years or more.	50,000÷ high	750000÷ high

Around 3, you will have to clean the soil and crust. The magnitude of oil products in the soil is given in Table 2. If the concentration of petroleum products is higher than 5 g/kg, measures are carried out to clean the soil layer [9].

Table 2 – The magnitude of oil products in the soil

Background indicator	Quantity of petroleum products, mg / kg
1	50
2	1000
3	5000

In the" methodological recommendations for the identification of degraded and polluted lands", an assessment of soils contaminated with petroleum products at five levels is prescribed. In accordance with the" methodological recommendations for the identification of degraded and polluted lands", the level of oil product content in the soil is given in Table 3 [10].

Table 3 – The level of content of petroleum products in the soil

Element additives	Composition according to the contaminated level (mg / kg)				
	ability to	low	medium	high	very high
Oil and petroleum products	<ШРК	From 1000	From 2000	From 3000	5000<

The soil is considered a biological environment saturated with various microorganisms (bacterial and fungal). By rotting organic soil residues, these microorganisms create favorable conditions for the formation of organic acids, which enter into a chemical reaction with mineral particles [11].

One of the most important parts of the soil is humus, which contains high molecular weight organic acids, salts and other substances (Table 4). Soil colloids, consisting of Fine Organic and mineral particles, increase the acidification of the exchange capacity of the soil [12].

Table 4 – Classification of oil waste processing methods

The main classification feature of the method	Variety of method	Main advantages	Restrictions in use
1	2	3	4
1. Thermal	incineration in open warehouses	It does not require particularly strong costs	Risk of incomplete combustion of petroleum products, severe contamination of the air basin from burned products
	incineration in furnaces of different designs and types	Used for many types of waste.	Large loss of purification and disinfection of flue gases
	AOSTRA TASIJUK method, which combines the processes of incineration and pyrolysis, thermal separation	The resulting products can be used again. Solid waste recycling particles will be environmentally safe. Much more economical than burning	High energy and material costs
2. Chemical	hardening by dispersing with slaked lime or other hydrophobic reagents	High efficiency of the process of processing oil-containing waste to obtain a hydrophobic powder-like material that can be used in road construction. This is one of the most promising methods of processing and using oil waste	It requires the use of a special installation, a certain amount of high-quality slaked lime, additional study of the environmental impact of the formed hydrophobic product.

Table-4 presents a classification of modern approaches to the use of oil waste used in world practice. Classification features are the processes that take place during the processing of oil waste. The table also shows the advantages and disadvantages of various approaches [13].

The application of methods depends on the composition of raw materials, the nature of oil waste, the ratio of organic and inorganic components in it, environmental requirements, specific conditions-the profile of the enterprise, its technical capabilities, etc. The analysis of oil waste processing technologies introduced at the enterprises of the industry showed that mainly foreign production equipment with a price of more than a million dollars is used for their implementation.

In addition, many equipment mainly works with heating of liquid oil waste – oil waste intended for processing the upper water-emulsion layer of reservoirs, and has a limit on the content of mechanical impurities of 7-20% in the oil waste processed by mass. The specified restrictions create difficulties in the processing of solid oil residues and provide only destructive thermal methods that do not allow them to return pre-oil products to stock turnover before cleaning at these installations [14-15].

In addition to the advantages and disadvantages of the method, the lack of a comprehensive criterion for choosing a technology for the neutralization of oil waste, which takes into account the reserve potential, origin, composition and beneficial properties of oil waste, complicates the choice of the most economically and environmentally optimal technology.

Results and discussion. The rise of environmental safety issues in the oil waste development system around the world is becoming increasingly urgent. After all, this problem is often observed in every oil-producing region.

Although we say that oil waste has a certain degree of harmful effect on the environment, the main important issue is the processing and use of oil waste (scientifically based amounts) throughout the entire period of oil refining work. At the same time, oil waste belongs to the second material resource and is used as the primary raw material in agriculture in terms of chemical composition.

Therefore, from an environmental point of view, the processing of oil waste and reducing its formation is an important issue, and this requires the availability of new approaches and techno-environmental solutions.

The results of the analysis of the scheme of movement of oil waste using the example of oil producing enterprises of the Kyzylorda region showed that the strict requirements imposed on oil waste are carried out in accordance with the current sanitary and hygienic and environmental standards of Environmental Management.This creates conditions for reducing the payment for harmful substances thrown into the environment and solving engineering and environmental problems with the introduction of new equipment, technologies.

The main directions of work on the cleaned floor were proposed: return to the original location or further reclamation with placement at production sites; use of damaged, but not contaminated areas for reclamation; improvement of landfills for road construction, cleaning and re-cleaning of solid oil residues.

In addition, using oil sludge in road construction, it is possible to reduce the cost of the constructed road and optimize the technological process.

Research studies have shown that by adding light oil to the soil in a volume of 2-3%, it is possible to reduce the consumption of cement material by 2%, while increasing the water absorption and cold resistance of cement soil. It turns out that with the addition of a mixture of 8-12% cement and 2-3% oil to smooth smooth sand, the cement soil corresponds to Class II-III strength.

Ttechnically close method of preparation of asphalt concrete mixture, which involves the use of asphalt concrete mixture containing 8-10% water by bubbling oil with a temperature of 80-950c, reheating with a mineral component to 150-1600c and adding bitumen heated to 140-1500C to this mixture. So the oilcloth is 18-20% of the mass of bitumen.

The disadvantage of this method is the duration and complexity of the process and its use of a scarce commodity product – bitumen, which is expensive in price.

The next area of application of oil waste as a raw material is the preparation of building materials. The use of oil waste allows not only to reduce the consumption of traditional raw materials – bitumen and oil, but also to obtain building materials that have high physical chemical properties.

The main results of the research work in the article consist of the following:

The analysis of the directions of use of oil waste as a reserve of non-refundable raw materials showed that mainly oil waste is obtained for use, such as oil sludge and oil soil. It was established that the main criterion for the suitability of asphalt-resin paraffin deposits for various industries as technogenic raw materials is the composition associated with its origin. Based on the study of the composition and mechanism of formation of ASHPF and its impact on environmental components, as well as methods of its use, it was found that there is insufficient data on its processing as a non-return raw material on the road surface.

The environmental and economic efficiency of the practical implementation of this solution is confirmed by the fact that the proposed technology for processing ASHPCS excludes the formation of non-return waste, and the implementation of which allows you to obtain new products that can fully compensate for production costs.

A resource-saving technology has been developed that allows you to reduce the volume of concentration of solid waste from oil production by using ASHPSH as an organic viscous

binder on the road surface with physical and mechanical characteristics at a level not lower than standard.

As a result of the study, ways of using oil residues, especially asphalt-resin paraffin deposits (ASHPSH), as recoverable raw materials were identified. The features of the composition of ASHPSH and its impact on the environment were studied and the scientific and technological foundations of its use as an organic viscous binder of road surfaces were developed. The proposed technology has been proven to be environmentally and economically efficient, reducing waste volumes.

The most important thing when assessing the state of the air basin of the oil production zone is to establish a dangerous amount of its pollution, depending on natural and climatic factors.

Each of the stages of development of oil and gas production zones (exploration, field development and construction of main oil and gas carrier systems, their operation) is characterized by Types, intensity, levels of impact and level of transformation of natural conditions [14, 15].

The main atmospheric pollutants emitted by internal combustion engines are: carbon monoxide, nitric oxide, sulfur oxide, benzapiren, aldgides and ash. To this list can also be added the smell and smoke of gases with an expired service life, which have a negative impact on a person [14, 16].

It is known that during the year, diesel installations of one drilling rig produce about 2 thousand hydrocarbons and ash, up to 30 tons of nitrogen oxide, 8 tons of carbon monoxide, 5 tons of sulfur andigrid. In winter, the removal of pollutants is carried out at intervals of more than 2 km near drilling. Within the framework of this zone, a man-made area with a total weight of chemicals of 2.4-3.4 t/km is formed.

In the process of operation of a diesel engine, it is necessary to take into account the presence of pollutants (fuel t/kg.) the number is shown below. They can significantly determine the sanitary level of the unit during Operation: carbon monoxide – 9, nitric oxide – 33, sulfur oxide – 6 (defined as the ratio of the specified number to % of sulfur in fuel); hydrocarbons - 20; aldehydes, organic acids – 6, solid particles (ash) (defined as the product of the specified number of % of solid particles).

Conclusion. As a result of the study, ways of using oil residues, especially asphalt-resin paraffin deposits as recoverable raw materials were identified. The features of the composition of ASHPSH and its impact on the environment were studied and the scientific and technological foundations of its use as an organic viscous binder of road surfaces were developed. The proposed technology has been proven to be environmentally and economically efficient, reducing waste volumes. As a result of practical tests, it was found that the physical and mechanical properties of asphalt-concrete based on ASHPSH fully comply with regulatory requirements. It was shown that at the plant of "Kyran" LLP in Kyzylorda region, the technology was implemented in practice, the economic effect of which will ensure savings of about 1.3 million tenge per 1 km of road.

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МҰНАЙ ҚАЛДЫҚТАРЫН ҚАЙТА ҚӘДЕГЕ ЖАРАТУ АРҚЫЛЫ ҚОРШАҒАН ОРТАНЫҢ САПАСЫН ЖАҚСАРТУ

Сарабекова Ұ.Ж.[1], PhD, доцент
Раймбекова С.Р.[1], 6В11279 «Өмір тіршілігінің қауіпсіздігі және қоршаған ортаны қорғау» ББББ-ның 3-ші курс студенті
Қасқырбекқызы Қ.[2], 6В07321 «Ғимараттар мен имараттарды есептеу және жобалау» ББББ 3-курс студенті

[1]Қорқыт ата атындағы Қызылорда университеті, Қызылорда қ. Қазақстан
[2]Халықаралық білім беру корпорациясы (ҚазБСҚА кампусы), Алматы қ., Қазақстан

Аңдатпа. Бұл мақалада ұйымдағы еңбек сараптамасы мен мұнай-газ кәсіпорынындағы өндірістік қауіпсіздікті қамтамасыз ететін шаралардың кезеңдік процесстердің жоспарын әзірлеу ұсынылады. Мақалада мұнай қалдықтарымен ластанудан қоршаған ортаны қорғау мақсатында Қызылорда облысы, Құмкөл кен орнының асфальтты-шайырлы парафинді шөгінділер түріндегі қатты мұнай қалдығы негізінде асфальттыбетон технологиясын жасау талданған.

Жұмыс барысында күрделі процесстер еңбекті қорғауды басқарудағы, қызметкерлер денсаулығы, мұнай өңдеу зауытындағы қоршаған ортаны қорғау және өндіріс орнындағы жарақаттануларды ең аз шамаға дейін түсіру жолдары қарастырылған, сонымен қатар өндірісте жазатайым оқиғаларды мүмкіндігінше болдырмау үшін, кәсіптік аурулар мен өндірістік апаттар және оқиғалардың алдын алу үшін өндіріс жағдайы мен еңбекті қорғауды жақсарту шаралары қарастырылады.

Жабындардың мерзімінен бұрын бүлінуіне қолданылатын битумның ұзаққа шыдамдылығы мен пайдалану қасиеттері себеп болды. Мұнайды қайта өңдеу зауыттары шығаратын жол битумдары өздерінің қасиеттері бойынша жабын жұмыс істейтін климат жағдайларына сәйкес емес. Соның салдарынан энергияны қажет етпейтін әдістер мен технологияларды пайдалана отырып, асфальттыбетон жабындарының аязға, ығысуға, сызатқа төзімділігін және беріктігін арттыруға бағытталған тұтқырлы заттар жасау қажеттілігі туындайды. Авторлар осы мақсатта көлемді зерттеулер жасаған.

Мақалада есептеу жұмыстары мен мақаланың негізгі бағытын тұжырымдайтын графикалық жұмыстар жасалынған.

Тірек сөздер: Асфальтты-шайырлы парафинді шөгінділер, майлар, шайырлар, битум, асфальтендер, серпімділік.

УЛУЧШЕНИЕ КАЧЕСТВА ОКРУЖАЮЩЕЙ СРЕДЫ ПУТЕМ ПЕРЕРАБОТКИ НЕФТЯНЫХ ОТХОДОВ

Сарабекова У.Ж.[1], PhD, доцент
Раимбекова С.Р.[1], студент 3-го курса ОП 6В11279 «Безопасность жизнедеятельности и охрана окружающей среды»
Каскырбеккызы К.[2], студент 3-го курса по ОП 6В07321 «Расчет и проектирование зданий и сооружений»

[1]Кызылординский университет имени Коркыт Ата, Кызылорда, Казахстан
[2]Международная образовательная корпорация (кампус КазГАСА), Алматы, Казахстан

Аннотация. В данной статье предлагается разработать план поэтапных процессов проведения трудовой экспертизы в организации и мероприятий по обеспечению производственной безопасности на нефтегазовом предприятии. В статье анализируется разработка технологии асфальтобетона на основе твердых нефтяных остатков в виде асфальтосмолопарафиновых отложений месторождения Кумколь Кызылординской области с целью защиты окружающей среды от загрязнения нефтяными отходами.

В ходе работы изучаются сложные процессы в управлении охраной труда, здоровье сотрудников, охрана окружающей среды на нефтеперерабатывающем заводе и способы снижения травматизма на производственной площадке до минимума, а также меры по улучшению состояния производства и охраны труда для предотвращения несчастных случаев на производстве, профессиональные заболевания, несчастные случаи и инциденты на производстве. Основной причиной преждевременного повреждения покрытий является длительная долговечность и эксплуатационные свойства используемого битума.

Дорожный битум, производимый нефтеперерабатывающими заводами, по своим свойствам не соответствует климатическим условиям, в которых эксплуатируется покрытие. В результате возникает необходимость в создании вязких составов, направленных на повышение стойкости и прочности асфальтобетонных покрытий к замерзанию, сдвигу, царапанию, с использованием энергоемких методов и технологий.

Авторы провели обширные исследования с этой области. В статье представлены вычислительные и графические исследования, которые формулируют основное направление статьи.

Ключевые слова: асфальтосмолопарафиновые отложения, масла, смолы, битум, асфальтены, эластичность.