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Environmental audit on the way of solving environmental problems in the oil and gas sector

The paper discusses the ways of solving the current problems in the area of environmental protection, particularly in the oil and gas sector of Kazakhstan by the environmental audit. Today, the environmental audit is one of the most important areas of the audit. The environmental audit can solve problems that could affect the improvement of environmental quality in the field of oil and gas. Environmental problems are reflected in the deterioration of the Caspian Sea, which has a negative impact on flora and fauna of the region. Despite the existence of legislative norms of environmental audit, taking over the foreign experience can improve the system of environmental management. Environmental audit is able to adjust and improve environmental inspections at the enterprises of oil and gas, which in its turn will lead the improving of the environment in general.

Key words: environmental audit, environmental management, oil and gas sector, oil, gas, pollution, the Caspian Sea.

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Мұнай-газ саласындағы экологиялық мәселелерді шешудегі экологиялық аудит

Бұл жұмыста қоршаған ортаны қорғау, оның ішінде Қазақстан мұнай-газ секторының мәселелерін экологиялық аудит арқылы шешудің тиімді жолдары қарастырылған. Бүгінде экологиялық аудит – жалпы аудит саласының ең маңызды бөліктерінің бірі. Оның көмегімен мұнай-газ саласындағы қоршаған орта жағдайын жақсартуға ықпалын тигізетін мәселелерді шешуге болады. Қоршаған орта мәселелерінің бір көрінісі — Каспий теңізі жағдайының нашарлауы. Бұл жағдай аймақтың өсімдік және жануар әлеміне кері әсерін тигізуде. Заңнамада экологиялық аудит жүргізу нормаларының болуына қарамастан, шетелдік тәжірибені қолдану табиғатты қорғау қызметін одан әрі жетілдіруге мүмкіндік берер еді. Экологиялық аудиттің мұнай-газ кәсіпорындарында экологиялық тексерудің деңгейін реттеу және жақсарту мүмкіншілігі бар. Бұл жағдай экологияның жалпы жағдайының жақсартуына келтіреді.

Түйін сөздер: экологиялық аудит, экологиялық менеджмент, мұнай-газ саласы, мұнай, газ, судың ластануы, Каспий теңізі.

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Экологический аудит на пути решения экологических проблем в нефтегазовом секторе

В работе рассмотрены актуальные пути решения проблемы в области охраны окружающей среды, в частности в нефтегазовом секторе Казахстана посредством экологического аудита. Экологический аудит является сегодня одним из наиважнейших сфер аудита. Посредством экологического аудита можно решить вопросы по улучшению состояния качества окружающей среды в сфере нефтегазодобычи. Проблемы окружающей среды находят свое отражение в ухудшении состояния Каспийского моря, что негативно влияет на флору и фауну этого региона. Несмотря на наличие в законодательстве норм проведения экологического аудита, перенятие зарубежного опыта позволило бы усовершенствовать систему природоохранной деятельности. Экологический аудит в состоянии урегулировать и улучшить состояние экологических проверок на предприятиях нефтегазодобычи, что, в свою очередь, приведет к улучшению экологии в целом.

Ключевые слова: экологический аудит, экологический менеджмент, нефтегазовый сектор, нефть, газ, загрязнение воды, Каспийское море.

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ENVIRONMENTAL AUDIT ON THE WAY OF SOLVING ENVIRONMENTAL PROBLEMS IN THE OIL AND GAS SECTOR

As never before, now the problem of ecology is the most urgent. In the period of rapid growth of the industrial production, environmental audit became a link between the state that carries out environmental protection in the face of executive bodies and enterprises that do harm to the environment. The problem of the Caspian Sea is pressing for our country.

As a result of the world's globalization economy the solution of environmental problems is not beyond the power of any one country. For example, cooperation between countries in the field of environmental protection is carried out through organizations such as the European Economic Community, the United Nations under the «United Nations Environment Programme» (UNEP) and others [1, c. 20].

At the international level, both in the USA and in European countries, the environmental audit is seen as economic and legal tool to stimulate environmental activities in order to increase investment attractiveness. Environmental audit is a major component of the environmental management system and includes an assessment of environmental performance indicators, risk analysis and management.

World Bank gives the following definition of environmental audit: environmental audit is the methodological study and analysis of environmental information of the organization, structure or object. It allows you to determine whether the activities and results satisfy planned indicators, whether it is the basis for the implementation of enactments that enhance the ecological and economic efficiency of the economic entity's activity. Environmental audit by determination of the International Chamber of Commerce looks the same way: environmental auditing is the systematic evaluation, which is undertaken in order to determine whether the consistent operation of the environmental management system conforms to the planned goals, objectives, structure and environmental policies of the enterprise. Audit of environmental management system is a systematic and documented verification process of objectively obtaining and evaluating data to determine whether the environmental management system has been adopted in the organization, the audit criteria of the system has been established by the organization, and also to report the results that were obtained in the course of this process to management . For the US Environment

Agency environmental audit is the study of ecological status of the object of property or activity in order to identify past and current problems, potential environmental risks and inconsistencies activity requirements of environmental legislation that governs this type of activity.

The relevance of environmental audit in Kazakhstan, in our opinion has the economic, environmental and social aspects and they are shown in Table 1.

The most urgent problem of environment in Kazakhstan is the pollution of the Caspian sea by producing oil and gas. When outputting oil the volume, qualitative and quantitative composition of pollutants are determined by the physicochemical properties by reservoir development technology, the system of collection and transportation of oil.

During the exploration and exploitation of oil transportation the seizure of land, pollution of water and atmosphere occur. All components of the environment in the oil-producing regions experience intense human impacts, and the level of negative consequences is determined by the negative impact of the scope and duration of hydrocarbon deposits' explosion. The processes of exploration, drilling, production, preparation, transportation and storage of oil and gas require large amounts of water for processing, transport, household and fire fighting needs with simultaneous discharge of the same volumes of highly mineralized, containing chemicals, surfactants and oil, sewage waters. The main pollutants of the environment in processes of oil production are: oil and oil products, sulfur and hydrogen sulfide gases, saline reservoir and waste water oil fields and drilling wells, sludge drilling, oil, water and chemical reagents that are used to intensify the processes of oil production, drilling and oil, gas and water treatment [2, с. 22].

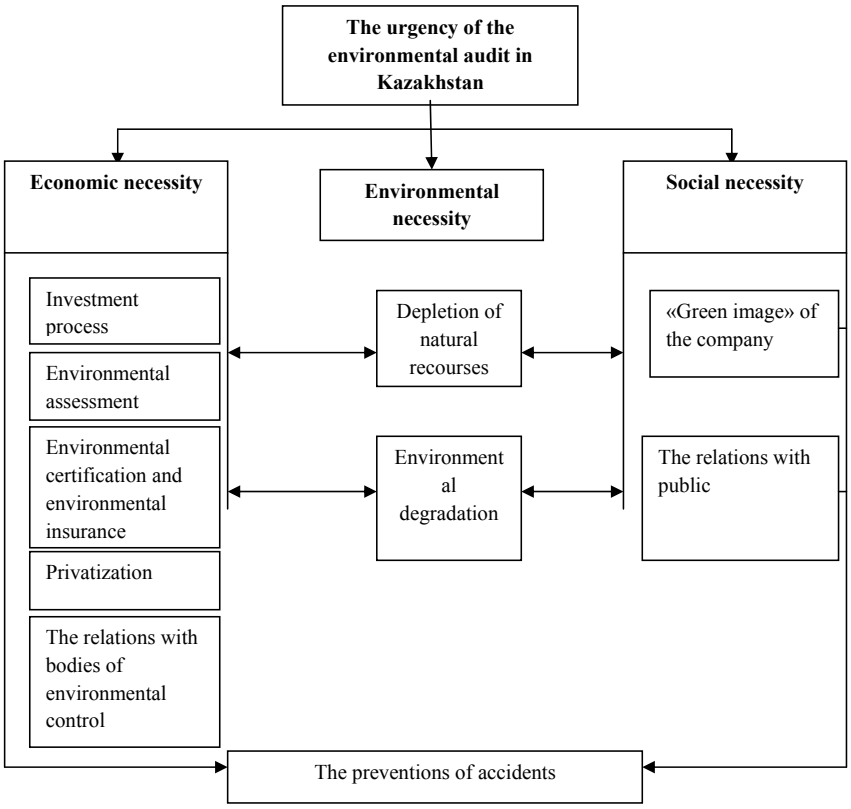

Table 1 – The urgency of the environmental audit in Kazakhstan

The applied technology of wells construction causes ethnogeny disturbances in the earth's surface, and changes in physical – chemical conditions at the depth at the opening of reservoir during drilling. Environmental pollutants in the sinking of wells and equipment are numerous chemical reagents that are used for the preparation of drilling fluids. Today, not all of the reagents that are included in the composition of drilling fluids have the established MPC performance and limit of harm index. Oil and

oil products significantly pollute the environment, which come to the surface of earth, not only as components of drilling mud's, but also with using of fuel and lubricating materials, in the test of well or as a result of the accident. During the construction of the drilling the pollution of atmosphere is mainly limited by air emissions of exhaust gases from the engines of vehicles.

The work of diesel plants throughout the year on one chink provides venting to 2 tons of hydrocarbons and soot, over 30 tons of nitrogen oxide, 8 tons of carbon monoxide,5 tons of sulfur dioxide. The transference of boring machines on the electric drive will reduce the consumption of petroleum products, to reduce the contamination of the territory and eliminate emissions of the products of fuel combustion into atmosphere.

The objects of oil production on the degree of environmental impact are among the leaders. While the process of extracting, gathering and preparation of oil into the environment except oil there also penetrate reservoir water, associated petroleum gas and a lot of chemical reagents that are included to boring mud.

Annually the companies of oil industry destroy up to 15 hectares of land, emit more than 2.5 million tons of polluted substances into the atmosphere, burn out about 6 billion cubic meters of associated gas, take about 750 million tons of fresh water, leave unconquered hundreds of barns with cuttings.

10% of all wells are abandoned or are in need of conservation and liquidation. Blocked wells under the influence of changes in the earth's crust can «come to life», highlighting the oil, gas and formation brine. In Kazakhstan, pours out dozens of wells have gone under water with the increase in water level in the Caspian Sea.

Oil and gas wells are complex and expensive installations that require constant monitoring and carrying out of technical measures for the maintenance of the operating modes. Due to untimely diagnostic tests in the industry stand idle for more than 20 thousand wells that should be repaired.

In all areas of the oil and gas business it is necessary to ensure environmental and energy security. Under the energy security it means the ability to ensure a stable supply of natural energy for domestic consumption. Ecological security means the security of the vital interests of the individuals, society and the state from natural and technogenic threats.

For traditional oil producing regions it is the most acute problem of environmental pollution by oil and oil products. It is very important to ensure environmental safety in the implementation of major new development projects of sea layers and insertion of arterial pipeline along the sea bottom. The problem of pollution is caused by the insufficient level of environmental technology processes and weak work of environmental services.

Our oil and gas production causes many issues for the Caspian sea. It's a big problem for ecology and to whole sea organisms. Containing some 18,800 cubic miles of water and covering more than 143,000 square miles, the Caspian Sea is the largest inland body of water on Earth. It has about a third the salinity of seawater, however, so it is not the largest freshwater lake. The salinity is in large part a residue of the sea's formation. Along with the Black Sea and the Sea of Azov to its west (which are not entirely landlocked) and the Aral Sea to its east, the Caspian is a remnant of the ancient Paratethys Sea.

As long as 65 million years ago, the Paratethys was connected to both the Atlantic and Indo-Pacific Oceans. By 5 million years ago, through shifts in the Earth's crust, a large landlocked sea had formed where the Caspian and its neighbours would later take shape. The waters became fresher, but then a link to the ocean was again established and a marine environment returned. About 2 million years ago that link to the ocean was closed, and the inland waters again became much fresher, through rainfall and the melting of glaciers. Eventually the Caspian Sea severed its connection to the Black Sea and became permanently landlocked [3, c.45].

The Caspian is fed by 130 rivers, the most significant being the Volga, which enters from the north and accounts for about 80 percent of the inflowing waters. In spite of the influx of freshwater, however, the sea remains salty, especially toward its southern end. The Caspian has no outlets, and in consequence loses water only through evaporation, a process that may tend to increase its salinity.

Owing to its large size, its long isolation, and its brackish waters, the sea supports an unusual collection of organisms. Among them are at least 331 endemic species, from zooplankton to mollusks and vertebrates. Most notably, the Caspian boasts five species of sturgeon, including the beluga, prized for their caviar. That population comprises 90 percent of the world's sturgeon stock. Such valuable aquatic resources, as well as lands suitable for agriculture (watermelon is a prime crop), have attracted dense human settlement to the coastal areas. Scientists who study the ecosystem have therefore become increasingly engaged in protecting it from industrial pollution and other damaging effects of human habitation and exploitation.

Of course, the main polluter of the sea is oil. Each year some 1.5 billion barrels of that resource,

pumped from wells around the seacoast and in the sea itself, are extracted, refined, and transported. Major pipelines are routed from Kazakhstan to China and from Azerbaijan to tanker terminals in the Black Sea and the Mediterranean. Tankers also travel via the Volga River and the Volga-Don Canal to the Sea of Azov and beyond. Almost half of Caspian oil is produced by Kazakhstan, with more to come, and one proposal is to add a pipeline to carry oil from that nation across the Caspian Sea itself to Azerbaijan, to link up with the pipelines that reach farther west.

The history of commercial oil and gas exploration and production in the region goes back nearly 150 years, so oil pollution is not simply a hazard of current activity. Some capped wells leak, and the fluctuating sea level has at times flooded onshore oil wells and oil-contaminated soils. Natural seepage also contributes to surface oil slicks and water column pollution. Under normal conditions, winds stir up ten-foot waves even in shallow parts of Caspian. That can help remove some lighter oil residues. But in recent years, winds in the northern and middle parts of the sea have declined markedly in velocity and frequency, as documented in Present State of the Caspian Sea, which was published in 2005 by Gennady N. Panin, a scientist at the Institute of Water Problems of the Russian Academy of Sciences; Ramiz M. Mammadov, deputy director of the Institute of Geography at the Azerbaijan National Academy of Sciences (ANAS); and Igor V. Mitrofanov, at McGill University in Montreal.

Oil pollution suppress the development of phytobenthos and phytoplankton of the Caspian Sea, represented by blue-green algae and diatoms, reduce the production of oxygen. Increasing pollution adversely affects the heat, gas and moisture exchange between the water surface and the atmosphere. Because of the spread on large areas of the oil film the evaporation rate reduced by several times. The pollution of the Caspian Sea leads to the death of a huge number of rare fish and other living organisms. Most clearly is seen the impact of oil pollution on waterfowl. The number of sturgeon stocks is steadily declining. Oil raw materials can be replaced by other raw materials, the sturgeon is no substitute and petrodollars can not be bought anywhere else. Diseases of the living organisms in the sea, that is, marine pollution leads to disease organisms in the sea [3, c.45].

There is a whole chapter in the Environmental Code of the Republic of Kazakhstan, which is devoted entirely to the environmental requirements in the implementation of economic and other activities in the state conservation area of the northern part of the Caspian Sea. It is very detailed environmental requirements for the management of exploration and production at sea, the designing and construction of oil and gas pipelines, onshore supply bases and other infrastructure, conservation and liquidation of wells, including at the time of spawning sturgeon. Such requirements are absent in the environmental legislation of other countries bordering the Caspian Sea, neither in Russia, nor in Azerbaijan, despite the fact that this problem requires urgent solutions. As a result of increase in sea level were flooded, more than 200 wells and oil fields, which threat is not only to biological diversity (in the Caspian Sea there are about 90% of world reserves of sturgeon, a large number of bird species, the Caspian seal), but also the entire ecosystem of the Caspian Sea. Over the past 15 years the commercial fish catch has decreased by 10 times[4, c.55].

Great attention is payed for environmental issues in Kazakhstan. In Kazakhstan, in addition to the Environmental Code were adopted such regulations like the Water Code of the Republic of Kazakhstan; Forest Code of the Republic of Kazakhstan; Law of the Republic of Kazakhstan «On Specially Protected Natural Areas» and others. Study of foreign experience of the environmental assessment indicates the broad scope of the various structures in the processes related to the conservation and renewal of natural resources, thus improving the environmental situation. For the Republic of Kazakhstan it is a practical interest of the following areas of international experience:

• the creation of the institute of environmental audit;

• the developing own programmers of environmental accounting of large industrial enterprises by themselves;

• the implementation to practice of second-tier banks in the financing of economic agents a preliminary assessment of their environmental activities.

In our view, to improve the efficiency of production and economic activities of economic entities in the sphere of environmental protection it would be appropriate the implementation of certain provisions of the Johannesburg Declaration ITOSAI related to environmental auditing activities to the authority of the major body of financial control [5, c.55].

It is also possible due to lack the performance of the state bodies to the optimal control of economic entities on environmental legislation to provide more extensive powers to independent environmental auditors. We can hardly say that the environmental audit can solve all the environmen-

tal problems in the field of oil and gas, and as in the whole world, but it can contribute for the reduction of harmful effects on the environment [6]. Environmental audit can provide recommendations for the improvement of the technical conditions for oil and gas production facilities, which in turn have a positive impact not only on the environmental situation of the enterprise, but also on its material condition. Environmental audit, despite the concerns about the environment, is a proof of the company, that its work and labour conditions are safe for its employees, and its products are environmentally friendly. From the point of view of investors it is more than the highest rating that can increase investment to organization.

As a result, you can gain the confidence of economic agents to conduct an environmental audit and decision-making to address environmental violations in the oil and gas sector. Despite stringent legislation in area of the environment's protection, we are often faced with its breach, which confirms the revision of the provisions on environmental audit in the direction of tightening it for using by organizations that are engaged in oil and gas production.

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