

liquidate this lake, however, the company decided to neglect this fact despite the significant risks and hazards. Finally, water of underground lake ($V \approx 28 \text{ mln.m}^3$) broke through above "Sapando-Kapital'naya" mine.

References

1. Conclusion № 55 from 8 September, 2014 "Reconstruction based on geomechanical study for "Project Plan of Hazardous Engineering Facilities Suspension – Mine "Chertinskaya-Yuzhnaya" within the license KEM 12259 ТЭ and KEM 01469 ТЭ».
2. Constitution of the Russian Federation, the Federal Law "On Subsoil", Art. 26.
3. Industrial ecology / Scientific-practical portal / Mine Abandonment in Rostov Region Led to Disastrous Environmental Consequences – 01.02.2006. – [Electronic Resource] – Access mode URL:<http://www.ecoindustry.ru/news/view/6548.html>
4. GN 2.2.5.1313-03 maximum allowable concentration (MAC) of hazardous substances in working place air / Ministry of Health of the Russian Federation. – Moscow – 2003. Mining Encyclopedia / Suspension. – [Electronic Resource] – Access mode URL:<http://www.mining-enc.ru/k/konservaciya/>.
5. Procedure for conducting operations on suspension and abandonment of production facilities related to subsoil use, M., 1999.

ENVIRONMENTAL PROBLEMS IN TRANSPORTATION OF HYDROCARBONS

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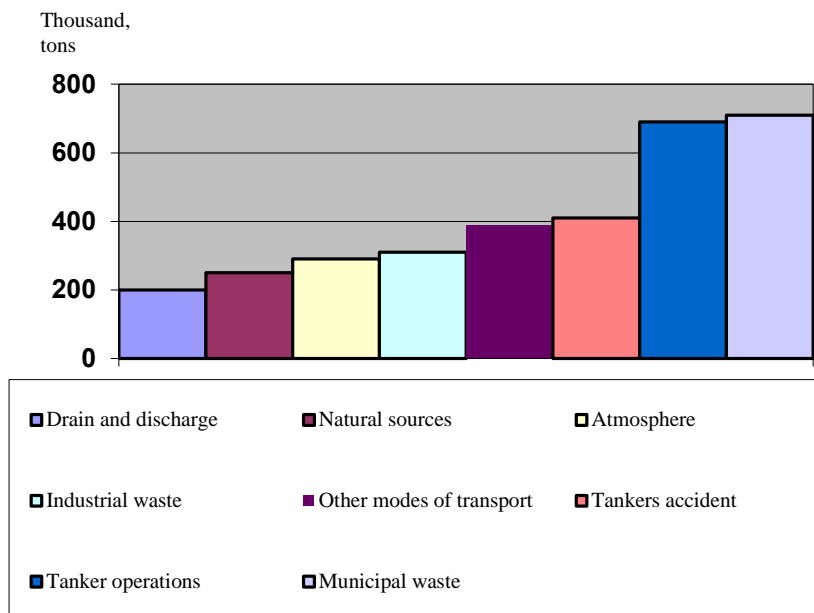
One of the most important environmental problems of the XXI century is emergencies arising during transportation of hydrocarbons. Thus, according to Greenpeace, the loss of the oil feedstock in the production and transportation in Russia is about 1%, and according to "Centre of Ecology of the fuel-energy complex" – 3.5-4.5% [5]. During transportation of hydrocarbons there are many difficulties that seriously affect the ecological state of the environment components.

Oil and gas transportation from the field to the consumer using a pipeline is the most common way of transporting oil: 99% of the "black gold" is delivered to destinations in this way. In this regard, one of the global problems is the oil spill during transport by pipeline. This is due to the fact that the life of the pipe steel and insulating coatings of 55% of oil has already expired and the possibility of manufacturing defects is quite large [3]. Only in our country there occur 50-60 accidents annually. The result of this situation is the large number of accidents involving oil spills, which lead to serious consequences for the environment. Remediation of contaminated areas is an expensive process, so it is much more profitable to invest all possible resources in the prevention of accidents [1].

To reduce the risk of accidents it is necessary to raise reliability requirements for oil pipelines. Today the technology and the production of anti-corrosive coating of pipelines are constantly improved; the use of flexible piping reinforced with plastic and having an unlimited operation life is being mastered. The most progressive companies are putting special systems for monitoring pipelines. To do this, a variety of technologies and strategies, from bypassing by people to controlling the objects from satellites, is applied. Nowadays a system of tracking the main characteristics of hydrodynamic processes (pressure, temperature and flow behavior of the fluid) is widespread. The data obtained are

compared with reference parameters which allow identifying possible anomalies associated with leakage [2].

Estimated numbers of annual discharge of oil



Oil spills in the sea are extremely dangerous. Since oil is lighter than water it spreads over the water with a thin film on a large area. Oil spills are accompanied by a massive loss of marine mammals, birds and reptiles. It causes damage to fisheries. Oil-drenched beaches deter tourists and harm coastal ecosystems, often irreparable. The most common accident is an accident at sea tankers. Tanker accidents at sea happen from the beginning of their use. The most serious accident involving the oil tanker took place in 1989. The tanker "Exxon Valdez" was to carry oil from Alaska to California, but suddenly in Alaska it ran aground bumping a reef Bligh. As a result, 260 thousand barrels of oil spilled into the sea. To reduce the risk of shipwrecks, first of all, you need to update the existing tanker fleet, achieving the operation of ships solely double-hulled [4].

Hydrocarbons transportation by water and land routes is an essential part of the world economy. Pipelines, tankers, barges, the main means of transportation of oil and gas, are economically viable, but at the same time associated with a greater risk of potential environmental disasters associated primarily with accidental spills. Recent events in the Gulf of Mexico have shown it. And because of the impossibility of replacing hydrocarbon as a main source of energy, people need ways to improve the prevention and elimination of consequences of hydrocarbon pollution of environmental components.

References

1. Belousov L.N., Korkhov Ya.G. (1984), *Tekhnologiya morskikh perevozok gruzov*, Transport, Moskva.
2. *Ekologiya transportirovki nefi (Rosneft)*, Available: <http://www.mirnefti.ru/index.php?id=108> Accessed 2015, October 20).
3. *Problemy ekologii pri dobyche i transportirovke nefi*. (2012), Available: <http://ecooil.su/139.html> (Accessed 2015, October 13).

4. Pshenitsyn M.C. Vse o nefti. Available: <http://vseonefti.ru/upstream/ekologicheskie-posledstviya-dobychi-nefti.html> (Accessed 2015, October 20) (Accessed 2015, October 16).
5. Zabello E., Neftyanye slezy Rossii: avarii na nefteprovodakh provotsiruyut rak. RBK. (2012), Available: <http://www.rbc.ru/economics/10/04/2012/645532.shtml> (Accessed 2015, October 16).

HYDROCARBON FIELD DEVELOPMENT AND ITS ENVIRONMENTAL IMPACT

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West Siberian region as one of the rapidly developing industrial areas is more and more facing environmental risks. A number of cities in Western Siberia can be considered to be the zones of ecological disasters.

The main reason for that is imbalance between the degree of anthropogenic impact on the environment and measures aimed at its preservation, recovery and protection. In particular, it is reflected in a growing number of areas and volumes of oil and gas extraction with more than 50% of depleted fields, use of obsolete technology, presence of hazardous chemical and nuclear facilities. What is more, insufficient attention is paid to the stability of natural landscapes regarding the anthropogenic impacts, which is associated with the peculiarities of zones where multi-year frozen grounds are spread, as well as with climatic conditions of pollutants dispersion in the atmosphere. [1] To understand the peculiarities of the environmental situation, we need to know what type of hydrocarbon it is and how it affects the environment.

Hydrocarbons are organic compounds molecules of which consist only of carbon and hydrogen atoms. The simplest representative is methane CH₄. Raw hydrocarbons are naturally occurring hydrocarbons and products which have undergone the recycling. Raw materials comprise the following substances:

- oil,
- natural gas,
- gas condensate.

Oil is a combustible oily fluid, found in sedimentary layers of the Earth; an important mineral. It is a complex mixture of alkanes, some of cyclanes and arenes, as well as oxygen, sulfur and nitrogen compounds. Gasoline, jet fuel, kerosene, diesel fuel, fuel oil are produced by oil refining. [2]

Oil recovery and its products, their processing and transportation have negative influence on the health and fertility of the Earth soil cover. Along with oil recovery, tonnes and tonnes of different rocks are being extracted and dumped.

One of the main properties of raw (unprocessed) oil is its density which depends on the content of heavy hydrocarbons: paraffins, resins and others. Higher molecular-weight methane hydrocarbons (C₁₂-S) consisting of normal alkanes and isoalkanes play an important role in light -fraction oil. The content of solid methane HC (paraffins) in oil is an important characteristic when studying oil surface spills. Paraffins are non-toxic for living organisms and become solid on the earth surface, depriving the oil mobility. Alkanes are assimilated by many microorganisms (yeasts, fungi, bacteria). Paraffin wax is very difficult to destroy and oxidize in the air. It can “seal” the pores of the soil cover for a