

РОССИЙСКАЯ АКАДЕМИЯ ЕСТЕСТВОЗНАНИЯ

# СЕРТИФИКАТ

научная работа

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**КЛИМАТИЧЕСКИЕ ОСОБЕННОСТИ ТРАНСПОРТИРОВКИ  
УГЛЕВОДОРОДНОГО СЫРЬЯ В НИЖНЕВАРТОВСКОМ РАЙОНЕ**

обсуждена на международной научной конференции  
Экологический мониторинг, Турция  
(Анталия), 16 - 23 августа 2012

Ученый секретарь РАЕ  
Н.Ю.Стукова



*Materials of Conferences***CLIMATIC FEATURES  
OF HYDROCARBON MATERIALS  
TRANSPORTATION  
IN NIZHNEVARTOVSK REGION**

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Nizhnevartovsk Region lies in a temperate climate zone. According to A.A. Grigorieva and M.I. Budyko's climate zones classification, it's characterized by humid climate with temperate warm summers and severe snowy winters. Climate of the region is characterized by prolonged winters, continuous snow covers (200–210 days), short mid-season periods, late frost in spring and autumn, short frost-free periods (100–110 days), short summers (70–90 days) [3, 4].

Temperatures in the region fluctuate prominently both seasonally and daily. When analyzing temperature factor, it's necessary to consider average maximum temperatures, duration and frequency.

Analysis of oil pipeline accidents and their relationship to an average annual air temperatures showed that the number of accidents is greater during the years with comparatively cold weather. For example, in 2006 an average annual air temperature was determined as 3, 2°C (with absolute minimum of –50,9°C on January 12), a number of accidents grew to 1678; in 2009 with an average annual temperature of 2,8°C (absolute minimum of –44,8°C on December 28) there were 2206 accidents. During periods of warm weather, a number of accidents was on the decrease, for example in 2003 with an average annual temperature of 1°C there were 543 accident, in 2005 an average annual temperature reached 0,16°C, number of accidents – 598. There were years when there was an increase in a number of accidents despite air temperature level (2007 – average annual temperature – 0,2°C, accidents – 1399; 2008 – average annual temperature – 0,3°C, accidents – 1260) and vice versa, (2010 – average annual temperature – 2,1°C, accidents – 820).

Since 2006 the Nizhnevartovsk region faced a growing number of oil pipeline accidents (2006 – 1678 accidents). In 2007, 1399 accidental spills were registered on the territory of the Nizhnevartovsk region, with contamination area covering 452,4 ha [1]. In the same way, in 2008 there were 1260 accidents and about 820 accidents

in 2010. Thus, «TNK-BP Management. Ltd» oil-fields presented highest accident risks in the Nizhnevartovsk region [2, 5]. The largest number of accidents in the Nizhnevartovsk region 2206 (or 45,9%) was registered in 2009. The final conclusion is that the accidents are mainly caused by internal and external corrosion.

The coldest month between 2003 and 2010 was January with the temperature of –34,9°C in 2006. Average monthly temperature in January is –20,8°C. The warmest month of the year is July with an average monthly temperature of + 17,9°C. Absolute maximum of air temperature can be observed in July – +33°C (July 8, 2007). In autumn, during average monthly temperature changeovers, a number of accidents usually increase. For instance, the average monthly air temperature in October is 0,1°C (changeover of daily temperatures is +5°C, 0°C), about 109 accidents can be observed during this period.

Soil temperatures are very dependent on atmospheric temperatures. That is why, changing of soil temperature regime results in changes of oil contamination area and its effects.

Minimal atmospheric and soil surface temperature levels also affect pipeline accident rate. During 2003–2010, more accidents occurred when minimal soil surface temperatures dropped to 47–54°C.

Humidification of the Nizhnevartovsk region area depends solely on moisture carried in the air from the west. Annual precipitation trend refers to continental type [3, 4]. Maximum precipitation amount accounts for summer months. Average precipitation amount between 2003 and 2010 in Nizhnevartovsk amounted to 459,9 mm. During several years it might diverge from the norm. Minimal precipitation was registered in 2005 (336,6 mm, number of accidents – 598), while 2007 pertains to a record amount of rainfall – 731,8 mm. There is no direct connection between the accident rate and rainfall amount, however unsteady and heavy rainfalls might cause washing-outs in trenches, damage of oil pipelines and might lead to other negative consequences.

Snow cover in the Nizhnevartovsk region appears in October or early November. During some years snow cover started to appear at the end of September. Loss of snow cover occurs in late April to early May. Period of winter lasts for 6–7 months [3]. Average snow cover depth makes from 23,6 cm (2010) to 72 cm (2003). There is a direct,

inverse connection between snow cover depth and pipeline accident rate: the deeper the snow cover, the lesser the number of accidents.

Reasoning from all the previously stated facts, it may be concluded that accident frequency depends not only on a single nature or climate features, but on a complex of such.

It's very important to conduct studies of environmental resources as they might help make use of favorable climate factors and prevent negative influence over pipeline transport.

Pipelines, main ones in particular, should be a subject to increased wear and corrosion resistance in different climate conditions. Under destructive effects of certain atmospheric conditions and aggressive environments, such as deformations, soil movements, damage of underwater crossings, nearness of groundwater occurrence, prolonged periods of cold weather metal structures gradually lose their initial characteristics and qualities which might eventually lead to an accident.

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The work was submitted to the International Scientific Conference «Environmental monitoring», August, 16-23, 2012, Turkey (Antalya), came to the editorial office on 28.06.2012.