

## **Environmental Situation and Conditions for Traditional Life Styles of Indigenous Communities in the West Siberian North**

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**Abstract:** The ecological situation on the Arctic and Subarctic areas of Russia is reviewed. The interaction of elements of oil and natural gas complex and nature systems, as well as their impact on the health of people living and working here are analyzed. The role of anthropogenic impacts on northern biogeocoenoses in maintaining ethnic identity and physical survival of the indigenous ethnic groups is revealed. The results of survey of indigenous communities, showing their concern over the deteriorating environmental and socio-economic situation are shown, some measures aimed at preserving the traditional Aboriginal lifestyle of the Russian oil and gas North are proposed.

**Key words:** Ecological Situation • Indigenous Ethnic Groups • Northern Biogeocoenoses • Ethnic Conflicts • Ethnographic Tourism

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### **INTRODUCTION**

One of the most important factors, largely determining the socio-economic development of the West-Siberian North is the ecological situation, changing as a result of natural processes (warming and the retreat of the Arctic coasts) and anthropogenic influences (industrial pollution). The Arctic (along with Subarctic) is the most fragile ecosystem of the planet and, at the same time, "kitchen" of European weather. However, many well-established in central and southern remediation technologies, restoration of damaged natural landscapes in the northern regions are completely unusable and in some cases cause harm for biogeocoenoses.

So here we need special, developed only in this particular region, environmental practices. It is here necessary to use environmental management systems that satisfy conflicting requirements. On the one hand, compliance with the recommendations of the ISO - 14000 and on the other - the specific characteristics of the region. All these contradictions are resolved at the level of specific Deming cycle, targeting natural resources on continuous improvement of their work in this region, rather than simply copying someone else's achievements [1].

It is known that in 1991 Russia, Sweden, USA, Finland, Iceland and Norway adopted policies on environmental protection of the Arctic (AEPS). In 1996, the foreign ministers of the Arctic region signed the Ottawa Declaration of the Arctic region and formed the Arctic Council, which was designed, including a program to provide a comprehensive introduction of the principles of sustainable development.

Water pollution of the northern seas and territories occurs mainly due to human activities and the main sources of pollution are mining, transportation (tanker fleet), pipelines, military installations and disposal, processing industry. The main pollutants are oil products, phenols, heavy metal compounds, nitrogen oxides [2].

During the construction of objects and communications of oil and gas complex numerous dumps of industrial wastes were formed, forests were cut down, hundreds of quarries were developed hydro alluvium over large areas was carried out, large tracts of land were seized.

Poor quality of construction, materials used in the construction of gas and oil pipelines, lack of environmentally friendly technologies, low environmental culture resulted in widespread contamination of the area, lead to violations of hydrological, hydrogeological and

Table 1: Main indicators characterizing the impact of economic activities on the environment

Indicators	Region	2005	2006	2007	2008	2009	2010	2011	2012
Polluted water in surface water objects, Mm <sup>3</sup>	South of Tyumen Region(S of TR)	416.15	388.91	357.07	361.53	405.87	-	-	-
	Khanty-Mansy Autonomous District(KMAD)	31	33	38	42	46	46	31	-
	Yamalo-Nenetz Autonomous District(YNAD)	31	59	49	48	33	31	27	-
Emissions of pollutants into the air from stationary sources, thousands of ton	S of TR	84.4	82.1	83.6	75.9	94.7	116.3	106.1	110.2
	KMAD	3024	3022	2907	2294	2201	2129	2353	2429.6
	YNAD	1071	919	1095	1124	972	886	834	980.0
Investments in fixed capital, aimed at protecting the environment and natural resource	S of TR	213	235	331.2	588.8	147.3	321.8	664.8	1758.5
	KMAD	5787.9	4841.9	3867.6	4919.9	2592.2	8824.8	6953.6	9415.4
	YNAD	793.5	1164.7	1360.7	2177.5	3941.9	3123.9	2294.0	1726.0

Source: Tyumen Region in Figures: short stat. collection in 4 volumes. Part 2, 3.4 / territorial body of the Federal State Statistics Service of the Tyumen region. - T. 2001. -P.17-18, p.18-19, p.17-18; Regions of Russia. Socio-economic indicators, 2012: Stat. Collection / Rosstat. - M. - 2012. - 990p.

permafrost regimes, topography, land cover, climate areas, species composition of plant and animal communities directly in areas of intensive economic activity and far beyond its borders.

The chemical pollution of areas with oil and gas products is especially dangerous. Contamination of ground biocoenoses with oil occurs primarily when spreading it on the surface of the soil as a result of pipeline ruptures, leaks from sludge pits or by other reasons. The greatest environmental damage is due to the oil pollution in floodplains, on terraces above the floodplain and not closed lowland lakes and marshes. In Western Siberia, where wetlands account for a significant share of the territory, they play an important water protection and water supplying role especially in the watersheds, the sources of rivers, in areas with a predominance of sandy soils. Wetland ecosystems are most significantly contaminated by oil spills and muds. This liquid contamination is spreading over the direction of motion of the bog water, which may contribute to the extensive areal contamination of the area and entering of toxicants into open water [3].

Devegetation along pipeline routes leads to greater fluctuations in temperature and soil moisture, to the increase of the depth of seasonal thawing, which stimulates the development of thermokarst, subsidence and failures. Often these processes are independent cause of leakage of pipeline systems and the occurrence of accidents.

A crucial component of the natural environment in the Tyumen region is the Ob-Irtysh water system - one of the largest in the world. The Ob which is the main waterway in Western Siberia unites almost all its territory in a single river basin. In the area annually more than 1 billion m<sup>3</sup> of water from various natural sources is used, of which about 70% is surface water, the main consumers of water are industrial plants, power stations and oil producers primarily to maintain pressure on the existing fields [4].

Water features are not only used as water supplying sources, but also as receivers of wastewater. The largest volumes of waste received from major customers, i.e. from industry and housing and communal services (Table 1). A serious problem for the Tyumen region is the problem of recycling and disposal of industrial and domestic waste. The region's enterprises produce more than 800-900 thousand tons of toxic industrial waste, of which more than one thousand tons of waste constitute the 1st (top) hazard class wastes.

Furthermore, there are the liquid and solid wastes formed in large quantities, containing a considerable amount of organic substances and toxic materials, which represent a serious toxicological and epidemiological problem. Due to lack of recycling companies overwhelming waste is stored in mass storage devices, at landfills. However, most of the places for storage and disposal of waste in the region do not meet sanitary and environmental requirements, in their operation serious violations occur, landfills themselves are major contributors to environmental pollution. Solution of the problem of waste can be realized with the construction of modern factories and production facilities for recycling and disposal. This issue is being actively discussed in the region but cannot be solved due to the fact that there are no economic entities, able to assume the establishment of such facilities due to weak prospects for their payback.

Economic activity in the Tyumen region is accompanied by emission of large amounts of pollutants into the atmosphere. The greatest negative effect is caused by flaring of associated gas into the atmosphere while carbon monoxide, soot, nitrogen oxides, sulfur dioxide, hydrocarbons and volatile organic compounds, as well as other harmful components are coming into the atmosphere.

In recent years, in the total amount of emitted pollutants into the atmosphere the share of road transport significantly increased, notably in cities with a large car park - Tyumen, Surgut, Nefteyugansk, Nizhnevartovsk,

etc. Some burned transport fuel (especially diesel) has low environmental characteristics; operated cars usually are not equipped with devices to neutralize harmful substances. As a consequence, in the city with heavy traffic air pollution levels are many times higher than the maximum permissible value.

Meanwhile, according to surveys, the population assessing of clean air in the region is high enough and in rural areas is increasing in the dynamics, whereas assessment of water quality is much lower. Many residents of the region have to buy clean water, so water quality assessment essentially depends on the level of family income. In more affluent families people almost do not consume tap water as rightly do not trust its quality.

In Western Siberia each year about 35,000 oil and gas pipeline failures and accidents occur. About 21% are associated with the loss of stability of foundations and supports deformation. During the years of operation of oil and gas deposits huge amounts of crude oil "lost" in various accidents and left in the ground, cuffed permafrost rocks. When warming and melting they contaminate new biogeocoenoses.

At the same time common problem for the Arctic region is pollution by persistent organic compounds and other substances that have accumulated over the years in these areas. With increasing of temperature, these substances can get out of the snow, ice, permafrost in the human environment. Climate warming and permafrost degradation increase the risk of coming of toxic substances from the burial sites of chemical and radioactive waste. Considerable trouble can be made by the destruction of the walls of underground storage facilities [5].

In addition, the serious risks are connected with numerous containers of radioactive waste and nuclear reactors removed from submarines submerged in the Kara Sea. Analysis of the quality of surface waters in the Arctic showed that they are significantly contaminated with oil products, phenols, heavy metals, nitrogen, etc. The Northern Fleet disposes annually more than 10 million cubic m. of untreated water. The atmosphere is polluted by products of flaring of associated gas, land and man-made waste of oil and gas drilling operations, by iron tanks, chemical handling. Ecological Doctrine of Russia, approved by the Government of the Russian Federation in 2002 is not actually realized [6].

Survey of suspended exploration wells in the Tyumen Arctic showed that due to the prolonged downtime irreversible processes of destruction occur in them; as a result open oil and gas fountains and gas-oil spills may appear.

New oil and gas fields, preparing for entry into commercial operation of which is carried out, are in the Ob and Taz Bays, where are the largest herd in the world of white whitefish - whitefish and white salmon and Siberian sturgeon. It is the area where now around 90% of Russian gas is extracted. In connection with the need to respect the principles of sustainable development adopted at the 23th Congress of the IGU and the requirements of social responsibility, OAO (JSC) "Gazprom" declares the desire to minimize the anthropogenic impact on the environment of this region. The legal basis for this was a "Memorandum of the Development of Hydrocarbons in the Yamal Peninsula and its adjacent areas ", signed by the Administration of YaNAO (YNAD) and OAO(JSC) "Gazprom" in 2002.

On the territory of Yamburg deposit research proving ground was created where scientists from Russia and Austria carried and carry out their experimental work. As a result of preliminary studies it was indicated that the territory near the gas fields' growth of lichen is significantly activated. This suggests that much of the greenhouse gases emitted into the atmosphere during operation of gas fields, tundra vegetation absorbs and preserves in biomass. It is the side result of the research, which is qualitative in nature and requires obtaining accurate quantitative estimates of the phenomenon of organizing and conducting in-depth studies of special influence of pollutants emitted into the atmosphere in the process of developing gas fields. The value of such studies is that in this region there are no factors other than the natural background and affecting the growth of plant biomass. Therefore, here you can make quantitative estimates of anthropogenic impact on the nature of the first links of the gas chain and assess nature's ability to dampen the impact of these influences.

Production sector of gas companies is inevitably linked to anthropogenic impacts on environmental components, which is expressed as follows:

- Changes in the hydrosphere - the contamination of surface and ground waters with oil, industrial waste water and drilling fluids in breakouts and interstratal overflows of groundwater, hanged in their hydrodynamic and hydrochemical regimes;
- Changes in the lithosphere - the contamination of the soil in the area of drilling, in violation of the geological environment and pollution in the thawing of ground ice, in the ground surface subsidence;
- Changes in the atmosphere - the contamination of the products of combustion of gas and condensate in the plume; gas emissions and leaks in cases of gas flow

in the layers under deformation wells; emissions of harmful substances at work of organized and unorganized sources, combustion products in accidents, with thermal exposure.

The environment hazards are industrial and technological wastes of drilling companies, which are collected and stored directly on the drilling site in earth barns (sumps), arranged in mineral soil or bulk, or transported to the disposal site.

Drilling wastes contain a wide range of pollutants of inorganic and organic origin, as well as materials and chemicals used for the preparation and treatment of drilling fluids. Crude oil and petroleum pollute not only as components of drilling fluids, falling objects in the environment, but also when they are used as lubricants (actuator, economic needs, boiler and road construction vehicles), at the completion of works on call or as a result of the influx of emergency (oil shows, open blowing, etc.).

#### **Contaminants Are Contained:**

- In the formation fluids, toxic components of which (carbon dioxide, electrolytes, solutions and a pair of heavy metals, mercury, mercaptans, organic sulfur compounds and aromatic hydrocarbons) may enter the environment when possible complications in drilling, testing, development, conservation, filling and elimination wells and underground tanks occur and may be emitted into the atmosphere by evaporation from the surface of the sludge pits and venting wells, in fuels and lubricants, fuels and fuel combustion products;
- In the materials for making and weighting of technical drilling and cement slurries, neutralization of hydrogen sulfide and processing of borehole with acid, silicate, emulsion and other means;
- In technical fluids - drilling mud and cement buffer; drilling wastewater and sludge;
- Suspensions for conservation wells and call inflow and etc.

A significant amount of emissions is constant and their composition depends on the type of industrial process or technology used, production volumes, as well as equipment used for cleaning in order to reduce emissions. This "normal" emissions, which to some extent, are predictable, are distributed through various environmental media (air, water and soil) and enter the human body, creating the possibility of a negative effect

on his/her health. In this situation, the main health risk is determined by the level (intensity) of the impact and nature of adverse effects arising. For northern regions, where most of the year the soil is frozen under the snow, the most relevant is the assessment of pollution of air and water components.

Thus, in the course of research in the water of the Ob River, in the Ob and Taz Bays a significant excess of permissible concentrations of heavy metals and petroleum products was found. Excess of phenol is 50 times, nickel – 14, chrome - 9.5, copper - 8 and mercury -2 times. In drinking water of the settlement of Yamburg iron exceeds the norm by 5 times, manganese 4 times.

When operating Yamburgskoye gas condensate field gaseous wastes are generated in the industrial sites in the process of production, collection and preparation of gas, as well as in industrial facilities - field base settlement of Yamburg, in shift residential complex and in transport. The main gas treatment processes (separation, absorption and cooling) are not associated with emissions.

Emissions are made during the auxiliary processes (gas compression and regeneration of reactants) and the operation of critical infrastructure of the field (boilers, power and ventilation systems).

During production of gas, its emission into the atmosphere is produced by blowing with combustion gas wells in horizontal flare devices. Contaminant components of the flue gases are nitrogen oxides, carbon monoxide and unburned methane.

According to the Russian Ministry of Health Information Letter "On the list of priority substances in the environment and their impact on human health" properties of substances such as carcinogenicity, ability of genes to become mutant, the ability to provide long-term effects and their prevalence in the air of populated areas, identified " short list "of priority substances, potentially the most dangerous to human health, which included : nitrogen dioxide, sulfur dioxide, carbon disulfide, phenol, hydrogen fluoride, particulate matter, carbon monoxide, benzopyrene, benzene, formaldehyde, ammonia, lead, nickel, arsenic and vinyl chloride. Among the substances which are most often the cause of occupational disease, carbon monoxide (10.04%), chlorine (8.26%), arsenic, hydrogen (6.69%), ammonia (6.10%), lead and its inorganic compounds (7.58%), mercury metal (6.02%), manganese in welding fumes (5.13%), hydrogen sulfide (3.79%), hydrogen fluoride (4.24%), xylene (3.12%) and carbon disulfide (2.9%) are observed.

Thus, the main pollutants in the air of Yamburgskoye gas condensate field and potentially dangerous to the health of working people, include nitrogen oxides, carbon monoxide and particulate matter.

Nitrogen dioxide and sulfur dioxide are strong irritants. Carbon monoxide is characterized by a wide range of toxic effects due to its ability to form carboxyhaemoglobin.

Most sensitive to nitrogen dioxide are people suffering from bronchial asthma, who at concentrations of 0.19 mg/m observe the phenomenon of severe bronchospasm. Increased sensitivity to this substance also shows people with chronic respiratory diseases. Sufferers of asthma and respiratory diseases are especially sensitive to sulfur dioxide. The concentration of sulfur dioxide at 0.25 mg/cc.m causes a sharp deterioration in their health.

Group of risk when exposed to carbon monoxide consists of people with coronary artery disease, cerebrovascular and peripheral vascular systems, patients with anemia, lung disease, as well as people experiencing physical overload. At concentrations of 9-16 mg/m carbon monoxide can lead to increased mortality from myocardial infarction.

Thus, issues of environmental security in the Arctic and Subarctic are particularly important because of the increased vulnerability of ecosystems in the region, their low resilience resulting in pollution of ecosystems has long-term negative impact on both flora and fauna and the health of people here, indigenous and visitors.

While committed changes of climatic conditions in the Arctic and Subarctic lead to significant increase of the environmental risks in the activities of oil and gas companies.

Thus, the emission of pollutants into the atmosphere of the Yamal-Nenets Autonomous District exceeds more than 1 million tons. Annually more than 18 tons of pollutants are dumped in water objects. There is an annual increase in the extent of contamination within the county itself (more than 1 million tons already). At the same time their disposal is almost undone, they concentrate on numerous dumps, landfills and the so-called "temporary accommodation". According to the inventory of 2011. YaNAO (YNAD) registered 23 landfills, 52 dumps (24 of which are not authorized), 7 metal storage sites, 161 sludge pits.

It is the environmental situation in the Arctic and Subarctic which largely determines the conditions of traditional economic activities and, consequently, the level and quality of life for indigenous people [7].

YaNAO (YNAD) population surveys which we conducted, showed, that the tension between indigenous and migrant population is preserved and its main causes are:

- Predatory attitude of visitors to the nature of the North - 36.5%;
- Differences in the amount of earnings - 36.5%;
- Infringement of the rights of indigenous people - 29.7%;
- Displacement of the Nenets from their land by outsiders - 9.5%;
- Lack of awareness of international communication - 9.5%;
- Providing benefits on a national basis - 4.1%.

For the indigenous population particular importance acquires the capture by geologists, builders, gas companies of the land on which they (indigenous population) performed traditional occupation and, above all, reindeer.

That it is a condition of preservation of ethnic identity and the physical survival of the Yamal Nenets. Judging by the results of the survey, herding is the most attractive occupation for 36.6% of respondents, fishing - 26.9%, hunting - 26.1%, production of souvenirs, traditional means of transport, processing of leather, fur and fur raw materials - 6.0%, sewing traditional clothes and shoes, the collection and processing of wild plants - 6.7%.

Interest in these activities despite the invasion of gas producing industry among Nenets is unabated.

In Khanty-Mansi Autonomous District the situation with life conditions of indigenous peoples and northerners is close to the Yamal. Conducted in four areas of KhMAO (KMAD) (Beloyarskoye, Berezovsky, the Otyabrskoye and Kondinsky) on a representative sample surveys of the indigenous population showed a significant level of dissatisfaction with elements such as the living conditions and employment opportunities (79.5%), preservation of the traditional way of life (78.3%), conservation of fishing areas (78.1%), preservation of national customs and culture (75.1%), it is advantageous to sell furs and fish (68.5%), purchase of machinery, equipment and materials for traditional crafts (52.9%).

More than half of respondents believe that their financial situation is deteriorating. More than half of indigenous populations of working-age of northern counties is currently without work, although official statistics shows a lower level of unemployment. This is

due to the fact that most of the representatives of the northern ethnic groups simply cannot be registered due to the lack of necessary documents (certificates of pension insurance, individual tax numbers, etc.). To get these is possible only in the district center, a trip which is not real because of lack of money.

In "The Code of the affairs of the natives" in 1822. Russian northern peoples were granted the right to live according to the traditions of their ancestors, selling them alcohol and renting their land were forbidden. Stolypin's reform equated indigenous people to the peasants and Yamal Nenets responded to it with uprising of 1898- 1899.

Conflicts between indigenous and migrant population of Tyumen North worsened with the beginning of oil and gas development. It received the greatest publicity with the development history Tyanovskoe oilfield, which was on the sacred lands for the Khanty people. An acute and rather long conflict between indigenous peoples and oilmen occurred.

In 1993 Khanty community, led by the family of Sopachin managed to halt the development of Tyanovskoe field for two years. There are other numerous conflicts, for example, on the Ob River, where production began from the bottom of sand and gravel and natives blocked the river with their boats, etc.

Ancient peoples (in the West they are now called First Nations) were under pressure from powerful alien ethnic groups who were on the other stage of social development. To adapt to the new life was extremely difficult the ancient peoples. It is therefore very similar to the problems of life of indigenous peoples and solutions not only in different regions of the Russian North, but also in other countries where the indigenous ethnic groups live.

It is generally accepted that the state custody underlies the "native policy". Per capita in Greenland, where 90% of the inhabitants are natives is continuously growing and direct cash transfers by Danish Government exceeded 10 thousand dollars per year. In Norway, 70% of the costs of the reindeer are reimbursed by the central government [10]. Essentially on the same basis of paternalism Russian "Federal program of economic and social development of the indigenous peoples of the North until 2000 ", adopted in 1996 and subsequent government decisions were created.

Today it is clear that this is not enough. To overcome the threat of loss of northerners themselves as ethnic groups and their complete assimilation is possible only with the strengthening of their traditional culture and economy. For this it is necessary, first of all, to ensure the environmental safety of the northern territories.

Particular attention should be paid to the conditions of development of reindeer - the basis of maintaining the traditional lifestyle of the Nenets and other northern ethnic groups. The main thing here is the preservation of areas and routes of nomadic reindeer herd, creating transitions through industrial communication, assistance in processing and marketing of surplus production (factories, mini-mills and mini-workshop, etc.).

It is necessary to take into account the structure of the most significant types of traditional activities of indigenous peoples in different areas. Thus, in the KhMAO (KMAD) most priority type of training is fishing. Behind it, as the level of significance should be hunting, there is gathering and processing of wild plants, farming, herding, production of souvenirs, traditional tailoring clothes and shoes, leather processing, fur and fur raw materials, production of traditional means of transport.

In YaNAO (YNAD) all these kinds of activities are also common. However, here the first and most significant occupation remains large herd reindeer, suggesting year-round grazing animals under the supervision of shepherds and reindeer herding dogs. Deer occupy a key place in the life of the Nenets, giving them everything they need: meat, skins for clothes and shoes, to thread the tendon, bone and horn for jewelry, tools and parts, fresh blood for the treatment and prevention of scurvy. Almost half of the Nenets leads a nomadic lifestyle.

An important direction for maintaining the traditional way of life and, at the same time, increasing its level and quality would be the development of inbound tourism in the region and active involvement in the tourism business of indigenous communities. For tourists from foreign countries "plague vacation" and photo tours on the site of nomadic camps became very attractive. The program includes home stays, installation of chums (traditional tents of indigenous peoples), participation in cooking and the rite.

In the Yamal only five Aboriginal communities host tourists on their tribal lands. However, the survey revealed a desire for this of more than 30 communities. Closely linked with tourism and directly dependent on the level of its development is the production of souvenirs, reflecting the ethnic flavor of the North. In the museum shop in the village of Korliki (KhMAO(KMAD)), tourists can view not only the exhibits and souvenirs, but also get practical advice on making national clothes and shoes, beading, manufacturing products made of birch bark, bones, fur, etc. [8].

According to statistics (Table 2), the number of indigenous people in the West- Siberian North increases. However, the study of the real situation shows the

Table 2: Rural population of Indigenous Peoples of the West Siberian North, thousands of people<sup>1</sup>

Living areas	Years			
	1997	2001	2005	2010 <sup>2</sup>
Tomsk Region	2.0	2.2	2.4	1.9
Tyumen Region, total, including:	46.6	47.5	50.4	50.8
KhMAO(KMAD)	15.1	15.5	16.3	16.4
YaNAO(YNAD)	31.5	32.0	34.0	34.0

<sup>1</sup>Stats. bulletin "Economic and Social Indicators of the Far North and equated areas. " - Rosstat, Moscow, 1998, 2002, 2006, 2011.

<sup>2</sup>.Census results

opposite trend. Many girls from indigenous northern ethnic groups in recent years do not want to marry their countrymen, preferring them to visitors. While in 70-80 - years, only about 25% of children born as a result of intermarriage were registered as ethnic indigenous peoples of the North, but now, because of the potential benefits, it makes the most of such parents and, in the list of families of Khanty, Mansi, Nenets one can see a significant proportion of Caucasian family names.

Meanwhile, the overall mortality rate among the indigenous population continues to grow. The main reasons are accidents, poisonings with substandard alcohol, suicides [9].

Only the preservation of the environment and traditional way of life, the real help from the state and social responsibility of oil companies are able to help indigenous ethnic groups to avoid the threat of degeneration and extinction, to develop unique national culture and the northern economy, alternative production of hydrocarbons [11].

Upcoming large-scale development of the Yamal Peninsula, the shelf oil and gas resources of Eastern Siberia requires finding effective routes unsuitable for permanent residence of alien population.

This requires a major interdisciplinary scientific study of all aspects of the existing socio- economic and environmental situation, the possible consequences of the planned oil and gas development projects.

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