

PANORAMA

CASPIAN PIPELINE CONSORTIUM



CASPIAN
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CONSORTIUM

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ISSUE'S FOCUS

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ZOOMING IN

LABOR MANAGEMENT
COMMUNITY OF LEADERS

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EARTH IN THE PORTHOLE

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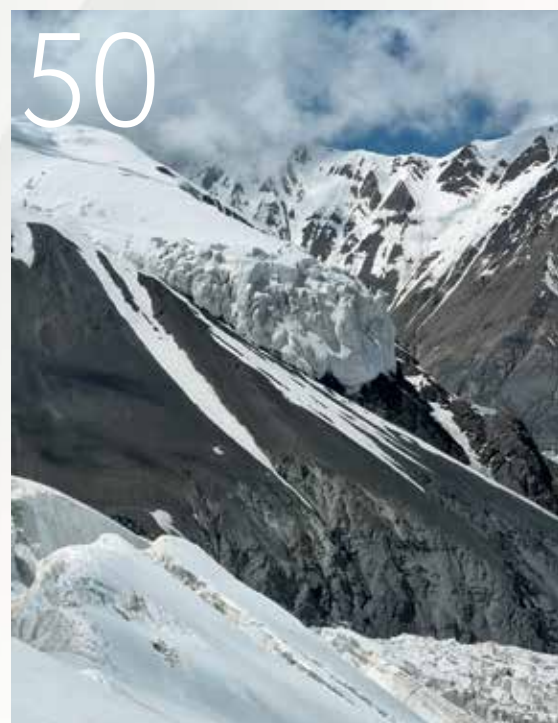
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DEAR COLLEAGUES AND FRIENDS!

Congratulations on Oil and Gas Industry Workers' Day!

Consistently making a significant contribution to the development of Russian, Kazakhstan and global fuel energy, the Caspian Pipeline Consortium celebrates its professional holiday with further achievements in production activities and the social sphere. In the first half of 2024, 33.2 million tons of oil were shipped at the Marine Terminal, which is one million more than in the same period of 2023, which became a record in the company's history. On July 31, a state expert review was received, officially allowing CPC to simultaneously transship oil from three single-point moorings, which will effectively make up for the reduction in shipments caused by weather conditions. The planned upgrade of the linear part continues. A program comparable in scale to the DBNP to replace mainline pumps with gas turbine drives with mainline pumps with domestically produced electric motors is entering the starting position, which will be a significant step for the company in the field of import substitution.

Deservedly included in the cohort of the largest taxpayers with a share of the Russian Federal Agency for State Property Management, CPC took

third place this summer in terms of the volume of dividends transferred to the federal budget. In the year of the 10th anniversary of our environmental and educational project "Protect Nature of Our Native Land", the Consortium was awarded a medal of the Ministry of Natural Resources and Environment of Russia, recognizing the company's assistance to the national project "Ecology". A 10% increase in participants was recorded in the second round of the international competition "CPC For Talented Children". Having become one of the favorite holidays of city residents and tourists, the open-air symphonic music festival "Novorossiysk chimes" attracted foreign participants for the first time in its third year.

The company's achievements are the result of the dedicated work of our close-knit multinational team, experienced professionals committed to the values of the Safe Work Culture. Resiliently and constructively responding to the challenges of the time, you lead our company forward for the better, and I wish that all of you also do well at home, in families, in personal endeavors and interests.

Happy holiday, oil pipeliners!

*General Director,
Caspian Pipeline Consortium*
N.N. GORBAN

AUTHOR
PAVEL KRETOV

FORMING NEW GROWTH POINTS

FOR THE 27TH TIME, IN JUNE 2024, REPRESENTATIVES OF THE LARGEST RUSSIAN AND FOREIGN COMPANIES GATHERED AT THE ST. PETERSBURG INTERNATIONAL ECONOMIC FORUM. THE EVENT WAS VISITED BY ABOUT 22 THOUSAND PEOPLE FROM 140 COUNTRIES. SINCE 2017, CPC HAS BECOME A PERMANENT PARTNER AND PARTICIPANT OF THE SPIEF

Heads of international organizations and associations, ministers, heads of diplomatic missions, cities and regions arrived in St. Petersburg. The largest delegations were sent by China, the UAE, Kazakhstan, India and Oman. From the Russian side, 40 high-ranking officials, 30 heads of federal services and agencies and 81 heads of subjects of the Russian Federation took part in the work of the forum.

The organizers formulated the slogan of the SPIEF-24 as follows: "The basis of a multipolar world is the formation of new points of growth". The freedom to choose the political and economic orientation of various countries was discussed within the framework of numerous sessions of the forum's business program. They were divided into four thematic blocks: "Russian Economy: Goals and Objectives of the New Cycle", "Transition to a Multipolar Model of the World Economy", "Technologies Ensuring Leadership", "A Healthy Society, Traditional Values and Social Development are the Priorities of the State".

An example of the broad opportunities for trade and economic cooperation in our time has become the BRICS association. Its participants (who have now caught up with and surpassed the G7 states in terms of GDP) discussed ways to build an independent system of international financial transactions, promising transport corridors, cooperation in the field of digital economy and much more at the forum.

The most important event of the forum was the plenary session, which was attended by the President of Russia. In his speech, Vladimir Putin noted: "The future of states depends on how effectively they can respond to global challenges,

realize their internal potential, use their competitive advantages and neutralize their weaknesses, maintain and strengthen partnerships with other countries".

The SPIEF Investment & Business Expo exhibition, where Russian regions and enterprises

MORE THAN 1000
AGREEMENTS WERE SIGNED
DURING SPIEF-24. THE
CONTRACTS AMOUNTED
TO ABOUT

6,5
TRILLION RUBLES

present their achievements, has consistently attracted high interest from SPIEF guests every year. On an area of more than 100 thousand m², using a creative approach and artificial intelligence, they demonstrated numerous projects, solutions and products.

Following the SPIEF, more than a thousand agreements were signed. The amount of contracts that were made public and not a commercial secret alone reached 6.5 trillion rubles. 250 agreements concerned the sphere of socio-economic development of Russian regions.

"Throughout the history of the SPIEF, our company has held many business meetings here, concluded many cooperation agreements with the heads of the regions where it is present – this lays the foundation for our social partnership", – this is how the CPC General Director Nikolay Gorban formulated company's participation in the forum in an interview with the magazine «SPIEF'24» (the official publication of the forum, distributed at the SPIEF exhibition areas, on Aeroflot flights and on Sapsan trains on the Moscow-St. Petersburg-Moscow route).

This year, on the sidelines of the SPIEF, CPC and the Government of the Astrakhan Oblast signed a new Agreement on Social and Economic

Cooperation. This document, signed by CPC General Director Nikolay Gorban and the Governor of the region Igor Babushkin, is aimed at further developing cooperation both in the production sphere and within the framework of social partnership.

In the new Agreement, the Consortium has recorded its intention to continue active support for the social sphere of the region and the implementation of programs to help the most vulnerable segments of the population. Mutually beneficial cooperation between the Consortium and the region will develop dynamically in such priority areas as education, healthcare, culture and sports. The provisions of the Agreement also define the areas of cooperation as the implementation of environmental projects, the





THE SPIEF SITE IS IN DEMAND BY THE GLOBAL BUSINESS COMMUNITY, AND INTEREST IN IT CONTINUES TO GROW

acquisition of municipal vehicles and special road equipment for the needs of the region.

A meeting with the leadership of another region through which the CPC pipeline system



passes, Kalmykia, was held in a traditionally warm and friendly atmosphere. In addition to CPC General Director Nikolay Gorban and the head of the republic Batu Khasikov, the conversation was attended by the Chairman of the Government of the Republic of Kalmykia, Gilana Boskhomdzhieva. The parties discussed the implementation of charitable projects, in particular, the transfer of a bus for the Uralan Olympic Football Reserve Sports School and environmental protection equipment for the Chernye Zemli Nature Reserve on the eve of the Republic Day. One of the topics of the conversation was the successful work of contractors from Kalmykia in the international CPC project.

Close cooperation between CPC and the authorities of the Republic of Kalmykia is carried out within the framework of a five-year Cooperation Agreement signed in April 2022. Last year alone, the Consortium allocated about 130 million rubles for the implementation of charitable projects in the region.

Representatives of the Consortium regularly hold meetings with partners of the international project on the sidelines of the SPIEF. Since 2008, SOGAZ JSC has been such a partner in the field of insurance and risk management. This time, issues of personal insurance were discussed at the negotiations between CPC General Director Nikolay Gorban and SOGAZ JSC Executive Director Natalia Komarova.

At the end of the SPIEF, experts noted that interest in the forum had reached the "pre-COVID" level and the period of recovery of business activity had successfully ended. The platform is in demand by the global business community, and interest in it continues to grow.

AGREEMENT IN INFORMATION SECURITY AREA



Photo: Bektemir Kazbekov

In June 19, 2024, a five-year Agreement on Cooperation in the Field of Information Security was signed in Astana between the Ministry of Digital Development, Innovations and Aerospace Industry of the Republic of Kazakhstan (MDDIAI RK) and Caspian Pipeline Consortium-K JSC. The document was signed by the Chairman of the Information Security Committee of the MDDIAI RK Ruslan Abdikalikov and the General Director of CPC Nikolay Gorban. Bakytzhon Dardenov, Head of Information Security Service, National Security Committee of the Republic of Kazakhstan (NSC RK), also participated in the signing ceremony.

The Agreement objectives include development and enhancement of efficiency of functioning of the Republic of Kazakhstan FEC facilities and arrangement of interaction of CPC with governmental authorities on information security issues.

The parties to the Agreement will cooperate in sharing information on terrorist and criminal risks and threats to information security.

The document provides for creation of a joint working group to develop proposals for preparation of legal acts determining the IS requirements for automated process control systems (APCS) and establishment of a CPC-K-based joint center for monitoring information security.

MEDAL OF THE MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT OF THE RUSSIAN FEDERATION

In July 2, 2024, in Elista, CPC General Director Nikolay Gorban was awarded the medal «For Assistance» by the Ministry of Natural Resources and Environment of the Russian Federation. The award, which was presented by the head of Kalmykia Batu Khasikov on behalf of the department, recognizes the contribution of the Caspian Pipeline Consortium to preserving the ecology of the regions of presence, assistance to the national project «Ecology», long-term implementation of the environmental education project

«Protect Nature of Our Native Land», support for reserves and specially protected natural areas, education of environmental awareness among young people, and proactive modernization of production facilities in order to minimize the impact on the environment. Another effective indicator of CPC environmental activities was the quantitative growth of the saiga population in the Chernye Zemli State Nature Reserve – 40 thousand saigas by summer 2024.



MEDAL OF THE EMERCOM OF RUSSIA

In July 3, 2024, in Stavropol, the first deputy head of the regional Main Directorate of the EMERCOM of Russia, Aprel Agakishiev, awarded the general director of CPC Nikolay Gorban with the departmental medal «For Cooperation for Salvation».

The order, signed by the Minister of the Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters, Lieutenant General Alexander Kurenkov, noted that the award is made "for merits in the implementation of a unified state policy in the field of civil defense, protection of the population and territories from natural and man-made emergencies, ensuring fire safety and the safety of people on water bodies".

CPC attaches great importance to the preparedness of personnel and representatives of contractors for emergency situations, as well as close cooperation with local administrations, EMERCOM units and emergency services. The consortium annually conducts at least 10 large-scale drills, including complex exercises, joint with EMERCOM units, on oil spill response and fire extinguishing. Large-scale training exercises are conducted in CPC on a regular basis and allow assessing the readiness of the pipeline operation units, security service and operational and dispatch personnel of CPC for emergency situations.



AUTHOR
PAVEL KRETOV

ZOOMING IN

THE SUMMER INSPECTION OF THE CPC PIPELINE FACILITIES WAS MORE EXTENSIVE THIS YEAR, AS IT INCLUDED THE EASTERN REGION



On June 29, CPC General Director Nikolay Gorban, as well as leading managers and specialists in the operation and implementation of construction projects of the Consortium visited the Tengiz, Atyrau, Isatay and Kurmangazy pump stations located in the Atyrau region of the Republic of Kazakhstan. During the working inspection visit, the equipment of the pump stations (including that installed during the implementation of the DBNP) was checked, as well as the readiness of operational personnel and contractors to act in case of emergency situations.

The key topics of the production meetings with the teams of the Eastern Region pump stations were further improvement of the level of the Safe Work Culture and discussion of the results of 2023. Thus, ER operational personnel and contractors completed the year with indicators

of over 4 million man-hours without injuries and incidents, the accident-free mileage of vehicles amounted to more than 7 million km.

On July 1, 2024, CPC General Director Nikolay Gorban, Operations Division Head (General Manager) Alexey Dmitryukov and other managers began inspecting production facilities of the Central Region in the Astrakhan Oblast and the Republic of Kalmykia – A-PS-4A, Astrakhanskaya PS, A-PS-5A, Komsomolskaya PS, PS-2 and PS-3.

Inspection of equipment and verification of personnel and contractors' readiness for prompt response to possible emergencies were carried out at each pump station. Also, the inspection objects were the sites of replacement of the linear part of the oil pipeline – 8 km at the exit from the Astrakhanskaya PS and 17 km at the entrance to the Komsomolskaya PS. Speaking about

the dynamics of the development of this project, it is worth noting that on July 21, the new section of the oil pipeline at the entrance to the Komsomolskaya PS successfully passed hydraulic tests. An important stage of replacing the linear part in Kalmykia and the Astrakhan Oblast is scheduled for October 2024: during the scheduled 72-hour shutdown, newly built sections will be connected to the main line, which will allow dismantling the old ones.

In the field of health, safety and environmental protection (HSE), the Central Region team (including contractors) demonstrated a good result, having worked in 2023 without injuries and accidents. The supervisory audit of the Quality Management System ISO 9001:2015 recorded that the activities of the division are fully compliant with international standards.



DURING THE WORKING VISIT, THE PS EQUIPMENT, PERSONNEL AND CONTRACTORS' READINESS FOR EMERGENCY SITUATIONS WERE INSPECTED

On July 4, 2024, the CPC management visited the production facilities of the Western Region – located in the Stavropol Krai and Krasnodar Krai PS-4, PS-5, Kropotkinskaya PS, PS-7 and PS-8. The inspection of pump stations included checking the technical equipment, as well as the readiness of the personnel of the PS and contractors for emergency situations. For example, the Kropotkinskaya pump station simulated a conditional tank fire, an explosive device and an oil spill. During these unscheduled exercises, the actions of specialists were practiced, contractor special equipment and OSR equipment were tested.

Based on the results of 2023, the team of the Western Region of CPC was recognized as the best among the Consortium divisions. The personnel of the PS and contractors worked almost 3 million man-hours without incidents and injuries, the accident-free mileage of vehicles exceeded 10 million km. In general, the overall indicators since the beginning of the accounting exceeded the marks of 35 million man-hours and 90 million km, respectively.

On July 5, 2024, as part of a working visit to production facilities, CPC General Director Nikolay Gorban and

leading managers and specialists in the operation and implementation of construction projects visited the Marine Terminal in Yuzhnaya Ozereyevka. In 2023, 63.5 million tons were shipped to MT. Despite the increase in transshipment volumes, the amount of emissions into the atmosphere was reduced by 5.5%.

In the spring of 2024, the 900 millionth ton of oil was loaded at the CPC Marine Terminal. Among the important tasks for 2024 is the in-line inspection of the offshore subsea pipeline to SPM-1. Also, a total of 107 hoses will be replaced at three single-point moorings. On July 24, 2024, after replacing 54 hoses, SPM-2 was put into operation. On July 29, SPM-3 was taken out for scheduled maintenance, where 27 hoses are planned to be replaced.

June at the Marine Terminal was the final month of the third stage of the DBNP, which included dismantling of two old lease automatic custody

transfer (LACT) with the release of the site for the installation of the third pressure control unit (PCU) and the third pressure relief system (PRS). This technical solution makes it possible to send oil for loading a tanker through any new LACT along any loading line and will allow simultaneous loading of three oil tankers, if necessary.

On July 31, 2024, this possibility was officially authorized at the federal level: by order of the Black Sea-Azov Marine Administration of Rosprirodnadzor, the conclusion of the state environmental review of the documentation "Justification of the planned economic activity for the shipment of oil at the Marine Terminal of CPC-R JSC with the simultaneous use of three oil quantity and quality measuring systems" was approved.

During the working visit, the PS equipment, personnel and contractors' readiness for emergency situations were inspected..



AUTHOR
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DIALOGUE AS AN ELEMENT OF DEVELOPMENT

ON JULY 4, AT THE KROPOTKINSKAYA PS,
CORRESPONDENTS FROM THE CPC PANORAMA
MAGAZINE AND THE RUSSIA TV CHANNEL
INTERVIEWED THE GENERAL DIRECTOR
OF THE CASPIAN PIPELINE CONSORTIUM,
NIKOLAY GORBAN



An oil pipeline is a complex system and some issues, including technical ones, cannot be resolved remotely. It is necessary to come and see with your own eyes, talk to the contractor on site, taking into account your own production experience. This disciplines both the manager and the employee. Direct dialogue is a very important element of sustainable development.

The main result is accident-free operation and, for the most part, impeccable compliance with labor protection rules, timely implementation of modernization plans.

By the way, it was coincidental that in the course of the inspections, a team-building corporate event on Leadership in the Development of CPC Safe Work Culture (SWC) was held in Elista on July 2-3. It was attended by top managers of the Consortium, as well as managers and specialists of all production facilities. And there we seriously elaborated on the key goals and objectives of the new HSE Strategic Plan for 2025-2027, and this is also a direct dialog between the company's management and specialists in the field.

What does HSE leadership mean to you personally? What do you see as a leader's main inspiration? What is new in CPC HSE strategic plan for 2025-2027?

and 300,000 sandbags for the dam's construction, and we brought some of the equipment from Astrakhan.

Technical re-equipment within the framework of the DBNP at the Tengiz and Atyrau PS was completed successfully, on time and without incidents. In my opinion, an excellent result.

What are the results of the inspection of objects on Russian territory? How does the new equipment installed within the framework of the DBNP show itself in practice?

At PS-2, work has been completed on installing four variable frequency drives for electric motors of mainline pumps. I would like to emphasize that the VFDs and pumps were made by domestic companies, which now gives the Tengiz-Novorossiysk pipeline system additional production stability. The equipment is operating smoothly and without complaints, so it is also being installed at other facilities.

Nikolay Nikolayevich, thank you for taking time out for an interview as part of your inspection tour of production facilities. It started in Kazakhstan, in the Atyrau region. What did your Kazakhstani colleagues please you with, what did you talk about at the meetings with the team?

First of all, I considered it important to personally express my gratitude to the team of our Eastern Region, which demonstrated maximum responsibility, one might say, selflessly, promptly responding to any challenges that arose during the flood period.

CPC-K promptly and actively joined the flood control work, among other things, in the area of the village of Bereke we helped to build a dam more than 5 km long.

The construction site involved 40 units of the company's special equipment, including 28 dump trucks, many excavators, bulldozers, and road rollers. The consortium provided 8,600 m² of geotextile

For me personally, leadership in this context is a conscious compliance with labor protection and industrial safety requirements and the promotion of this idea by personal example.

This is responsibility to the team in creating working conditions, training, providing protective equipment and necessary information. And, as I said, a personal example of actions: a manager at any level, including the entire enterprise, must first of all strictly adhere to the principles of the Safe Work Culture.

This is one of the most important factors of vertical integration, unification in achieving common goals and motivation of each individual employee.

In my opinion, inspiration for a leader comes with the awareness of the effectiveness of the work done. Today, we have another large-scale project behind us – DBNP. Any specialist in the oil and gas industry will agree that construction often significantly increases the statistics of accidents, incidents, road accidents, etc. I am sure that the Safe Work Culture system, introduced years ago, as well as the accompanying specialized events and information campaigns we conduct, including our team-building corporate Safety Day, have helped us to minimize their number.

The relevant company standard was adopted in early 2022. According to the internationally accepted Bradley scale, our company has now reached the third "independent" level of the Safe Work Culture, and the progressive movement continues.

What is important is that all levels of CPC employees and management are involved in it to improve the level of Safe Work Culture and leadership development, which is becoming another step towards more effective management of the risks typical for our industry.

I would like to make a special note: the strategic plan for HSE for 2025-2027 takes into account

the results of the implementation of the previous Plan 2022-2024 in conjunction with the current practical experience of shareholder companies and the oil industry as a whole. The number of goals (7+basic) does not change, but the stages of their implementation have been updated.

As in the previous plan, each senior CPC manager is assigned as the curator of a specific strategic goal. I am the curator of the basic goal of increasing the level of Safe Work Culture and leadership development.

The updates to the Plan are due to the following: the company has completed construction within the framework of the DBNP, implemented OSR plans updated by governmental authorities, and has passed the period of the Covid-19 pandemic – hence the number of key production risks has changed. Due to the increase in the productivity of the pipeline (with the modernization of the PS) and the Marine Terminal (with the commissioning of a new LACT), more attention is paid to the safety of marine transshipment of oil and its storage in tank farms, power supply, as well as the reliability of the linear part along the entire length of the Tengiz-Novorossiysk pipeline.

Since 2022, the Facility and Steering Safe Work Culture Committees with a cascade hierarchy have been in effect. Effective methods of "5 Why", "Tree of Causes" and others, as well as VR technologies, have been introduced into the training, certification, and risk assessment procedures. The new Plan takes into account these achievements and organizational changes. The new Plan also takes into account work with contractors to improve the SWC based on leadership practices, exchange of experience, and a motivational component.

A number of tools for developing leadership skills and popularizing them will also be developed and

implemented: the "Talent Academy", a specialized HSE website with a mobile application, a chat bot, a program for monitoring the activities of the SWC Committees.

Environmental protection as one of the objectives of the Plan will also receive a number of new tools. Thus, it is planned to improve the automation of the air quality control system at the Marine Terminal, improve the quality of marine water control using hydrobionts, constructive dialogue with the local population on the environmental agenda by organizing meetings, round tables, promptly responding to complaints and suggestions.

What is the optimal motivation for an employee, for an HSE leader, and what does it take to become a leader?

There is probably no better motivation than incentives. At CPC, the system of incentives for HSE achievements has been in effect for a number of years. We know that people are all different, and for some, authority and respect in the team are more important than, say, a cash bonus. A photo on the Honor Board and publication in the corporate press are also worth a lot.

A manager's personal example of commitment to the principles of labor safety is a good motivator. When a person sees that all requirements and regulations are observed not for the sake of appearances, but as a conscious necessity on which the health and lives of people depend, he is more likely to believe that he should do the same. And this is the Safe Work Culture and leadership as its most important mechanism.

Anyone can become a leader, not just a boss. To do this, you need to be a proactive and caring person, open to improving the principles of labor protection and industrial safety, as well as leadership practices.

The main work on the DBNP has been completed, the system is ready to pump 83 million tons of oil per year.

At the beginning of the year, you said that CPC, according to preliminary requests from shippers, expects about 70 million. The system is functioning properly, without damage, and demining of the Marine Terminal water area is not expected. Against this background, following the results of the meeting of the governing bodies, a significant reduction in the volume of oil delivered by shippers in 2024 was announced. Can you tell if this is a one-time event or a certain trend? And do you associate this with the development of additional options for transporting oil from Kazakhstan to world markets?

As has been officially stated many times, and experts know this very well, there is no real alternative to the Tengiz-Novorossiysk pipeline for the delivery of the main volumes of Kazakh oil for export, and it simply cannot be created in the near future for technical reasons.

Kazakhstan really needs additional oil export routes for obvious reasons, and this is not politics, but a calculation for future

THE VOLUME OF IMPORT-SUBSTITUTED EQUIPMENT IS APPROACHING

85 %

production growth, risk hedging, market diversification, in a word, common sense.

Over its more than 25-year history, CPC has proven its reliability, adaptability, and ability to modernize and expand if necessary. It has proven its rhythmic work, professionalism, and, I dare say, sometimes dedication of the employees of both the Consortium itself and partner and contractor organizations.

Yes, according to the updated forecast, in 2024 a 7% decrease in oil transportation volumes is expected compared to the figures included in the budget based on preliminary applications from shippers.

Thus, shipment from the Tengiz field assumes a decrease of 7.9 million

tons and an increase of 3.3 million tons from the Kashagan field, the total deviation from the planned volumes is 4.8 million tons. In general, we plan to ship about 65 million tons, that is, to set a new record. As of June 30 of this year, we shipped 33.2 million tons, which is 1 million more than in the first half of 2023.

It is not my prerogative to comment on the presence or absence of a certain trend. However, the topic of reducing the previously declared volumes is becoming the object of increased attention of all shareholders as a factor influencing the Consortium's profit and the payment of dividends to its participants. After all, CPC plans its forces and means for the declared volumes, purchases anti-turbulent additives, reserves electrical power, that is, bears some costs.

Taking into account current realities, has CPC made any progress in matters of import substitution for key components and assemblies?

Yes, CPC has done a lot of work here: all major units, components, consumables, etc. are supplied and will be supplied in the interests of the Consortium without interruption. The volume of import-substituted equipment is approximately approaching 85%. We have found Russian-made analogues for almost all items that required replacement. But there is still room to move on critical elements..

This issue tells about the beginning of a new project for CPC — the transition from gas turbines to external power supply of facilities. How large-scale is this endeavor and what does it involve? Can the “electrification program” be

compared to the DBNP or Expansion Project??

By implementing this new project, we are working, one might say, ahead of the curve, removing some risks for ourselves, taking care of the environment, moving away from gas turbine units.

As part of the implementation of the Program for the replacement of mainline pumps with GTU with mainline pumps with electric motors, it is necessary to reconstruct three pump stations and build external power supply facilities for two pump stations.

Currently, a prototype of a domestic mainline pump with EM with an 8.3 MW power, complete with a VFD and an EM purge and cooling unit, is being developed. After it passes factory acceptance tests, we will begin implementing the Program. Estimated deadline: June 2025.

There is no doubt that the structural divisions of Transneft PJSC have the necessary competencies and capacities as partners of the Program: over the past few years, the plants of this company have manufactured more than 40 mainline pumps, which are currently operating at the PS without problems or complaints.

Under the Program, new pumping buildings with auxiliary equipment, cable racks, fire extinguishing systems, technological pipelines, main fiber-optic communication lines will be built. And all this will happen on a working system!

Thus, if in terms of the volume of work the MLP with GTU Replacement Program is slightly inferior to the Debottlenecking Program, in terms of complexity of the issues to be solved it is significantly superior to the DBNP. Therefore, the Program will be implemented using specialists who have proven themselves in the implementation of other projects of significance for CPC to the maximum extent possible.

Is each site inspected according to a standard procedure or individually?

Despite the standardization of our PS, each has certain features. Somewhere we will definitely pay attention to the results of the installation of the VFD, the operation of the LACT, PCU, industrial and environmental safety systems, and other important elements.

The Marine Terminal is in the process of scheduled replacement of underwater and overwater hoses at SPM-2 — this is a complex job and requires special attention.

All the main processes at the facilities should not only be provided in the 24/7 mode, but also controlled by the company's management. Of course, we check the readiness for emergency situations, rescue equipment, and machinery. We pay attention to the work of the security service; by the way, not long ago a criminal tap into our pipeline was prevented. In a word, maximum inspection coverage for maximum results.

During the trip, you took part in the final stage of several charity projects. What can you say about these activities of the CPC for the future — will it maintain or change their volumes? Which projects are dear to you personally?

We presented ambulances and medical equipment in Stavropol, in Kalmykia we presented a bus to a sports school, water purification filters to children's institutions, and equipment to the Chernye Zemli Nature Reserve.

Everything to do for children is my favorite. This includes the kindergarten that we built in Novorossiysk. “Treasure Island” is a two-time winner of all-Russian competitions. This is also our project “CPC for Talented Children”, which involves young performers from four regions of Russia, as well as Kazakhstan. This is «CPC for First-graders”, “Protect Nature of Our Native Land”, where children participate in environmental education projects, and we help reserves and support the national project “Ecology”.

In 2023, we invested over 610 million rubles in social projects in Russia and about 1.5 billion tenge in Kazakhstan. We bought computer tomographs, excavators and mobile technology parks — “Quantorium” — which are relevant in the context of the development of the national project “Education”. These are minibuses filled with 3D printers, CNC machines, laser MFPs, dozens of powerful laptops. They drive around rural schools, teach children programming, modeling and much more, important for career guidance. We understand that in 10-15 years, professions will already be new, related to IT, neural networks and so on, new skills will be in demand, and these foundations need to be laid for children now.

Last year we started a major construction project — the Cultural and Aesthetic Center for Children and Youth in the Astrakhan Region. In May of this year, construction of the same CACCY began in Yuzhnaya Ozereyevka near Novorossiysk.

The CPC main oil pipeline runs through the Atyrau region in Kazakhstan and through four regions of Russia — the Astrakhan Oblast, the Republic of Kalmykia, Stavropol Krai and Krasnodar Krai. Within the framework of renewable five-year agreements with the governments of these regions, our company traditionally helps medical, educational and cultural institutions, children's sports centers, transport workers, and utility workers.

For me personally, each of these projects is equally close and dear. But it is much more important that they all bring benefit and joy to people, residents of the regions where our oil pipeline passes. And, judging by the feedback, we have succeeded in this so far. This is our responsibility, our social work, which will always be carried out.

The CPC slogan is “A time-tested international project”. Can you add anything to this laconic definition?



CPC is a growth point, in the broadest sense of this phrase. The CPC is highly dynamic and responsible. CPC is a route of good deeds...

Here we cannot fail to mention our unique team of professionals, and the high level of industrial safety throughout the entire technological process, and the ability to learn from any experience, to become better and stronger.

But, in addition to this, the Consortium today is certainly a time-tested, but dynamically and progressively developing cross-border project that has united the territories and shareholders of Kazakhstan and Russia, as well as other participants from a number of countries.

It is no exaggeration to say that our activities and charitable projects unite people, regional leaders, and the younger generation. It is amazing, but a couple of generations of children who participated in our first competitions and projects have already grown up and stepped into adulthood!

This synergy — of productive, dynamically developing production and the energy of successful and positively minded people around us — is what gives us additional strength to move forward and upward, promotes both production growth and interstate dialogue, and simply makes life around us a little better.

AUTHOR
PAVEL KRETOV

FROM WEST TO EAST

THE NEW SECTION, LIKE THE NEW FORMAT OF THE VIDEO PROJECT "FROM SEA TO SEA" LAUNCHED THIS YEAR, ALLOWS US TO LOOK AT PUMP STATIONS AND OTHER FACILITIES OF THE CPC PIPELINE FROM A SLIGHTLY DIFFERENT ANGLE. NOT ONLY THE "PLAN-FACT" AND OTHER PRODUCTION INDICATORS OF THE PS, BUT ALSO THE FEATURES OF THE LOCATION, INTERESTING EVENTS IN THE "WATCH LOG" AND UNIQUE FACTS



The last of the 15 stations along the CPC pipeline route is located in Kuban, in the foothills of the Caucasus. These places are considered the small homeland of Russian oil workers: industrial oil production began near the village of Kievsky in the Krymsky district earlier than anywhere else in our country.

Nowadays, tourists come here to see the unique monument "Grandmother Oil Rig". On this place on February 15, 1866, following the drilling of a 37-meter well by Guards Colonel Ardalion Novosiltsev, the first oil fountain in Russia, 5 meters high, gushed out. The development of the local fields was monitored by the government, and the Minister of Internal Affairs Pyotr Valuev received instructions from Emperor Alexander II to provide the enterprise with all possible

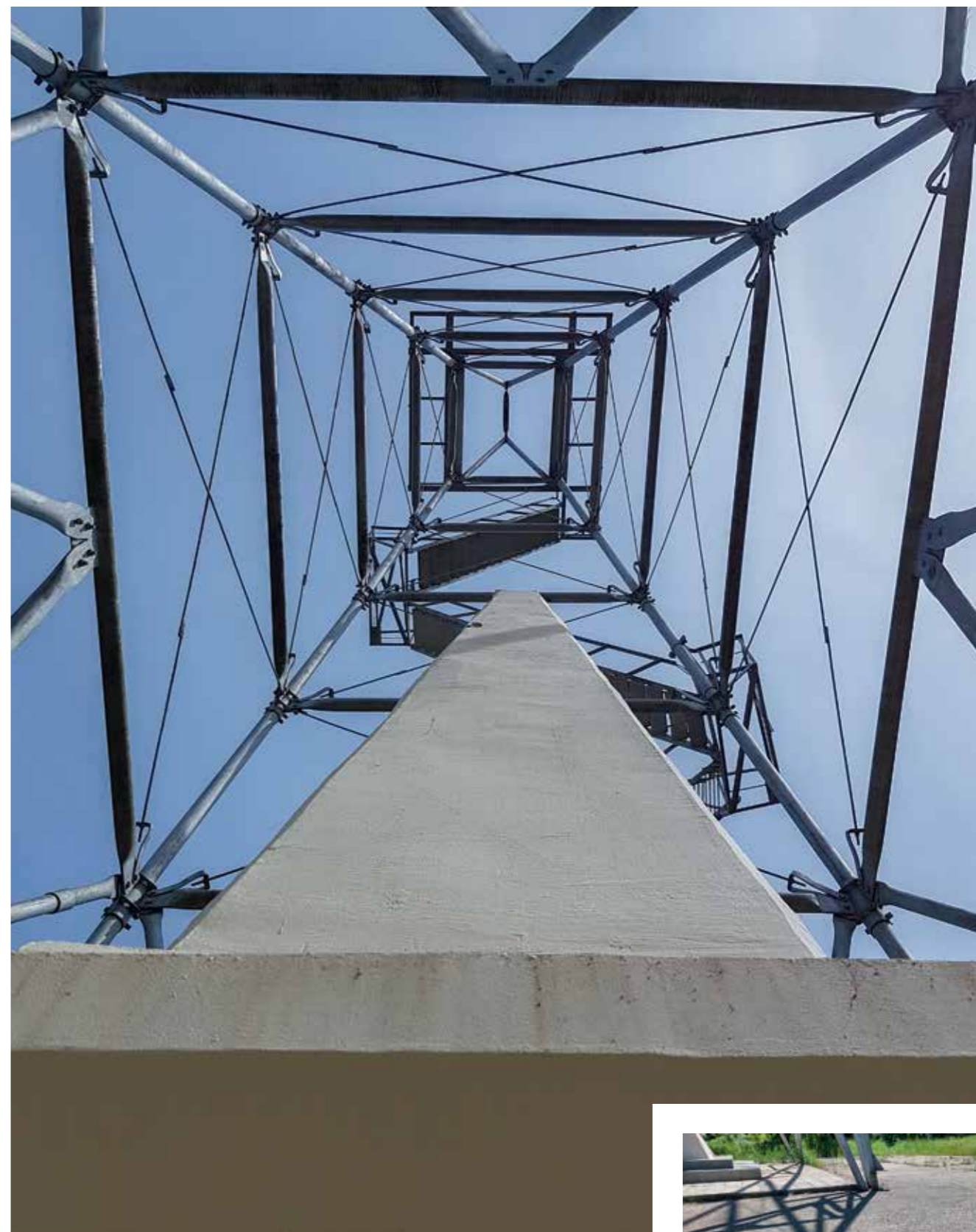
assistance. In 1880, the famous chemist Dmitry Mendeleev visited the deposit. Following the trip, he wrote a letter to the ataman of the Kuban Cossack Host, in which he noted that a lot of oil should be expected in these places.

PS-8 also attracts tourists: students from specialized universities, schoolchildren deciding on their future profession, and the interested public. The station was built according to a special cascade project at several height levels. Those who work here note that from above, the complex of all the buildings and structures of the PS resembles a diamond with a diamond-shaped cut. There is also something to admire below: a lot of greenery is planted between the white and blue buildings. A considerable number of flower beds add coziness.



Photo from the archive of Transneft Media LLC

"DIAMOND" PS-8 IN NIGHT ILLUMINATION



FEW PEOPLE KNOW, BUT THE FIRST OIL WELL IN RUSSIA IS STILL OPERATING

"We constantly monitor working conditions, potentially dangerous situations and accidents without consequences", says Sergey Moroz, PS-8 Manager.

"The whole set of practices is widely used: leadership visits, employee motivation, correction of their actions. Both operational personnel and contractors, if they





BOTANICAL DIVERSITY OF PS-8

STARTING NEXT YEAR, IT IS PLANNED TO BEGIN CONSTRUCTION OF AN ELECTRICAL SUBSTATION AT KROPOTKINSKAYA

see opportunities for improving working conditions, fill out observation cards.

One of such improvements is the installation of fences on the service platforms for shut-off valves, carried out at the station at the suggestion of an instrumentation technician, or the installation of lightweight covers on the wells of the platforms for the chambers of cleaning and diagnostic equipment, which was suggested by the operator of the PS. Today, this innovation is being replicated at all oil transportation facilities of the CPC.

If necessary, the station does not hesitate to apply the right to suspend work. In 2024, this happened during an operation at altitude. Then, using the "5 Why" method (formulated by Sakichi Toyoda), a mandatory investigation was conducted and measures were implemented to prevent similar situations in the future.

IN THE NAME OF THE GEOGRAPHER

PS-8 is not only the "last in line", but also the most compact station of the Consortium. The largest one, Kropotkinskaya PS, is located here, in Kuban. The station was named after a neighboring settlement, the city of Kropotkin, which, in turn, bears the name of the famous scientist-geographer, philosopher, publicist, evolutionist, geomorphologist and anarchist. The descendant of the Ruriks in the 30th generation combined revolutionary activity with participation in expeditions and major discoveries. It was Pyotr Alekseevich, studying cold currents in the Arctic Ocean and the motionless state of ice north of Novaya Zemlya, who predicted the existence of the Franz Josef Archipelago even before its discovery. The significance of Kropotkin's contribution to science was so indisputable that, by personal order of the emperor, he was given a pen and paper in prison, where he wrote a study "On the Ice Age".

Involvement in the Safe Work Culture at Kropotkinskaya is the leader in the region: 50–60 observation cards are filled out here per month.

"It would seem that there is nothing special about it: lay an additional path, modify the service area", explains Sergey Alferenko, Kropotkinskaya PS Deputy Manager. "But it is precisely from such "little things" that overall safety is formed".

Recent improvements include the installation of protective canopies on gas analyzer sensors and service areas. In the first case, this eliminated

SERGEY
MOROZ

SAFETY HANDRAILS AT THE
KROPOTKINSKAYA PS

the need to clean sensitive devices after mowing the lawn, and in the second, it increased the safety and convenience of personnel during rain and other precipitation.

ONE OF THE IMPROVEMENTS TO PS-8 IS THE INSTALLATION OF FENCES AT SHUT-OFF VALVE SERVICE AREAS

Starting next year, the station plans to begin implementing a major project – the construction of an electrical substation. This will increase the cost-effectiveness of the production facility, which currently generates energy using gas turbines. A new mainline pump with four units will also appear at Kropotkinskaya.

In Stavropol Krai, "video content hunters" managed to catch an interesting stage in the operation of pipeline: connecting to the system a new capacity of surge relief system at PS-5, installed during the implementation of the DBNP. There is no need to wait for the next scheduled shutdown of the entire pipeline system – it is

P. A. KRETOV AND D. R. ENALIEV AGAINST THE BACKGROUND OF
THE CONSTRUCTION SITE OF VFD BLOCK BOXES AT PS 5

enough to take the station itself out of operation.

"During the period of execution of the complex of works on cutting the fifth tank of the PMS into the

existing system, the station was cut off from the main oil pipeline by shut-off valves and the oil pipeline continued its operation in the normal mode, bypassing the PS", comments Denis Yenaliyev, Lead Specialist, Construction Quality Control. "The local shutdown lasted 72 hours, after which the personnel and contractors concentrated their efforts on the final part of the DBNP – the installation of block boxes of variable frequency converters". ●



SAFETY FENCES AT THE SITE OF PS-8

AUTHOR
DMITRY KONSTANTINOV

TWO HOT DAYS IN JULY

ON JULY 9 AND 11, 2024, IN THE TURKMEN AND TRUNOVSKY DISTRICTS OF THE STAVROPOL KRAI, THE CASPIAN PIPELINE CONSORTIUM CONDUCTED TWO-STAGE COMPREHENSIVE DRILLS TO CONFIRM READINESS FOR ACTIONS TO LOCALIZE AND ELIMINATE OIL AND OIL PRODUCT SPILLS, AND TO VERIFY THE COMPLIANCE OF FORCES AND MEANS WITH THE NEW OIL SPILL RESPONSE PLAN

The first stage of the comprehensive exercises was carried out on July 9 on the linear section of the CPC oil pipeline in the immediate vicinity of one of the main ball valves (MBV). According to the legend of the exercise here, as a result of a hydraulic shock, there was a conditional rupture of the pipeline with a spill of 13,544.5 tons of oil on land and subsequent fire. 34 specialists

from professional emergency response teams and 18 units of equipment (bulldozers, dump trucks, loaders, fire trucks and medical vehicles, etc.) were involved in localizing the spill with an area of 80,622 square meters and eliminating its consequences. Specialists from the fire and rescue teams of the EMERCOM No. 4 and No. 5 took part in the fight against the simulated fire.



During the first stage of the exercises, actions were worked out to coordinate with the management bodies and forces of the unified state system for the prevention and elimination of emergency situations (the Civil Defense and Emergencies Department, the Unified Dispatch Service of the Turkmen District, the Main Directorate of the EMERCOM of Russia for the Stavropol Krai), notification, fire extinguishing, providing assistance to conditionally injured (four people) with delivery to the hospital, collecting and removing conditionally contaminated soil, and environmental monitoring. To localize the spill, a 120 m long retaining wall was erected, the collected oil was pumped back into the pipeline.

The second stage of the complex exercises was carried out on July 11 at the underwater crossing of the Tashla River (1124 km of the CPC pipeline). According to the exercise scenario, a simulated rupture of the pipeline occurred here as a result of a hydraulic shock, with a spill of 6,898.5 tons of oil on the water. 36 specialists from professional emergency rescue teams and 45 units of equipment (motor pumps, tank trucks, motor boats, excavators, skimmers, etc.) were involved in localizing the spill and eliminating its consequences.

"We used such specialized equipment as water skimmers, which is unique for an oil pipeline company", Pavel Moskatov, Chief Engineer for operation



and maintenance of the Western region, explained to a correspondent of the Rossiya TV channel.

During the second stage of the exercises, actions were worked out to coordinate with the management bodies and forces of the unified state system for the prevention and elimination of emergency situations (the Civil Defense and Emergencies Department, the Unified Dispatch Service of the Trunovsky District, the Main Directorate of the EMERCOM of Russia for the Stavropol Krai), to notify, to provide assistance to the simulated victim with delivery to the hospital, to collect and remove the water-oil emulsion to the PS-5 reception point, to clean up the coastal strip, and to carry out environmental monitoring. To localize the spill, 300 m of boom barriers were installed, and five temporary oil collection tanks and five earthen barns were used to eliminate the consequences.



During the two-stage comprehensive training, the personnel of CPC and contractors (Professional Emergency Rescue Team TsASEO JSC, STARSTROY LLC, Private Security Organization Nachin LLC, Sluzhba Pozharotusheniya LLC, Medis LLC, KubanEkoproekt LLC, etc.) demonstrated coordinated actions in emergency situations, prompt notification, and professional skills in using specialized equipment. All goals and objectives of the two-stage comprehensive training were successfully achieved. The

Commission of the Main Directorate of the EMERCOM of Russia for the Stavropol Krai made a decision on the readiness of CPC-R for actions to localize and eliminate oil and oil product spills.

"The personnel of the exercise tasks worked competently, according to the plan. It is worth noting the good preparation and professionalism", commented on the results of the exercise to the correspondent of the Rossiya TV channel Head of the Civil Defense and Population Protection Department of the Main Directorate

36 SPECIALISTS
FROM PROFESSIONAL
EMERGENCY RESCUE
TEAMS AND

45

UNITS OF EQUIPMENT WERE
INVOLVED IN LOCALIZING
THE SPILL AND ELIMINATING
ITS CONSEQUENCES

of the EMERCOM of Russia for Stavropol Krai Sergey Sotikov.

CPC annually conducts at least 10 major oil spill response and firefighting exercises. Large-scale training drills are conducted at CPC on a regular basis and allow assessing the readiness of the CPC pipeline operation units, security service and operational and dispatch personnel of the Consortium for emergency operations.



AUTHOR
PAVEL KRETOV

DIGITAL TWIN AS THE HERO

THE CASPIAN PIPELINE CONSORTIUM AND GUBKIN UNIVERSITY HAVE LONG AND FRUITFULLY COOPERATED IN THE SCIENTIFIC AND EDUCATIONAL SPHERES. CPC PANORAMA CORRESPONDENTS DISCUSSED ONE OF THE ASPECTS OF SUCH COOPERATION WITH MIKHAIL FEDOSEEV, ASSOCIATE PROFESSOR OF THE DEPARTMENT OF DESIGN AND OPERATION OF GAS AND OIL PIPELINES



Mikhail Nikolaevich, allow me to belatedly congratulate you on Gubkin Day. What is the university for you, besides your alma mater and place of work? What is the rating of Gubkin University today against the background of domestic and world higher schools of the oil and gas industry, what is its contribution to industry science?

My life has been connected with Gubkin University for 15 years now – I became a first-year student in 2009. Its scientific and educational significance goes far beyond the oil and gas sector. Let me give you an example. As an applicant, I prepared using various manuals, collections of physics and mathematics books. But I was quite surprised already in my first year to come to a lecture on physics by Alexey Igorevich Chernoutsan. It turned out that I prepared using a book developed by a professor from Gubkin. And the author of my textbook for applicants in mathematics was Mikhail Vladimirovich Lurye. As a schoolboy, of course, I could not imagine that after two years of studying at the university he would become my scientific supervisor. So our scientists are known far beyond the walls of their alma mater. And one of the advantages of the scientific school of the Russian State University of Oil and Gas (National Research University) named after I.M. Gubkin is that, along with immersion in engineering research, the professors have a full opportunity to continue to engage in fundamental and theoretical science.

Today, science has “grown up” to the point of mathematical modeling of objects and processes in pipeline transport, creating digital twins. But, as we remember, the builders of the first oil pipelines in the 19th century

strove to be purely practical, preferring to gain experience from personal mistakes. At what point did scientists come to their aid?

Here it is worth starting with the outstanding Russian scientist-mechanic, the founder of hydro- and aerodynamics Nikolay Yegorovich Zhukovsky. Many people know him, first of all, as the author of the theorem on the lifting force of a wing, but this scientist made a really great contribution to the mathematical description of the movement of liquid through pipelines, gave an explanation of the phenomenon of hydraulic shock, derived formulas linking the flow rate, pressure, density, with the radius of the pipe, depending on the time and distance of the section under consideration from the chosen origin. This gave impetus to research in the field of pipeline reliability. Of course, at that time the mathematical apparatus was not so highly developed – differential equations with partial derivatives, but even simplified graphoanalytical methods made it possible to draw a conclusion about what was happening in the transported liquid, and therefore to calculate the diameter, wall thickness, etc. After all, it is one thing to understand what is happening in a pipe at a constant flow rate, and another – transient processes or a sudden shutdown of the pump, closing of the valve.

As for the development of mathematical models, our university began to study them back in the 1960s in parallel at several departments – design and operation of gas and oil pipelines, hydrodynamics, underground hydromechanics. And today, the issues of reliability of pipeline transport systems are at the crossroads of several disciplines, and new and new mathematical apparatus and modern computing technology are used.



INTERFACE OF THE “HYDRAULIC CALCULATOR” OF THE CPC OIL PIPELINE

Mathematical modeling of objects and processes in oil pipeline transportation, digital twins, Big Data... It seems to us that these technologies are more in demand today than ever in the applied aspect. What are the priority goals of implementing “digital twins” and everything that goes with it – efficiency, safety, acceleration of design, construction, and maintenance processes?

Let’s talk about specific examples. I personally work with digital twins not only at Gubkin University, but also as an employee of one of the private companies developing digital twins for oil and gas companies, so I know the topic well. Imagine an oil pipeline with an extended linear section, a certain number of pumping stations, process equipment, and devices for introducing antifriction additives. The dispatcher managing the system sees on the monitor the state of a particular element, the degree of opening of the regulators, the rotation frequency of the rotors, the pressure level in the pipe, flow rates, etc. High qualifications and considerable experience of the specialist are required to keep everything under control, to make the right decisions, especially when it is necessary to switch to another mode or an emergency situation arises. Of course, the dispatcher has undergone special training, knows how to react, but the human factor in case of errors cannot be completely excluded. And in this case, the digital twin can suggest how to normalize



PRESSURE MITIGATING SYSTEM AT THE CPC FACILITY

the state of the pipeline system, is able to predict the further development of the situation.

In addition to safety, digital twins help operate oil pipelines more efficiently and economically. Let's say you need to pump 20,000 tons of oil per day. You

outstanding Soviet mathematician and economist, Nobel Prize winner Leonid Vitalyevich Kantorovich. This mathematical model, combined with modern computing technologies, allows making optimal decisions when operating pipeline systems.

“THE DIGITAL TWIN CAN SUGGEST HOW TO NORMALIZE THE STATE OF THE PIPELINE SYSTEM AND CAN PREDICT THE FURTHER DEVELOPMENT OF THE SITUATION”

can do this in different ways: either the entire volume at once, or slowly over the entire allotted period. Or 15,000 tons quickly, then stop pumping and transport another 5,000 tons a few hours later. But which of these options will be the most efficient, which will put the least load on the entire system and its elements?

Here we are already moving away from the issues of hydraulics and transport and approaching the issue of linear programming problems. To the theory of optimal resource allocation, created by the

You are the head of the development team of the software package for automation of hydraulic, technological and economic calculations when planning deliveries via the CPC pipeline system. Please tell us more about this SP.

The software package created by our department for the CPC can be called a digital twin, because it allows you to build pumping modes, plan oil transportation along the main pipeline with the required flow rate, taking into account the volumes of raw

materials entering the system and the schedules of shippers. In particular, the following are calculated: the combination of included mainline pumps; the degree of opening of the valves of the pressure control unit; the consumption of antifriction additive at each PS.

Of course, the CPC technology department, which is engaged in drawing up plans, has a program of its own development, also a kind of digital twin, taking into account such indicators as costs and revenue. But they approached us with a request to create a project that would have a more convenient interface, speed up and optimize the calculation process.

What exactly are we doing? We are developing a client-server architecture for a hydraulic calculator. That is, the CPC will have a fully localized server without Internet access. And any specialist who needs it will be able to connect to this server via the internal network and make a calculation. Check different modes, in different combinations and find the most optimal one. The one that will allow you to complete all the tasks with minimal costs, electricity consumption, additives, taking into account, among other things, changes in the temperature of the transported oil.

At the same time, at least at the first stage, our software package will not interact with the real oil pipeline, take indicators from sensors and from the SCADA system.

Currently, variable frequency converters are installed at CPC pump stations. Does your model take them into account?

Of course, to create a complete twin of your hydraulic system, we could not do without taking into account such an important parameter as the ability to change the rotation frequency of the

rotors of the main units. We have provided for this parameter in our software package.

Will artificial intelligence now or in the future be able to help specialists in choosing the optimal mode?

Over time, yes. Right now, this is still an impossible task for neural networks; there are too many factors to consider. That is why, for example, the world's largest oil pipeline companies still do not

“AS FOR THE DEVELOPMENT OF MATHEMATICAL MODELS, OUR UNIVERSITY BEGAN TO STUDY THEM BACK IN THE 1960S IN PARALLEL AT SEVERAL DEPARTMENTS”

have central dispatching offices. There are territorial ones, but no central one. For now, this is a complex mathematical problem related to discrete programming, taking into account such a feature as the transportation of oil batches of different quality. Nevertheless, technologies are confidently moving along this path. And the use of aggregated modeling algorithms based on artificial intelligence systems is already quite applicable.

One of your research papers is called “Modeling the shutdowns of pumping stations equipped with pressure mitigating systems”. This topic is important for us, since there are 15 pumping stations in the CPC pipeline and their unplanned shutdowns are highly undesirable. Could you please tell us more about your research, as well as how the PMS works, when this system was invented and implemented, and to what extent is it now the only alternative in protecting equipment from hydrostroke?

My PhD thesis, which I prepared under the supervision of Doctor of Sciences Mikhail Vladimirovich Lurye, is devoted to modeling the operation of pressure mitigating systems. It is largely based on the experience of operating the CPC pipeline system. 10 years ago, an international consortium expanded the pipeline capacity to 67 million tons of oil per year, and I made calculations on how to reconfigure the pressure mitigating systems to new modes.

Sometimes you can hear the opinion that the Soviet Union had strong students, then their level began to decline and continues to decline. I think this is a myth, and it certainly does not apply to Gubkin University. Rather, the opposite. Students come who solve complex problems, and you think: what a great bunch of students, you probably couldn't wish for better, the previous ones would not have coped so well. Then new ones come and surprise again. They write such papers that you can almost immediately submit them to a scientific journal.

Modern students are not only prepared, but also active. From the fourth year, they begin scientific distribution, but now I already have a queue of third-year students asking me what to read additionally, what textbooks to study, what problems are still unsolved. Or another example. In our specialization, in fact, there are two most important requirements: understanding the basics of mathematical analysis and programming skills. And if a few years ago students had to be taught programming languages, spending at least a semester on it, now they come to us with the ability to program basic things. ●

There are various ways to capture pressure waves in a pipeline, the simplest and most classic of which is a safety valve. But it opens and will remain open for quite a long time – two to three hours, until the pressure in the pipe drops to a level lower than the force of the spring holding it.

The pressure mitigating system protects the pipeline well from hydraulic shock, while its valve opens for only tens of seconds, which is enough for the operator to make the necessary switches. PMS systems are complex and expensive to operate, requiring careful monitoring of the condition of many elements, but given the high speeds of oil pumping through the pipeline, the simultaneous use of several such systems is justified in the CPC.

Please assess the level of today's students. What advantages do they have, what are they interested in, what do they lack?



AUTHOR
PAVEL KRETOV

ELECTRIFY THIS

IN MID-2025, CPC WILL START IMPLEMENTING A PROGRAM TO REPLACE GAS TURBINE-DRIVEN MAINLINE PUMP UNITS. THREE STATIONS IN RUSSIA WILL BE COVERED BY THE PROJECT: A-PS-4A, KOMSOMOLSKAYA AND KROPOTKINSKAYA PS

Most of the mainline pumps in the Tengiz-Novorossiysk pipeline system are driven by electric motors, but there are a few stations that use gas turbines. One of them is the largest in the Consortium, the Kropotkinskaya PS. This section

pumps the largest volume of oil, so transportation is provided by six main and four booster pumps. To drive them, Kropotkinskaya PS has eight gas turbines, six of which operate as turbopumps and two as turbogenerators. The operation is also provided by air

and gas compressor stations and a gas distribution station. Three new gas turbines were installed at the PS as part of the CPC Expansion Project in 2014, modernizing the 2002 equipment set-up.

The current replacement of units at three pumping stations will



Photo from the archive of Transneft Media LLC

significantly reduce the operating costs of operating these facilities of the pipeline system, because today, in fact, some of the pumps at these stations are powered by a mini-power plant, which requires fuel and regular costly specialized

maintenance. At the same time, mainline pumps and their drives are too important equipment for oil transportation to continue to depend on supplies from abroad for its condition and availability of spare parts. Decommissioning

three Russian stations with gas turbines would reduce the nominal throughput capacity of the pipeline system from 81.5 to 65.5 million tons of oil per year.

The CPC management considered various options for upgrading the PS,





Photo from the archive of Transneft Media LLC



Photo from the archive of Transneft Media LLC



Photo from the archive of Transneft Media LLC

including switching to domestically produced gas turbine units and gas turbine power plants. As a result, it was decided to provide the stations with external power supply and install new Russian-made mainline pumping units with a drive from 8.3 MW electric motors.

When making the decision, such factors as the forecast on

the decommissioning time of the operating gas turbine units, time costs and the cost of the work were taken into account. It was equally important to ensure that pumping volumes were maintained during the installation of the equipment. Upon completion of construction, the stations should ensure the first category of power

supply reliability with the ability to automatically enter a reserve for main and booster pumps.

The experience of import substitution and the production capacities of Transneft PJSC served as the basis for attracting the company's structural divisions to participate in the new CPC project. Currently, prototypes of

mainline pumping units and electric motors are being manufactured. The involved structures of Transneft are faced with the task of creating universal pumping units with extended Q H characteristics that differ from the standard line of equipment manufactured by the company. Their implementation will increase the overall flexibility of the CPC pipeline system both when increasing pumping volumes and when reducing modes.

"In February 2025, we will receive from Transneft PJSC a test kit developed specifically for us, including a universal pump and an electric motor", said Nikolay

be constructed with units installed in parallel. Auxiliary devices – oil systems, drainage, blowdown and cooling systems – will ensure reliable operation of the equipment.

The process pipelines and shut-off valves will be placed so that both the old and new pump stations can be in operation during the transition period. Two drainage tanks with semi-submersible pumps will be installed at the process sites. The complex of structures will be completed by new buildings for the indoor switchgear and a complete transformer substation. Just like all other stations, A-PS-4A, Komsomolskaya PS and

enhanced fire protection. Fire extinguishing pumping stations will be modernized: they will be equipped with higher-performance pumps, a foam generator unit will be built, and water and foam extinguishing units will be deployed.

As part of the program, CPC contractors will need to lay high-voltage lines (HvL-110 kV) for A-PS-4A and Kropotkinskaya PS and build substations (SbS-110 kV). It is assumed that the length of the high-voltage line supplying A-PS-4A will be 55 km, for Kropotkinskaya PS – 11 km. External power supply facilities for Komsomolskaya PS will be created by Rosseti PJSC at the expense of CPC-R JSC.

The Program strategy provides for its phased implementation with the following main stages.

Phase 1 – initiation of the Program, obtaining shareholder approval – completed.

Phase 2 – elaboration, execution of design and survey and earth-building works, manufacture and testing of a prototype of MPU and ED is being implemented.

Phase 3 – implementation of the Program – starting from June 2025.

NEW RUSSIAN-MADE
MAINLINE PUMPING
UNITS POWERED BY

8,3^{MW}

ELECTRIC MOTORS WILL
BE INSTALLED AT THE PS

Gorban, CPC General Director, in an interview with the Rossiya TV channel.

At each of the three stations, new main pumping buildings will

Kropotkinskaya PS will receive four VFD block boxes and additional cable lines.

The increased volume of equipment at the PS will require



AUTHOR
DMITRY KONSTANTINOV

COMMUNITY OF LEADERS

IN EARLY JULY, ANOTHER MEETING OF THE LEADERS OF THE CPC SAFE WORK CULTURE DEVELOPMENT TOOK PLACE IN ELISTA. AS PART OF THE TEAM-BUILDING EVENT, THE GOALS OF THE COMPANY'S STRATEGIC PLAN LABOR PROTECTION, INDUSTRIAL SAFETY AND ENVIRONMENTAL PROTECTION FOR 2025-2027 WERE FORMED

The format of the July meeting was developed and successfully tested a year ago, at the first congress of leaders. The

choice of location was also successful: the capital of the Republic of Kalmykia is located approximately in the middle of the Tengiz-Novorossiysk

pipeline route, which equalizes the transportation "shoulders" for representatives of all production facilities and administrative offices of the



MUKHIT MAZHENOV,
REGIONAL MANAGER, CPC
EASTERN REGION:

« The attitude of managers towards the development of the Safe Work Culture is the most important marker that shapes the behavior of other employees. The motto that I would suggest for today's situation is: "Do as I do". Our Regional Safe Work Culture Committees are held with the participation of contractors, and we, by the way, were the first of the Consortium's divisions to implement contractor motivation tools.



THE MEETING PARTICIPANTS MADE COMMITMENTS FOR 2025 IN THE FIELD OF LABOR PROTECTION, THE ENVIRONMENT AND INDUSTRIAL SAFETY

CPC. The opening of direct air service to Elista was a pleasant bonus for the delegates of the Moscow office.

"Gathering and rewarding the best, exchanging experiences and training are not the only objectives of the summit in Elista", noted Nikolay Gorban, CPC General Director, in an interview with the RUSSIA 1 TV channel. "Genesis, continuous development year after year – we set this task at the first meeting in 2023, outlining the theme "a leader is not a position, but a state". The range of tasks and involvement is expanding: this year, PS deputy managers are participating in the summit, next year we plan to invite our strategic partners, contractors. These enterprises employ a comparable number of people

RUSLAN KAPKAEV,
SERVICE HEAD, CAPITAL
CONSTRUCTION PROJECTS
SUPPORT, CENTRAL REGION:

« The best motivation is an honest dialogue that will allow a person to open up, talk about problematic issues and solve them together.



ABZAL ABZELBAEV,
REGIONAL
ADMINISTRATION

« There is a proverb in Kazakhstan: “The state begins with the family”. I think it is also necessary to develop a Safe Work Culture at the enterprise – starting with yourself, becoming an example for others, that is, a leader. Participation in forums like the one in Elista gives a certain leap, a level up in the development of leadership practices with the prospect of their application among contractors. And such communication with contractors in our case is not built in the format of a monologue-“sermon”, but in a dialogical manner, when all parties have the opportunity to speak out and be heard.



and in some cases exceed the number of CPC personnel, and without their conscious attitude to production safety, there will be no overall effectiveness.

The participants of the event were welcomed by the Head of the Republic of Kalmykia Batu Khasikov and the Chairman of the Government

of the Republic of Kalmykia Gilana Boskhomdzhieva. “It is symbolic that an international event of such a scale is taking place on Kalmyk soil”, Batu Khasikov emphasized. “The approaches and skills that are being developed here are in demand by everyone, including new manufacturing enterprises in the Republic of Kalmykia, which has taken a course towards development in the industrial sector. Kalmykia had the status of an agro-industrial region in Soviet times, and now there is a task to restore this status”. Combining organizational and training events, the Summit schedule included reports from the curators of the goals of the HSE Strategic Plan for 2022–2024 on the status of their implementation, awarding the best leaders of the company

IVAN BAEV,
PS-7 DEPUTY MANAGER:

« The most important task for a leader is to maintain his reputation. If you violate the rules you are implementing once, your authority in the team and people’s trust will be undermined. The second, no less important task is to find allies, like-minded people, both in your department and in contractors. You can’t dig a pit alone, and here the work is proportionate.



in the development of the Safe Work Culture based on the results of 2023, and presenting and agreeing on the key provisions of the HSE Strategic Plan for 2025–2027. The company’s top management also reviewed and analyzed the current level of maturity of the corporate Safe Work Culture. “We have moved to the third, “independent”, level on the Bradley scale in 2022, and the following year we approached the fourth highest “interdependent” level on one of the parameters – informing about production risks”, commented on the results of the discussion the head of the Summit organization, Deputy General Manager, HSE, Russian Federation, Sergey Polovkov. “This implies a conscious commitment of CPC



personnel to the values of the Safe Work Culture and a focus on working with contractors in order to achieve similar results. At the end of 2024, it

is planned to organize another independent assessment of the level of development of the Safe Work Culture, and based on the result, we will be able to

ALEXANDER VOLKOV,
SERVICE HEAD, CAPITAL
CONSTRUCTION PROJECTS
SUPPORT, WESTERN
REGION:

« The key condition for developing a conscious attitude towards the Safe Work Culture in a contractor is being present in the same information field with him.



VLADISLAV LAVRINOV,
A-PS-4A MANAGER:

« The leader’s motto in my understanding should sound like this: “We invent, plan, engage and safely implement”. Motivating employees to commit to the principles of the Safe Work Culture, in particular, to the activity of filling out observation cards, we must form an understanding that their quality is primary, not quantity. The cards should be filled out primarily for reasons that are relevant in the HSE sphere.





visualize the dynamics of the development of this important area in the company's work".

Interaction with contractors in the area of Safe Work Culture was considered in the format of a team game using the Lego Serious Play tool. Under the guidance of the lead trainer (and with the help of team trainers), participants modeled situations using multi-colored elements of the world-famous construction set. The tasks were successively more complex and, as a result of the training, the teams created already voluminous and complex compositions reminiscent of the computer strategy game Minecraft.

"Training using Lego elements involves not only visual-verbal communication centers, but also hand motor skills", explained a leading trainer and HSE expert at Abiroy Sergey Kharitich. "This technology has a different effect on the trainee's brain,

and the material is better absorbed and remembered".

The Summit-24 agenda also included analysis of practical cases and problems of contractor management in the field of HSE (proposals were created using the Corporate Change Matrix tool), improvement of leadership skills during meetings of facility and regional Safe Work Culture Committees, development of measurable KPIs for changing the quality of work with contractors.

As part of the meeting's summary, personal commitments were made by managers and specialists for 2025 in the field of labor protection, industrial safety and environmental protection. An interesting feature of this year's Leaders' Summit was a meeting with the pilot-cosmonaut, Hero of Russia Andrey Borisenko, which allowed for a comparison of safety requirements on Earth and in orbit. ●

AIDAR TOLESHOV,
SENIOR MECHANICAL
ENGINEER, CPC-K:

« In my understanding, a leader is, first of all, a mentor. We see different levels of Safe Work Culture and different understandings of it in different contractors. I believe that one of the effective motivating tools will be the contractor's awareness that doing it safer means doing it less expensively (i.e. avoiding accidents, downtime, injuries and related expenses), respectively, more profitably. ●



CPC PRESS SERVICE

CREATIVE APPROACH

CPC ENVIRONMENTAL EDUCATION PROJECT "PROTECT NATURE OF OUR NATIVE LAND" CELEBRATES ITS 10TH ANNIVERSARY IN 2024. THE EFFECTIVENESS OF THIS INITIATIVE CAN BE ASSESSED "BY THE HEADS" OF THE PRESERVED AND RESTORED POPULATIONS OF RED-LISTED ANIMALS, OR BY WORKS OF ART

Astrakhan Oblast, the Republic of Kalmykia, Stavropol Krai and Kuban – in each region, the project "Protect Nature of Our Native Land" is developing according to an individual scheme but has a common component: creative competitions. Every year, the jury examines dozens and hundreds of works by young enthusiasts, made in various techniques of fine art. Many of them are truly talented, many have undoubted artistic value.

For the second year in Elista, the works of young artists are exhibited at specialized exhibitions, the last of which was organized in the Amur-Sanan National Library. Visitors from among all comers (which helps to expand the audience of the eco-project) could see watercolors by 25 students of art schools and other educational institutions of Elista, as well as Iki-Burulsky and Chernozemelsky districts of the Republic of Kalmykia,

made during the plein air "Oh my steppe, land of wormwood herbs".

"Plein air is a very useful practice for beginning painters", noted Tatyana Serechenko, a member of the Union of Artists of Russia, who conducted the master class. "Here, children learn not only to feel and understand nature, but also to visualize its value and beauty, passing on their impressions to their peers and adults".

The creativity within the framework of the eco-project in Kalmykia is not limited to this "spring vernissage"; at the end of September, the results of the "Together We Will Save the Planet" competition will be summed up. And, of course, many talented works also appear every year in the Astrakhan Oblast, Stavropol Krai and Krasnodar Krai. Time will tell whether the tradition of exhibiting these works for public viewing, established in Elista, will be continued and replicated. ●



AUTHOR
PAVEL KRETOV

DISPATCHER'S SCORE

AT THE BEGINNING OF 2024, NARIMAN DILYAVEROVICH KASIMOV, A PIPELINE CONTROL LEAD DISPATCHER, CELEBRATED HIS ANNIVERSARY. HE HAS BEEN WORKING AT CPC SINCE THE FIRST DAYS OF OPERATION OF THE TENGIZ-NOVOROSSIYSK PIPELINE SYSTEM

have made significant strides since then", says the anniversary celebrant. "Previously, these were push-button remote controls for telemetry systems, then computers appeared that showed only the pressure at the inputs and outputs from the station collectors".

In 2001, Nariman Kasimov came to the position of dispatcher in the international CPC project. He participated in filling the pipeline with oil from the Tengiz field. At the beginning of the process, one Tengiz pump station was involved, then the pumps of the Astrakhanskaya PS were connected.

During his shift at the Operation Control Center, Nariman Dilyaverovich is responsible for half of the linear part and the PS. The work of the dispatchers is organized so that there is an alternation of control of sections for their versatility. Today you control the first half of the MP equipment, on the next shift – the second. It is very important that the dispatchers not only see and control each object, but are also in direct contact with the operational personnel.

"An oil pipeline is a connected hydraulic system", explains Nariman Kasimov. "If something happens on the linear part, for example, one of the mainline pumps stops due to a power outage, this immediately changes the situation along the entire length of the pipeline. It is necessary to quickly reduce the pumping modes so as not to create conditions for the occurrence of a hydraulic shock".

It is also necessary to adapt to the requests of shippers. Sometimes, due to repair and maintenance of equipment at the fields, they need to reduce the supply of oil to the CPC system, and sometimes, on the contrary, increase it. The autumn and winter months are difficult for dispatchers, when the weather conditions especially affect the rhythm of loading export tankers.

The dispatcher's work day begins with the acceptance of the shift. The colleague on duty is given information

about all important events. The dispatcher in charge also receives a plan: how much oil needs to be pumped through the pipeline. The technological modes and the number of stations involved in transportation depend on this.

During the shift, the dispatcher interacts with the CPC management, with the dispatchers of the shippers, with the shift supervisors at the PS. This can be a telephone conversation or negotiations via the dispatch conference call. The latter is used, including when some important switching is carried out on the oil pipeline.

The dispatcher's working tool is the SCADA control and management system. To master it, a specialist needs a special training course and must study the methodological manual. From the very beginning of CPC's work, SCADA S/3 was deployed in the company. After 10 years, a decision was made to replace the system with a new version – SCADA OASyS. The control and management system became even better, more convenient and intuitive and, among other things, made it possible to process the received data and determine the reliability of the sensors.

"During the modernization, all the experience of CPC dispatchers was taken into account", – says Nariman Dilyaverovich. "We expressed our



DISPATCHERS ALEXANDER NOSOV, NARIMAN KASIMOV, ROMAN FEOKTISTOV

wishes about what information we wanted to see first. The new SCADA conveniently graphically visualizes the pressure distribution along the pipe and the temperature. You can

If the dispatcher starts his duties after a vacation, he is given a day to familiarize himself with the changes that occurred during his absence, to study the operational logs. It is

A DIFFICULT TIME FOR DISPATCHERS IS AUTUMN AND WINTER, WHEN THE WEATHER AFFECTS THE RHYTHM OF TANKER LOADING

select any point along the pipeline and study historical trends along it".

The dispatcher's shift lasts 12 hours. They work for four days, then have the same amount of rest.

welcome if the specialist spends time working with a computer simulator that simulates hydraulic processes in the pipeline, and recalls the most important skills.

Every three years, all dispatchers take exams confirming their qualifications. What quality does our hero of the day consider the most important for a dispatcher?

"Attention", Nariman Kasimov answers. "This quality is equally important when studying the guidelines along with the instructions, and when working with notifications. Dispatcher training takes a long time, from six months to a year he is trained and even after that he works for several months only in tandem with a more experienced colleague. It is good that we have a young generation growing up. Guys come from stations, mostly shift supervisors, sometimes from other companies".

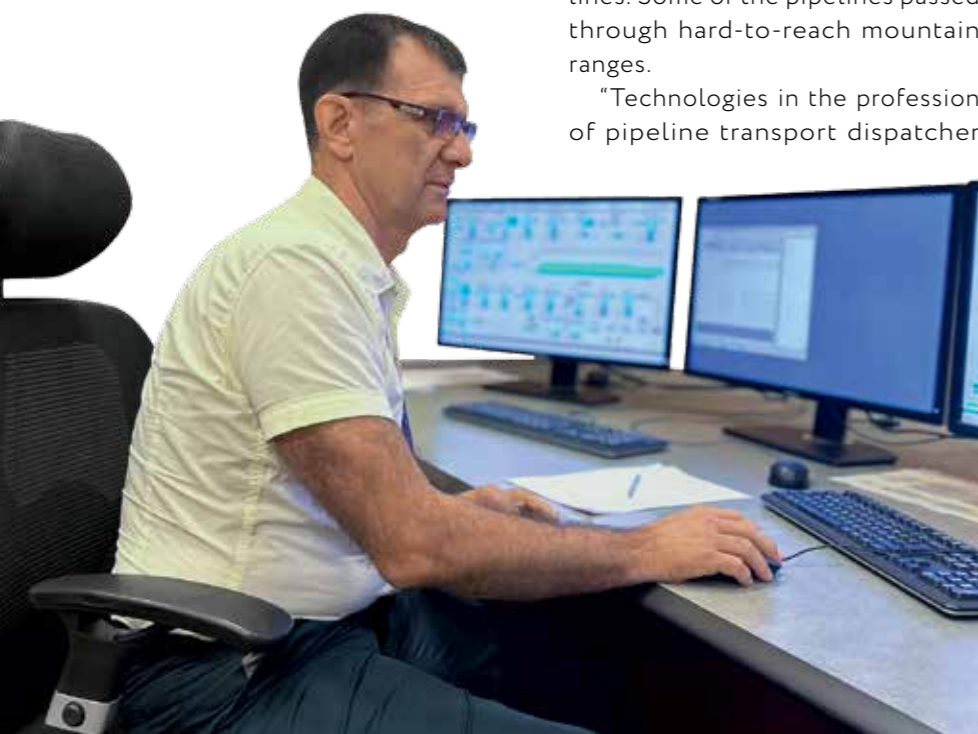
Nariman Kasimov was born on February 20, 1964, in the Kazakh city of Shymkent, known for its chemical and oil refining industries. Since childhood, he was interested in automation and devices, so after school he graduated from the Kazakh Chemical Technology Institute (now the South Kazakhstan University named after M. O. Auezov) with a degree in automated process control systems (APCS). He later moved

to Novorossiysk, where he began working at Chernomortransneft JSC.

"Since 1986, I was a shift engineer for the automated process control system and 12 years later became a dispatcher for the Krasnodar regional department of main oil pipelines", says Nariman Dilyaverovich.

Krasnodar regional department of main oil pipelines serviced more than 1,000 km of oil arteries, the main ones being the Tikhoretsk-Tuapse and Tikhoretsk-Novorossiysk main lines. Some of the pipelines passed through hard-to-reach mountain ranges.

"Technologies in the profession of pipeline transport dispatcher



OBTAINING CERTIFICATES OF TRAINING IN THE LEAK DETECTION SYSTEM BY THE DISPATCH SERVICE OF CPC, 2003

AUTHOR
PAVEL KRETOV

A PROFESSION OF LIFELONG LEARNING

IN THE SUMMER OF 2024, DMITRY LEONIDOVICH ZHIVOTOV, THE OPERATOR OF THE KROPOTKINSKAYA PS, CELEBRATED HIS 50TH BIRTHDAY. THE EDITORIAL BOARD OF THE CORPORATE MAGAZINE JOINS IN CONGRATULATING COLLEAGUES

“It was a large and important area”, recalls the hero of the day. “Judge for yourself: in those years, the oil depot shipped up to 50 million tons of oil and oil products per year for export. There were four oil and fuel oil metering units, plus two diesel ones. At the same time, they also bunkered ships”.

At Chernomortransneft JSC, Dmitry acquired valuable skills and experience in the field of oil transportation. The subsidiary of Transneft PJSC was dynamically modernized, additional capacities were built.

In 2005, Dmitry Zhivotov joined CPC. He didn't have to go far from Novorossiysk: he started working as a process unit operator at the Marine Terminal of the international consortium. It took a lot of hard work and persistent study, expanding his knowledge and skills. Learning a foreign language was not a bad idea — some of the instructions were in English. The geographical scope of work was also extensive: until the mid-2010s, MT operational personnel serviced both the Shore Facilities and the Tank Farm, moving between the facilities between the facilities, which were located 9 kilometers away. In 2011, when the CPC Pipeline System Capacity Expansion Project began, the workload increased significantly.

“What I remember most from the Expansion Project was the operation to switch programmable

After university, he worked at Yuzhgazstroy LLC, where he participated in the construction of medium-pressure gas pipelines, gasified villages and farms in Kuban. So, the fact that the village of Abrau-Dyurso, adjacent to the CPC Marine Terminal, is now fully gasified is partly due to Dmitry Zhivotov.

In 2000, Dmitry Leonidovich moved to Chernomortransneft JSC, becoming an operator of oil metering units at the Sheskhari transshipment oil depot.

Dmitry was born on June 3, 1974, in the city of Rovenki in the Voroshilovgrad region (now the Lugansk People's Republic within the Russian Federation), where during the Great Patriotic War, the events described by Alexander Fadeev in the novel “The Young Guard” unfolded. However, the family soon moved, and Dmitry spent his childhood and youth in the hero city of Novorossiysk.

“There was no doubt about which path to choose after school: in our country, rich in natural resources, there has always been, is and will be a great demand for specialists in the fuel and energy sector”, says Dmitry Leonidovich. “First, I studied at a technical school as a gas technician, and then at the Moscow State Open University, where I graduated with a diploma in the design, construction and operation of oil and gas pipelines and oil and gas storage facilities”.



logic controllers at the Shore Facilities”, admits Dmitry Leonidovich. “One night was allotted for its implementation, for which tanker loading was suspended. It required intense work and precise interaction between various departments. We completed the operation on time, and all the distinguished specialists were awarded bonuses and acknowledged with gratitude”.

Since 2014, Dmitry Zhivotov has been the operator of the Kropotkinskaya PS. We, correspondents of CPC Panorama, find it appropriate to ask: does he regret changing the main CPC facility for one of the pump stations, albeit with a promotion?

“No regrets, the Kropotkinskaya PS is the largest station in the entire CPC pipeline system”, Dmitry answers. “Thanks to the Expansion Project and the commissioning of new oil pumping facilities, many vacancies opened up at that time. I was ready to go to PS-4 in Stavropol Krai, which is serviced by a rotational basis, but I ended up at Kropotkinskaya in Kuban, and I think it worked out even better that way”.

Arriving at the PS, the new station operator immediately found himself in the thick of production events. He participated in the reconstruction of three units of the main pump

station, then in the re-piping of the booster. Now, like all specialists at Kropotkinskaya, he is preparing to implement a program to replace gas turbine drives of pumping units with electric ones with VFDs and the construction of a new mainline pump.

“My working day begins with walk around the main equipment”, says

observation cards. For example, in May 2024, about 60 such cards were prepared at the Kropotkinskaya PS, and a quarter of them were initiated by Dmitry Leonidovich.

“It just happened that way”, the hero of the day smiles. “It's nice to see how the station is becoming more comfortable and safe with each

“IT'S NICE TO SEE HOW THE STATION IS BECOMING MORE COMFORTABLE AND SAFE WITH EACH PASSING MONTH”

Dmitry. “Then I draw up work permits for contractors. I determine the nature and scope of work, make sure that the teams will not interfere with each other. Then it is necessary to inspect the workplaces and confirm that all the requirements of the work permit have been met, the team's admission and control over the completeness and quality of the work performed is carried out in accordance with the work permit. At the end of the work, it is necessary to check whether everything has been cleaned up”.

Our interlocutor takes the most active part in the preparation of

passing month. All our suggestions are not ignored and are carefully studied by the management”.

All professions at oil pipeline production facilities are important and interesting in their own way, but Dmitry Zhivotov values his own profession for its dynamism.

“There is a minimum of routine here, I never feel “stagnant”, admits the operator of the Kropotkinskaya PS. “You can study this specialty your whole life: something is constantly being modernized, instructions are updated, new, more and more advanced equipment is being introduced”.

AUTHOR
PAVEL KRETOV

SOUTHERN GATE OF RUSSIA

AT THE TURN OF THE 19TH-20TH CENTURIES, NOVOROSIYSK BECAME THE LARGEST TRADE CENTER IN THE NORTH CAUCASUS AND CONTINUED ITS DEVELOPMENT

With the opening of the Black Sea Cement Manufacturing Company in Novorossiysk in 1882, the city port, in addition to grain and oil, began to annually transship impressive volumes of cement, which was made from local marl. It is known that the Port Arthur fortress, the port of Vladivostok, and many roads in Transbaikalia were built using Novorossiysk cement.

An important improvement to the port infrastructure was the construction of the western and eastern breakwaters to protect ships from storm winds. The latter also served as a mooring point for sailboats and small steamers sailing to nearby ports.

In the summer of 1901, it was at the Novorossiysk roadstead that wireless communication devices were tested with the participation of Russian inventor Professor Alexander Popov. During the experiments, the devices demonstrated stable operation at a distance of up to 100 km. After testing various antenna options, all ships of the Russian fleet began to be equipped with radio rooms. The vast majority of them were equipped with radio communications by the beginning of the Russo-Japanese War.

The First World War, the Revolution, the Civil War and the intervention caused significant damage to the port facilities. However, already in 1923

Novorossiysk became the second largest port in the country in terms of cargo transshipment, second only to the port of Petrograd. For these outstanding achievements, the Novorossiysk port team was awarded the Order of the Red Banner of Labor of the RSFSR.

A serious problem after the civil war was the lack of a navy. The young Soviet republic could not afford to build or buy ships abroad. The solution was to raise sunken and scuttled ships, including those under the terms of the Brest Peace, in Tsemes Bay. For this purpose, a specialized enterprise — the Special Expedition for Underwater Works (EPRON).



TODAY NOVOROSIYSK IS ONE OF THE LEADING CITIES OF KUBAN IN TERMS OF SOCIO-ECONOMIC DEVELOPMENT

The first ship raised by EPRON was the destroyer Kaliakria, followed by the oil tanker Elbrus. Most of the ships sunk in 1918 were raised by the end of the 1930s. The port workers' success was recognized with a second Order of the Red Banner of Labor. According to the report on the port's economic activity in 1927-1928, more than 400 ships were annually moored at its berths.

In pre-war 1940, the Novorossiysk sea trade port occupied an area of over 100 hectares and had 40 berths. Since September 1942, battles for Novorossiysk began: the city was the key to the road along the Black Sea coast, the capture of which by the Germans would have deprived

the Soviet fleet of its last bases. But the Nazis did not go further than the cement factories at the beginning of the strategically important Sukhumi highway — they were stopped by the Red Army and Red Navy. Soviet artillerymen played an important role in the defense of Novorossiysk, eliminating the possibility of enemy ships entering Tsemes Bay. They coped no less brilliantly with the task of supporting the defenders of Malaya Zemlya.

After the liberation of Novorossiysk in September 1943, it took almost complete reconstruction of the city. Destruction amounted to more than 90% of the built-up area, and everything that was not destroyed was mined by the Germans before they left, including the Lenin monument. Of the 40 berths of the port, only one remained, and all warehouses and cranes were also destroyed. But the restoration work was carried out at a rapid pace: the port reopened for cargo operations just a year later, in October 1944.

In the post-war period, the city's port industry continued to develop. Already at the end of 1946, after the restoration of the oil depot, the port again began to receive tankers. By 1961, the volume of annual oil shipments for export exceeded 11 million tons.

By order of the Council of Ministers of the USSR, Novorossiysk was chosen as one of the main directions for oil export. The construction of a new oil transshipment complex began in the city. It included an oil depot on Cape Sheskhari (translated from Adyghe as «patrol») — in the eastern



THE FIRST TANKER LIKHOSLAVL, LOADED AT SHESKHARIS IN 1964





part of Tsemes Bay. At the same time, the main tank farm was planned in the Grushovaya Balka tract. It was decided to connect both facilities with pipelines laid in a technological tunnel inside the Markhotsky Ridge.

By the way, in 1960, among the options for placing an oil transshipment complex, experts considered a site in the area of Yuzhnaya Ozereyevka, where the CPC facilities are now located. But calculations showed that it was more economical to build on Sheskhari.

The construction of the complex at Sheskhari began in 1961. The production facilities were commissioned in three stages. The first stage included a tank farm with a capacity of 99 thousand m³, a reinforced concrete protective pier and four berths. On October 19, 1964, the first tanker, Likhoslavl, was loaded at berth No. 4, taking on board 37 thousand tons of oil.

In parallel with the construction of the Sheskhari transshipment oil depot, in 1962, the construction of 20 reinforced concrete tanks of the SCR-10000 type began in Grushovaya Balka.

Since oil and oil products were to be delivered not only via main pipelines but also by rail, two railway discharge overpasses were built in parallel: one for fuel oil, the other for oil and oil products. At the same time, a highway was being built through the pass and the above-mentioned

tunnel. These works were included in the second stage of construction of oil depots.

The third stage was the expansion of the tank farm in Grushovaya Balka to 300 thousand m³. In 1978, this site received its own access to the sea — thanks to an oil pipeline, through which ships could be loaded directly, bypassing the Sheskhari tanks.

Today, Grushovaya is one of the largest oil depots in Russia. On an area of 211.8 hectares, there is a tank farm with a total capacity of 1.2 million m³, three railway loading and unloading racks capable of accepting 188 tank cars, and other facilities.

Sheskhari, which once began with two berths 150 m long, today is a powerful complex of structures

3 km long, capable of receiving several vessels at the same time, including tankers with a deadweight of up to 250 thousand tons.

Novorossiysk is currently one of the leading cities of Kuban in terms of socio-economic development. It produces more than 13% of the gross domestic product and ranks second after the regional center in terms of production of goods and services. The city has its own flag, coat of arms and even its own anthem, written by Dmitry Shostakovich in 1960. This anthem, «Novorossiysk chimes», can be heard on the Heroes' Square of Novorossiysk, where it is periodically performed, including as part of the festival of the same name, which has been held since 2022. ●



FIRST FESTIVAL «NOVOROSSIYSK CHIMES», SEPTEMBER, 10, 2022

AUTHOR
DMITRY KONSTANTINOV

SINGULAR FAIRWAY

THE BOSPHORUS STRAIT, WHICH CONNECTS THE BLACK SEA WITH THE WORLD OCEAN, IS ABOUT 30 KILOMETERS LONG, HAS AN UNCERTAIN ORIGIN, AN IMPORTANT ECONOMIC SIGNIFICANCE, AND AN INTERESTING HISTORY, WHICH IS IN NO SMALL MEASURE FULL OF DRAMA

The name «Bosphorus» (Bosporus) is literally translated from Greek as «cow ford». The Greeks called the modern Bosphorus the Thracian Bosphorus, and the Kerch Strait the Cimmerian Bosphorus.

Modern science believes that the Bosphorus Strait was formed naturally about 7.5 thousand years ago as a result of a geological fault, an earthquake and the melting of glaciers. At that time, the water level in the Black Sea was 100 m lower than in the Mediterranean, and a powerful water flow going from south to north

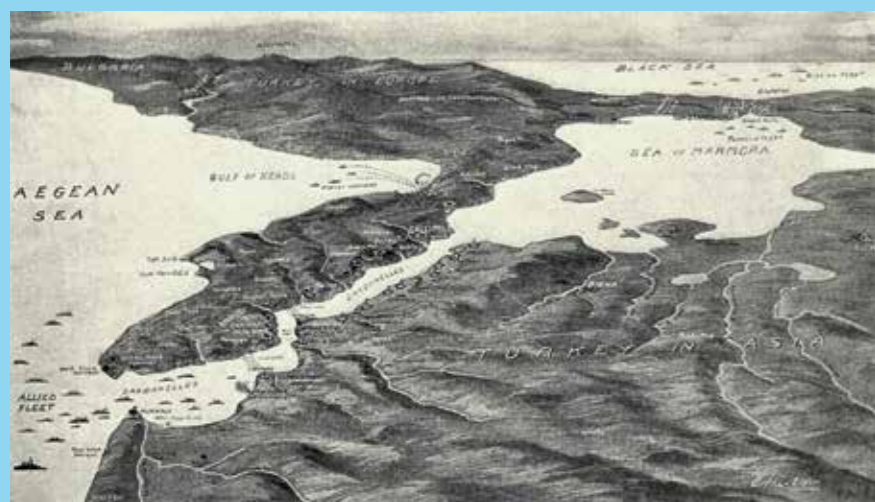
gave rise to legends about the Great Flood. Subsequently, the strait was closed and reopened several times under the influence of geological ups and downs, shifts, erosion and landslides. There are versions that this was done man-made.

The port city at the exit from the Bosphorus to the Sea of Marmara had an important strategic significance, allowing control over maritime trade and logistics. Olive oil, wine, weapons, fabrics, and ceramics were transported through the strait. Ships loaded with grain, timber, honey, wax, furs, and slaves were sent

back. In just six years (324–330), Caesar Flavius Valerius Aurelius Constantinus built a new capital of the Roman Empire here on the site of Byzantium.

As the second Rome, Constantinople existed for over a thousand years, surviving both the Russian shield on its gates (907) and three sieges by the Crusaders (1097, 1203 and 1204). In 1453, the city was captured by the Ottoman Sultan Mehmed II Fatih. Since then, Turkey has owned the Bosphorus Strait, which runs through its territory, albeit with some international adjustments.





Everett Collection/Shutterstock/FOTODOM

GEOLOGY, BIOLOGY, ANTHROPOLOGY

At present, when the Sea of Marmara and the Black Sea are not isolated lakes but communicating vessels, the difference in water level between them is only 35 cm in favor of the Pontus Euxinus. That is, the main current of water in the Bosphorus is directed from the Black Sea to the Sea of Marmara at a speed of 1.5–2 m/s. However, there is also a reverse bottom and saltier current with a speed of 0.9–1 m/s, which was discovered in 1881–1882 by the Russian admiral (then still a commander) Stepan Makarov.

In August 2010, an expedition of scientists from the University of Leeds, UK, exploring the bottom of the Bosphorus with underwater drones, led by Professor Daniel Parsons, discovered a trench there 59 km long and up to 35 m deep, along which a “river” with rapids, waterfalls and whirlpools flows from the Sea of Marmara to the Black Sea at a speed of 7.5 km/h. Moving 22 thousand m³ of water per second, the underwater river extends almost

twenty kilometers into the Black Sea shelf and ends at the cliff of the first “bottom terrace”. In an interview with the Daily Telegraph, Professor Parsons explains the origin of the phenomenon by the difference in the density and salinity of the water in the Black and Marmara Seas.

The Bosphorus Strait is about 30 km long, reaches 3.7 km at its widest point, and 750 m at its narrowest. The maximum depth is 121 m, the minimum is 27.5 m. There are about 200 species of fish in the strait. The most valuable are bonito, bluefish, sea bass, tuna, and swordfish. Old-timers complain that over the past 20 years, the ichthyological wealth of the Bosphorus has been halved due to commercial fishing from boats. But fish, as we know, is a renewable resource.

In the memory of local residents, the Bosphorus froze six times: in 401, 763, 928, 1878, 1929 and 1954. The strait also became the arena of military actions more than once. In 1043 disbanding of the new emperor of Byzantium Constantine Monomakh subordinate Russian-Varyagian corps

and murder in the market of Tsargrad of the Russian merchant of I guild served as the reason for war. Prince Yaroslav the Wise sent 400 ships to Byzantium under the command of his son Vladimir. The Russians crossed the Bosphorus and gave battle to the Byzantines at the Iskrestu lighthouse. Greek fire (a mixture of crude oil, saltpeter, sulfur, rosin and linseed oil) helped the Romans win the battle. The defeat of Yaroslavich's squadron completed the storm. Vladimir has lost his flagship boat, but still, with a small number of ships, he managed to leave the Bosphorus back to Kyiv, along the way giving his pursuers another, this time successful, sea fight.

During the Russo-Turkish War of 1768–1774, Ottoman ships were pulled up along the Bosphorus for military operations in the Aegean Sea, where the Baltic Fleet of the Russian Empire passed through Gibraltar. The Russians won this campaign, and in October 1774, the frigate Slava passed from the Sea of Marmara to the Black Sea via the Bosphorus, delivering a party of Greek settlers to Crimea.

In August 1798, Vice-Admiral Fyodor Ushakov's squadron entered the Mediterranean Sea through the Bosphorus, this time reinforced in Constantinople by the allied Turkish fleet.

The Treaty of Adrianople of 1829 between the Russian and Ottoman Empires ended the Russo-Turkish War of 1828–1829 and allowed Russian and foreign merchant ships to freely pass through the Bosphorus and Dardanelles.

In February–April 1833, three Russian squadrons with a 30,000-strong landing force entered the Bosphorus. This was

done at the request of Sultan Mahmud II to protect Constantinople from the former vassal of the Porte, Muhammad Ali of Egypt. On July 8, Russia and Turkey concluded the eight-year Treaty of Unkiar Skelessi, which provided for a military alliance between the two countries in the event that one of them was attacked. In this case, Turkey could not help with troops and a fleet, but was obliged to close the Bosphorus at Russia's request for ships from all other countries.

After the expiration of the Unkiar Skelessi Treaty, the Straits Convention was concluded in London on July 13, 1841 between Russia, Great Britain, France, Austria, Prussia and the Ottoman Empire. According to this document, the Bosphorus and Dardanelles were declared closed to warships of all countries in peacetime. Turkey could issue permits for the passage of light warships belonging to the embassies of friendly countries. The London Convention said nothing about the regime of the straits during wartime.

On June 1, 1853, Russia once again broke off diplomatic relations with Turkey. On November 30 of the same year, Vice-Admiral Nakhimov's ships destroyed the Turkish squadron of Osman Pasha during the Battle of Sinop. In January 1854, the combined Anglo-French fleet entered the Black Sea through the Bosphorus. On March 27, 1854, Great Britain and France declared war on Russia, which went down in history as the Crimean War. As a result, the Black Sea was declared a demilitarized zone for Russia.

Mark Twain, who took a cruise on the steamship Quaker City with a group of tourists in 1867, visited Odessa and

Crimea, and met Emperor Alexander II in Yalta, compared the Bosphorus to a turbulent river that connected two seas. Perhaps only Bosphorus, called “incomparable” by the novice writer, escaped sarcasm, unlike all the other characters and episodes in the book “The Innocents Abroad”.

Russia managed to return its navy to the Black Sea only in 1871, with the weakening of France following the Franco-Prussian War. However,

THERE ARE ABOUT

200

SPECIES OF FISH IN THE STRAIT

the appearance of Admiral Hornby's British squadron off the shores of the Bosphorus stopped the Russian offensive on Constantinople in the war of 1877–1878.

On July 6, 1895, a “Special Conference” was convened in St. Petersburg to discuss the readiness of the Russian armed forces and navy to take control of Constantinople and the Bosphorus “during exercises”. The project was opposed by Finance Minister S.Y. Witte, and at the last moment it (the project) was canceled by Emperor Nicholas II. The next such conference was held during the First World War in 1915. The final decision to take the Bosphorus was made in April 1917, and command was entrusted to Vice-Admiral Alexander Kolchak, who headed the Black Sea Fleet. The February bourgeois revolution in Russia cancelled these plans, and V. I. Lenin, after the victory of the

Great October Socialist Revolution, developed the concept for “restoring the rights of the Turkish people to their territory and waters, closing the straits in peacetime and wartime for military and armed vessels, as well as military aviation of all countries except Turkey, and complete freedom of commercial navigation”.

It should be noted that similar plans for the military capture of the straits were also developed by the British

Empire, which held special meetings in 1906 and 1915. Based on the results of the reports and discussions, the idea was considered too risky. An attempt to partially implement it during the Dardanelles Operation of 1915–1916 was completely failed by the Anglo-French command, which led to the resignation of First Lord of the Admiralty Winston Churchill, as well as the growth of popularity and political weight of the colonel who led the defense, and then the first president of the Turkish Republic, Mustafa Kemal Atatürk.

In April 1919, all surviving members of the Romanov family were taken out of Russia on board the British battleship Marlborough through the Bosphorus Strait.

The Lausanne Convention on the Straits was signed on July 24, 1923 by Great Britain, France, Italy, Japan,



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Greece, Romania, Bulgaria, Yugoslavia and Turkey. The Soviet Union initially signed it, but then refused to ratify it. The Convention, while providing for the demilitarization of the straits zone, at the same time allowed free passage through the Bosphorus and Dardanelles not only for merchant ships, but also for military ships (with minor restrictions) of any country in the world.

The Montreux Convention, which currently regulates the passage of ships and vessels through the Bosphorus, was signed on June 22 – July 21, 1936 in the city of the same name in Switzerland by representatives of the USSR, Turkey, Great Britain, France, Bulgaria, Romania, Greece, Yugoslavia, Australia and Japan. Italy joined the convention in 1938.

The Montreux Convention preserves freedom of passage for merchant ships of all countries through the straits in both peacetime and wartime. At the same time, the document provides for different regimes for the passage of warships for the fleets of Black Sea and non-Black Sea states. In the event of Turkey's participation in the war, as well as if this country considers that it is directly threatened by war, the state is granted the right to permit or prohibit the passage of any warships through the straits, as well as to cancel the transit of merchant ships under the flag of potential or actual enemy countries.

During World War II, Turkey remained neutral until February 1945, during which time the straits were closed to warships of the belligerent countries, although some German auxiliary vessels were allowed to transit. In February 1945, Turkey declared war on Germany, but did not participate in offensive operations.

In 1945, at the Potsdam Conference, the USSR attempted to revise the

Montreux Convention, demanding a naval base in the Dardanelles and favorable passage through the straits. At the same time, the USSR made territorial claims to Turkey. The Soviet Union renounced these claims on May 30, 1953.

TRAFFIC AND SCHEDULE

The Bosphorus is one of the top 10 most difficult straits in the world: strong current, heavy traffic, ferry crossing, sharp weather changes in the fall and winter period. For transit passage, it is recommended to hire a pilot, the speed of ships should not exceed 10 knots (18.5 km / h). Since the conclusion of the Montreux Convention in 1936, a so-called "lighthouse fee" has been charged for passage through the straits, amounting to 1 gold Swiss franc (\$0.8) per ton of cargo. From July 1, 2022, Turkey increased this fee fivefold, to \$4.08 per ton and announced that this amount would be adjusted annually. From July 1, 2023, the "lighthouse fee" for passage through the straits was again increased by 8.3% and amounted to \$4.42 per ton.

From July 1, 2024, the Ministry of Transport and Infrastructure of Turkey increased the duty on the transit of ships through the Bosphorus and Dardanelles by 14.7%, to \$5.07. Over 50 thousand ships pass through this route per year (including over 10 thousand tankers carrying 145 million tons of oil), so Turkey will earn over \$1 billion on the straits this season. The trend of increasing transport costs alarmed the Kazakh media, since 80% of the republic's oil is exported through the straits annually.

The strongest impressions are those of childhood. Probably the writer Orhan Pamuk, who grew up on the shores of the Bosphorus, wrote the most vivid

and figurative descriptions of the strait, as well as the catastrophes that have occurred here at various times. Over the past half century, more than half a thousand have happened, and 27 large-tonnage vessels lie at the bottom of the strait.

"The kerosene that began to spill out of the Yugoslav tanker exploded with such a rumble that it could be heard throughout Istanbul", Orhan Pamuk describes the collision of the tankers Petar Zoranic (SFRY) and World Harmony (Greece), which occurred on the night of December 14, 1960. "The crews of both ships immediately abandoned them or perished in the explosion, and the tankers, left without control, turned into fireballs, carried by the capricious and mysterious currents of the Bosphorus from one shore to the other... The tankers turned into heaps of red-hot iron, their pipes, masts and captain's bridges melted and sank. The sky was illuminated by bloody reflections. From time to time there was an explosion, and huge sheets of metal flew in all directions; screams and children's cries were heard from the coastal hills".

The fire over the Bosphorus blazed for 52 days, and a special ship was sent from the United States to put it out. The coastal district of Istinye, built up with wooden houses, burned down almost completely. And at four in the morning on September 4, 1963, another catastrophe occurred: in conditions of poor visibility, the 5,500-ton Soviet dry cargo ship Arkhangelsk, carrying weapons (according to Pamuk, according to other sources – grain) from Novorossiysk to Cuba, crashed into the shore in Baltyliman, going 10 m inland (25 m according to other sources). In one fell swoop, two wooden boats were demolished, three people died.

Over the years, ships have become more maneuverable and safer, equipped with a variety of electronics, and are learning to see better in the dark and in fog. But the number of incidents and accidents in the Bosphorus has not decreased. So, over the past few years, the strait has been closed several times due to shipping accidents. In April 2018, the 225-meter tanker Vitaspirit lost control under the Fatih Bridge and rammed a 19th-century coastal mansion. Traffic was stopped three times in 2021: due to the breakdown of the bulk carriers Viva Eclipse and Briza (in September), as well as the tanker USICHEM, which was carrying sunflower oil (in December). On October 13, 2022, the bulk carrier Annita broke down in the strait, and the Bosphorus was closed for a day.

In December 2022, a queue of 20 tankers loaded with oil at the CPC Marine Terminal in Novorossiysk formed at the entrance to the Bosphorus from the Black Sea. The reason was the embargo on the transportation of Russian oil by sea that came into force, which is why Ankara began to demand supporting documents from all ships. Later, the "traffic jam" gradually disappeared.

In January 2023, the Bosphorus was closed due to the 142-meter bulk carrier MKK-1 running aground. In August of the same year, traffic was blocked by a tanker under the Liberian flag. In January 2024, traffic was interrupted due to an engine failure on another tanker, the Peria. Last March, the bulk carrier Sea Turtle's steering failed in the Kandilli area of Istanbul. Then shipping was blocked in both directions, and in May 2024, the statistics was supplemented by the tanker Sea Marine, sailing from Greece to Russia under the flag of Vietnam, with its engine failure.

In June 2021, Turkey began construction of the Bosphorus 2, a canal west of Istanbul. This canal is about 45 km long, 275 m wide and 20 m deep, which should relieve the Bosphorus for the safety of navigation. At the same time, Turkey may not comply with the Montreux Convention in the new canal and set its own rules. The first proposal to dig such a canal was made in the 15th century, and the

Istanbul Canal Project

Turkey has approved a plan for the construction of a double channel of the Bosphorus Strait.



INTENSE LOADING OF THE BOSPHORUS STRAIT



• Major accidents are becoming more frequent

14,5 hours average waiting time

	ISTANBUL CANAL	BOSPHORUS STRAIT
Length	45 km	30 km
Min. width	275 m	698 m
Min. depth	20 m	20,75 m
Bandwidth	Up to 185 ships per day	120 ships per day

TASS, 2021. Sources: kanalistanbul.gov.tr, Ministry of Transport and Infrastructure of Turkey

project was subsequently postponed and then resumed, but only on paper. Opposition to the construction is currently led by Istanbul Mayor Ekrem Imamoglu, who points to the potential pollution of Lake Durusu, which feeds the city's water supply. The work is scheduled to be completed in 2027, and according to satellite images, the \$10 billion construction is indeed underway.

The straits are closed not only because of accidents, but also because of fog or smoke from forest fires. There is also a much more positive reason, which Panorama CPC wrote about in the September 2022 issue: since 1989, the 6.5-kilometer swim "Asia-Europe" has taken place here and traffic along the strait is closed for about two hours.

It is not necessary to force the Bosphorus (although it is an honor), but you should visit it at least once in your life to be imbued with the special energy of this unique place, where a large and strong stream carries many different ships, and the shores of an ancient and beautiful city are pulled together by kilometer-long strings of bridges. The most impressionable ones stay here to live forever and, gradually getting used to it, begin to count the ships going along the Bosphorus, as Orhan Pamuk did in his childhood. ●

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EARTH IN THE PORTHOLE

THE GUEST OF HONOR AT THE CPC SAFE WORK CULTURE LEADERSHIP SUMMIT, PILOT-COSMONAUT ANDREY BORISENKO SPENT 337 DAYS IN SPACE AS PART OF TWO CREWS OF THE ISS. IN AN INTERVIEW WITH CPC PANORAMA, THE HERO OF RUSSIA TALKS ABOUT THE INTENSE DETAILS OF ORBITAL SAFETY AND THE FEATURES OF COSMONAUTS' TRAINING FOR EVERYTHING ELSEWHERE THAT AWAITS HUMANS BEYOND THE EARTH'S ATMOSPHERE



Andrey Ivanovich, what are the fundamental differences between a person's stay on Earth and in space? Did you have the feeling during flights that at a certain altitude the earthly nature gradually ends and some other nature begins?

Yes, such a feeling arises immediately as soon as the ship gains the first cosmic velocity and enters the near-Earth orbit. Weightlessness falls upon you – real, pure, cosmic, which is impossible to simulate on Earth. All existing technical means – a hydro-weightlessness pool, weightlessness stands, a prolonged dive of an airplane – give only an approximate feeling of weightlessness. Weightlessness is fully felt only during a space flight and this is probably the most important difference from the earthly nature.

Our company has 12+ Life Saving Rules that everyone must follow at production facilities. All oil production workers have these rules in one form or another. In our opinion, working in space is much more dangerous than on an oil pipeline. Does the ISS / Soyuz / Crew Dragon have its own vital safety rules (top 10, or top 20, or some kind of reminder) and what are they?

Safety rules at enterprises in the rocket and space industry, in my opinion, are not very different from the requirements that exist in the oil and gas industry. In both cases, production has a high hazard class, and emergency situations are fraught with serious consequences. In both cases, there are general system-forming safety rules that regulate behavior, barriers, prohibitions, etc. For example, we were taught this at the institute in the labor protection department.

In space flight conditions, everything is much more interesting. There is no concept of "safety precautions" here, instead there is strict adherence to instructions,

WITH A DREAM OF SPACE

Andrey Borisenko was born in Leningrad on April 17, 1964. According to his own words, he dreamed of becoming a cosmonaut since childhood. He studied at the G.S. Titov Youth Cosmonaut Club of the Leningrad Palace of Pioneers. He graduated from the Leningrad Military Mechanical Institute named after D.F. Ustinov, specializing in dynamics and flight control of aircraft.

On May 29, 2003, he was enrolled in the cosmonaut corps of RSC Energia. In July 2009, he was assigned to the prime crew of Soyuz TMA-21 and ISS-27/28. The ship, named Yuri Gagarin in honor of the 50th anniversary of the first human space flight, was launched on April 5, 2011. Docking with the ISS took place on April 7, 2011. Crew commander Andrey Borisenko became

the 200th cosmonaut of the ISS. The duration of the Gagarin flight was over 164 days. One of the tasks completed by the expedition was modeling the conditions of a six-month flight to Mars.

The second flight of A.I. Borisenko began on October 19, 2016 on the Soyuz MS-02 spacecraft. On October 21, 2016, the spacecraft docked with the ISS. The flight duration was more than 173 days.

Andrey Borisenko is the first Russian cosmonaut who was considered for joint flights as part of the crews of the Crew Dragon and Starliner spacecraft.

He was awarded the honorary titles Hero of the Russian Federation and Pilot-Cosmonaut of the Russian Federation, and the Order "For Merit to the Fatherland" IV degree.

which spell out certain requirements for the safe performance of work.

For example, if we are carrying out extravehicular activity, it is required that each cosmonaut be secured to the external elements of the structure (specially marked for such fastening) with either two halyards or one halyard and an arm. We try to secure ourselves with both halyards and an arm additionally, just for our own peace of mind. There have been cases when an unsuccessfully secured halyard has come undone. There are no engines on the spacesuits, so the life of an astronaut who has physically lost contact with the spacecraft will end along with the oxygen in his tanks.

Is the spacesuit created individually or passed down "by inheritance"?

There are two types of spacesuits. The Sokol model, in which cosmonauts take off and land, is sewn individually according to anthropometry and has a certain shelf life. If a little time passes

between flights, it is permissible to use such a spacesuit a second time. But this usually does not happen, and the spacesuits are given to future cosmonauts for training, where their resource is already exhausted to the end. Sometimes Sokol spacesuits are given to museums with the permission of Roscosmos. I gave my first spacesuit in a similar way to the German Stepanovich Titov Youth Cosmonautics Club.

The second type of spacesuits is designed for spacewalks. They are already manufactured on average with the possibility of individual adjustments and are located in the airlock module.

Do you have the right or requirement to suspend work?

For example, when manual docking is performed, it is strictly forbidden to continue work if interference appears in the camera and we can no longer see the image of the object we are approaching. We must move away a certain number of

meters and hang there until further instructions from the Mission Control Center or the restoration of video communication. Such nuances exist in almost every operation.

Is there room for error in the corporate culture of space flights? How does the system of rewards and punishments work on the ISS?

The more experience and qualifications you have, the harder it is to admit your mistakes. But even the highest professional is not immune to mistakes: due to carelessness or other reasons. When Sergey Pavlovich Korolev created the Energia Corporation, he introduced an interesting rule: if an employee admitted to a mistake before its consequences became apparent, he was not punished. The rule is still in effect, I experienced it myself in my youth, when I worked at the Mission Control Center. This rule also applies in space. If you make a mistake, report it as soon as possible so that Earth has time to mitigate the consequences. An astronaut's mistake can have very serious consequences, since the ISS is the most expensive man-made object on Earth today, costing \$150 billion. There are no models of an ideal corporate culture, but we strive for improvements in our field, we try to make our corporate culture effectively motivating and fair in terms of rewards and penalties.

What would you recommend to replicate from this culture to earthly industries?

The Korolev rule and, possibly, some technological developments that prevent, for example, incorrect connection or switching due to mechanical limiters and blockers.

The "plan-safety" dilemma – does it exist in orbit and how is it resolved?

As already mentioned, we have strict instructions, but they are written by people who have never been in space. Therefore, the dilemma exists, as well as cases of compromise solutions.

For example, we periodically need to clean the fan from dust. According to the instructions, it is necessary to disconnect it from the power supply, but then the dust from the impeller flies all over the room, which sometimes leads to the activation of the fire-fighting system sensors. I tried to take a risk and bring the vacuum cleaner to the working fan. It turned out better, according to telemetry, they could not help but notice it, but they did not react in any way. After some time, the instructions were replaced.

Have you ever taken responsibility for this kind of decision, but at the cost of human life?

In the anniversary, «Gagarin» flight of 2011, our crew on the ISS was replenished with the crew of the last shuttle in history. According to the ISS rules, the number of seats in the docked ships must correspond to the number of people on board the station. At the same time, there was another instruction written by NASA after the Columbia disaster in 2003: if the shuttle's heat-protective lining plates are damaged, it departs empty in automatic mode, and a new one is sent to the ISS for the crew. Since a new «Atlantis» no longer existed, we had to solve the problem of returning to Earth in the event that damage to the lining was established.

We had two Soyuz spacecraft left, but there were no free seats. Theoretically, a fourth person could have been placed in the three-seat descent module, but without a cradle and with the risk of the craft breaking into a ballistic descent with more severe overloads – up to 10 g (versus 4 g in normal mode) and a hard landing. The fourth crew member would most likely have received serious injuries, and everyone else would have been in trouble. But this was at least some chance to save the lives of the astronauts, since leaving them on the ISS was even more risky.

Fortunately, the shuttle's lining was in good condition, and the mission was completed successfully. Otherwise, as the crew commander, I would have had to take responsibility for the decision myself.

What is the algorithm of actions on the ISS in case of an emergency? Are all actions taken in coordination with the Mission Control Center or autonomously?

The main hazards on the ISS are depressurization, fire, and ammonia release. Such situations require the fastest possible response in accordance with the roles and algorithms learned during training (including in the dark and smoky room). If it is necessary to go beyond routine ops, the decision is made by the crew commander, then we act autonomously and together with our neighbors on the ISS, notifying the Mission Control Center. Upon returning to Earth, a collective report is written, actions in an emergency situation are discussed with the participation of the heads of space agencies.

In your case, are leader and manager unambiguous concepts?

Formally yes, essentially no. Leader is an informal concept. It is great when this position coincides with a management position, but it can be different. As a shift flight supervisor, I encountered a situation where teams already had their own informal leaders. In this case, it is important for the supervisor and the leader not to compete, but to agree on the delineation of their roles in the team: who is responsible for what.

Has your attitude towards the Earth's ecology changed after flying into space?

There is a trajectory in orbit that takes the station 8 minutes to travel from the east coast of North America to the west coast of Europe. The first time I made such a "transatlantic flight," I realized that our planet is



really small. You understand how fragile it is when you see traces of forest fires or a 500-km-long lightning bolt from a height of 400 kilometers.

The Dzhaniybekov effect, discovered in 1985 and classified for 10 years, how does it affect work in space and safety requirements? Have you encountered similar or other difficult-to-explain phenomena “up there”?

I wouldn't say that the Dzhaniybekov effect was classified — they simply preferred not to talk about it until there was a theoretical justification. Over time, scientists developed a mathematical model that, although complex, fits this interesting rotation of objects and bodies in unexpected planes in zero gravity into the existing laws of physics.

As for other unusual cases, I encountered a phenomenon in flight that I called a “moon bunny”. When we were flying over the dark side of the Earth, I saw a not very bright spot of light below, about 500 km in diameter. My first thought was: “Well, finally, brothers in mind”. We didn't bother the Mission Control Center and after about 10 minutes

the heart, there is a defibrillator on board and we are taught how to use it. But there have been no precedents — their potential is cut off already on Earth. If doctors have an assumption that a person may become ill on board, such a candidate does not pass the selection for the cosmonaut corps.

So nothing unpredictable should happen there — at least not to a person?

“Shouldn't” and “doesn't happen” are not quite the same things. Sometimes the human body can react in a way that doctors didn't expect. I don't know of any such cases among Russian cosmonauts, but I have seen something similar among my foreign colleagues. As a rule, this is associated with impaired coordination of movements and “shaking” of the vestibular apparatus — all this occurs in conditions of loss of gravity.

Our cosmonauts, Chinese taikonauts, American astronauts — who is better prepared and responsible in the area of safety? Are there different approaches, or are there unified safety rules for the ISS?

orbit for another month or month and a half. Because space flight is the pinnacle of the profession, the result of many years of work. The preparation of a professional astronaut for a flight lasts 6–7 years, which is comparable to obtaining a higher education and an academic degree. Just like at the institute, there are many different disciplines, and you can be expelled for two satisfactory grades, for two “C”.

What about space tourists? Are they judged more leniently by doctors?

There is a different selection system there. Not a single tourist who has been to space would have passed the selection to become a professional astronaut. But we are not offended: the experience of space tourists provides invaluable statistics that clarify the requirements for professional astronauts. Based on this, conclusions are drawn about what should really be feared, and where the risks are overestimated.

Is the tradition of watching “White Sun of the Desert” before a flight still going on?

Yes, and experience shows that it is better not to interrupt it. In 1983, the crew did not watch this film due to lack of time, and the next day at the launch site there was a fire and explosion of the launch vehicle. Thanks to the standard operation of the emergency rescue system and the excellent work of the control group, everyone survived and even flew into space later, though as part of different crews. But since then, all cosmonauts — both ours and foreign — watch “White Sun of the Desert” before their flights. The film has subtitles in all languages.

How is rest organized in orbit? Do astronauts have days off during the flight?

We, like most workers, have two days off a week — Saturday and Sunday. However, on Saturday morning we clean up, put our space house in order. For me, the preferred

form of relaxation has always been observing our planet. It is a fantastic, unforgettable and unique spectacle.

What places on the globe do you think are the most photogenic?

The Caribbean Sea with its islands and coastline — the color saturation here is stunning, perhaps due to the depth difference and different temperature layers. And also the panoramas of night cities. But, of course, there are other, more mundane tasks during your vacation. Read, check your email, call home...

So you can just pick up and dial a number at any time?

Practically yes — it depends on the workload here and what time of day it is there. IP telephony is tied to the onboard communications. Usually I called my wife twice a day — in the morning and in the evening.

What do they read in orbit?

In my case, “Moonbow”. I read this book by Soviet science fiction writer Sergey Pavlov as a child, when I dreamed of becoming an astronaut, and promised myself that I would reread it “up there”. The dream came true, the gestalt closed.

What are the favorite sports and standards of astronauts?

There are enough standards. For example, you need to swim a 25-meter pool underwater without surfacing. Jump into the water from a three-meter platform, shuttle run, etc. Among the favorite sports now, badminton is the most popular among cosmonauts, followed by tennis.

How do you sleep in zero gravity conditions? Do you have blankets and pillows there?

We have sleeping bags attached to the walls of the cabin. Blankets and pillows are useless in space. My personal feeling about sleeping in zero gravity is like when I was a child in my grandmother's hayloft. It's quite comfortable and, just like on Earth, you don't want to get up

in the morning (you get up at 6), you want to reset the alarm clock and sleep longer.

How to relieve stress in space conditions? After all, limited space, six months in the company of people with different psychotypes... There, in zero gravity, you can't beat a punching bag or scream in solitude? Do astronauts have life hacks for such cases?

Why you can't scream? The station is not as crowded as it seems on the broadcast, all seven cosmonauts do not live in a barrel like Diogenes. If the ISS lands, it will cover the entire Red Square. The corridors there are long, about a hundred meters, and the sound background is quite intense. So, I think you can find a place to retire to scream, although I do not remember such cases.

Sensors on the ISS allow specialists of the Mission Control Center to monitor the situation using 4,000 parameters. To prevent cosmonauts from experiencing stress due to constant monitoring, there are periods and places free from video surveillance. In case of stress, remote assistance from psychologists is also provided.

A good and repeatedly tested way to defuse the situation is to get together, invite foreign colleagues and dine on some delicacy from the reserves. We grow wheat on the ISS and looking at fresh greenery among all the devices and equipment is also a good anti-stress.

In general, I believe that the psychological climate on the ISS is more stable than in other work collectives. The importance of the work mobilizes and restrains, experience teaches us to predict behavior in advance and not allow irritating topics in communication. There is an official document — the Code of Conduct for the ISS — in which topics of politics, religion, and family values are prohibited for discussion.

As far as we know, the ISS is scheduled to be shut down in 2030. Will there be a replacement for this station?



What is the prospect of joint flights? What is the situation with flights to the Moon and Mars?

In 2033, it is planned to open a domestically developed space station ROSS in orbit. The start of its deployment is planned for 2028. The project to build a Russian-Chinese lunar base has reached the stage of discussing financing. Mars is also in the plans, and all this information is already publicly available.

Tell us, as a person who is closest to the celestial bodies, do the Moon or retrograde Mercury influence people's behavior or what happens on Earth?

Of course, planets and satellites do not influence us to such an extent as astrologers claim. But in nature, everything is interconnected and the influence of space, previously underestimated, is now quite obvious. Now is the year of the active sun, and we see how the increase in flares affects the “abnormal” behavior of the weather on Earth. Today, we do not always understand many existing connections between extraterrestrial and terrestrial nature and cannot adequately assess them given the level of development of modern science. But science is moving forward, so sooner or later we will feel these connections too.

“LEADER IS AN INFORMAL CONCEPT. IT IS GREAT WHEN THIS POSITION COINCIDES WITH A MANAGEMENT POSITION, BUT IT CAN BE DIFFERENT”

we realized that it was a reflection of the full Moon on the Earth's surface.

Are there any first aid trainings in the cosmonaut training program and are they different from those on Earth? For example, how to perform cardiac massage or artificial respiration in orbit?

Appropriate training is conducted in preparation for the flight. We practice artificial respiration, “start”

I wouldn't put these training systems on a pedestal, I'll just note that our methodology is definitely the toughest. For example, our doctors sometimes tell a candidate: “You won't pass according to our criteria, but you'd have a chance with the American selection”.

From my observations, American colleagues do not like it when their expedition is extended. And ours, on the contrary, are happy with the opportunity to work in

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ALTITUDE GENE

IN JULY, LEADING CONTRACT SPECIALIST OF CPC-R JSC ELENA LAMKINA CLIMBED THE PEAK OF RAZDELNAYA (6148 M) IN PAMIR. CONGRATULATING HER COLLEAGUE ON HER VICTORY, THE EDITORIAL STAFF DID NOT MISS THE OPPORTUNITY TO ASK ABOUT THE TRENDS AND SECRETS OF MODERN MOUNTAINEERING

Elena, congratulations on behalf of the staff on your next ascent and we hope for more details. How has your mountaineering practice developed, what is your peak number?

I am an amateur mountaineer with three ascents to my credit. The hobby developed relatively recently. Seven years of experience snowboarding in the mountains once led to a relapse: I became “sick” of mountaineering, feeling an interest not only in descents, but also in ascents.

Almost everyone’s journey to the mountains begins with the Western peak of Elbrus (5642 m). Having been there, you are faced with a choice: to continue

or not. I liked it, so I continued. That same year there was Ararat (5165 m). Having visited the summits of two five-thousanders and consulted with friends, more experienced climbers, I decided that it was time to take on a new height.

Please explain the mechanics of a climber’s choice of the next level. Is it necessary to increase the altitude consistently, not to skip a six-thousander after a five-thousander? Is it physically impossible to “jump” 2 kilometers in a year or according to some “club rules”?

There is such a thing as altitude tolerance or “altitude gene”, the latter

is my favorite expression. You cannot predict how your body will behave at a new altitude. There are many factors: weather, level of physical and technical training, moral readiness for the living conditions of high-altitude camps. The main thing is that you do not know at what altitude and how altitude sickness will show itself – from an elementary headache to the need for an urgent descent down. The calling card of Pamir and the main peak that climbers from all over the world strive to – Lenin Peak (7134 m), requires a certain altitude experience, so beginners stop at an intermediate peak – Razdelnaya Peak. It is also the site of the last assault camp.

What type of mountaineering do you prefer – solo or team?

Only professionals and amateurs of “solo” ascents climb alone, the majority work in a “team”. The expedition group format is closer to me: support, mutual assistance, and it is easier and more pleasant to endure all the hardships of the ascent in the company of friends. Again? It is a question of safety, the risk of “rescue work” is always assessed, for this, among other things, a team is required.

What does it take for an amateur to become a mountaineer?

The main thing is to have desire and strong motivation, everything else is training. Personally, I go to a mountain school and a climbing wall, as this infrastructure is well developed in Moscow. All this gives the skills of technical mountaineering, helps to overcome the fear of heights, instills faith in the reliability of insurance and your own hands. In addition, endurance training is important, for me it is swimming, cross-country skiing, the gym several times a week. Theory also plays a significant role – lectures on preparation for big mountains, expedition reports,

studying the region, routes. After Pamir, I realized that it would be good to master ice climbing, in high-altitude mountaineering it is required. On the way to the same Razdelnaya there is a section of the ice wall that must be passed on a jumar or climbing with an ice ax in hand – there are no other options.

What other specific skills does a beginner climber need to master?

All expedition groups allocate days for so-called snow and ice training, where equipment is checked, the team works out the “fall” command, movement on the glacier, and crossing crevasses. In an emergency, the team must act without delay and in a coordinated manner – each participant is assigned a role.

All this requires knowledge of mountaineering knots, methods of descent and ascent on a rope, skills in using an ice axe, ice screws, jumar, descender, the ability to organize fixation points and stations.

How many kilograms of equipment do you have to carry?

As a rule, there is group equipment – ropes, and personal equipment – a safety system, several carabiners, a jumar, a descender, cordalets and rep-cords, an ice axe and ice screws. For example, my personal «hardware» weighed 4 kg, plus crampons, high-altitude boots, and a backpack.

Is it more difficult to choose and buy gear now?

The market has narrowed, but we search and find. In addition, there is an extensive secondary market and rentals.

Is there a superstition that you can’t use someone else’s or used equipment?

I’ve never heard of that. On the contrary, it is considered good manners to share gear with friends. For example, my assault backpacks are now traveling in different parts of Russia.

How difficult is it to get to Pamir, how is the infrastructure there?

There is a direct flight to Osh, Kyrgyzstan. From there it is a 5-hour bus ride to the base camp at 3,600 m. The border area with Tajikistan begins there, and everyone is given a pass. The infrastructure here is more developed than on Elbrus.

The base camp has hot water, electricity is supplied to each tent, sleeping places are organized, and the main convenience is provided – a stove.

The next camp No. 1 is located at an altitude of 4,400 m. There is no water or electricity here, but there is a stunning view from the tents onto the wall of Lenin Peak and a common dining room, also known as the “cabin-company”, where climbers get to know each other, exchange experiences, while away the evenings.

In Camp No. 2 at an altitude of 5400 m you sleep in a tent right on the glacier, with amenities including a gas burner and melted snow.

The rescue chief is on duty in Camp No. 1, he hands out radios to all teams and conducts a control communication session (CC) four times a day. The location, well-being, further plans and weather are requested. Our head of rescue operations was Vladimir Ivanovich Suviga, a four-time «snow





leopard», 28 seven-thousanders. When it was time to go home, we all approached him and thanked him for his attention and care for each group.

Do you have any idols among famous climbers?

My main idol is the Knight of the British Empire, Nepalese Nimsdai Purja. He made the film "Project Possible" about conquering 14 eight-thousanders in 7 months, and probably played a key role in my passion for mountaineering. Among my compatriots are Alex Abramov and Sergey Kovalev, they head the leading mountain clubs "7 Summits" and "Alpindustry". Also Anatoly Bukreev, known to many from the film "Everest". I read his biography, memories of him as one of the outstanding post-Soviet climbers.

Yes, all mountains are different and you need to adapt to each one. I think it's too early for me to brag about life hacks, but there are some general unwritten rules. I really liked the phrase "a climber should not rest in the off-season". He must prepare, because studying knots and the operation of safety devices already on the mountain is simply life-threatening. Along with physical preparation, moral preparation is no less important. You need to understand that the situation will not be easy, that "the drowning man must save himself".

First aid kit, communications, first aid — how's that going?

The guide has an emergency first aid kit, and he is also responsible for communication. But an individual first aid kit is necessary.

“MOUNTAINEERING TEACHES YOU TO PATIENTLY ENDURE DIFFICULTIES, TO MAINTAIN CLARITY OF MIND AND FORTITUDE IN DIFFICULT EXTREME SITUATIONS”

Are 8000m peaks conquered by amateurs?

Climbing an eight-thousander is already professional mountaineering, usually with oxygen cylinders. However, there is a concept of oxygen-free climbing, its supporters are the same Nimsdai Purja or Kristin Harila. But in any case, an expedition to an eight-thousander is a period that takes more than a month and requires colossal expenses. It is incompatible with office work, and as a hobby it is practically unrealizable.

Do you have your own life hacks, developed over the years, on choosing equipment, rules of conduct in the mountains, protection from hypothermia, counteracting risks? Or are they new with every mountain?

What is this sport for you — a hobby, a way to unload, a chance to take a break from work? Or can some of the qualities of mountaineering be useful in work, especially teamwork?

It is not enough to be passionate about mountaineering, you need to live it, which is exactly what happened. In general, climbing, from preparation for the expedition to the climb itself, is a long and thorough process, taking more than half a year, comparable to the gradual implementation of some project. Mountaineering teaches you to patiently endure difficulties, to maintain clarity of mind and fortitude in difficult extreme situations. It teaches you to work in a team, to solve management problems. It teaches friendship and mutual assistance. "To rely only on the strength of hands, on the hands of a friend and a hammered hook". I will also note

that colleagues are my main support group, who are among the first to receive news from the snowy slopes.

It seems that the lyrics of the modern climber do not change, but technologically the sport has already advanced far since the times of the "Vertical"?

Very far, the main vector of this development is aimed at safety and lightening of equipment. Recently, the pace of development has increased significantly, ascent records are broken every year.

Have you picked your next height yet?

In progress. It will be a seven-thousander and the most logical thing would be to climb Lenin Peak. But at the same time I want to visit new mountains: Nepal, Tien Shan, Fann. "The only thing better than mountains is mountains you haven't been to yet".

The hero of Vysotsky you quoted thought: "After all, Elbrus is clearly visible from an airplane". The guest of this issue, cosmonaut Andrey Borisenko, says that he likes to observe the earth's landscapes from orbit. But all this cannot 100% replace a real view from the summit, right?

By the way, during my trip to Pamir, another Russian cosmonaut, Sergey Ryazansky, successfully climbed Lenin Peak. First of all, all these observations from above cannot replace the real scale and the feeling of yourself in this scale. For example, the Caucasus Mountains after Pamir seem cozy, homey, even "toy-like" somehow. Secondly, beauty in all possible dimensions, and not just from one angle. And also, when you look at all this from the top, you feel not like the "king of the mountain", but like "the conqueror of yourself". As they say, we climb the mountains, and they conquer us. All day and night passages of 12 km with 1000 meters of altitude, frightening meter cracks of the glacier — all that will be dreamed about for a long time to be repeated next year. ●



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SPORTS FOR BODY AND SOUL

THERE IS AN ERRONEOUS BUT PERSISTENT OPINION THAT VISITING FIGHTING SECTIONS IS SOMETHING INEVITABLY DANGEROUS AND IS A RELIC OF THE “DASHING NINETIES”. HAVING SOME EXPERIENCE IN MARTIAL ARTS, IN PARTICULAR, IN MMA, I WILL TRY TO REVEAL TO THE READERS OF CPC PANORAMA THE MEANING AND MORALITY OF THIS SPORT, ITS HEALTH AND EDUCATIONAL COMPONENTS

I don't like to talk about my sporting achievements, but apparently I need to provide some information so that the reader can trust my judgment. My acquaintance with martial arts began with karate, where much attention was paid not only to physical development, but also to discipline, the development of moral principles and values.

From training, where the prize was chocolates promised by my dad, I went all the way to winning the Junior Championship in 2011 and being included in the Russian national team. That same year in Kuala Lumpur (Malaysia), I became a prize winner of the World Championship and achieved the standard of master of sports in karate.

School years gave way to university studies, which involved moving to another city. Of course, there were all the reasons to abandon sports and plunge headlong into the so-called “student romance”, but that was not the case. While studying in my specialty, I was simultaneously engaged in MMA, boxing and hand-to-hand combat, became the winner of the Spartakiad, multiple Champion of Russia and Champion of Europe as part of the national team.

Many times I have encountered the established opinion that athletes do not show interest in learning and do not work hard at it. Disagreeing with this stereotype, I tried to always have excellent academic



turned out, such a “reboot” had a positive effect on the results of the fights, on the atmosphere in the team and on the moral and motivational mood of the athletes.

Now let's clarify what kind of “dish” sport is, what benefits it brings and how to dose it correctly. Sport, in my understanding, is a way of self-expression and realizing one's ambitions and talents, a process of eradicating internal complexes, an opportunity to study oneself and creative work on one's body and inner world. What are the differences between martial arts, the purpose of which seems to be similar – learning self-defense skills through the use of physical force? Let's look at the example of several types.

Boxing is a sport that allows punches only. This is different from kickboxing, which allows punches and kicks. Hand-to-hand combat is a sport that allows punches, kicks, and wrestling, with the time limit for using wrestling techniques being 20 seconds. Jiu-jitsu is a sport that uses painful and

performance and graduated from university with honors. In my free time, I participated in professional MMA fights, Russian and international. This was a kind of optional process of replacing adrenaline hunger, as it turned out, a mistake. You can't compete with professionals as a hobby. Over the years of competing in various competitions, our team has developed a rather unusual system of distraction and relief from the cumulative impact of pressure for the previous result. A few minutes before the fight, we would sit down to play some kind of “board game”. As it

choking techniques, with any type of punches prohibited.

MMA (an abbreviation for Mixed Martial Arts) is, in turn, a symbiosis, a unification of all types of martial arts. Initially, when this sport did not yet officially exist, a special subculture was formed, within which masters of other martial arts shared their experiences. It is worth noting that in MMA there are areas of the body that are prohibited for striking (the back of the head, spine, groin, eyes, etc.), and you can't hit someone who is lying down, so the phrase "fights without rules" mistakenly used as a synonym has no logical basis.

In my opinion, MMA differs from team sports (football, basketball, hockey, etc.) in its stricter discipline, absolute personalization of responsibility for the result and, as a consequence, characteristic determination and unbending will on the way to the goal. In individual sports, a person learns to calculate his strength, correctly formulate tasks and step by step go to their solution, bearing responsibility for failures and mistakes to himself and others.

From my own experience, I will note that in individual disciplines there is a very important difference in the mental component. This is expressed in the philosophy of full involvement, which became the basis for me first in sports, then in other life endeavors. It can be described as follows: it is not so important what I do, more important is that I must give my best and achieve the maximum on the way to the goal. Do not be afraid of a negative result, accept it, work on mistakes and try again.

Here we logically approach the detailing of the original question, what are the benefits of impact sports and is it worth bothering with it? In the modern world, for good to be heard, its voice must

sound loud, clear, confident and have an unshakable position, and for this, good must be ready to stand up for itself.

Any martial arts are based on a certain set of motor skills, which ensures high coordination development, quick reaction and brain work at high speeds with instant analysis of each micro situation. There is a training in discipline, a culture of competition, rational acceptance of failures and their detailed analysis, continuous work on oneself and working through one's weaknesses. Martial arts help people gain self-confidence, conquer their fears and complexes, improve their physical capabilities. It may sound paradoxical, but often those who practice martial arts are absolutely non-conflict, responsive and ready to help at any moment in everyday life.

An important advantage of MMA is its versatility. If a person cannot decide whether he wants to wrestle or box, he can take up MMA, because it is here that you can acquire wrestling skills, striking techniques, improve stretching and functional

endurance, restructure the body and get rid of internal contradictions. From my own experience, I can say that only during training can you distract yourself from everyday problems and reboot your thoughts and body, which subsequently becomes an impulse for working with new strength and a special "injection of enthusiasm" to overcome difficulties. Thus, MMA allows you to master the whole variety of martial arts, improve your health, develop muscles, and eradicate internal contradictions and complexes.

I would also like to draw attention to the importance of distinguishing between professional MMA training and regular practice of maintaining physical and psychological tone. Conceptually, MMA, as one of the forms of creative self-expression, can be compared with Japanese painting and calligraphy, when an artist learns to draw both landscape contours and hieroglyphs with a virtuoso stroke of a brush. It is important to remember that we are not talking about daily sparring, regularly missed blows, work to exhaustion, not at all. Here we are talking about systematic work on yourself to achieve harmony of the inner and outer "I".

It is worth noting that people working in office premises need training to an exceptional extent as an opportunity for physical activity. In the future, this will help to avoid many diseases and injuries that are associated with a sedentary lifestyle. In conclusion, I will quote Boris Pasternak: "The goal of creativity is dedication, not hype, not success. It is shameful, meaning nothing, to be a byword on everyone's lips". If your goal is to learn and work on yourself, without chasing instant results and momentary desires, then you can succeed in everything. Start with sports and see how life will sparkle with new bright colors. ●





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