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ANTARCTIC

How Much is a Barrel at the South Pole?

The satellite automatically tracked the six brave souls engaged on the still unprecedented crossing, but they themselves were getting their bearings only from the signals of the Soviet station Vostok, to which there were still 300 miles to travel. On 1 January the expedition had covered 2,394 miles in all and had already noticeably distanced itself from the South Pole.

In order to preserve the attained rate of travel and to free themselves from some part of the cargo - and any cargo in Antarctica, especially at 3,100 meters of altitude - seems superfluous, the participants in the crossing asked to set up additional sub-bases, one of them at 82° south latitude. In moving with comparatively little cargo, they will possibly arrive at Mirnyy Station - their destination - on 1 March.

It is difficult to reach these places by any route, to say nothing of the one selected by the expedition. Flights here are exceptionally risky and supplying aircraft with the necessary reserves of fuel is as mandatory as the presence of a pilot in the cabin. This is why, when difficulties arose with "fuel" a radiogram from the Goskomgidromet (State Committee on Hydrometeorology) of the USSR reporting the allocation of the fuel needed by the expedition was met with a loud hurrah.

The "New York Times" exclaimed: "Either fuel or death!" Whereupon the newsmen calculated how much it would cost to deliver a barrel of oil to the South Pole. The answer was: 20,000 dollars!

Normally they travel about 25 miles in a day, although they move all the time over difficult sastrugi. I think that to some extent all the adversities that they reported while en route were smoothed out by friendship.

"This was the main thing otherwise they would not have survived," a participant in the 2nd Soviet Antarctic Expedition, Yu. Azarskiy, told me yesterday. "Thirty-three years have gone by since I was in Antarctica, but we former polar explorers have met since then. It was there that we found more than friendship - we found kinship."

Pravda
4 January 1990
Page 8 (slightly abridged)

The AN-28 at Station Vostok

How did this aircraft come to be on the sixth continent? It had delivered fresh vegetables and potatoes and also mail to Vostok station. Everything turned out as opportunely as possible. Yesterday the Soviet polar explorers, who were carrying out a special scientific stint, encountered the Trans-Antarctic Expedition. Its participants will rest for three days under conditions close to domestic ones, following which they will make preparations for the subsequent journey.

At this time Vostok will be connected by telephone via space with Moscow, Washington and Paris. It will enable the editorial staff to receive information about the courageous six at first hand - from Viktor Boyarskiy, representing the Soviet Union in the Trans-Antarctica. Besides him, an American, a Japanese, a Chinaman, a Frenchman and an Englishman participated in the crossing of the Anarctica.

Vostok station, located at an elevation of 3,400 meters, where a temperature of minus eighty-nine degrees has been recorded, was not unduly affected by the events, two of which happened simultaneously. The first came from the sky, the second from out of the snow drifts to the joyful barking of dogs which had gotten the scent of normal human habitation. The quadrupeds were already exhausted, having run across almost the entire continent.

They waited on the aircraft, conjecturing how much of the 3,000 meter runway it would use up during its landing run. After touching down on the snow-covered frozen crust it travelled a distance of 200 meters and stopped dead in a seemingly frozen state (the take-off run had required twice the distance). I saw joy in the eyes of those who told me about this at the Arctic and Antarctic Scientific Research Institutes.

"You understand that a multipurpose turbojet aircraft on skis is something we have dreamed about for a long time," said the deputy director of the institute V. Klokov.

I understand, because I knew the need for such an aircraft. Scarcely had the AN-28 appeared then it attracted the attention of the polar explorers. But all was not as expected: the aircraft didn't have skis. The O.K. Antonov Experimental Design Bureau had done the work on their development. They should have been capable of withstanding the rigid snow of Antarctica, which had the consistency of sand, and many other harsh conditions. It seems that the necessary variant was found, but that it had been flying in the high latitudes without them.

"We were glad about the news communicated by you," said the deputy-chief designer of the Experimental Design Bureau, A. Bulanenko. "Our specialists carried out tests in Antarctica and they finally did what was necessary. Many have been asking for an aircraft on skis."

About a month ago the diesel-electric ship "V. Arsen'yev" entered the fast ice near Moledezhnaya station, carrying a dismantled AN-28 on board. Test pilot A. Khrustitskiy was preparing to take the aircraft into the expanses of Antarctica. I recall how an ice dock was made right in the shore ice, which the elements constantly broke up, and there on the ice, despite the motion and compression, they set about assembling the aircraft.

Upon arriving at Moledezhnaya, they began preparing for the flight to Mirnyy, where the ships had gone with various goods for the polar explorers. Two intermediate fuel caches were created - on Bisko mountain and at Progress station. They arrived at Mirnyy on time, and the potatoes and vegetables were airlifted from there to station Vostok.

Pravda
19 January 1990
Page 8 (full text)

ENVIRONMENTAL PROTECTION

The Arctic To Be Under International Protection

The problems of protecting the Arctic ecosystems and the strategic policy of the arctic states in this regard were at the center of attention at a meeting of specialists from the USA, Canada, USSR, Norway, Denmark, Iceland, Sweden and Finland, which concluded yesterday in Murmansk.

As is well known, a proposal concerning international cooperation in the Arctic was advanced by M.S. Gorbachev during his sojourn in the autumn of 1987 in this largest city of the trans-polar region. And the first steps towards the realization of this important proposal were made soon afterwards. Upon the initiative of scientists from the USA and Canada a working group on international Arctic relations was created, with representatives of six other interested states, including the Soviet Union, included in it. Several meetings of the group have already been held. At the first there was a discussion of the global problems of the contemporary development of the Arctic, and at two others the scientists and specialists of the eight countries exchanged their experience in working for the prevention of further pollution of the arctic basin with industrial wastes and improvements in the living conditions of the indigenous population of the arctic regions, particularly, the Saami (Laplanders) who inhabit the territory of the USSR and Finland.

Vodnyi transport
27 January 1990
Page 3 (full text)

OIL AND GAS

Currency for Petroleum Industry Workers

The Tyumen' petroleum industry workers have gotten a good start: since the beginning of the year they have extracted more than 20 million tons of hydrocarbon resources from the Earth's interior in Western Siberia. The collectives of the "Surgutneftegaz," "Yurganskneftegaz," and "Purneftegaz" combines are working at high productivity and surpassing the daily assignments. And the industrial workers of Noyabr'sk, Kogalym and Nizhnevartovsk are keeping up with them.

This gives us confidence that the state production order for the year - 375 million tons of oil - will not only be fulfilled, but even substantially exceeded.

There are good grounds for making favourable forecasts. During the past turbulent months the influence of the trade unions and the Komsomol has become stronger and the other public organizations have functioned more actively.

The socialist competition has taken on a different role. Whereas formerly the names of the leading drillers burned like unattainable stars, while others remained in the shade, today a mass movement has developed for the purpose of ensuring that all 400 drilling brigades of the Glavtyumenneftegaz (Main Administration of the Tyumen' Petroleum and Gas Industry) attain the productivity of such illustrious masters as V. Sidoreyko and S. Anan'yev.

The new levers of economic self-interest recently brought into use have already proved themselves in a positive manner. Now, in accordance with a governmental decree from 5 to 20 percent of the currency awarded for exceeding the petroleum raw material extraction plan is being made available to the petroleum industry workers themselves. Thus, in the account of the "Surgutneftegaz" combine there will be many millions of dollars. The council of the labor collective and the administration are channelling a part of this currency into the acquisition of consumers' goods and foodstuffs. Highly productive equipment will also be purchased abroad for the development of plants for the processing of agricultural products - the production of sausages, butter, cheese and canned milk.

The expansion of economic independence is having a beneficial effect. The Tyumen' inhabitants have already begun to establish joint enterprises with foreign firms. Thus, the business partnership of the "Yurgansknefteqaz" combine with its associates from Canada will make it possible for the Siberians to phase in more progressive extraction technology and will permit the extraction of those raw material resources which we are unable to develop on our own at the present time.

Contacts with consumers within the USSR are becoming more concrete and business-like. Previously, the giant concern Glavtransneft' (Main Administration for the Transportation and Procurement of Petroleum Products) devoured the almost 400 million tons of oil extracted annually by the Tyumen' workers. This "office," which has neither a face nor regional interests, has become the owner of tremendous riches without lifting a finger . Those, who laboured ceaselessly to extract the valuable hydrocarbon product from the depths of Siberia were deemed to have no rights to it. This nonsense has seemingly begun to be put right.

The petroleum industry workers have taken the first steps on the path to achieving full regional cost accountability. Thus, according to agreements the Tyumen' workers are now supplying a specific quantity of oil to Belorussia and the Baltic Republics, and the latter in turn are building dwellings and everyday social and cultural amenities in a number of northern cities and villages.

The next step on this path, in the view of the industrial workers, should be to begin the conclusion of direct agreements with the oil refining enterprises. Knowing their capabilities and interests, maybe it will be possible to cooperate with them, expand production and obtain common profits. Such work, of interest to both parties, will make it possible to eliminate the present paradoxes caused by mismanagement. Everywhere today - in air transport, motor vehicle transport and agriculture - an acute shortage of fuel is being experienced. At the same time the industry's workers have nowhere to put the extracted oil and casing head gas, and since they do not have the capacity for processing them, they are not economically interested in obtaining the final product. Tongues of flame from a broad fraction of lightweight hydrocarbon, literally worth its weight in gold, are burning on the vast expanses of Western Siberia and they are also humming in thousands of holding furnaces operating on crude oil...

The establishment of fair prices for the raw material they extract will lead to a strengthening of the economic independence of the petroleum industry workers.

"According to the economists' calculations," says Deputy Minister of the Oil and Gas Industry and Head of Glavtyumenneftegaz V. Grayfer, "each ton of oil will give the national economy 1,400 rubles of pure profit. The extracting enterprises will receive only... 23 rubles from the state for each ton of "black gold," which means that

we will spend the greater part of this money on regeneration and operating expenses. Therefore our profits will, for the time being, be more in the nature of bitter tears. In order to conduct the business successfully and profitably, the Siberian petroleum industry workers should be receiving, according to their calculations, 80-85 rubles for each ton of extracted oil.

It is impossible to avoid mentioning the gas-lift method of extraction, which has been widely discussed in its time. The Ministry of Heavy Machine Building and the Sumskoye Combine im. Frunze had promised the Tyumen' workers that they would help to introduce it. In response to the promises, over the next two years the Siberians invested 120 million rubles and constructed four gas-lift complexes, from which they were to receive annually not less than 5 million tons of oil. However the low standards of engineering, the poor quality of the automation system and other serious deficiencies made it impossible to place these complexes in service. All these things and "like annoyances" are in no way conducive to rhythmical operations by oil extraction workers of Western Siberia.

Pravda
23 January 1990
Page 1 (full text)

TRANSPORT - WATER

Arctic Heroes

Work is proceeding at full speed and simultaneously on atomic icebreakers at the Baltic Shipyard im. Sergo Ordzhonikidze in Leningrad. The icebreaker "Oktyabr'skaya Revolyutsiya" was launched recently and the almost completed nuclear-powered icebreaker "Sovetskiy Soyuz" lies next to it. These ships will complete the arctic flotilla, where without the nuclear-powered heroes operations along the Northern Sea Route would simply be impossible.

Pravda
29 January 1990
Page 1 (full text)

Atomic Ice-Breaker "Taymyr" Begins Piloting Ships in the Lower Reaches of the Yenisey

This only became possible after a special public commission headed by Vice-Chairman of the Executive Committee of the Taymyr Okrug Council of People's Deputies D. Dudnikov, completed its work on board the icebreaker. In October of last year the Okrug Council at the request of the inhabitants of the polar city of Dudinka and villages of the autonomous okrug reached the following decision: "That operation of the icebreaker "Taymyr" along the Dudinka-Sibiryakov Island route and also the entry of atomic ships and icebreakers into the Yenisey Gulf and the waters of Dikson maritime trade port be regarded as intolerable."

The protests by the inhabitants of the peninsula based on rumors, emotion and conjecture have become a more serious obstacle in the path of nuclear-powered vessels than the ice and ice hummocks.

The northern inhabitants were and are alarmed by possible radioactive hazards in the area where an icebreaker is operating. They want to know how the movement of a ship with 50 thousand horsepower of thrust will affect the fish stocks of the Yenisey and the state of the wharfs and docks of the port, which was built on permafrost. More and more frequently it is possible to hear demands for the cessation of year-round navigation between Murmansk and Dudinka. And the absence of special nuclear safety services in the Taymyr region is making the local inhabitants more cautious...

What was it that prevented the directors of the Murmansk Maritime Steamship Line last summer from sending a special group of designers, observers, and veteran icebreaker sailors to Dudinka for meetings with the local residents for comprehensive explanatory work? What prevented the steamship line from sending the "Taymyr" to this port for a couple days, so as to give all of the inhabitants an opportunity to go on board? This was not done and as a result - the protest occurred. And then, when the passions had reached their peak and the icebreaker was confronted with a real threat of having to remain at sea, a group of specialists headed by deputy chief of the Murmansk Steamship Line N. Matyushenko arrived in Dudinka. By now the visitors did not merely have to convince the hosts: they had to make them change their minds. And this, naturally, was considerably more difficult.

A. Ponomarenko, a state inspector of the Gospromatomnadzor (State Industrial Nuclear Energy Inspectorate), spent a great deal of time attempting to show that the "Taymyr" conformed to all of the

international rules and standards imposed on ships operating on nuclear fuel. The deputies of the Okrug Soviet cited dozens of figures and evaluations made by International Atomic Energy Agency (IAEA) experts...However, even after this many people remained dissatisfied with the words of the competent specialist.

At a meeting of the Okrug Executive Committee it was stated that due to the disruption of the ice crossing, the industries located on the banks of the Yenisey would lose more than a million rubles annually. They would have to give up inexpensive motor vehicle transport and use aircraft and helicopters to deliver goods to fishermen, hunters and reindeer herders. And this would be the case even if they were located only on the opposite bank of the river. The channel left by the icebreaker would block the path of motor vehicles and people for a long time. The Taymyr hunters would lose approximately 500,000 rubles annually due to the change in the traditional migration routes of the wild animals. The fishermen, who would not be able to cast their nets in the river near the ice channel, would suffer considerable losses...

Who will compensate the okrug for the losses? The State? The Murmansk Maritime Steamship Line? The Noril'sk Mining and Metallurgical Combine? This question remains unanswered even though common sense suggests that it is within the power of the Noril'sk Combine. For, as is well known, the annual profit of such a large enterprise is measured in tens of millions of rubles.

In December the independent commission came on board the "Taymyr" in Murmansk. The final decision concerning the fate of the nuclear-powered vessel was in the hands of its members.

"The questions of radiation safety and the radiation situation on the icebreaker were especially important to us," said D. Dudnikov. "It was necessary to explain how the potentially ionizing effects of the nuclear-powered vessel on the water and the atmosphere of the Arctic would be monitored."

L. Pankratov, a radiation hygiene physician of the Krasnoyarsk Regional Sanitary and Epidemiological Station carried out a whole complex of careful investigations with the appropriate instruments at various points on board the nuclear-powered vessel. The commission also studied the results of the thirty-year monitoring of the crews of the first nuclear-powered icebreaker, the "Lenin," which had been conducted at the Leningrad Scientific Research Institute of Maritime Transport by the laboratory of Doctor of Medical Sciences V. Baranovaya.

At the base used by the atomic fleet the Siberians became familiar with the procedures for receiving and burying the residues of nuclear fuel and liquid radioactive wastes.

"The specialists on board the "Taymyr" made available to us the necessary documentation during the trip and they gave exhaustive written answers to all questions," continued Dudnikov. "Together with the crew we decided that it would also be necessary in the future to conduct investigations into the problems of operating an atomic icebreaker on the river, which made it expedient to enlist the help of scientific-research organizations."

Thus, the commission came to the conclusion that the ship was operating under conditions of complete ecological and radiation safety and that it complied with the requirements of the IAEA. On the basis of this conclusion, the Executive Committee of the Okrug Council

rescinded its previous decision. But it ordered the appropriate services to carry out scientific observations of the state of the broken ice in the channel, the variation in the temperature of the surface layer of water and the effect of the ship on the phyto and zooplankton.

Henceforth the Dikson maritime operations staff in the western sector of the Arctic was obliged to inform the population of the coastal villages about the movement of the nuclear-powered vessel and the radiation situation. Procedures are being worked out for withdrawing the "Taymyr" from the Gulf of Yenisey and the lower reaches of the river in the event of its breaking down, running aground or the emergence of other irregular situations.

Well, the passions in the Taymyr region over the "Taymyr" have gradually subsided. But it appears that it is still too early to consider the matter resolved

Everybody still remembers the history of the lighter carrier "Sevmorput'", which for a long time was unable to put in at far eastern ports due to the protests of the local inhabitants. Now the situation has repeated itself with the "Taymyr." Once again we have seen graphic evidence of the consequences of a lack of openness (glasnost) and an uninformed population. Have the necessary conclusions been drawn at the Murmansk Steamship Line and in the Ministry of the Maritime Fleet? For as you know, after the "Taymyr" the atomic icebreakers "Sovetskiy Soyuz", "Vaygach", "Oktyabr'skaya Revolyutsiya" and "Ural" will arrive for service in the Arctic...

Vodnyi transport
13 January 1990
Page 2 (full text)

On Hay, Bricks and Millions

(Changes in Transportation Patterns)

To an article under the above heading (Vodnyi transport, November 25 1989), our newspaper received a reply signed by deputy chief V. Leshchenko of the Main Administration of Shipping and Ship Repair Establishments of the USSR Ministry of the Maritime Fleet.

In the reply it is stated that the total volume of shipments by sea to the port of Tiksi, the Yana and the Indigirka rivers during the years of the 12th Five-Year Plan has constantly decreased. In 1986 shipments into these regions from the west and the east totalled 276 thousand tons, in 1989 - 169 thousand tons and from orders received for 1990 - 120 thousand tons.

Besides the drop in the absolute volume of supplies to the regions of the Extreme North, the expansion of shipments in the form of mixed railroad-river traffic by ships of the Lena United River Steamship Agency (LORP) from the port of Osetrovo caused a reduction in the flow of freight along the Northern Sea Route. The ever increasing volume of general bulk and bulk-oil freight for the needs of the economy and the population of regions gravitating towards the Lena River, and in recent years - the Indigirka, Yana and other rivers - is being transported by the ships of LORP.

For an objective evaluation of the facts presented in the article it is necessary to take into account that local products cannot be substituted for specific types of goods which either don't exist in this region or are not extracted or produced here. Gravel was delivered from Murmansk to Tiksi for the express purpose of especially important construction work, since the local variants did

not satisfy the builders. The volume of production of building materials in the city of Pokrovsk in the Yakut ASSR did not meet the demands of the capital of the autonomous republic and the large enterprises. The shortage was covered by means of the delivery of structures and materials via the Northern Sea Route or along the Lena. We are not aware of any expansion of the production of building materials in Pokrovsk, but let us assume that the government of the Yakut ASSR has provided for this in its plans.

An analogous situation exists with respect to many other types of goods delivered to the Extreme North. We cannot leave the population of these regions without the necessary resources, even if the cost of transporting them is high at the present time.

Vodnyi transport
4 January 1990
Page 2 (slightly abridged)

Losses are Inevitable...

Who Will Compensate for Them?

A letter written by Yu. Smirnov, Captain of the RK-60 of the LORP (Lena United River Steamship Agency) operating out of Zyryanka river port, was published in "Vodnyy Transport" on 21 November 1989. I consider it necessary to deal with the subject matter in somewhat greater detail.

First we need some background history. The RK-60 motor vessel was assigned to the river port in 1977 at the request of the Nizhnekolymsk Regional Executive Committee, specifically for organizing passenger transportation on the Cherskiy-Podkhodsk and Cherskiy-Kolyma lines, where regular passenger air services were lacking at the time. In the first years of its operation the income from transport was 11-12 thousand rubles, with operating expenditures of 45-47 thousand. At that time this did not particularly disturb us, as suitable indices would be included in the plan.

The picture changed sharply during the three years following the opening up of regular passenger airlines. Income declined in 1988 to 7.6 thousand rubles, and in 1989 it was down to 8.4 thousand. At the same time the expenditures were respectively 49 and 50 thousand rubles. And this in spite of the fact that Yu. Smirnov, who was in command of the motor ship in 1987 and was truly enterprising and business like, had done everything he could to search for additional income. The coefficients of utilization of the passenger capacity did not exceed 60 percent, and in non-flying weather there were more customers than the motor ship could carry. This depicts an unpromising situation if one examines the real figures rather than the data about an increase in the percentage of income, presented in the letter.

At the same time the simplest analysis shows that when operating at such a capacity an increase in income is accompanied by an increase in expenditures. We have good understanding and support for the concern of Yu. Smirnov about the problems of improving the conditions for the passengers and the crew. The steamship line could assign us a motor ship of design No. 81080 ("Moskovskiy"). However its cost is three times higher than that of the RK-60, and the operating expenses are not 50, but 120 thousand rubles. Thus, in order to cover the losses it is necessary to increase the income almost tenfold. Let us be realistic: no enterprise can help us do this.

Now let us talk about the change in schedule which made it possible to increase the coefficient of operating time. We actually went to these lengths to reduce the number of planned trips on the Cherskiy-Kolyma line by half, transferring them to nighttime hours. This made it possible for the crew to organize pleasure trips during their free time. Unfortunately, the change in the schedule brought about unfavorable criticism by the passengers. Therefore, at the request of the Regional Executive Committee we will be forced to return to the old schedule in the next navigation season.

Vodnyi transport
13 January 1990
Page 2 (abridged)

Concerning the Nuclear-Powered Icebreaker "Taymyr"

Still fresh in one's memory are the far eastern "reverses" of the "Sevmorput'" - the first nuclear-powered transport vessel in our country. Something similar is happening now on the Taymyr Peninsula. In the autumn, the "Taymyr," the first shallow-draft atomic icebreaker in the world, constructed in Finland on orders from the Soviet Union, was scheduled for arctic patrol here, piloting ships in transit along the Northern Sea Route into the estuary of the Yenisey and the port of Dudinka.

It should have taken up station here, but it did not ... the Executive Committee (Ispolkom) of the Taymyr Regional Council of People's Deputies adopted a special resolution, prohibiting the operation of the atomic icebreaker "Taymyr" on the Dudinka-Sibiryakova Islands line, and also of ships with atomic power generating from entering the Gulf of Yenisey and the waters of Dikson Seaport.

"We lack confidence in the safety of this type of technology," said the Vice-Chairman of the Taymyr Ispolkom, G. Nedelin.

These words are not simply the "atomophobia," which arose in many people's minds after the Chernobyl' catastrophe...

It is already ten years since the year-round maritime Dudinka-Murmansk crossing became operative and which made it possible for the metallurgists of the Noril'sk Mining-and-Metallurgical Combine to seemingly draw closer to the mainland and operate a reliable transport route even in the harsh winter months. Transported across the "sea bridge" are goods, materials and equipment for the people in the Taymyr region, with raw materials and manufactured products moving in the opposite direction from the Taymyr Peninsula to the mainland.

To ensure that the crossing remains open in winter, the sailors keep two diesel powered motor vessels operating on this route all the time. With each burning about a hundred tons of fuel per day they can work at convoying ships for not more than twenty days. Then, they either put into their home port for fuel or bunker in the open sea at -50° temperatures, which is uneconomical since each ton of fuel must be delivered from the mainland for this.

The "Taymyr" has an engine capacity of 50 thousand horsepower and a single refueling of the vessel is sufficient for two to three years of operation.

But... the year-round crossing has existed for ten years, and the Taymyr Okrug incurs nothing but losses from this. A part of the goods remains for the Okrug, but you know this is less even than the proverbial drop in the ocean. But then the channel, several tens of meters wide, cut along the bed of the powerful river, seemingly divided in half the life style developed here over the ages.

Solely on account of the necessary air dropping of goods and materials onto the tundra, rather than delivering them by land, as previously, the Okrug is losing up to a million rubles annually. The hunters are short another 500 thousand due to the change in the traditional migration routes of the reindeer. The Yenisey fishermen are also suffering a significant loss.

However neither the Noril'sk combine nor the Murmansk Steamship Line is in any hurry to make up the losses: the departments in our Okrug do not like to share the profits they have made. Therefore, as soon as it became known that a nuclear-powered vessel would be making its appearance in the waters of the Yenisey, the general public on the peninsula sounded the alarm.

The sailors assure us that there is no danger whatever. Today the nuclear-powered "Taymyr" has the ecologically cleanest reactor in the world and its radioactive wastes are collected by a special ship far from inhabited sites. Also, the designers have stipulated something else: the strength of the icebreaker's hull is such that it can withstand a head-on collision at full speed with a ship displacing 26 thousand tons. And in the event of running aground, special shielding protects the reactor against rupture.

"The two diesel icebreakers now operating in the river, poison it much more than a nuclear-powered vessel does," say the specialists of the steamship line.

Perhaps that is so, but how then do you explain the fact, inquires the public, that along the entire route of the atomic icebreaker no emergency services have been provided which could bring assistance, and that not even a simple notification to the inhabitants of the coastal villages about its passage has been foreseen? Why was it that only after the "Taymyr" had been launched did this become known on the peninsula? Was it really impossible to involve the local ichthyologists in an investigation of the consequences of the icebreaker's operation in the nearby waters? These ichthyologists are now more concerned about cleaner polynia (areas of open water in ice) than the operations of diesel powered icebreakers.

The feeling on the Taymyr is that a commission of experts is needed, to study all these problems. I would like to add only one thing myself: why should such a commission be assembled after, rather than before, the launching of the atomic icebreaker? Why, in making the decision about its construction, did the maritime department not find the time to inquire about the opinions of people living along the shores of the Siberian river?

I contacted Murmansk and they assured me that an arrangement had been reached with the Taymyr authorities concerning a one-time visit of the nuclear-powered vessel into the estuary of the Yenisey so that Dudinka residents could be convinced of its absolute safety. Moreover, a delegation from the autonomous okrug visited the Kola Peninsula. A decidion was made to revoke the ruling of the Okrispolkom to prohibit the visit of the nuclear-powered vessel into the inland waters of the Taymyr. Several days ago a nuclear-powered vessel visited the lower reaches of the Yenisey for the first time.

Rabochaya tribuna
17 January 1990
Page 4 (full text)

MISCELLANEOUS

Thirteen Thousand Meters Under the Ground

Written on site

At the Kola ultra-deep borehole, located several kilometers from the city of Zapolyarnyy, a new stage of work has begun: the turbo-drill has already descended to a depth of 12 kilometers 115 meters. The task of the expedition is to drill to 14-14.5 thousand meters.

The sun was no longer visible above the horizon and for a short time only the cumulus clouds in the grayish sky were rose tinted. After that the polar tundra and the snow mounds which clustered near the road became dark blue. From far away the construction of the Kola ultra-deep borehole looked like an ocean submarine with a tall conning tower. "Only the periscope protruded, but downwards rather than upwards, helping the 'captains' to find out what was going on there," - this is what occurred to me before my meeting with the interesting people who had linked their fate with a unique achievement of our time.

My first thoughts are of the many readers who, having quickly glanced at the first lines of the reports will exclaim to themselves: "And why is all this necessary?" During the four hours of travel from Murmansk to Zapolyarnyy, this question also tormented me, since I am not a specialist in the geology of ultra-deep (or shallow) drilling. I also thought about this on my return to Moscow.

The drilling foreman on duty, Vladilen Ismagilov, stood before the main drilling panel like a captain on the bridge of a ship. Lights and numbers flickered while the television screen on which I saw how the next braid of the tube was fed to the base of the borehole, lit up. Let's take a look at it.

"The entire process of operating a super-deep borehole," says Vladilen Abdulovich, "is completely computerized. There are programs for drilling, lowering, raising and other operations. On the panel I have information from 32 channels.

"How do you find out what's going on at the 12-kilometer level?"

"A hydraulic communications channel is provided. What kind of a thing is this braid made from lightweight alloy tubes 147 millimeters in diameter and 12-kilometers long? Take an ordinary thread, measure off five meters, and put a needle on the end. This will be a simplified mock-up of the ultra-deep borehole. If we didn't have information from the turbo-drill, then how would we know whether it was working or not, and whether well or poorly? We also have in operation a program for identifying a pre-breakdown situation."

"And does anybody else have such information?"

"No. We are monopolists, who have the rarest specific statistical data about the activity of one or another unit of the drilling equipment and about the appearance of pre-breakdown situations. but nobody is interested in this, which is a pity..."

Nevertheless the fellow-countrymen exchanged Moscow news with the boss of the Kola ultra-deep drilling expedition, David Guberman. I pondered at length on where I had met him before, but apparently we had not met. However, on entering one of the rooms, I saw a familiar photograph dating from March of 1966. There on white, boundless tundra, near one of the pegs driven into the snow, stood a short, sturdily built man with a kind face. Guberman "and colleagues" were beginning this ultra-deep borehole in the harsh polar tundra.

"At first we drilled with a standard rig," said David Mironovich, "rated for up to five kilometers. We did seven. Then we exchanged it for a new, more sophisticated unit, but take note, this was also Soviet-made. It was not possible to work with steel tubes - one meter weighs 37 kilograms. Multiply this by 10 thousand plus fifty percent of the weight for resistance during lifting. Lightweight alloys were employed - 16 kilograms per meter. But the tubes could not be rotated, so a turbo-drill which turns from below was set in place. The USSR is the father of this method. After nine thousand sinkings the shaft deviated from the vertical by 25 degrees. Again we managed to outwit the Earth - we lowered the casing string to 8.770 meters, and then redrilled 3.5 thousand. Now we can go farther along a new vertical shaft.

What do I want to say by this? The Kola ultra-deep borehole refuted the classical concepts of drilling into the Earth's interior. At first we did not know how we had to proceed but eventually we understood what to do.

The main information for geologists is contained in the core sample of stony material. Usually ultra-deep boreholes are drilled without it - and the core sample is 5-7 percent of the length of the shaft. At the kola site it is more than 80 percent. In a special automated storage site the chief geologist of the expedition, Vladimir Stepanovich Lanev, opened two long containers in front of me. The first was from six kilometers and there were smooth stone columns in it. In the other, from 12 kilometers, instead of "columns" there were circular plates. When this material was raised to the surface the force of the rock pressures dispersed and the column "exploded".

"The column is sawed lengthwise," recounts Vladimir Stepanovich. "One half is not used in the testing - in the future newer methods of investigation will be developed and it is necessary to save it for them. The other half is used for immediate investigation. We have done these here in the laboratory, by studying the physical, petrographic and mineralogical properties. A complex analysis is performed at institutes in Moscow and Leningrad. An interesting site was selected for a super-deep borehole on the Baltic Shield. The age of the rock at the surface is 1,500 million years. At a depth of 12 kilometers it is three billion years old and the age of the Earth is 4.5 - 5 billion years. Thus I, as a geologist, measure the borehole in such a way that its length spans a period of one-and-a-half billion years. You have to agree, this is a substantial chunk out of the life of our planet."

Guberman told me the following story. Grigoriy Ivanovich Gorbunov, the former President of the Kola Branch of the Academy of Sciences of the USSR and a Corresponding Member, called one day from Apatity.

"Drop in and see us," he said, "we have received some samples of lunar soil."

We fly there and enter through an iron-clad door into a clean room. We put on foot covers and white attire. We admire the "moon" under the microscope: 28 tiny particles of dust. It turned out that this was exactly like our material from a depth of 3-4 kilometers. Since then geologists have postulated that the Moon was torn from the Kola peninsula. But where this site is located they have not yet determined.

It was here that I decided on the main question:

"Why is all this being done? What will the super-deep borehole give to man?"

Whereupon the people I was speaking with looked at each other and smiled. They wondered why I would ask them this question without first learning something about the super-deep borehole. But I was patient.

"The point is," began Guberman, "that our work on the Kola Peninsula has practically disproved the contemporary hypotheses concerning the origin and placement of minerals. Today we have detected iron ore and gold mineralization at a depth of 10 kilometers. Do you know how much? Up to seven grams per ton. But man does not go down so deep. We have found a prospecting show, suggesting that we may find copper, cobalt and gold above. Thanks to

our core samples it has been possible to explore the geophysics of the Earth with sonic irradiation. You know, in very concise terms this is a re-interpretation of the laws governing the placement of minerals, and in summary the discovery of a large number of new deposits without additional expenditures. And the deposits discovered on the Kola Peninsula alone, with the aid of our input, will completely pay for the ultra-deep borehole.

"The coastal dwellers, for example," continued Vladimir Stepanovich, "panned for gold here many years ago. But this question has been covered several times. They were sure it exists on the peninsula. Today the geologists have mapped the territories of their countries. But this two-dimensional picture should be supplemented with a third coordinate - seismic prospecting or therapy to use the language of the medical people. But it is imprecise. Our drilling resembles a surgical knife, which gives an unambiguous picture. With the help of this true coordinate it is possible to build a model of the Earth's crust, which will be a necessity in the 21st century..."

"There is much talk today about the fact that geologists are burying public funds in the earth and that the ultra-deep borehole is burying them even deeper" I remarked.

"This is primitive thinking" David Mironovich lauths in reply. "In such cases we don't even know how to justify ourselves. It is necessary to do a lot of thinking about this. To close down research on the cosmos and geology, where we currently occupy one of the leading places in the world, would be a crime and an unacceptable luxury. To suspend the ultra-deep drilling program would be to suspend thinking and stop progress. Whereas we are wearing poor trousers today, after five years without geology we would be doing without T-shirts and shorts. This has already happened with computers and satellite communications...

"We geologists were at fault during the stagnation period," continued Lanev. "We hastened to find rich deposits and pumped oceans of petroleum. If there had been no Tyumen', for example, the economic structure would have forced us all to work much earlier. But today everybody is focusing on the total reserves of minerals. Yes, our country is rich. But where are these riches - in Chukotka, in Eastern Siberia, on the continental shelf? Try and reach them. And what are the active reserves that everybody is keeping quiet about? By the end of the decade it may be possible to close the bulk of the refineries ..."

The Kola ultra-deep borehole program has served to create and execute a whole series of investigations of the Earth's interior. A combine was formed for the comprehensive investigation of the latter. Throughout the country there are 9 more boreholes: the Ural, the Tyumen', the Krivoy Rog, the Timano-Pechora, the Marantau and other boreholes. A number of countries have embarked on analogous programs via legislation and on a governmental level. For example, 510 million DM have been appointed in the FRG for scientific continental drilling. The USA has appropriated 20 million dollars for the current year.

Guberman told us about the International Geological Congress, convened in Moscow in 1984. the leading scientists of the world set this condition: "We will come if you let us see the Kola ultra-deep borehole." They assumed that the Russians would "promise them the world, but not deliver," given the enormous depths and the backward technologies. When the directors of the geological services of the developed capitalist countries saw the core samples from 0 to 12,000 meters they were speechless. This is priceless for a geologist.

People work here not for the sake of records, but for the sake of people. Even so, the ultra-deep borehole is listed in the "Guinness Book of Records." It is specialists, for example, who determine the age of a core sample. That's right, not too long ago, the latest methodology revealed the age of one deep-drilled section to be 12 billion years!

I pick up a small flat grayish pebble with black specks. It is three billion years old. What new information will it convey to the scientists about the Earth?

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