

1) <http://www.geocities.com/WallStreet/1242/partizansk.html>

## Partizansk

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### BASIC INFO

- **Partizansk** is located in the southern part of Primorsky Province, 36 km (23 miles) away from Nakhodka Bay of the Sea of Japan.
- **Partizansk borders** *Partizansky*, *Shkotovsky*, and *Anuchinsky* Regions.
- **Founded** in 1896.
- **Population:** 61,500 people (as of 1/1/1996).
- **Extention from north to south** is 45 km (28 miles), **from east to west** - 33 km (21 miles)
- **Old Name:** *Suchan*
- **The area** subordinated to the town administration totals 1,288 sq km (495 sq miles) including more than 1,000 sq km (384 sq miles) of the forested territory.
- **On the territory of Partizansk** the following settlements are located: *Tigrovy*, *Uglekamensk*, *Avangard* (Avant-Garde), *Kazanka*, *Bronnichi*, *Khmelnitskoye*, *Melniki*, *Zalesye*, *Serebryanoye* (Silver).
- **Geographical coordinates** are 133°E, 43°N.
- **Telephone area code** is 42-363-0 (or 263-0 if you call from inside of the Province).
- **Railroad distance to Vladivostok:** 164 km (102 miles).
- **Highway distance to Vladivostok:** 236 km (146 miles).

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*Partizansk* is a green town with many gardens. Even *Leninskaya* (Lenin) Street where the administrative establishments, large shops and movie theaters are located looks more like a shady avenue than the main street of the town with a 60,000 population. Most of *Partizansk* is built up with one-story individual houses. Modern five-story buildings prevail only in the city center.

### Partizansk Ecology

The ecological situation of the *Partizanskaya* (Partisan) river and its tributaries within the town border and in the suburban settlements is very unsatisfactory. According to the results of inspection the waters can be considered polluted. Pollution of the river basin leads to deterioration of fresh water quality in the water-distributing structures of the town. From year to year water quality less and less fits the State Standards. Bacteriological index also exceeds the norms. In *Uglekamensk* and *Avangard* (Avant-Garde) settlements the bacteriological index lies in the zone of epidemiological danger (level 2). In *Uglekamensk* the water pollution level is 16 times more than the norm, in *Avangard* (Avant-Garde) - 10 times, in *Partizansk* - 7 times. In *Lozovy* (Vine) settlement the water bacteriological index lies in the zone of the third level epidemiological danger.

The main water polluters of the *Partizanskaya* (Partisan) river basin are the industrial enterprises: the Central Concentrating Factory, mines, brewery, the hydro-electric power

station, motorcade #1512, "Primorskugol" motor-transport depot, meat processing factory, "Lazurny" (Azure) state farm, agriculture enterprises of *Kazan'ka* and other settlements. Mines and concentrating factory pollute rivers with suspended particles, ions of iron, copper, phenols, oil-products. In the *Melniki* and *Postyshevka* rivers the maximum permissible concentrations (MPC) are exceeded. In the *Melniki* river the concentration of oil products 9 times exceeds the MPC, of phenols - 4 times, of suspended particles - 26 times. In the *Postyshevka* river the concentration of oil products 9 times exceeds the MPC, of phenols - 6 times, of **nitrogen nitrite** - 7 times, of copper ions - 7 times, of suspended particles - 196 times, of iron - 3 times. In the *Partizanskaya* (Partisan) river even after the dilution of all sewage the concentration of phenols 3 times exceeds the MPC, of oil products - 6 times, of copper ions - 2 times, of suspended particles - 26 times. A case of ions concentration 13 times exceeding the MPC was registered.

In the *Partizanskaya* (Partisan) river waters 20 km (12 miles) below the town the concentrations of **nitrogen nitrites** and phenols exceed the MPC. The level of epidemiological danger is very high (biological index is 33%, sanitary index is 60.5%). In general the waters of the *Partizanskaya* (Partisan) river basin do not conform to the norms by 73.9% (average index in the Province is 47.7%), and to the microbiological pollution norms by 75% (average index in the Province is 20.2%).

Not only *Partizansk*, but also *Yekaterinovka* settlement and *Nakhodka* city, which are further below along the *Partizanskaya* (Partisan) river flow, are using this water.

The reason for such pollution is absence of **water purifiers** or their small capacity. For example, the mine purifiers purify water from coal slag by only 30-35%. Water-obtaining structures of *Uglekamensk*, *Lozovy* (Vine), and *Lozovy Klyuch* (Vine Spring) settlements do not have water purification at all, and the system of water disinfection is rather primitive.

As a result in the town and settlements cases of infectious hepatitis and fever typhoid are registered annually. Comparing to 1994 the number of cases of liver, gall-bladder, stomach, and duodenum sickness increased 3 times, the number of intestinal sicknesses increases 10 times.

Currently in *Partizansk* the reconstruction of town water-purifying structures is being conducted. In future the construction of such structures is planned for *Uglekamensk* settlement (they are currently being projected). After the construction is finished waters of the *Partizanskaya* (Partisan) river will become much cleaner and safer.

The condition of air in the town satisfies the norms. MPC's are not exceeded. There are 3 functioning sanitary posts: on the territory of the sanitary and epidemiological center, in *Lozovy* (Vine) settlement, and on *Gogolevskaya* Street. Some of the boiler-houses were closed, which led to reduction of atmosphere pollution.

*Partizansk* is located in the Primorsky seismic zone. Here the earthquakes force 7 are possible (while on the rest territory of Primorye the earthquakes force 5-6 are only possible). The earthquake force 7 happened in *Partizansk* on September 18, 1933. Weaker earthquakes had also taken place.

## **Partizansk Rivers and Lakes**

### **The *Partizanskaya* (Partisan) river**

The main water artery of *Partizansk* is the *Partizanskaya* (Partisan) (or *Suchan*) river with many small rivers and springs flowing into it. It starts in the southern spurs of the *Przhevalsky* (or *Sikhote-Alin*) mountain range, and flows into the *Nakhodka* Bay of the Sea of Japan. The

river's length is 137 km (85 miles), the reservoir area is more than 4,300 km<sup>2</sup> (1,660 sq miles), the flow velocity is from 360 m/h (1,181 ft/h) to 18 km/h (11 mph), or 1-2 m/s (3-7 ft/s) on average.

Due to the large amount of waterflows river's basin has very **partitioned** landscape. There are many watershed eminences, ranges, river and spring valleys, and ravines. Diversity of rocks and abundance of summer rains favor the development of erosion processes. Slopes formed with volcanic rocks are steeper than the ones formed with sedimentary rocks.

The largest tributaries of the *Partizanskaya* (Partisan) river are the *Malaya Tigrovaya* (Small Tiger) river, the *Bolshaya Tigrovaya* (Large Tiger) river, the *Melniki* River, the *Sobolinaya* (Sable) river. The *Bolshaya Tigrovaya* (Large Tiger) river's length is 50 km (31 miles) with its valley expanding up to 2 km (1.2 miles) at the place of its flowing into the *Partizanskaya* (Partisan) river.

During the heavy showers in July and August a significant rise of water level in rivers occur. Floods inflict great damage to agriculture and transport ways. During this time inflow of surface waters into mines through the holes above the depleted coal beds increases. During the floods most of the *Partizanskaya* (Partisan) river valley is inundated, especially at the place where the *Belaya* (White) river flows into it. In winter and during droughts rivers grow very shallow, some of them even dry up.

The *Partizanskaya* (Partisan) river is the main source of water-supply for household and industrial needs of the town and nearby settlements. In order to improve it hydrogeologists are constantly prospecting underground water reserves. A significant underground water reserve was discovered in the area of *Lozovy* (Vine) settlement. After a new reservoir has been being built the water-supply of fresh drinking water in *Partizansk* will improve greatly.

### **The Tyoploye (Warm) Lake**

The *Tyoploye* (Warm) Lake is situated in *Lozovoye* settlement 7 km (4.3 miles) away from *Partizansk*. It is an artificial reservoir used as a cooler for the electric power station. The lake is periodically being cleaned from silt.

The lake's length is about 2,000 m (6,560 feet), its width is 500 m (1,640 feet), and its depth is 10-12 m (33-39 feet). From one side it is enclosed with forested hills, from the other side a residential block is located. On the lake's shore there are a recreational children camp and a rowing base of the "*Olimpiysky*" (Olympic) sports complex. Further (along the *Lozovy Klyuch* (Vine Spring) and its tributaries) the "*Lazurny*" (Azure) hothouse enterprise and a psychoneurosis boarding school are located.

On the lake's bottom two kinds of soil prevail - stone-sandy and stony. The shore soil is stony. Water worked out from the electric station is warm, turbid, and odorless.

The *Tyoploye* (Warm) Lake has clear boundaries and is inhabited with plants and animals forming a unified ecological system. The following plants grow on the lake's shore:

**тростник обыкновенный, рогоз широколистный, стрелолист обыкновенный, осока пузырчатая.** On the shallow water duckweed grows. In the deep part of the lake **рдест курчавы** and **элодея канадская** grow. Also here are good conditions for plankton, **бентос**, and **phytophile** fauna development.

The best living conditions are in the coastal area, which is better lit, warmed, and richer in oxygen. Here fish (**секамбра**, gudgeon, **гальян**) feeds and spawns. Larger species (wild carp, sheat-fish, crucian, **верхогляд**) live in the open water area. The lake's bottom is inhabited with freshwater molluscs, **беззубки**, snail-**фины**. On the air-water boundary **water bugs**, dragon-flies, and mosquitoes live.

Every fall migratory ducks settle on the lake. Some flocks of teals migrating from Siberia to China and Japan and large gray ducks stay here. The lake does not freeze and there is enough forage for birds. In April ducks fly away.

It is very important to support normal water regime in the lake and keep it clean since industrial and household sewage waters get into it. This is done with the help of refinery system of the *Partizanskaya* hydro-electric power station.

The *Tyoploye* (Warm) Lake is a favorite recreational place of the *Lozovoye* (Vine) and *Partizansk* inhabitants. A famous "*Gornyye Klyuchi*" (Mountain Springs) tourist center existed here before. Before 1996 there was a station for carp fish species (wild carps, carps, crucians) cultivation. Today the power station does not have it any more.

## **Partizansk -- Natural Resources**

There are deposits of coal, granite, marble, clay, and polymetal ore in the vicinities of the town. In *Lozovoy* (Vine) settlement the deposits of underground water have been prospected. The main natural resource of the *Partizanskaya* Valley is coal. Coal deposits in the river basin stretch along the valley from *Lozovoy* (Vine) settlement to *Molchanovka* settlement in the north. Thickness of the coal deposits reaches 1,400 m (4,592 feet). In the sedimentary rocks (sandstones, argillites, alevrolites) more than 30 beds of coal were discovered. The total amount of coal in *Partizansky* deposit is estimated to be 426 million tons.

Nowadays the coal deposits are depleted. Only inconvenient very deep and steep deposits are left. Because of that the costs of mining increased significantly, and most of the mines are not profitable, which led to considerable economic problems in *Partizansk*.

## **Partizansk Economy and Industry**

### **General Description of the Town Economy**

Until recently *Partizansk* was known mostly as a coal mining town. This was true since more than three quarters of all industrial production was high-quality coal.

Though *Partizansk* is still one of the important coal mining areas of the Province, more branches of industry appeared here in the recent several years. After the *Partizanskaya* (Partisan) hydro-electric power station was built the town became an important supplier of electric power in Primorye. In 1960 the "*Gorizont*" (Horizon) leather goods factory started to function. Its production was in great demand far beyond the Province boundaries. In 1962 the "*Molodyozhnaya*" (Youth) garment factory was built, in 1969 the "*Avangard*" (Avant-Garde) garment factory started functioning. There are the "*Pishchevik*" (Food Industry Worker) Joint-Stock Company (former meat processing plant), a brewery, a town food industrial complex, a bread-baking plant, and a State timber industry enterprise in the town. In 1980s several defence industry plants were built. They include the "*Uragan*" (Hurricane) turbine plant, the "*Amur*" instrumental plant, and a chemical-pharmaceutical plant. The first two were restructured in the first years of perestroika to serve other branches of industry, and the chemical-pharmaceutical plant merged into the "*Farmgorod*" (Pharmaceutical City) enterprise in Nakhodka free economic zone.

In 1996 coal industry share in the gross product of *Partizansk* was 65.2%, light industry share was 2%, food industry made up 28.6%, and machine-building industry - 3%.

In the suburban area the network of specialized holdings was created, which included the "*Gorny*" (Mountain) and "*Yantarny*" (Amber) State farms (specialized in gardening), the

"*Lazurny*" (Azure) State farm (vegetable-growing), "*Kazansky*" State farm (milk and vegetable-growing). The "*Tigrovy*" fur State farm grows minks. The "*Pribrezhnoye*" (Coastal) enterprise (former State farm) is in charge of **taiga gifts** procurements and fur bagging. *Partizansk* is located near the Nakhodka free economic zone, and is supposed to be included into it.

*Partizansk* is a large transport junction. It is connected with Nakhodka, Vladivostok, and *Vostochny* (Eastern) port by railroads. After the second *Sikhote-Alinsky* (Sikhotae-Alin) tunnel was put into operation, the goods traffic increased significantly. New passenger trains (including "*Primorochka*") appeared.

## Industry

The traditional industry in *Partizansk* is coal industry. The town itself was founded because of the vast coal deposits. Since the times of foundation coal industry has been being the main industry in the town. New mines had been being put into operation constantly. In 1901 mine #1 was put into operation (its output was 105,000 tons of coal a year). This mine depleted long ago already. In 1918 the "*Tsentralnaya*" (Central) mine was put into operation, in 1938 - the "*Nagornaya*" (Mountainous) mine, in 1942 - the "*Glubokaya*" (Deep) mine, in 1943 - the "*Severnaya*" (Northern) mine, in 1949 - the "*Avangard* (Avant-Garde) mine. Since 1930 the "*Dalshakhtstroy*" (Far Eastern Mine Building) specialized enterprise had been building new mines and dwellings for miners. Coal mining mechanization and new mining equipment introduction started, as well as newer and more modern ways of coal extraction were introduced. In the 1930s pneumatic drills started being used. New railroads on the *Partizansk - Anisimovka* and *Partizansk - Nakhodka* sections were built.

The rated capacity of *Partizansk* mines is more than 1 million tons a year. This is how much coal was being mined in the 1980s and in the beginning of the 1990s. The peak was in 1960s, when about 3.5 million tons of coal were being mined. In 1994 the amount of mined coal fell to 758,000 tons, and in the first half of 1996 only 273,400 tons of coal were mined.

There are several reasons for such decline. Mine works are being carried in hard conditions. The layers are not very thick, and they are located very deep underground (up to 700-1,000 meters (2,300-3,280 feet)); the layers fall sharply (the angle is 45-90°), they have many magmatic intrusions and breaks. Also, the methane **exhausts** are possible, and the layers are very sensitive to **shocks**. This makes coal mining much more expensive. Since this branch of industry is not properly financed, the development of new technologies and mines reconstruction is impossible. This is why new ways of more economical coal mining are being looking for. The "*Glubokaya*" mine was closed. It is planned to mine coal on the *Semyonovka* section near *Sergeyevka* (reserve of 3 million tons), and on the *Soboliny* (Sable) section in the *Belaya Pad* (White Valley). They will be mined under the *Nagornaya* (Mountainous) mine administration control. The layers on these sections are located close to the surface, and open mining is possible. The corrected rated capacity of these mines is 770,000 tons of coal a year.

With the development of the coal industry a number of enterprises serving it appeared. After the *Partizanskaya* (Partisan) hydro-electric power station was built in 1954, the **power engineering** industry appeared.

Today the coal industry in the town is being restructured. Instead of the "*Partizanskugol*" two new mine administrations are functioning ("*Nagornoye*" (Mountainous) and "*Avangard*" (Avant-Garde)). The first controls not only the "*Nagornaya*" (Mountainous) mine, but also the "*Tsentralny*" (Central) mine and three sections of open coal mining. The second controls the "*Severnaya*" (Northern) and the "*Avangard*" (Avant-Garde) mines.

Light and food industries also are facing significant difficulties now, and the amount of construction are constantly falling.

Several enterprises are successfully working even in the difficult conditions of the so-called "transitional economy". The "*Pishchevik*" (Food Industry Worker) joint-stock venture, based on the former meat processing plant, is working even more successfully than in socialist times. Its assortment increased to 70 items. Besides sausage and meat products it produces confectionary, bread products, sells its production, and maintains several public catering businesses. The company uses both local and imported raw materials. The demand for its production is not only the local market, but the whole Province. The amounts of production are constantly rising.

The "*Uragan*" (Hurricane) turbine plant is now a joint-stock company as well. As a result of conversion it was restructured into an enterprise, which processes orders of the coal and **power engineering** industry enterprises. It produces spares and spare equipment (transport rollers for coal mining, wheel-gear pumps, various spares for electric power stations, ports, and mines). The amounts of production are rising.

The "*Uragan*" (Hurricane) plant is becoming a leading enterprise in the town in creating new **work places**. Six business-plans were developed; it is planned to create six new production lines with 500 new **work places**, assuming that investments are available.

### **The Most Important Enterprises in *Partizansk***

#### **The "*Tsentralnaya*" (Central) Mine**

The prospecting here actually started in the beginning of the new coal deposits opening period. In the end of the XIX<sup>th</sup> century the prospecting works were held by mining engineer *D.L. Ivanov*, and in the beginning of the XX<sup>th</sup> century by foreman miners *Akulov* and *Revyakin*. The result of prospecting let found a prospecting mine #10 (now "*Tsentralnaya*" (Central)) on the "*Dvoynik*" (Twin) layer in 1912. Soon after that the prospecting mine #11 on the "*Yuzhny*" (Southern) layer was founded.

The "*Tsentralnaya*" (Central) mine was the first where pneumatic drill was used for the first time. In the years of the first five-year plans the Stakhanovite movement started from this mine.

During the Great Patriotic War 300 workers from this mine were recruited to the Army. Half of them died on the front. In spite of that the amount of mined coal did not drop. Women and children were working on the mine.

After the war the mine was awarded a Deed of the Superior Council Presidium of the RSFSR.

Nowadays the "*Tsentralnaya*" (Central) mine is one of the largest coal enterprises in Primorye. The mine is automated, almost all of the processes are mechanized. Combines, rock and coal loading devices, electric locomotives are being used in mining.

Mine's rated capacity is 280,000 tons of high-quality coal a year. Of the seven prospected layers only three are being mined: the "*Barsuk*" (Badger) layer (thickness of 0.6-1.4 m (2.0-4.6 feet)), the "*Nizhne-Kedrovoy*" (Lower Pine) layer (2-28 m (7-92 feet)), the "*Dvoynik*" (Twin) layer (1.6-25 m (5.2-82.0 feet)). High-quality coal does not need concentration, its **общая зольность** is 23-24%.

Because of the decline of profitability the mine was going to be closed several times.

## The "Severnaya" (Northern) Mine

The "Severnaya" (Northern) mine is located in *Uglekamensk* settlement. It was put into operation in 1943 with the rated capacity of 200,000 tons of coal a year. Mined coal was processed on the *Partizanskaya* Central Concentrating Factory, used as fuel, for the needs of the cement industry and household, and partially exported abroad.

Coal layers lie 5-50 m (16-164 feet) away from each other. Average layer thickness is 1.2-1.8 m (3.9-5.9 feet). Layers **зольность** is 10-40%. Combustion heat is 5,100-6,600 kcal/kg (2,313-2,994 kcal/lb).

The hydrogeological conditions of the deposit are difficult. Rock lodes in the coal layers often accumulate water, which makes mining much more complicated. Coal layers are dangerous because of large concentrations of coal dust.

On the level marks average temperature lies in the range from +12.5° (54.5°F) at the depth of 230 m (754 feet) to +18.1°C (64.6°F) at the depth of 400 m (1,312 feet). The maximal registered temperature was +45.8°C (114.4°F) at the depth of 1,240 m (4,067 feet).

Coal is mined with help of the "Ural" (the Urals), "Gornyak" (Miner), and "Donbas" combines. Level of combine mining mechanization is 5-20%.

Rated capacity of the "Severnaya" (Northern) mine is 270,000 tons a year. The reserves are 21,192,000 tons. In 1990 811 tons of coal a day were mined, and 1,150 miners were occupied.

## The Central Concentrating Factory

The Central Concentrating Factory was built and put into operation in 1963. Its main goal was concentration of the coals used for power engineering.

Originally the factory worked 300 days a year with 2 shifts. 31 shifts are used for repairing. Rated capacity of the factory (1.2 million tons a year) was reached in 1966. The factory is processing mainly *Partizansk* coal. For the 30-years existence large quantities of slag (coal dust) were accumulated. The slag occupies significant areas near the factory and pollutes nearby waters.

Burning of slag after its drying in furnaces is not efficient, since slag burns up only partially, which leads to the air pollution.

Coal briquetting helps reduce air and water pollution. The results of researches let develop the technology of producing of briquettes for household use. Briquetting is not possible without binding substance. In China coal is used as binding substance, in Japan it is sawdust and grinded bark of conifers. Both methods are not ecologically secure, and the briquettes are not durable. In *Partizansk* more efficient method is being used. Here sodium **гуманат** is added as binding substance. It can be obtained from the peat (which is abundant in Primorye) and lignite from the *Pavlovskoye* and *Lipetskoye* deposits. Special equipment is needed.

Nowadays because of the restructuring of the town industry and sharp decline of the amount of coal mined the factory is temporarily stopped.

## Central Electromechanical Workshops

In 1924-1925 in *Suchan* workshops on the mining equipment and mine roads repair appeared. They were later renamed the central electromechanical workshops (CEW). Since 1930, when a shop on electric appliances repair was put into operation, the CEW consist of the following sections:

- underground section, which is responsible for repairing of the rock loading machines, sinking combines, and mine conveyors;

- power engineering and repairing section, which is responsible for repairing of the electrical engines;
- mechanical assembling section, which is responsible for parts turning processing, for parts milling and assembling, for the pumps repair and parts polishing;
- boiler and blacksmiths section, which is responsible for making of forged pieces, conveyor **peirTaks**, and other metal items, for parts casting and punching;
- road-building machines section.

The CEW are working successfully only if the coal industry will be developing.

### **The *Partizanskaya* (Partisan) Hydro-Electric Power Station**

The station is located near the *Lozovaya* (Vine) station in the *Partizanskaya* (Partisan) river valley 10 km (6.2 miles) away from *Partizansk* and 40 km (25 miles) away from Nakhodka. The station was built in 1945-1949. The raw materials for the station are coal and lignite, which are available in *Partizansk*, and can be exported from the other areas of the country by the railroad. The dam at the *Lozovy Klyuch* (Vine Spring) provides water reserves necessary for the station functioning. Consumers of the electric power are the industrial enterprises in *Partizansk* and Nakhodka, the neighbouring regions, and their population. The station was projected by the "*Teploelectroproyekt*" institute (*Leningrad*). Equipment needed for the construction came from all over the country: boilers were brought from *Barnaul*, turbines - from *Leningrad* and *Sverdlovsk*, mills - from *Kramatorsk*, and pumps - from Ukraine and *Podmoskovye*.

On December 14, 1954 the first turbo-alternator, which was the most powerful in the whole whole Far East started functioning. In 5 years the station reached its rated capacity and became one of the leading stations in the "*Dalenergo*" system.

In 1979 the station reached new stage of its development. Reconstruction and modernization of obsolete equipment began. In 1989 the second reconstruction was carried out.

In times of the economic reforms the enterprise was transformed into a joint-stock company as a part of the "*Dalenergo*" JSC together with the heating power plants #1 and #2 in Vladivostok, and the *Artyomovskaya* and *Primorskaya* hydro-electric power stations. The station faces huge economic difficulties due to the consumers non-payment. The production of electric power in 1995 reduced 1.2 times comparing with 1994. Because of the difficulties with the equipment modernization the costs of electric power are constantly rising. Coal and lignite became more expensive, its supply is very irregular.

The station burns 3,500 tons of coal for the 24-hour period. Coal is imported from *Partizansk*, *Artyom*, *Zabaykalye*, and *Neryungri* (in Yakutia). There are three turbines and six boilers for supplying the turbines with steam. The station is working in close connection with the other stations in Primorye.

There are main and auxiliary shops at the station. They are all formed into one technological chain. Below is the list of the main shops.

- Fuel and transport shop, which receives incoming coal and transports it to the boilers;
- chemical shop, which prepares water for the boilers;
- boiler shop, which burns coal and obtains steam from water;
- turbine shop, which is responsible for turbine rotation with the help of steam from the boiler shop. Here are also located the boilers for water heating, which is needed to heat the settlements and some areas of the town;



- electric shop, which amplifies the voltage in order to make transferring of electric power possible. This shop also serves all electric equipment of the station;
- shop of thermal automatic equipment and measurements, which serves all automatic systems and measuring devices of the station.

Power generation at the station is not ecologically safe. The main polluter is cinders, which is ejected into the air. In 1992 about 15,000 tons of cinder were ejected. Burning of 3,500 tons of coal a day results in approximately 1,000 tons of cinders thrown into the air. Of them about 10% pollutes atmosphere, the other 90% are captured by золоулавливатели. Another polluting substance is coal dust, which is scattered by the wind from the coal field, where 100-300 thousand tons of coal are stored. Cinders and coal dust are very dangerous for human health.

2) <http://www.uglemetan.ru/HTML/WhitePapers.htm>

## COAL INDUSTRY STATUS AND DEVELOPMENT PERSPECTIVES OF COALBED METHANE RECOVERY AND UTILIZATION IN THE RUSSIA'S FAR EAST

UNDEP/GEF Project RUS/03/G31

A major coal mining company in the Far East is presented by Primorskugol that performs a coal production in Primorsky and Habarovsk Krai. The key industrial centers are Arterm, Partizansk, Lutchegorsk, Novoshakhtinsky of Primorsky krai and Tchegdomyn of Habarovsk Krai. Previously the company was composed with 17 underground mines. But in the course of coal industry restructuring, all of them were closed, except one, which was handed over to a municipal ownership of Partizansk city. Coal mining is being accomplished on coal deposits of Partizansk coal basin, Razdolnensky and Pogorodnetsky basins; lignite is mined in Uglovsky coal basin, of Shkotovskoye, Pavlovskoye, Bikinskoye deposits, Retinovskoye and Khasanskoye in Primorsky Krai (Fig. 3) and Urgalskoye deposit of Bourensky coal basin in Habarovsk Krai (Fig. 4). Brown coal is characteristic with up to 40% ash content (average 1-3%) and 0.3-0.75% - sulfur content Bituminous coals are of long flame, gaseous, fat, lean and leaned baked ranks with high ash content, that reaches 40% and low sulfur composition (making in average 0.3%). A dominating method of brown coal mining - open cast one (76%), aimed for 27 meters combined coal seams capacity at 0-500 angle of dip. Till year 1999 bituminous coal deposits and partially brown coal ones were mined by underground method. Aforementioned deposits are specific with great tectonic anomalies. The mined out coal seams had between 0.7-5 m thickness (at some sections up to 8-10 m) with 7- 900 angle of dip. Coal mines are ranked as gassy and incorporate prone to sudden coal and gas outbursts and rock bumps coal seams (Table 2).

Partizansk deposit incorporates four geological-industrial areas: Staropartizansky (Glybokaya, Centralnaya mines; sections of Oleny, Kabany and Korkinskaya syncline; Zasinsky area (coal fields of "Nagornaya" mine and sections Goryachii and Pravoberzny-2, Kalinovsky); Tudagousky area (coal fields of Severnaya, Avangard mines with Kazankovsky, Pravoberzny Beloretchensky, Zabaikalsky sections, including valeys of rivers Tudagou and Belaya); Belopadinsky region (sections Belopadinsky, Tahobenekii, Eldogousky and Klutchevsky). Staropartizansky region was developed by mines of 660 and 820 meters deep. Coal grades named fat, lean and low baked coals. Mines extremely gassy regime was reported. Annual

atmospheric methane emissions made about 20-27 mln.m<sup>3</sup>. Average in-situ methane content amounted to 11.1 m<sup>3</sup>/t and 10.8 m<sup>3</sup>/t. Forecasted methane resources are estimated to be 2.5 billion cubic meters. In Zasinsky region one mine of a 650m depth was operating. Specific methane emissions quantified 34.4-52.4 m<sup>3</sup>/t during 1989-1992 years. Mine's ventilation system emitted 8-11 MMm<sup>3</sup> of methane into atmosphere annually. Average in-situ methane content amounted to 12.8 m<sup>3</sup>/t. Forecasted methane resources are estimated to be 1.8 bln.m<sup>3</sup>.

In Tudagousky region mining operation was carried at 250-350 meters depth. Specific methane emissions constituted 10 m<sup>3</sup>/t and annual atmospheric methane emissions made up to 8 MMm<sup>3</sup>. Average in-situ gas content varied between 2.5 and 6.9 m<sup>3</sup>/t. Forecasted methane resources are estimated at 1.5 bln.m<sup>3</sup>. Belopadinsky region is presented by exploration sections, where in-situ methane content varies between 1.1 and 11.8 m<sup>3</sup>/t at a 100-800 meters depth. Forecasted methane resources are estimated to be 1.9 bln. m<sup>3</sup>. By a present moment on a Primorsky kraj territory the worse unprofitable mines have been closed in Partizansky (Glybokaya, Severnaya, Avangard coal mines), in Razdolnensky (Lipovetskaya-4 coal mine) and in Uglovsky coal basins (Kapitalnaya, Primorskaya, Podgorodnenskaya, Ozernaya, Dalnevostochnaya, Smolyaninovskaya coal mines). Above cited coal mines featured a low labor productivity and an extremely high prime cost of coal production. The underground coal mining is accomplished at Centralnaya mine, situated in Partizansk city. Mine's allotment comprises a 10 km<sup>2</sup> area and outflow methane concentration displays 0.5%. Absolute methane emissions constitute 9-10 thousand m<sup>3</sup>/min.

3) <http://vn.vladnews.ru/Arch/2000/ISS220/text/upd28-2.html>

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### ***Shut mines emit choking gases***

**By Anatoly Medetsky**

PARTIZANSK - When Maria Grogulenko needs to fetch a bucket of potatoes or a jar of jam from her basement pantry, she dons a gas mask fitted with a long rubber pipe that snakes out above ground.

Her neighbor, Valery Shchekolda, hooks up a vacuum cleaner to a ventilation pipe coming out of his cellar and runs it for half an hour before he'll venture down for a few minutes.

And then he rushes back up.

The 59,000 residents of this town in the Far East thought the worst had happened when Partizansk's unprofitable mines started shutting down in 1996, robbing the townspeople of their work.

But then they faced a new, even more worrying problem: A mix of carbon dioxide and nitrogen seeping out of the closed mine shafts has replaced almost all the oxygen in residents' cellars, making the air there potentially lethal.

After a few gulps of air in the cellar, people have trouble breathing and break into a sweat.

Three people have been hospitalized over the past three years after being found unconscious in their cellars starved of oxygen; many more have been hauled out by neighbors, friends or family members standing by above ground.

"Of course, it's scary, very scary," Grogulenko said. "But we have to store food somewhere. We eat what we raise on the plot. What we harvest gets us through the winter."

For the 90 years that the mines worked, water was pumped out of Partizansk's swampy ground into a nearby river to keep the underground passages dry. But after the mines closed,

the water started rising and pressing a mix of carbon dioxide and nitrogen upward from the shafts.

Officials supervising the shut mines have prohibited local residents from using about 600 cellars. But most have ignored the ban.

"Descent to cellar prohibited" is scrawled in chalk on the door to Shchekolda's garage, which is over his cellar. Below the warning are the results of an air probe in his cellar: There is 6.1 percent carbon dioxide and just 1.9 percent oxygen.

Mine safety experts say that oxygen levels below 12 percent cause many people to lose consciousness, and that carbon dioxide levels above 0.5 percent are considered unhealthy. But Shchekolda still ventures down often.

"A person needs to eat," he said. "It's too expensive to build another garage and where else to keep food? You can't keep it in the house, and to buy food in stores is expensive."

Experts assume that the gases will stop gathering when the water reaches the surface.

According to the Primorye Center for Ecological Monitoring, the process may last two or three more years.

Of the 180 mines closed across Russia since 1994, 19 are in the Primorye region, where Partizansk is located. Five of them are in Partizansk.

Scientists say that even when the gases have dispersed, Partizansk could be in for more ecological damage from the closed mines.

Vladimir Okavity, deputy chief of the local branch of the Natural Resources Ministry, said that as the water from the mines rises, it could carry pollution from the mines, including phenols and nitrates, into the town's water supply.

Partizansk's water pipes are in such bad repair that mud seeped into them last year, causing an outbreak of hepatitis.

"I think that in the near future, Partizansk will be declared a national emergency zone," Okavity said.

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