Open Joint-Stock Company
Polymetal

Company Limited
«Albazino resources»

FEASIBILITY STUDY FOR

ALBAZINO-AMURSK GOLD PROJECT

VOL. 6

Project Environmental Assessment

BOOK 1

ALBAZINO ORE MINING AND PROCESSING COMPLEX

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1 GENERAL

1.1 Location of Albazino Ore Mining & Processing Enterprise

The Albazino Ore Mining & Processing Enterprise is to be designed within the territory of the Albazino deposit in the Far East Federal Region of the Russian Federation, which is located in the eastern part of the Polina Osipenko regional center of the Khabarovsk Territory in the Amgun-Somnya interfluve.

There are no inhabited localities near the Albazino deposit job site. Neither sources of electric power or power transmission lines, nor telecommunications are available there.

The nearest localities are the Kherpuchy and the Oglongy settlements that are linked to one another by an all-year motor road about 8.0 km long. Communication as far as the Kherpuchy settlement is possible by an earth road 119.7 km long. Transportation by barges and motor boats is possible along the Amgun river towards the Oglongy settlement (8 km distance from the Kherpuchy settlement). Through water-ways the region has communication with the Komsomolsk-on-Amur and the Khabarovsk river ports and the Nikolaevsk-on-Amur sea port. In spring and autumn in the periods of ice drift and freeze-up the air communication (by helicopter) only is possible.

The nearest railway station (Berezovy) is about 280 km away, in which distance an improved earth road about 140 km long is available as far as the Polina Osipenko settlement.

The Polina Osipenko region presently represents a poorly developed area of the Khabarovsk territory. The energy supply is extremely low there. There is an existing 35 kW power transmission line running up to the Briakan settlement. They are planning construction of a power transmission line to be connected to the regional center. The rest of the settlements are powered by the diesel power station.

A telecommunication line runs along the Amgun riverside. It provides communication between the Kherpuchy settlement and the regional center (the Polina Osipenko settlement). Transportation network is not well developed.

The regional center (the Polina Osipenko settlement) is linked by a 145 km hard surface motor road up to the Postyshevo railway station and the Khabarovsk territory's motor roads. The length of motor roads within the region is not very long.

There are wharfs available in the Polina Osipenko and the Oglongy settlements, and some other small localities. Waterage in summer is provided by shallow barges and tugboats as far as the Oglongy settlement, and then motor vehicles deliver cargos to a job site. There is an established water-way communication with the Komsomolsk-on-Amur and the Khabarovsk river ports and the Nikolaevsk-on-Amur sea port. In spring and autumn in the periods of ice drift and freeze-up the air communication (by helicopter) only is possible.

Supply of materials, transportation of the concentrate, and handling of cargos during construction and operation of the ore mining facilities is supposed to be by water transport. The Oglongy settlement is supposed to function as a cargo arrival/despatch terminal.

Small aviation provides communication with the center of the Khabarovsk territory, the Kherpuchy settlement, the Oktyabrsky settlement and the city of Nikolaevsk-on-Amur.

1.2 Analysis of Projected Area Current Environmental Conditions

1.2.1 Physiographic and Climatic Characteristics of the Area

The Albazino deposit area is in the domain of temperate monsoon climate with acute continental properties.

The climate features slightly cloudy, dry and cold weather in winter time, which is linked to the impact of the eastern periphery of the Siberian anticyclone, and overcast, warm, moderately rainy weather in summer time, which is linked to the cyclone formation over the Sea of Okhotsk in the 1st half of summer and the influence of the cyclones from Mongolia and Transbaikalia in the 2nd half of summer.

Nearest to the deposit is the Polina Osipenko weather station located 110 km south-westwards.

The climatic survey of the Albazino deposit is carried out on the basis of the long-term observations as are set forth in the construction regulations and rules SNiP 23-01-99 "Construction Climatology" and the guide "Climatic Parameters of the Eastern-Siberian and Far East Economic Areas". The temperature conditions are specified in the table below (Table 1-1).

Table 1-1 - Air Temperature Data at the Polina Osipenko Weather Station

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Average Monthly and Yearly Temperature, ^{0}C												
-29.3	-22.8	-12.7	-0.8	6.9	13.3	17.8	16.6	10.7	0.7	-13.8	-25.6	-3.2
Monthly and Yearly Absolute Temperature Minimum, ^{0}C												
-56	-50	-41	-30	-10	-4	-1	0	-9	-29	-45	-51	-56
Monthly and Yearly Absolute Temperature Maximum, ^{0}C												
-3	2	10	22	33	35	36	37	31	23	12	0	37

The date of the winter setting in (average date of the air daily mean temperature transition over -5 ^{0}C) is October 29th, while the date of the cessation is April 2nd. Winter in the projected area is rather long. It lasts for 156 days.

The period of below 0 ^{0}C air temperature averages 183 days, with the air mean temperature of -17.2 ^{0}C during the period.

The heating season averages 240 days (air temperature < 8 ^{0}C).

There is no permafrost phenomenon in the area. The seasonal frost penetration into soil ranges between 1.0 and 1.5 m.

According to the Polina Osipenko weather station, average annual precipitation comes to 475 mm on average. In the warm season, when the cyclonic activity becomes stronger, on average 85% of annual precipitation falls out. In the cold season average precipitation comes to 65 mm. The minimum fall (6 or 7 mm) may be observed during January – March, while the maximum (13 mm) may be observed in November. The daily precipitation maximum reaches the value of 102 mm.

The period of snow deposition at the Polina Osipenko weather station averages 170 days, with average snow depth ranging between 30 and 50 cm.

Mean annual wind velocities near the earth surface, according to the Polina Osipenko weather station, are not high and equal to 2.6 m/s. North (41%) and south (26%) winds have the highest frequency during the year. Frequency of calms during the year comes to 23%, with the highest recurrence in winter time (55%). Strong winds (velocity $\geq$ 15 m/s) at the Polina Osipenko weather station may be observed for 11 days over the entire year. Strong winds are the least likely in the period of July–September and January. In over than 94% observations of wind conditions at the Polina Osipenko weather station winds at a velocity of 7 m/s may be observed. With the likelihood of over 72%, there blow winds at a velocity of 3 m/s. During nearly half of the year there blow winds at a velocity of 0 − 1 m/s.

To carry out a comprehensive evaluation of the atmosphere's scattering ability, the air pollution potential (APP) is used. The APP represents a combination of the meteorological factors that exert influence on a potential air pollution level produced by emission sources. This factor is to show how many times an average air pollution level in a definite area, which is determined by a real combination of meteorological parameters unfavorable for the scattering of impurities, will be higher than that in a certain reference area with optimum scattering conditions. Average annual APP at the Polina Osipenko station is equal to 3.23. According to the Voyeikov's classification, this territory can be regarded as a zone with high air pollution potential, i.e. it has potentially unfavorable weather conditions with respect to the scattering of impurities, with the most unfavorable conditions observed during the cold season.

As far as the orthographical aspect, the deposit area represents a combination of highlands and taiga. The area features a billowy low-medium mountainous erosion-tectonic and fluvial (erosion-accumulative) landform. On the whole, the deposit's landform is low mountainous, highly partitioned. The maximum hypsometric point is 770 m. Relative landform partitioning is 500 – 600 m, however generally the excess of watersheds over the lowest points of adjacent valleys can not be higher than 300 m.

According to the construction regulations and rules SNiP П-7-81 "Construction in Seismic Zones" with Amendment No. 5 (1999), the area seismicity is equal to 7.

The drainage network within the deposit area is rather well developed. The stream frequency ranges within 0.7 – 1.0 km/km^2. Major water-shed arteries are the Amgun and the Somnya rivers. The Amgun is the Amur river's left tributary. It flows into the Amur 70 km upstream the city of Nikolaevsk-on-Amur. Main water artery within the deposit area is the Oshybochny stream with two low-yield tributaries – Anfisinsky and Khvoyny.

The spring tide within the projected area starts in the period of April 15 – 25 and ends in late May – early July (average duration 40 – 45 days). Floods last for 140 – 150 days (from mid June to late October). First ice formations on the rivers within the deposit area appear in late October – early November. Early November is remarkable for the autumn ice drifts. Rivers freeze in the 2nd half of November. The freezing period is 170 – 190 days. In winter time many small rivers with up to 1 – 2 thsnd. km^2 drain areas freeze down to their bottom. The flow-off in beds of such rivers stops for a long period (80 – 100 days; in the Oshybochny stream 114 days) which varies, however, from winter to winter. Debacle

of the rivers followed by the spring ice drift takes place during May 5 – 15.

As far as the drainage, the deposit area is regarded as a moderate drain zone. The average unit discharge for the Omalsky ridge is 8.46 l/s km^2, the run-off coefficient is 0.42.

As far as the water regime, the rivers of the Amgun basin are categorized as the Far East type, being remarkable for the evidently prevailing rainfall run-off, which fact can be attributable to the monsoon climate of the projected area. The main source of the rivers feeding is liquid precipitation in the warm season. The rainfall accounts for 60 – 85 % of the annual run-off, while the snowfall accounts for just 5 – 20%, and the underground feeding amounts to 10 – 20%.

The hydrochemical regime of the water bodies within the Albazino deposit area have been considered using the field researches carried out by the Field Research Group Laboratory, the Far East Region, the Russian Academy of Sciences. The research works took place in the Oshybochny Stream's basin in the summer of 2001.

The semi-mountainous nature of the river and low temperatures of its water determine the high content of dissolved O2 in the water bodies of the projected area. In the period of the summer low water the dissolved O2 level does not drop below 10 mg/dm^3. In other phases of the water regime even higher level of dissolved O2 may be observed (during the time of high water and floods it is linked to the increased turbulence of the river flow, whereas at the beginning of the winter low water it is caused by the water temperature fall).

Groundwater and surface water in the Albazino deposit area are of hydrocarbonate type and characterized by essential predominance of hydrocarbonate ions (over 90% mg-equiv.). Sulfate and chloride ions make up a small share of up to 5% mg-equiv.

Mineralization level of the Oshybochny basin springs and streams in the time of the summer low water ranges within 66 – 90 mg/dm^3, which is not endemic to surface waters of the Lower Trans-Amur Territory (the Priamurye). High mineralization level of the Albazino deposit springs and streams is determined by the high concentration of Ca, Mg and hydrocarbonate ions. Emergence of the above mentioned ions in such quantities is linked to the leaching thereof from the terrigene carbonates (dolomite, calcite, ankerite etc.)

The lowest mineralization of the Albazino deposit surface waters (up to 40 mg/dm^3) is observed during the period of the high water, which is attributed to low salt content in the snow cover in the Lower Trans-Amur Territory (the Priamurye), whereas the highest mineralization is observed during the period of the winter low water (up to 100 mg/dm^3), which is

linked to the full transition of waterways to the groundwater feeding.

The content of Na, K, chloride and sulfate ions in the Oshybochny basin springs and streams during all phases of the water regime does not exceed 5 mg/dm^3, which is essentially lower than the max. allowable concentration.

Concentration of biogenic (nitrite, nitrate and ammonia nitrogen, phosphates, general iron) and organic matters in the Albazino surface waters is small. The least amount of the said matters (right up to absence of phosphate and nitrite ions) in the surface waters may be observed during the time of the summer low water when the waterways are fed owing to relief of the groundwater. To some extent it happens also due to the consumption of the said matters by the aquatic vegetation. During floods when a great amount of organic matters come into the river network from catchments the content of biogenic and organic matters in spring water may grow (in some cases concentration of ammonia nitrogen can exceed the max. allowable value).

Chemical composition of the surface water and groundwater of the Oshybochny basin is shown in the table below (Table 1-2).

Table 1-2 – Chemical Composition of Surface Water and Groundwater, the Oshybochny Basin

Parameter	Oshyboschny Stream	Khvoyny Stream (Northern)	Well downstream Tailing Dump
O_2	11.2	11.25	-
pH	7.52	6.89	6.41
Na^+	2.7	2.75	9.0
K^+	0.5	0.3	0.8
Ca^{2+}	11.8	10.8	28.2
Mg^{2+}	4.1	4.0	16.1
NH_4^+	0.05	0.04	0.000
HCO_3^-	60.4	53.4	169.0
SO_4^{2-}	2.3	1.2	10.2
Cl^-	1.2	1.3	1.8
NO_3^-	0.13	0.17	0.000
NO_2^-	0.000	0.000	0.000
HPO_4^{2-}	0.002	0.001	0.,000
Fe_{total}	0.07	0.12	0.17
Mineralization	82.9	77.0	238.0

Heavy metal content in the surface water and groundwater of the Oshybochny basin is shown in the table below (Table1-3).

Table 1-3 – Heavy Metal Concentration in Surface Water and Groundwater, the Oshybochny Basin

Sampling Point	Concentration, mcg/l									
	Bi	**Pb**	**Zn**	**Cu**	**Ni**	**Co**	**Fe**	**Mn**	**Cr**	**V**
Khvoyny Stream (Northern)	52	8	8	-	7	8	108	3	18	8
Well downstream Tailing Dump	52	10	4	1.3	10	12	2759	-	18	10
Oshybochny Stream	95	11	4	12	8	8	179	-	20	30
Somnya River	55	10	8	3	8	8	36	-	18	7
Left Anfisinsky Spring	56	13	10	5	10	8	248	-	18	8
Zmeiny Log Spring	58	14	13	2	10	9	596	-	18	8
Anfisnsky Stream Headwater	55	12	33	4	10	9	471	22	19	8
Anfisinsky Stream upstream Open Cast	56	11	11	2	9	8	88	-	18	8
Max. Allowable Concentration	-	6	10	1	10	10	100	10	70	1

As it is seen from the table, the content of nearly all heavy metals and iron exceeds the maximum allowable concentration for water with respect to the fish industry water consumption.

As the soil forming rocks in the Oshybochny and the Anfisinsky basins area the Mesozoic sedimentary rocks serve (sandstone, siltstone) that are apt to be easy weathered. This causes development of denudation processes on the mountainsides and formation of acidic gleized and podzolic brown soil. Such soil occupies 40% of all the projected area. In the Anfisinsky Stream headwater the metamorphic ultra-acidic rocks prevail, which are saturated with silica and alkali. This causes development of illuvial and humic carry-over and formation of illuvial and humic brown soil and podzolic semi-brown soil. These soil groups occupy almost 15% of the projected area. Alluvial soil is formed in the flood-lands of the rivers and streams.

As for the geobotanical zoning, the Oshybochny basin makes part of the mountain and plain sector of the larch and fir-spruce forests of the Amur-Okhotsk province at the Yuzhnookhotsk dark coniferous subregion of the Euro-Asian coniferous-deciduous forest

territory. Two altitudinal belts are distinct in the projected area, namely, the mountainous-taiga (forest) belt which occupies the altitudinal range of 700 − 800 m above the sea level, and the subloach belt.

Forests represent the predominant type of vegetation in the Oshybochny basin area. Among the aboriginal vegetation there mainly prevail light fir associations with Kayandera larch and derivative associations (mountain oak-wood, alder-wood). Smaller areas are occupied by fir-spruce cenoses generated on well watered lands. Secondary forests as represented by white birch formations emerged at the spots of primary fires, afterwards conflagrations. The shrubby vegetation is represented by brushwood of mountain pines, ovate-leaf birches, and willows.

Presently, the forest resources in the Oshybochny basin are essentially disbalanced and have inadequate percentage of forest land. About 15 − 18% of forest lands are denuded (light forest, shrubs and wastelands are noted). Of the whole forest-covered area, 20% is the saplings (mainly, larch, white birch, and alder). The extant forests (larch forests) are characterized by low growth class and density. Dark fir species occupy about 1% of the entire forest-covered area. The loss of almost half of the resources and environmental potential is attributable to fires because the area has hardly been exploited.

The fauna can not be regarded as diverse. The inhabitants are brown bears, elks, hares, squirrels, sables, musk deer (seldom), Siberian weasels, and wild deer.

The main migration route of the waterfowl and near-water birds in the Trans-Amur Territory passes over the Amgun bottomland and the Evoron-Chukchagirskaya plain.

Ordo Anseriformes, Ordo Gruiformes, Ordo Podicipediformes, Ordo Charadriiformes, Ordo Passeriformes and others can be found within the area.

As for transit ducks, anas acuta, anas crecca and anas formosa predominate in number. As for geese, Anser albifrons and Anser prevail. During the nesting period anas falcate can be found more often. The most interesting and the Red Book's rare species are the aix galericulata and anser cugnoides.

The Amgun river and its tributaries represent the major spawning area of oncorhynchus keta and oncorhynchus gorbuscha. The Amgun and its tributaries accommodate brachymystax tumen sis, thymallus bevrirostris, hucho taimen, and esox reisherti.

1.2.2 Economic Management of the Area and Social Environment

The Polina Osipenko region was founded in 1926.

The projected area is poorly developed. It is categorized as a territory equated with the Arctic Regions' areas. The major industries are gold mining, forestry, and commercial hunting. The area's economic position is rather difficult. In 2000 its own income made up RUR 12.9 mln with expenditures in the amount of RUR 54.7 mln.

As of January 01, 2001 the population of the seventeen localities included into the six settlement administrative centers was 7.6 thousand people. The number of able-bodied people was 4,686 persons. The number of younger than able-bodied people was 1,829 persons. The number of older than able-bodied people was 1,252 persons.

In terms of commercial production the area is insufficiently developed. Major mining enterprises are the JSC (OAO) "Dalzoloto" prospectors' cooperative association; the "Kherpuchinskaya" prospectors' cooperative association; the JSC (OAO) "Cheatyn" prospectors' cooperative association; the OOO "Amgun" limited liability firm; the "Alfa" prospectors' cooperative association.

Alluvial gold reserves are extremely low here; therefore it would be reasonable to set up extraction of gold by way of the gold ore concentration.

The mineral and raw material resources available within the Polina Osipenko region can be used to contribute to the prospective economic and social development of the region itself and the entire Khabarovsk territory.

In today's conditions the charge for the use of mineral resources is the main and the most reliable source of the region's budget fill-up. By administering the use charge the regional authorities and inhabitants will obtain the opportunity to implement their economic and social development programs. That is why the expansion of the mining industry and effective use of the mineral resources are likely to become the priority guidelines in the region's development strategy.

Development of the Albazino deposit's reserves and construction of a new mining enterprise will require involvement of mainly local manpower, which offers the challenge to achieve higher economic and social status of the local population by creating new work places and employment opportunities.

The Albazino deposit lies fairly remote from the localities; therefore no negative consequences for the population will arise out of the development of the area. There are no na-

tional parks, game reserves or territories having the status of protected areas.

The development of the Albazino deposit will contribute to achievement of higher economic and social position of the local population by creating new work places and employment opportunities, obtaining an inflow of additional taxes into the local budget, developing the regional infrastructure, means of transport and communication.

2 OVERVIEW OF PROSPECTIVE ACTIVITIES

The daylighting and production schedule provides for consecutive brining of the Anfisinskaya and Olginskaya ore zones into development. Such an approach will allow intensive development of pits with steady annual production of ore to be further processed at the Crushing & Flotation Section Main Structure within 2012 − 2019.

Opencast and dump site in the Anfisinskaya ore zone includes:

- Opencast
- "Severny" (Northern) Refuse Heap No. 1
- "Yugo-Zapadny" (South-Western) Refuse Heap No. 2
- "Yugo-Vostochny" (South-Eastern) Refuse Heap No. 3
- "Maly" (Small) Refuse Heap No. 4
- Pit Water Sump No. 1
- Recrement Water Sumps Nos. 1, 2, 3
- Process Access Roads.

Opencast and dump site in the Olginskaya ore zone includes:

- Opencast
- Refuse Heap
- Pit Water Sump No 2
- Recrement Water Sump No. 4
- Process Access Roads.

The location of pits in terms of spatial arrangement is defined by location of the Anfisiniskaya and Olginskaya ore zones.

The opencast and dump sites in the Anfisiniskaya and Olginskaya ore zones as well as the Tailing dump stretch from the south-east to the north-west. In the very south there are located the Olginsky opencast and the dump adjacent to the Olginsky opencast from the west. North-westwards the Anfisinsky opencast is located with the adjacent dumps – "Yugo-Zapadny", "Maly" and "Severny". The first three ones are arranged in immediate proximity to the opencast, which is at 100 m distance. The "Severny" dump is situated 250 m away. Further, at the northern border the Tailing dump is situated.

The jobsite is located westward to the "Severny" dump, which is at 800 m distance. Between the jobsite and the "Severny" dump they have designed a storage house for fuels, oils and lubricants.

The areas of the thermal power station, mechanical and repair workshop, water intake and personnel camp stretch along the water protection zone of the Oshybochny Stream south-westwards. The personnel camp is situated 800 m away from the jobsite. The repair and mechanical workshop is situated 400 m away from the jobsite. The thermal power station is situated 150 m away from the jobsite.

The ammonium nitrate storage areas and the waste burial grounds are located 500 m eastward to the Tailing dump.

Construction of the opencast is supposed to be started with mining and capital construction operations in the Anfisinskaya ore zone. Achievement of the design capacity is scheduled for 2012. After slowdown of the ore and capping production in the Anfisinskaya ore zone in 2016 it is planned to put into commission the Olginskaya ore zone opencast.

Putting into commission of an ore-dressing facility is scheduled for the 2nd half of 2010. Production startup is supposed to be fulfilled under a section-by-section scheme at the production rate of 750,000 tn/yr (two sections). The commissioning of the 2nd section is scheduled for the 1st half of 2011. By the year end the ore-dressing facility is expected to reach the throughput capacity of 1.5 mln tons per year.

The entire complex is supposed to reach the design capacity by January, 2012.

The Albazino deposit operation cycle is supposed to be all the year round, i.e. 365 days continuously. The mining operations are supposed to be on two-shift basis, 12 hours each.

The deposit's mining conditions call for the transportation mining scheme with external piling.

The mining bulk consists of hard rocks; therefore it is envisaged to employ the drilling and blasting technique to facilitate the recovery. For drilling of straight and slant boreholes at the ore's opening as well as for drilling of line boreholes it is envisaged to use the Atlas Copco ROC L8 rigs. For drilling of straight boreholes at the ore's opening it is envisaged to use the Atlas Copco DM 45, with borehole ∅ 191 mm.

Igdanite is supposed to be used as the main explosive for the blasting of dry holes. For the blasting of wet holes regular factory-made waterproof explosives like Granulotol are envisaged to be used.

In accordance with the mining scheme it is supposed to exploit the Komatsu PC-2000 hydraulic excavators (bucket capacity 11 m^3). For production operations it is supposed to

exploit the Komatsu PC-1250 hydraulic excavators (bucket capacity 6 m^3) with further bulk loading into the Komatsu trucks with load-carrying capacity of 91 tons.

For ragging of lumps it is supposed to use the Atlas Copco MB1000 rubble crusher as based on the Komatsu PC-270 excavator (the backhoe).

For the cleaning up of jobsites, access ways and opencast internal roads and for any other cleanup works it is supposed to exploit the D275A dozers and WD600 truck.

From the Anfisinsky pit the balance mining rocks are transported along a process access road about 4 km long to the balancing tank located on the jobsite, further they are supplied to the ore pretreatment complex. Then the rocks are transported to the Refuse Heap No. 1 located northwards to the opencast. The transportation distance is 400 m to the Refuse Heap. From the upper levels of the pit's southern part the rocks are transported to the Northern small Refuse Heap and the Southern Refuse Heap that are located in immediate proximity to the south-eastern and south-western boundaries of the pit. The mean transportation distance across the surface is about 200 m.

In 2016 development of the Olginskaya ore zone is planned to be commenced. The extracted mining rocks will be piled in a separate dump on the western side of the pit.

The accepted mining scheme with external piling as well as the topographic peculiarities of the deposit determine the arrangement of a mountain dump for the capping. Depending on the stability properties, the waste pile is foreseen to be bulked in one tier. Taking into account the physical and mechanical properties of the mining rocks, it is envisaged to make use of the D275A type dozers. For the operations on the balancing tank area it is supposed to exploit the D155A type dozer.

For the treatment of pit water and dump water it is supposed to make use of pit water and dump water sumps. The Anfisinsky pit water is supplied to the Pit Water Sump No. 1. The Olginsky pit water is supplied to the Pit Water Sump No. 2.

Dump water is collected in the furrow underneath the dump foot, by which it goes in free flow into the Dump Water Sumps. Due to the complicated configuration of the Anfisinsky pit the three Dump Water Sumps No. 1, 2, and 3 are designed. For the collection of dump water from the Olginsky pit it is envisaged to use the Dump Water Sump No. 4.

The following buildings and structures are included into the configuration of the ore processing complex:

– Coarse Crushing Section;

– Coarse Crushed Ore Depot with Belt Haulage Galleries for each Section;

– Crushing & Flotation Section Main Structure having 3 benches, each with the 2 m difference in the floor elevation. The upper bench is designed for crushing, while the intermediate bench for flotation and filtration and the lower bench for thickening;

– Concentrate Thickening Section sized as 13X25 m, which accommodates a concentrate thickener, tanks and drainage pumps to draw off the thickeners and circulating water pumps;

– Tailing Thickener is installed outdoors;

– Circulating Water Tanks, 2 pcs, 1000 m^3 capacity each;

– Laboratory Facilities including Sample Preparation Section and Analytic Laboratory;

– Chemical Storehouse.

The concentration plant consists of two sections which represent two fully identical trains of crushing, screening and concentrating systems. Annual throughput capacity of the Albazino Ore Pretreatment Complex amounts to 1,500 thsnd. tons per year.

The commercial produce of the concentration plant is the gold-containing sulfide concentrate, the chemical composition of which complies with the requirements of the downstream pressure leaching process.

The Crushing & Flotation Section utilizes the ore dressing technology that specifies the following basic limits:

– feed ore coarse crushing range: 250+0 mm;

– two crushing stages to the size of 70-75%, i.e. 0.071+0 mm, with semi-self-crushing at stage 1 and globular crushing at stage 2;

– 1st stage of flotation concentration of the milled stock, including the basic treatment, check and cleaner flotation operations;

– 2-stage screening of Tailing produced at the flotation stage 1 in hydrocyclones with gold-containing Tailing draw-off into the Tailing storage;

– final crushing (3d stage) of the deslurrying sand fraction in hydrocyclonic closed cycle up to the size range of 75%, i.e. 0.071+0 mm;

– 2nd stage of flotation concentration, including the basic and check operations, and two cleaner flotation operations;

– thickening, filtration and drying of the flotation concentrate up to the moisture content of 3-5%, with packaging of the concentrate into soft containers for transportation for the downstream processing;

– thickening of the flotation concentration Tailing up to the density of 40-45% of the solid;

– piling of thickened Tailing in the Tailing dump of filling type by means of the reverse water supply loop. The type of the Tailing piling has been determined following the technical and economical analysis of the filling and half-dry piling methods.

The following chemicals are supposed to be used in the technological processes at the Crushing & Flotation Main Section: butyl xanthate, blue vitriol, AERO 8045, foaming agent OP F-597, flocculating agents Magnoflock 156 and Magnoflock 1697. The annual consumption amounts to 1437.5 tons.

The reverse water supply scheme is designed for the concentration plant.

It is envisaged that piling of Tailing will take place in the Tailing dump. The Tailing dump of filling type has been selected. Acc. to the engineering design, the Tailing will be hydraulically piled, and the reverse water will be fed back to the plant. The Tailing dump tank is formed by the dam that is built from the gravel and pebble stone mix and the Oshybochny Stream banks.

For performance of current repair and maintenance of the mine transport, concentrating and auxiliary equipment as well as for the receipt, storage and issue of the materials, spares and equipment as necessary for the operation and repair a maintenance and supply base is designed, which consists of the following facilities:

1. Repair & Mechanical Workshop.
2. Vehicle Inspection Platform.
3. Heated Warehouse for Equipment and Materials.
4. Container Yard.
5. Open Area for assembly and demounting of large size parts of process dump trucks, for receipt of any delivered heavy-duty equipment, and for short-term storage of equipment.
6. Container Type Oxygen Station for oxygen production in cylinders for gas-cutting operations.
7. Fire Station accommodating two fire trucks.

Petroleum fuels are stored in a special warehouse, particularly:

- diesel fuel in five vertical tanks, 1000 m^3 capacity each;
- gasoline in two horizontal tanks, 100 m^3 capacity each.

Oils in the volume of 59.6 tons are envisaged to be stored outdoors in 200 liter drums.

For fuelling of the diesel transport with diesel and gasoline there is designed a petrol point including a container type filling station.

In the ammonium nitrate and explosive agents storage area there is designed a surface active storage facility of container type including a number of buildings and structures and an ammonium nitrate storehouse with the material loading depot. Storage of the explosive agents and ammonium nitrate in the main warehouse is supposed to be in the original containers.

The personnel camp includes a dormitory accommodation for 400 people, a hotel for 30 bunks, a household service complex consisting of a laundry, a first-aid center, a mending parlor, a canteen with a bakery, and food storage facilities.

Electric power supply for the Albazino mining enterprise is designed to be provided by a stand-alone 6 kV diesel power station. The power station consists of 8 diesel units, 1600 kVA capacity each. Distribution of electricity takes place in the distribution unit (RU-6kV), which is powered by the diesel units. The RU-6kV distribution unit has lead-in, distribution and section compartments with vacuum circuit-breakers.

Electric power supply for the jobsite facilities (camp, Tailing dump, explosive agents and ammonium nitrate storehouse etc.) is designed to be provided via the 6 kV overhead transmission lines supported by wood piles, using the AC-70 and AC-95 cables.

Heat supply for the Albazino mining enterprise is supposed to be provided by an exhaust heat recovery unit and the waste heat of the diesel units' cooling system at the diesel power station. A deficient amount of the heat energy is supplied by a nearby modular automated boiler-house operated on diesel fuel.

For a number of facilities, due to their remoteness from the heat supply systems, electric power is used as a heat source. As heating appliances electric furnaces of industrial type are accepted.

3 MAIN SOURCES, TYPES AND EFFECTS OF ENVIRONMENTAL IMPACT

An inevitable consequence of any mining and processing facilities operation is disbalanced natural environmental conditions. Affected become such natural environment systems as ambient air, surface and ground water, land and mineral resources, flora and fauna, landscape, involved labor force. Development of the projected facilities will exert direct influence on the area's inhabitants in terms of social and economic aspects, partially inclusive of the employment rate.

The environmental impact effects will be as follows:

Ambient Air:

- pollution with dust and exhaust gas emissions from arranged and non-arranged sources, and as a result of wind erosion on dust-forming surfaces.

Surface and Ground Water:

- changes in the hydrographic properties of run-offs as a consequence of the surface rearrangement (it is supposed to change the Oshybochny Stream's location);

- potential changes in the hydrological and hydrochemical regimes of surface water as a consequence of discharge of contaminants together with effluents. The sources of contamination are the dump water and pit water as well as household, production, rainfall and melt water run-offs from the jobsites;

- changes in the hydrodynamic regime and level of groundwater as a consequence of extraction thereof for the household and production purposes, the same with drain water and pit water.

Land Resources and Vegetation:

- withdrawal of acres from the forestry for the purpose of arrangement of the Albazino mining enterprise's production and auxiliary facilities, which will result in irreversible effects with respect to the land resources, such as deformation of the surface as well as changes in heat and moisture exchange and reduction of fertile acres;

- imbalance in the earth structure or total destruction of soil cover and vegetation as a result of construction of the Albazino facilities;

- degradation of the soil quality and pollution of the vegetation due to emissions, wind erosion and ablation;

Fauna:

- decrease in number of all species of game birds and mammals, some species of fishes;
- some of not numerous and rare species can vanish away from the deposit area;
- increase in population of the synanthropic species and immigration of new ones (such as house mice, common rats, tree sparrows, blue rock pigeons).

Moreover, the environment is affected by the following sources of disturbance:

- noise and vibration generated by the transport and production equipment and blasting operations;
- heat generated due to discharge of hot water and use of ventilation systems and utilities;
- electromagnetic radiation produced by the diesel power stations and high voltage power grids.

Construction of new mining facilities, development of pits and piling bays produces changes in the natural structure of the massif, deforestation, deformation of the surface, change in groundwater level, water relationships in the earth and soils. Any changes on the whole bring about alterations of the landform and, as a result, formation of a man-induced relief.

4 AIR PROTECTION MEASURES

4.1 Air Pollution Level Assessment within Location of Albazino Ore Mining & Processing Enterprise

Of all forms of natural environment degradation the atmospheric pollution is the most hazardous one. The environmental conditions in the projected area are determined mainly by the state of the ambient air.

The territory of the Albazino gold deposit is rated as a highly polluted area with potentially unfavorable weather conditions for dispersal of pollutants in the ambient air.

In the course of the geological prospecting operations the air pollution for the most part was caused by the diesel combustion products and the SiO_2 20-70% inorganic dust emissions. The ingress of pollutants on the whole was small and short-term. Operation of the prospectors' camp production facilities, the mining equipment and vehicles did not and do not have any great impact on the area's environment. The air quality in the deposit area has not been analyzed so far; however, it is most likely that background concentrations of contaminants can be regarded as equal to zero.

4.2 Air Pollution Effect of Albazino Ore Mining & Processing Facilities Operation. Characteristics of Emission Sources

In normal circumstances (when the enterprise's facilities are normally operated) air pollution sources are located in the following areas:

Mining Site:

Pit and dump site in the Anfisinskaya ore zone including:

- Opencast
- "Severny" (Northern) Refuse Heap No. 1
- "Yugo-Zapadny" (South-Western) Refuse Heap No. 2
- "Yugo-Vostochny" (South-Eastern) Refuse Heap No. 3
- "Maly" (Small) Refuse Heap No. 4

Pit and dump site in the Olginskaya ore zone including:

- Opencast
- Refuse Heap

Production Jobsite:

- Ore Pretreatment Section
- Crushing & Flotation Section Main Building

6.0 MW Modular Boiler House

Maintenance and Supply Base

Petroleum Fuels and Oils Storehouse

Diesel Power Station

Process Access Roads.

At each of the projected facilities the type and volume of emissions are associated with either the employed ore processing technology or the auxiliary production processes.

Mining Site

Development of the Anfisinskaya and Olginskaya ore zones will be carried out in accordance with the transport development scheme with transportation of extracted ore by dump trucks to the intermediate ore storage and external refuse heaps. Emissions produced due to the development of pits and during piling are linked to utilization of diesel equipment, blasting operations, operation of vehicles as well as rising of dust at freshly bulked dumps in warm seasons.

The main emission sources during the open mining works will be the following:

- blasting operations when such explosives as Igdanite and Granulotol are used;
- Atlas Copco DM-45 and ROC L8 rotary-percussion drilling rigs;
- Komatsu PC-1250 and PC-2000 hydraulic excavators (bucket capacity 6 m^3 and 11 m^3 respectively) for loading of extracted ore and barren rock into dump trucks;
- MB1000 rubble crusher as based on Komatsu PC-270 excavator (the backhoe);
- Komatsu D275A dozers and WD600 loader exploited for the cleaning of areas and roads, leveling of excavator faces, snow removal in winter time etc.;
- Amerind mix-pump truck for preparation of Igdanite (mixing of ammonium nitrate with diesel) and charging of wells;
- Komatsu HD785-5 dump trucks for transportation of ore in the opencasts along the process access roads.

The main emission sources during the piling will be the following:

- dumping of Komatsu HD785-5 trucks;
- Komatsu D-155A dozers when used for surface leveling;

- dust-forming freshly bulked dumps (in summer time).

Ambient air is conjectured to be polluted with inorganic dust containing 20–70% of SiO_2 and diesel combustion products such as NO2, NO, SO2, CO, soot, kerosene.

Production Jobsite

The Crushing & Flotation Section employs the flotation technology for ore dressing with further obtaining of sulfide concentrate and Tailing.

Prior to be supplied to the process sections of the Crushing & Flotation Section Main Building the feed ore undergoes ragging in the Ore Pretreatment Complex. The extracted ore from opencasts is transported by dump trucks to the feed ore storage and then by a front loader to the Ore Pretreatment Complex receiving bunker.

Air pollution with the contaminants produced by the Ore Pretreatment Complex and the Crushing & Flotation Section is linked to the operation of the process equipment and motor vehicles, dust formation in the ore handling yard and the coarse crushed ore storage.

Ore Pretreatment Complex

The main emission sources at the Ore Pretreatment Complex are:

- crushing and screening equipment (boom fixed hydraulic ragging device for ragging (crushing) of ore lumps, the CJ-613 primary, belt transporters No. 1 and 2, the 1-15-60Б feed aprons);

- ore handling yard, unloading of ore by belt transporters at the coarse crushed ore storage and further despatch thereof by feed aprons.

Besides, dust emissions take place during warm season when dust is blown off from outer surfaces of the coarse crushed ore storage.

Emissions are also associated with the transport operation within the Ore Pretreatment Complex.

Ambient air is polluted with 20–70% SiO_2 inorganic dust and diesel combustion products such as NO2, NO, SO2, CO, soot, kerosene.

Crushing & Flotation Section Main Building

The main source of hazardous substances in the Crushing & Flotation Main Building is the process equipment installed in the workshops, particularly:

- fine crushing section: semi-self-crushing mill, ball grinders, hydrocyclones, belt transporters, din;

- section of basic treatment, check and cleaner flotation: flotation machines, sumps;

- thickening area, concentrate filtration and drying section: thickener, vacuum filter, drying oven, sumps;

- chemical solution preparation section: chemical preparation tanks.

Ambient air is polluted with carbon black (soot), H2S, white zinc, copper and its derivatives, NO, sodium hydroxide, NO2, CO, potassium butyl xanthogenate, 20–70% SiO_2 inorganic dust.

Modular Boiler House

Heat energy is supplied from the modular automated boiler house operated on diesel fuel.

The ambient air is polluted with NO, NO2, SO2, CO, soot, benzpyrene.

Maintenance and Supply Base

The maintenance and supply base comprise a repair and maintenance workshop and a vehicle inspection platform. The repair and maintenance workshop is intended for current repair and maintenance of all the available transport and machinery (the general repair and maintenance shop; the maintenance shop for the fueling equipment, pneumatic and hydraulic equipment, electric equipment; accumulator shop; forging and welding shop; electric equipment testing shop; washing facility).

The sources of hazardous substances emissions are the following:

- acid accumulator charging compartment;

- accumulator soldering stand;

- welding station;

- diesel equipment adjustment and testing stand;

- kerosene washing point for fueling equipment components;

- entries and exits of gasoline- and diesel-powered motor vehicles to/from the inspection platform and open parking area.

Welding operations produce various air contaminants such as ferric oxide, manganese and its derivatives, NO2, CO, gaseous fluorides, low soluble fluorides, 20–70% SiO_2 inorganic dust.

The acid accumulator charging compartment gives off sulfuric acid fumes. The kerosene washing point for fueling equipment components and the diesel equipment adjustment and testing stand give forth kerosene fumes.

During entries/exits of motor vehicles to/from the maintenance and supply base area

the following combustion products escape into atmosphere: NO, NO2, SO2, CO, kerosene, soot.

Fuels, Oils & Lubricants Storehouse

The fuels, oils & lubricants storehouse is intended to supply petroleum fuels and oils to the diesel power station and boiler houses and for fuelling of the process and auxiliary transport with diesel and oils.

The pollution sources here are the following:

- five aboveground vertical diesel storage tanks (unheated), 1000 m^3 capacity each, and two horizontal A-76 & AI-92 gasoline storage tanks of 100 m^3 capacity each, and the container petrol station's fuel-filling columns.

The storage tanks pollute air with the following products: H2S, paraffins C1-C5, paraffins C6-C10, amylene, xylene, toluene, ethylbenzene, paraffins C12-C19. The container petrol station's fuel-filling columns pollute air with H2S and C12-C19.

During entries/exits of the fuel-servicing truck to/from the storage area the following combustion products escape into atmosphere: NO, NO2, SO2, CO, kerosene, soot.

Diesel Power Station

Electric power supply of the Albazino Enterprise is provided by the stand-alone 6 kV diesel power station, which consists of 8 diesel units, 1600 kVA each.

The diesel power station pollutes air with the following products: NO, NO2, SO2, SO2, CO, soot, benzpyrene, formaldehyde, kerosene.

Process Access Roads

The main process hauling equipment used for transportation of extracted ore and capping is the Komatsu HD785-5 trucks operated on diesel. The process access roads for dump trucks are designed at the following point: opencast – dump – ore intermediate storage.

Traffic causes pollution of ambient air with various combustion products such as NO, NO2, CO, SO2, soot, kerosene.

Later on, in the course of construction engineering of the Albazino enterprise they will define parameters of pollution sources, gross emission volumes and values of surface concentration and pollutants at the border of the standard sanitary and protection zone (SPZ).

No quantitative calculations of the composition, volumes and concentration of emissions have been carried out so far. Such calculations should be done at the next stages of

design engineering.

In accordance with the requirements of the sanitary rules and standards SanPiN 2.2.1/2.1.1.1200-03, a sanitary and protection zone will be arranged around the enterprise premises.

The projected enterprise is rated as SPZ Class 1: mining and processing enterprises. The sanitary and protection zone area is designed to occupy 1000 m. There are no inhabited localities within the sanitary and protection zone.

4.3 Emission Minimization Measures during Operation of Albazino Ore Mining & Processing Facilities

With the view of reduction of air pollution during operation of the Albazino enterprise the following arrangements are foreseen:

- in the production workshops where the pollutant accumulation phenomenon takes place it is envisaged to install dust trapping and gas cleaning facilities (cyclones, bag collectors) for purification of emissions;

- for suppression of dust in summer time it is envisaged to do moisturizing (watering) of ore handling yards, the earth access roads, and the freshly bulked area of dumps;

- keeping the process equipment and the storage tanks at the fuels, oils and lubricants storehouse in operable and leakproof state;

- adjustment of the required excess pressure and upkeep of breathers of the storage tanks at the fuels, oils and lubricants storehouse;

- observance of the tightness requirements for discharge and measuring devices, inspection manholes and drain wells;

- use of the fuels complying with the state standards;

- adjustment of engines of mechanisms and machines in order to maintain optimum carburetion conditions for full combustion of fuel;

- scheduling of regular monitoring of ambient air quality;

- arrangement of the sanitary and protection zone acc. to SanPiN 2.2.1/2.1.1.1200-03.

4.4 Noise and Vibration Protection Measures

Noise level within the enterprise' premises varies subject to the intensity of the works. The main noise sources initiated by the operation of the Albazino enterprise are the

following:

– process equipment on the mining site, in particular, drilling rigs, loaders, excavators, dozers;

– blasting operations;

– special purpose machinery, process equipment, fans of the ventilation systems in the production buildings on the production jobsite and the maintenance and supply base;

– motor vehicles on the process access roads.

According to the mining equipment specification the allowable sound level for mining and bulldozing machinery (tractors) is within a wide range, which is subject to the type of manufacturer, operation life and whether acoustic absorbers are used. The max. sound level, however, should not exceed 85 dBA.

The noise effect factor emerges as a result of the general man's impact from operation of the pits, dumps and production jobsite facilities.

When arranging a work place it is appropriate to take any necessary measures for reduction of the noise, which affects a man, to the values not exceeding the allowable level. This should be accomplished using technical means of noise control (employment of technological processes which do not cause overriding of the allowable sound level etc.) and relevant organizational arrangements (efficient scheduling of work and rest time, reduction of duration of stay in noisy conditions, medical and preventive measures etc.)

To provide allowable noise level conditions and to reduce vibration on the production jobsite and other work places the following arrangements are envisaged:

- acoustic insulation of noise generating parts of the equipment;

- installation of fans on isolation pads and rubber gaskets; equipping of ventilation systems with tubular muffler;

- smooth operating conditions;

- provision of personal protection equipment.

5 WATER AND AQUATIC BIOLOGICAL RESOURCES CONSERVATION AND PROTECTION

5.1 Water Supply and Disposal

Household water requirement is covered by the use of the Oshybochny Stream left tributary groundwater through the system of three water intake wells and a pump station of household water supply with water reservoirs. Water consumption for household and production needs amounts to 176.54 m^3 per day and 61.2 thsnd. m^3 per year, inclusive of hot water in the amount of 69.32 m^3 per day and 25.05 thsnd. m^3 per year.

Process water consumption is covered by the use of the Oshybochny Stream left tributary groundwater (6 wells) and the Ryabinovy Stream (1 well) through the system of water intake wells and a pump station for household and fire water supply with two water reservoirs V=700 m^3 each and the return water from the Tailing dump.

Process water requirement amounts to 695.24 m^3 per day and 228.46 thsnd. m^3 per year.

Fire water requirement for the production jobsite amounts to 55 litre/day, or 594 m^3 per day based on 3 hours fire extinguishing.

Fire extinguishing within the fuels, oils and lubricants storage area is supposed to be done by mobile fire extinguishing plants with the use of water from the two fire water reservoirs V=700 m^3 each.

Fire extinguishing within the explosive agents storage area is supposed to be done by mobile fire extinguishing plants with the use of water from the two fire water reservoirs V=700 m^3 each.

Disposal of waste water is supposed to be carried out under a split sewerage scheme:

- household sewerage with effluent treatment systems;
- rainwater sewerage with effluent treatment systems;
- process water sewerage connected to process systems.

5.2 Assessment of Impact on Water Systems during Albazino Ore Mining & Processing Facilities Operation

Development of the deposit reserves, construction and operation of concentrating and

other production facilities will have a certain impact on the hydrological regime of the surface water, the hydrodynamic regime of the groundwater, as a result of changed geological processes. The water quality within the construction area will be influenced as well.

The environmental impact effects will be determined by a number of factors such as:

– changes in the surface run-off due to the surface rearrangement as a result of construction, opencasting, piling, destruction of soil cover and vegetation;

– withdrawal of the groundwater for production and household water supply purposes;

– ingress of contaminants with the dump water and pit water as well as rainfall, melt water and surface run-offs from the jobsites, formation and operation of artificial water bodies, i.e. Tailing dumps.

The operation of the Albazino enterprise will entail such effluents as:

– household waste water

– production waste water

– pit water and dump water

– rainfall and melt water from the jobsite, from the fuels, oils and lubricants storehouse, and from the camp.

Disposal of waste water is supposed to be carried out under a split sewerage scheme:

– household sewerage with effluent treatment systems;

– rainwater sewerage with effluent treatment systems;

– process water sewerage connected to process systems.

The production waste water is not supposed to be discharged into the natural water bodies because the crushing & flotation section has a circulating water supply system.

In accordance with the engineering design the Tailing dump of filling type is foreseen, with hydraulic piling of Tailing and return of circulating water back to the technological process.

For the environment protection against seepage water pollution catchment of contaminated water is envisaged beneath the dam of the Tailing dump. To this effect they designed the drainage system consisting of pipe drainage, a pump station and a drain water culvert.

The seepage water velocity is quite low (about 20 cm per stream day). Consequently, the seepage water flow is laminar one, i.e. the flow layers do not get intermixed, and the

water from the Tailing dump's pool will be filtered in the upper layer only. The drain collector will be capable of 100% catchment of contaminated seepage water.

Household waste water from the production jobsites and the camp are supposed to be supplied by the internal sewerage pipe-lines to the container type sewage purification facilities of 160 m^3 per day capacity.

The sewerage flowrate is 145.64 m^3 per day; 53.2 thsnd. m^3 per year. A purified and disinfected stream from the container type sewage purification system returns to the process and fire water reservoirs.

The sludge from the container type sewage purification system is transported by special trucks to the solid waste burial ground.

Rainfall and melt water from the production jobsites are supposed to be drawn-off by the rainwater sewage system to the following local treatment facilities:

- rainwater treatment facilities in the fuels, oils and lubricants storage area;
- local treatment facilities from the repair workshop area, fire-station and heat and power station.

The treatment facilities configuration includes storage tanks and a two-stage treatment plant.

The amount of rainfall and snow water is estimated at 6.33 thsnd. m^3 per year and 34.62 thsnd. m^3 per year.

Pit water is generated by a groundwater inflow and precipitation. In the Anfisinskaya and Olginskaya ore zones a pit water pumping unit is envisaged. The pit water pumping unit's running cycle is 365 days a year, 2 shifts per day, 12 hours per shift.

Estimated designed inflows by the end of the development works are specified in the table below (Table 5-1).

Table 5-1 – Estimated Pit Water Inflows

Inflow	Anfisinskaya Ore Zone	Olginskaya Ore Zone
Annual Average Volume, m^3/hr	65	25
Max. rainfall volume, m^3/hr	706	159

The pit water can contain suspended matters and petroleum products. The max. amount of suspended matters can be 150 mg/litre. The max. amount of petroleum products can be 1.5 mg/litre.

The pit water goes to the sumps where it settles and forms the biggest fractions of suspended matters. For removal of small fractions and petroleum products the pit water is infiltrated through the filter dam.

The pit water from the Anfisinskaya ore zone is fed into the Pit Water Sump No. 1. The pit water from the Olginskaya ore zone is fed into the Pit Water Sump No. 2.

Dump water corresponds to pit water by the volume of suspended matters and petroleum products.

Dump water is collected in a ditch arranged beneath the dump foot. The collected dump water goes by gravity flow into the Dump Water Sumps. The design of the sumps and the treatment technology is similar to those of the pit water.

Due to complicated configuration of the Anfisinsky pit's dump, it is not feasible to collect the dump water into one sump. Therefore, for collection of the Anfisinsky dump water three sumps are foreseen, in particular, Dump Water Sumps No. 1, 2, 3. For collection of the Olginsky dump water the Dump Water Sump No. 4 is envisaged.

Contaminants content in the pit water and dump water after treatment amounts to: suspended matters: 10 mg/l; petroleum products: 0.05 mg/l. The filter dams provide treatment of the pit water and dump water so that the amount of suspended matters is lower than the background level; and the amount of petroleum products is up to the max. allowable concentration in the water bodies of fish industry.

5.3 Surface Water and Groundwater Protection Measures during Albazino Ore Mining & Processing Facilities Operation

With the view of surface water and groundwater protection during the operation of the Albazino enterprise the following arrangements are envisaged:

- initiation of technically appropriate consumption rates;
- utilization of circulating water supply system at the ore dressing facilities;
- creation and maintenance of the sanitary and protection zone around the household water supply source;
- arrangement of the enterprise's production facilities outside the water protection zones of water bodies;
- treatment of household waste waters coming from the production jobsites and the camp;

- treatment of rainfall and snow water coming from the fuels, oils and lubricants storage area by means of the container type sewage and purification facilities;

- treatment of the pit water and dump water up to the specified requirements prior to discharge thereof into natural waterways;

- fuelling the mining hauling equipment at special points or with the use of trays;

- arrangement of observation wells beneath the household and industrial waste stockpiling grounds;

- scheduled regular monitoring of the quality of wastes and natural waters at the potential pollution points.

6 LAND RESOURCES AND SOIL COVER CONSERVATION AND PROTECTION

Fundamental changes in the state of the land resources in the course of the deposit development will become apparent as deformation of the earth surface, formation of man-caused landform, decrease in the area of production lands, disturbance of the soil cover, deterioration of the soil quality, and change in the aeration zone water balance.

Failure of the soil structure and natural landform consequently precipitates erosion phenomena in the territories adjacent to the mining site thereby causing pollution with hazardous substances, and other negative effects.

Degradation of the natural environmental systems can last for a long time when contaminants penetrate into atmosphere in small quantities and gradually accumulate in the ground and soil. Apart from the pollution, the contaminants induce changes in the physical-chemical and physical-mechanical properties of the soil and rocks.

Disturbance of the soils that will be brought about by the construction and operation of the basic and auxiliary facilities of the Albazino ore mining & processing enterprise in addition to that induced by the exploration and prospecting works can be categorized as direct and indirect disturbance.

Subsequent to the direct local disturbance in the areas where the deposit's ore bodies are localized and the basic and auxiliary facilities are located the following effects will take place:

– change in the surface topography and the visual characteristics of the deposit's landform and geological structure;

– disturbance or complete destruction of the vegetation and soil cover.

Progress of the indirect disturbance is determined by the natural and man-caused factors interaction and characterized for the most part by such processes as water-wind erosion, leaching of chemical substances from man-caused formations, spatial movement of the components in the solid, soluble and gaseous state with further accumulation thereof by natural environment components. The sources of the indirect man-caused disturbance and respective disturbance of the natural environment can be the points of direct disturbance which did not undergo conservation and reclamation after completion of a specified work stage.

Albazino enterprise's land resource requirement is to be defined on the basis of disposition of the basic and auxiliary buildings and structures. The size of the required plots is specified in the table below (Table 6-1).

Table 6-1 – Albazino Enterprise's Land Resource Requirement for Disposition of Buildings and Structures within Albazino Deposit

Plot Designation acc. to Plot Plan	Size, hectare
Anfisinskaya Ore Zone Opencast and Dump Area	330
Olginskaya Ore Zone Opencast and Dump Area	40
Production Jobsite	12
Tailing Dump	120
Heat & Power Station Area	2
Maintenance & Supply Base including:	19
- Fuels, Oils & Lubricants Storage Area	5
- Repair Workshop Area	6
- Explosive Agents Active Storage Area	4
- Ammonium Nitrate Active Storage Area	4
Camp Area	7
Water Intake Facilities Area including:	4.5
- Household Water Intake Facility Area	4
- Utility Water Intake Facility Area	0.5
Environmental Protection Complex	0.5
Industrial Solid Wastes and Household Waste Burial Ground	1
Utility Service Lines and Transportation Network	40
TOTAL	576

The negative effect on the land resources in the opencast and dump areas becomes apparent through:

– almost total destruction of soil cover and vegetation throughout the jobsite area, and withdrawal of mineral resources;

– dust pollution of the adjacent area due to blasting operations, drilling equipment operation, excavation and loading operations, and extracted ore transportation;

– potential soil pollution with the contaminants coming with the pit water and dump water.

The construction of the Albazino mining enterprise's production jobsite, the Tailing dump, the maintenance & supply base, and the camp will bring about destruction of vegetation, and surface rearrangement as caused by leveling. Near the mining facilities the soils

will be affected in different ways subject to the emission sources, the most significant of which is the pollution with substances penetrating together with the gaseous emissions that result from the operation of the enterprise's process equipment, maintenance & supply base facilities, boiler houses, diesel power station, and traffic on the inside roads. The pollution becomes also possible due to the ingress of contaminants with the run-offs from the production jobsites and with the Tailing dump drain water.

For protection of the land resources during the operation of the mining facilities it would be recommended to provide for the following arrangements:

- paving of most of the motor ways as well as sites and passages;
- fuelling of the mining equipment at special filling points with the use of trays;
- optimum conservation of the soil cover and vegetation in the construction areas where those were previously destructed due to the exploration and prospecting activities;
- scheduled regular monitoring of the quality of soils.

All the land-lots after the completion of the deposit development should be reclamated and handed over to the land user in such condition as appropriate for further efficient utilization thereof and causing no ultra-negative effect on the environment.

Taking into account the disadvantageous status of the projected area from the point of view of the farming, forestry and recreation aspects of the reclamation activities as well as economic inefficiency of the destructed land-lots it is reasonable to accept the sanitary and hygienic orientation of the reclamation activities.

In the areas where the superposition of fertile soil layer is impossible due to the soil deficit the land-lots are left for natural rehabilitation (self-overgrowing).

Reclamation of Pit Land.

Rehabilitation of the disturbed soil in the uplands of the pits is supposed to be realized through the natural overgrowing. The upland area is equal to 230 thsnd. m^2. The reclamation of the uplands is envisaged to be accomplished as the pit walls reach their final position.

Reclamation of Dump Land.

In accordance with the recommendations of GOST 17.5.3.04-83, the dump is arranged on unsuitable land with compliance with the sanitary regulations and due consideration of the landform and prevailing wind directions as well as water protection zones of the rivers and streams.

The sides of the benches will be formed under angles not exceeding the natural side angle and providing stability of the dump. When the dump is closed a protection bank is foreseen (availability of the protection bank is a mandatory requirement acc. to the regulations).

Rough and final leveling of the dump surface is performed in the course of operation and upon reaching design boundaries. The leveled dump surface is left for natural overgrowing.

In accordance with the requirements of GOST 17.5.3.04-83, no additional arrangements (such as flattening of terraces, terracing of slopes etc.) is not required.

Reclamation of Tailing Dump Land.

At the 1st stage of the tailing dump conservation it is envisaged to remove the settling pond from the dump's area. The settling pond water during high water is discharged into the pretrenched ditch in the Oshybochny Stream. While being discharged, the settling pond water is diluted with the Oshybochny's clean water.

Concurrently with the tailing dump water discharge the crushed ore piping, water piping and pumping equipment are dismantled.

As soon as the tailing dump water is discharged and the groundwater level in the tailing massif is down a number of measures are taken with the view of elimination of surface erosion, prevention of dust pollution of the tailings and assurance of their integrity.

To this effect the surface of piled and dried tailings throughout the entire tailing dump area is covered with gruss and cobble mix, 0.6 m layer thickness, the quality of fill is 480,000 m^3.

Across the tailing dump land it is supposed to trench a drainage ditch to provide draw-off of the rainfall from the tailing dump area into the hillside ditch, then to the Oshybochny Stream.

The tailing dump land is leveled with slopes towards the drainage ditch. The leveled surface is covered with a 0.2 m layer of fertile soil or conditionally fertile soil. The required quality of fill of the fertile or conditionally fertile soil is 160,000 m^3.

It is supposed that the leveled area will be steadily overgrown with trees and bushes. The channel-offtake, the drainage and hillside ditches continue functioning. There will be no necessity in them as soon as the tailing dump land is overgrown.

7 FLORA AND FAUNA PROTECTION MEASURES

The projected Albazino mining & processing enterprise area lies on the Goslesfond's lands. The area's woodland is for the most part occupied by young forest and coniferous trees, the major species are larch and mountain pine.

Damage to the plant associations will mainly be associated with the destruction of the silva as well as mechanical violation and degradation of the vegetation within the allotted land.

The impact on the natural plant associations during the operation of the Albazino mining and processing facilities will be linked to the violations in the course of construction of the basic and auxiliary facilities and partially to the size of the allotted land.

Outside the allotted land negative effect on the vegetation can be caused only by the air pollution with hazardous substances produced by the Albazino production facilities.

Larch is regarded as a gas-resistant plant. Cedar is not capable of gas resistance due to long life of its needles and gas absorption. After a partial loss of its needles cedar suffers lack of assimilates and can die from carbonic acid starvation.

During the vegetation period the gas resistance capability of plants varies. Plants are most sensitive to NOs at the beginning of the vegetation period, rather than in the middle and at the end. As leaves age, their sensitivity to gases weakens, which is linked to increase of the lethal level of toxicants in their tissues. Such gas resistance increase dynamics resides in wood species regardless of the degree of their relative resistance to polluted air.

Where roads run in larch forests difficult-to-pass hollows can appear.

Negative effects on the vegetation can also be brought about by unreasonable behavior of the personnel, in particular, unauthorized garbage dumping, increase of fire hazard, mechanical damages to the silva.

Thus it may be concluded that if relevant fire safety rules and production regulations are duly observed the impact of the flora within the deposit area will not have irreversible and irretrievable consequences and will be limited to the size of the allotted land.

During the deposit development the magnitude of population and the species composition of the terrestrial and aquatic fauna are likely to change for the following reasons:

- alienation of lands for construction of the mining and processing facilities;
- emergence of animal anxiety factor due to the noise generated by running machines and mechanisms and blasting operations;

- higher accessibility of lands due to construction of roads and presence of human habitation (the camp).

Some changes can occur primarily with respect to the magnitude of population on account of animals' migration to the nearby lands.

Changes will be as follows:

– decrease in numbers of game birds and mammals (elks, hares, hazel grouse etc.) and most of fish species (salmonids);
– some of not numerous and rare species can vanish away from the deposit area. Such species are represented primarily by mammals, in particular, musk deer, Siberian deer, otter; by birds, in particular, Siberian grouse and capercaillie (wood grouse); by fishes, in particular, grayling which is fastidious about water quality;
– increase in population of the synanthropic species and possible immigration of new ones (some species of rodents, insectivores, tree sparrows, blue rock pigeons).

However, taking into account the exploration and prospecting works in the deposit area the above mentioned changes have already taken place.

With a view to mitigate the negative effect on animals during the construction and operation of the Albazino facilities it is recommended to take the following steps:

- control and prevention of any poaching attempts on the part the enterprise's personnel inside and outside the Albazino enterprise premises;

- dumping of production wastes on special disposal sites or in containers, which can help prevent loss of animals and eliminate possibility of animals' attraction to the wastes disposal site.

Impact on the plants and animals regarded as rare species, or endangered, or having need for protection will not occur because such species are not available in the projected area.

8 WASTES COLLECTION, UTILIZATION, NEUTRALIZATION, TRANSPORTATION AND DISPOSAL

8.1 Types of Wastes Due to Operation of the Projected Facilities

One of the aspects of the man-caused environmental impact brought about by the mining & processing facilities operation in the Albazino deposit will be production and consumption wastes.

Wastes are categorized as follows:

Production Wastes: gas scrubbing dirt, outspent lead accumulators with removed electrolyte; mineral sludge, waste motor oils; waste industrial oils; scum, metal removal chips and dust; rubber with lost consumer properties; ore minerals mining wastes etc.

Consumption Wastes: food wastes in bulk from public catering; bulk garbage from offices; wastes (sludge) from catch pits, household effluents; wastes (sludge) after chemical sewage treatment etc.

Large amount of wastes will be produced during the ore mining (capping) and concentrating (tailings):

"Ore Minerals Mining Wastes (Capping)": 3450000000000

"Ore Minerals Mining Wastes (Tailings)": 3450000000000.

Over the entire operation period the following volumes of rocks will be despatched from pits to dumps (Table 8-1).

Table 8-1 – Despatch of Mined Rocks from Pits to Dumps

Designation	Severny Dump	Severny Dump (Small)	Yugo-Zapadny Dump	Yugo-Vostochny Dump	Olginsky Dump
Volume, mln. m^3	49.80	0.32	1.20	0.60	3.36

The amount of tailings piled in the tailing dump comes to 1350 thsnd. tn/yr (or 964 thsnd. m^3/yr).

In accordance with the Federal Wastes Classifier (FWC), any wastes fall within five environmental hazard classes.

Similarly to the activities of Polymetal's existing enterprises and other companies in the same industry, it can be definitely stated that class 1 hazard will apply to the only waste type which is rejected and used-up Hg-lamps, and fluorescent Hg containing tubes.

List of wastes generated in the course of the Albazino enterprise's facilities operation, environmental hazard class, designation of technological processes which entail wastes, and final point of wastes disposal are shown in the table (Table 8-1).

Quantitative evaluation of the wastes formation will be presented later on at the next design engineering stages.

Table 8-2 – Wastes Generated from Albazino Ore Mining & Concentrating Facilities Operation

Waste Designation	Waste Code acc. to Federal Waste Classifier	Hazard Class	Production Unit Where Wastes Are Generated	Technological Process Which Entails Wastes	Waste Disposal Final Point
Ore Minerals Mining Wastes (Capping)	3450000000000	5	Mining Site	Extraction of Ore	Capping Dump
Ore Minerals Mining Wastes (Tailings)	3450000000000	5	Crushing & Flotation Section Main Building	Ore Dressing	Tailing Dump
Greasy Cleaning Rags (<15% lube oil content)	5490270101034	4	Mining Site Crushing & Flotation Section Main Building Maintenance and Supply Base	Wiping of Mining Machinery Wiping of Mining Machinery Wiping of Mining Machinery	Garbage and Production Wastes Burial Ground
Ferrous Metal Bulk Scrap	3513010001995	5	Mining Site Crushing & Flotation Section Main Building Maintenance and Supply Base	Wearout Replacement of Drill Bits Wearout Replacement of Ore Grinding Balls Wearout Replacement of Parts of Process Equipment and Vehi-cles	Enterprise licensed to take in metal scrap

Waste Designation	Waste Code acc. to Federal Waste Classifier	Hazard Class	Production Unit Where Wastes Are Generated	Technological Process Which Entails Wastes	Waste Disposal Final Point
Gas Purification Mineral Wastes (Ore Dust)	3140390001000	4	Ore Pretreatment Complex Crushing & Flotation Section Main Building	Air Cleaning in Ore Coarse Grinding Shop Ore Handling Spots	Back into Technological Process
Steel Containing Lump Scrap	3512011201995	5	Ore Pretreatment Complex Crushing & Flotation Section Main Building	Replacement of Jawbreaker Metal Parts Wearout Replacement of Ore Grinding Balls	Enterprise licensed to take in metal scrap
Non-contaminated Rubber with Lost Consumer Properties (Conveyor Belt)	5750010113005	5	Ore Pretreatment Complex Crushing & Flotation Section Main Building	Wearout Replacement of Conveyor Belt - « -	Garbage and Production Wastes Burial Grounds
Non-contaminated Rubber with Lost Consumer Properties (Ball Grinder Lining)	5750010113005	5	Crushing & Flotation Section Main Building	Replacement of Ball Grinder Lining	Garbage and Production Wastes Burial Grounds
Gas Scrubbing Sludge (Containing White Zinc)	3160600004000	2-3	Crushing & Flotation Section Main Building	Air Cleaning in Concentrate Thickening, Filtration & Drying Section	Back into Technological Process
Stubs and Tails of Steel Welding Rods	3512160101995	5	Crushing & Flotation Section Main Building Maintenance and Supply Base	Small Welding Operations	Enterprise licensed to take in metal scrap

Waste Designation	Waste Code acc. to Federal Waste Classifier	Hazard Class	Production Unit Where Wastes Are Generated	Technological Process Which Entails Wastes	Waste Disposal Final Point
Waste Industrial Oils	5410020502033	3	Crushing & Flotation Section Main Building Maintenance and Supply Base	Oil Changeout in Process Equipment and Vehicle Crankcases	Incineration in Boiler-House or Special Purpose Units
Waste Hydraulic Oils, Halogen Free	5410021302033	3	Crushing & Flotation Section Main Building Maintenance and Supply Base	Oil Changeout in Process Equipment and Vehicle Crankcases	Incineration in Boiler-House or Special Purpose Units
Waste Transmission Oils	5410020602033	3	Maintenance and Supply Base	Oil Changeout	Incineration in Boiler-House or Special Purpose Units
Wooden Containers (Disposable) Made from Natural Wood	1711050213005	5	Crushing & Flotation Section Main Building	Unpacking of Chemicals and Consumable Materials	Garbage and Production Wastes Burial Grounds or Incineration
Waste Packing Paper Clean	1871020101005	5	Crushing & Flotation Section Main Building Laboratory	Unpacking of Chemicals and Consumable Materials	Garbage and Production Wastes Burial Grounds
Plastic Containers Damaged	571029 0313995	5	Crushing & Flotation Section Main Building Laboratory Active Storage	Unpacking of Chemicals and Consumable Materials Unpacking of Explosives	Garbage and Production Wastes Burial Grounds

Waste Designation	Waste Code acc. to Federal Waste Classifier	Hazard Class	Production Unit Where Wastes Are Generated	Technological Process Which Entails Wastes	Waste Disposal Final Point
Iron Drums with Lost Consumer Properties	3513030113995	5	Crushing & Flotation Section Main Building	Unpacking of Chemicals and Consumable Materials	Enterprise licensed to take in metal scrap
Aluminum Containers & Packing Dirty with Oils & Lubricants (<15% Oils & Lubricants Content)	35350 0313034	4	Crushing & Flotation Section Main Building	Unpacking of Chemicals and Consumable Materials	Enterprise licensed to take in metal scrap
Glass Scrap Clean (Except for Electron-Ray Tubes and Fluorescent Lamps)	314008 020 995	5	Laboratory	Unpacking of Chemicals	Garbage and Production Wastes Burial Ground
Plastic Containers Clean	571018 0013005	5	Laboratory	Unpacking of Chemicals	Garbage and Production Wastes Burial Ground
Slag, Skim and Dust (Lab Slag)	3120000000000	3-4	Laboratory	Processing of Technological and Geological Samples	Back into Technological Process
Bulk Scrap Lead Containing (Incl. Lead Dust and/or Cuttings) (Magnesite Drippings)	3531021101102	2	Laboratory	Processing of Technological and Geological Samples	Back into Technological Process
Firebrick Scrap (Fireclay Pots)	3140140101995	5	Laboratory	Processing of Technological and Geological Samples	Garbage and Production Wastes Burial Ground
Lead Accumulators Outspent, with Electrolyte Removed	9211010213013	3	Maintenance and Supply Base	Repair & Maintenance of Mining Machinery and Vehicles	Enterprise licensed to take in accumulators

Waste Designation	Waste Code acc. to Federal Waste Classifier	Hazard Class	Production Unit Where Wastes Are Generated	Technological Process Which Entails Wastes	Waste Disposal Final Point
Brake Shoes Used-Up	3515050001995	5	Maintenance and Supply Base	Repair & Maintenance of Mining Machinery and Vehicles	Garbage and Production Wastes Burial Grounds
Waste Metal Cord Tires	5750020413004	4	Maintenance and Supply Base	Wearout Replacement of Tires	Improvement of Premises, Road Guarding, Sales to Third-Party Companies
Solid Wastes Containing Petroleum & Mineral Oils (Lube System Filter Elements in Motor Vehicles)	5490300000000	3-4	Maintenance and Supply Base	Oil Filters Changeout	Garbage and Production Wastes Burial Grounds
Piping and Storage Tank Oil Slime	5460150104033	3	Petroleum, Oils & Lubricants Storehouse	Tank Cleaning	Enterprise licensed for oil slime processing
Spent Carbon Filters Contaminated with Mineral Oils (<15% Oil Content)	3148020201034	4	Petroleum, Oils & Lubricants Storehouse	Filter Cells Changeout in Rainfall Treatment Systems	Garbage and Production Wastes Burial Ground
Boiler Scale	3140500001995	5	Boiler-House	During Scheduled Cleaning of Boilers	Garbage and Production Wastes Burial Ground
Household Wastes in Bulk (Except for Oversize Wastes)	9110010001104	4	Camp	Life Activities of the Staff Living in Hostels and Hotel	Garbage and Production Wastes Burial Ground
Food Wastes in Bulk from Public Catering	9120100000005	5	Camp (Canteen)	Preparing of Food	Garbage and Production Wastes Burial Ground

Waste Designation	Waste Code acc. to Federal Waste Classifier	Hazard Class	Production Unit Where Wastes Are Generated	Technological Process Which Entails Wastes	Waste Disposal Final Point
Solid Wastes (Sediments) after Mechanical & Biological Sewage Treatment	9430000000000	4	Rainfall Treatment Systems	Run-off Treatment	Garbage and Production Wastes Burial Ground
Solid Wastes (Sediments) after Chemical Sewage Treatment	9450000000000	4	Household Wastes Treatment Systems	Household Wastes Treatment	Garbage and Production Wastes Burial Ground
Bulk Garbage from Offices (Except for Oversize Garbage)	9120040001004	4	Office Building	Office Work	Garbage and Production Wastes Burial Ground
Consumption Residues in Production, Similar to Household Wastes (Debris after Cleaning of Territory)	9120000000000	5	Premises of the Ore Mining & Concentrating Enterprise	Cleaning of Territory	Garbage and Production Wastes Burial Ground
Rejected and Used-Up Hg-lamps and Fluorescent Hg Containing Tubes	3533010013011	1	Premises of the Ore Mining & Concentrating Enterprise	Replacement of Used Lamps	Enterprise licensed to deactivate Hg-lamps
Debris	9120060001000	5	Premises of the Ore Mining & Concentrating Enterprise	Construction Works	Garbage and Production Wastes Burial Ground

8.2 Description of Waste Disposal Sites

In compliance with the Federal Law on Production and Consumption Wastes, by disposal of wastes they imply storage and burial of wastes.

Waste storage (accumulation) areas at the Albazino enterprise are arranged in compliance with the sanitary and hygienic regulations which prescribe procedures for production and consumption wastes handling and fire safety requirements.

Such wastes as gas scrubbing dirt containing minerals (ore dust), gas scrubbing dirt containing minerals (white zinc), lead containing wastes (incl. dust and/or lead cuttings) in bulk, waste industrial oils, waste transmission oils are supplied back into the technological process or used as fuel for boiler houses or special purpose units. Some types of wastes are despatched on contractual terms to specialized companies for further neutralization, burial or recycling of the wastes.

Time-limits of the waste collection at the Albazino enterprise are specified in compliance with the environmental safety requirements, availability of space for temporary storage with provision of free access for loading and transportation of wastes to the designated disposal sites, and disposal schedule.

Waste disposal frequency is determined by the waste hazard classification of wastes, their physical and chemical properties, capacity of temporary storage tanks, waste collection volume limits, safety rules, explosion and fire hazards of wastes, load carrying capacity of refuse tippers.

The following waste disposal (burial) sites are located within the Albazino ore mining & processing enterprise:

- "Severny" (Northern) Refuse Heap No. 1
- "Yugo-Zapadny" (South-Western) Refuse Heap No. 2
- "Yugo-Vostochny" (South-Eastern) Refuse Heap No. 3
- "Maly" (Small) Refuse Heap No. 4
- Olginsky Pit Refuse Heap
- Tailing Dump
- Solid Household Waste Disposal Site
- Production Waste Disposal Site.

Refuse heaps are intended for piling the capping formed as a result of the mining operations.

According to the design, the capping dumps area is equal to:

- "Severny" (Northern) Refuse Heap No. 1 – 110 hectares
- "Yugo-Zapadny" (South-Western) Refuse Heap No. 2 – 8.1 hectares
- "Yugo-Vostochny" (South-Eastern) Refuse Heap No. 3 – 4.6 hectares
- "Maly" (Small) Refuse Heap No. 4 – 2.3 hectares
- Olginsky Pit Refuse Heap – 11.4 hectares.

As environment protection systems, a dike, drainage and treatment systems for rainfall and snow water are envisaged at the dumps alongside with strict control over incoming wastes, and record keeping.

For piling of the concentrating tailings the filing type tailing dump with hydraulic piling of tailings and return of circulating water back to the technological process has been designed. The tailing dump capacity is formed by a levee built from local gravel and pebble soil and the sides of the Oshybochny Stream's bottomland and is equal to 8.39 mln. m^3. The quantity of tailings discharge into the tailing dump over the operation period will come to 11,739 thsnd. tons.

The Oshybochny Stream is channeled on the right side. On the left side of the tailing dump a drain canal of a nameless stream and hillside ditch are supposed to be built.

The levee is designed to have a screen and an upstream apron made of PE film 1.5 mm thick. At the levee's bottom there is a layer of the gravel and pebble soil mix with sabulous ballast 2-3 m thick. Then go layers of gruss and cobble soil mix 3-4 m thick, and fractured sandstone. Max. height of the tailing dump's levee after the lengthenening is 26 meters.

Protection against environment pollution with seepage water is traditional in this particular case. Such a protection system has proven its effectiveness in real conditions just by catchment of water beneath the tailing dump levee.

Control of operation of the tailing dump is carried out in accordance with the Safety Instructions for Operation of Tailing Dumps, Sludge and Sludge Ponds Areas.

For environment protection the following arrangements are foreseen: installation of a screen, collection and drainage of seepage water penetrated through the tailings dump levee, and collection of rainfall at the upper part of the tailing dump, control of any incoming

wastes (concentration tailings) and record keeping.

Production and household wastes storage areas are designed in accordance with the requirements of SanPiN 2.1.7.722-98 and the Guide for Engineering, Operation and Reclamation of Grounds Intended for Solid Household Wastes", 1996.

Waste burial grounds are intended for collection and burial of garbage from residential and public buildings as well as for production wastes collection and burial.

As environment protection systems, a hillside ditch for elimination of flooding and underflooding are envisaged on the Waste disposal sites alongside with strict control over incoming wastes, and record keeping.

To carry out control beneath the waste disposal site there is an observation well is envisaged.

9 ENVIRONMENTAL IMPACT ASSESSMENT STATEMENT REGARDING THE PROJECTED ALBAZINO ORE MINING & PROCESSING FACILITIES

The main task when elaborating the plot plan, transportation network and utility service lines was efficient use of the lands with damaged natural landform, reduction of the number of pass-through waterways, and subsequently reduction of the harmful effect on the natural environment and minimization of capital expenditures. To this effect alignment of roads, which appeared during the exploration and prospecting operations, and the buildings and structures existing in the camp area have been used to the maximum.

Minimization of the harmful effect on the natural environment during the construction and operation of the ore mining facilities is achieved owing to the environmental protection arrangements as foreseen in the project, and observance of the process requirements and continuous monitoring of the state of environment components.

With the view of mitigation of the harmful effect the following measures are envisaged:

- a sanitary and protection zone is foreseen in accordance with SanPiN 2.2.1/2.1.1.120-03;
- placement of all production facilities outside the water protection zone, in compliance with the Water Code requirements.

Duration of the negative environmental impact will be limited to the operation period of the deposit. Upon completion of the deposit development the land will undergo reclamation. As for the spread size, the environmental impact will be limited to the sanitary and protection area of the Albazino enterprise.

Operation of the new ore mining & processing facilities will require involvement of mainly local manpower, which offers the challenge to achieve higher economic and social status of the local population by creating new work places and employment opportunities, obtaining an inflow of additional taxes into the local budget, and developing the regional infrastructure.

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