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ENVIRONMENTAL AND SOCIAL IMPACT ASSESMENT OF KOKTASZHAL PORPHYRITIC COPPER MINE DEVELOPMENT, KAZAKHSTAN

NON TECHNICAL SUMMARY

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CONTNENT

ABBREVIATIONS AND CURRENCY CONVERSION

AP	Altay Polimetali LLP
EBRD	European Bank for Reconstruction and Development
EHS	Environment Health and Safety
ER	Emergency Response
ESAP	Environmental and Social Action Plan
ILO	International Labour Organization
MPC	Maximum Permitted Concentrations
MPE	Maximum Permitted Emission (Project)
OEC	Operational Environmental Control (Plan)
OHAS	Occupational Health and Safety
PPE	Personal protective equipment
PR	Performance Requirement of the EBRD Environmental and Social Policy
SPZ	Sanitary Protection Zone
TKB	Terekty Ken Baitu LLP the processing plant owner

For financial figures an exchange rate KZT235/€ is used in this report

1 INTRODUCTION

The European Bank for Reconstruction and Development (EBRD) is considering providing finance to Altaipolimetally LLP (AP) to develop Koktaszhal porphyritic copper/silver/gold deposit located in Karaganda region of Kazakhstan. AltaiPolimetally is the holder of subsoil use contract to explore and develop the greenfield open pit mine and a processing plant with 4 million tons annual capacity.

EBRD has assigned a Category A to the project, requiring an Environmental and Social Impact Assessment. A national EIA (aka OVOS) has been prepared for this project. This Non-Technical Summary presents the key elements of the Project in order to allow all stakeholders to understand the planned investments and their impacts both on the AP operations and the surrounding area.

2 PROJECT DESCRIPTION

The process consists of the waste rock, off-balance ore and ore blasting, remaining large boulders blasting, excavating with a 21 m^3 scoop excavator, jaw crushing of rock above ∅30cm (~40%), mobile conveyor belt transportation, waste rock and off-balance ore stocking, ore intermediate cone crushing to 0-5cm, conveyor belt transportation (1.2km) and final tower crushing at the refinery plant, mixing with water, flotation, dehydration and packing of ore concentrate, tailings dehydration and stocking and transportation of gold and copper-silver concentrate by trucks along tarmac road to a railway terminal planned to be built at Burkity station 91km away. The refinery plant annual capacity is 4 million tons of the oxide ore and 3 million tons of sulfide ore.

It should be stressed that this project has been designed and developed to be compliant with good international practice, and in some instances as state of the art. For example, there will be no large dump truck of internal combustion engines used in the pit or onsite ore transportation processes. Material will be excavated using electrical excavators, and transferred to primary crushers mounted on an articulated conveyer system. This system will transfer both ore material and waste rock. Another item of advanced technology used for this project is the application of paste technology for tailings. This technology, while more expensive than conventional systems, significantly (up to 50%) reduces the use of water and provides for a chemically stable waste material. These are tremendous achievements

The mining is done on a continuous basis (24-7-365) providing long-term employment and income to the workers. Working on a continuous basis will help to reduce worker injuries and environmental contamination by avoiding starts and stoppages of machinery. All workers will be paid based on time worked as opposed to production related pay.

The majority of the mining equipment is electrical with the power provided from a 193km 220kV designated to the project line built straight from Ekibastuz GRES. The only sources of internal combustion engines within the mine are two dozers that level the pit floor, 6 trucks used to export concentrate and several standard vehicles used for personnel transport between the office and the mine site. Each concentrate hauling truck carries 20 tons in the truck and 10 tons in the trailer applying 5t road pressure per wheel pair.

Blasting will be conducted 3-4 times a month and will require 361t of explosives (or 90.25t per blast). Boreholes for blasting explosives are drilled with electrically driven rigs DML LPE 1600/110 to 16m to reduce dust clouds and rock flying distance during the blasting events. Non-explosive components sodium nitrate and diesel are mixed at the boreholes. Up to 120t of rock is exploded per blast. Combustion is claimed to be leaving no toxic residues in the ground. As 30L CO is produced by each kg of explosives, 2 707.5 m^3 of CO in the air per blast or near 130 000m^3/year.

The crushers, shifting screens and the conveyors are fully automatic with four levels of protection. The operators will be placed in isolated control cabins with climate control and provision of hygienic necessities. These operators are responsible only for monitoring the process and reporting progress, malfunctions and breakages to qualified repair teams with the appropriate safety training. This approach allows AP to introduce to the process higher proportion of the local workforce that are not highly qualified or trained.

Table 1 Ore extracted metal content

Ore Type	Copper, %/ton	Gold, g/t	Silver, g/t
Oxide	0.53	0.47	2.12
Sulfide	0.61	0.74	2.94

The intermediate crushing process (0-5cm) and the ore transfer to the plant is fully enclosed to avoid dust generation/liberation. Where complete enclosure is impossible, water sprayers will be installed to suppress dust.

Radial rail conveyor-stacker places waste rock and off-balance ore directly on the ground surface with no provision for leachate collection.. Tests performed on the ore and rock samples indicate that formation of sulfuric acid from sulfide rich rock is highly unlikely. First the rock does not contain pyrite (iron sulfide) with loosely bound sulfur. The present copper sulfide binds sulfur stronger than iron. If acid forms, its effectiveness in rock fracturing will be retarded with the absence of calcite.

The final crushing is made in a vertical tower with an internal screw and small steel cylinders. The process consumes much less power and is much quieter and safer than the traditional long array of noisy horizontal ball mills that require frequent repair and replacement of balls and shields. Simplified compact refining process allows simultaneous output of the gravitational (gold) and flotation (copper-silver) concentrates from both oxide and sulfide ore.

Table 2 Reagents (liquids) used for ore refinery

Reagent trade name	Purpose	Usage g/t ore	Hazard codes KZ/EU or US
Sodium sulphide Na_2S	CuS coating formation on $CuCO_3$ particles	300	2 / CLP ECHA: H290,H301, H314, H400, EUH031, EUH071
Butyl potassium xanthate BKK200	CuS coating/ air bubble binder	200	3/ No data
AM28	$CuCO_3$/air bubble binder	70	No data / No data
MX900	Gold/air bubble binder	20	None / HMIS: H=1, F=2, R=0
Magnofloc M336	Tailing thickener/stabiliser	25	None / HMIS: H=1, F=1, R=0
Methyl isobutyl carbinol MIBC	Air bubble stabiliser	30	NA/ CLP ECHA: H226, H319, H335

EU CLP ECHA Regulations
H290 – May be corrosive to metals
H301 - Toxic if swallowed.
H314 - Causes severe skin burns and eye damage.
H400 - Very toxic to aquatic life.
EUH031 - Contact with acids liberates toxic gas.
EUH071 - Corrosive to the respiratory tract
H226 – Flammable liquid and vapour
H319 – Causes serious eye irritation
H335 – May cause respiratory irritation

US Hazardous Materials Identification System (HMIS)
H – Health, F – Fire, R – Reactivity
4 - Life-threatening, major or permanent damage may result from single or repeated overexposures (e.g., hydrogen, cyanide).
3 - Major injury likely unless prompt action is taken and medical treatment is given.
2 - Temporary or minor injury may occur.
1 - Irritation or minor reversible injury possible.
0 - No significant risk to health.

Ore refining part of the process requires 255 640m^3 of water to start but then less than 1 800m^3 (or 0.7%) for daily replenishment. Low replenishment requirement is explained by high effectiveness of tailing paste dehydration (72-75%) which allows a high degree of water recycling and reuse of the quarry water (up to 480-1200m^3/day). Water will be supplied to the site via a 15km underground pipeline from the saline lake Saumalkol [1] that has sufficient volume and replenishment rate (2Mm^3/y) for the planned extraction. The source of this water supply, and sustainability thereof has been the subject of detailed hydrological investigations as part of and in cooperation with the EIA for the site development. While it is thought that there is sufficient water in this lake (due to the annual recharge and lack of outflows) a backup plan exists for supplementing this supply. The levels of the Saumalkol

[1] This lake should not be mixed up with Saumalkol lake 90km southwest of the mine designated as an important bird area.

Lake will be carefully monitored to ensure that site water supply has not adverse impacts on the water quality or quantities. If a drop in the water level of the lake is observed, then the lake water will be augmented with supply from the nearby Karasu River. As pointed out in the hydrological reports, the area has a large volume of meltwater every spring. This water flows rapidly downstream and ends up in the Karasor Lake. A stormwater retention berm has been installed in the Karasu river to delay and temporarily retain this flow of water, to allow some of this to be pumped to the Saumalkol Lake. The Karasu River berm is set us a backup supply for the years with exceptionally low thaw water volume (5% of time). It will be connected to the lake by a pipeline and retain thaw water from 245km^2 catchment. The 0.6Mm^3 berm backup is necessary because other forms of precipitation do not play part in the water resources replenishment.

High level of tailing dehydration is achieved by using a 1.5m high (20m total height) coned paste thickener DeepBed^{TM}. A thin gapped radial rake squeezes water from tailing at 1/3 of the tower height and Magnoflock adds to tailings cohesiveness turning it to hydrophobic viscous and stable paste It does not settle and segregate and water does not dissolve the paste or leach out toxic substances. This allows the paste stacking on the ground without a liner or drainage collection.

Tailings will be poured to the ground surface with a 7.6% slope in sectors allowing it to flow down before a new seam is poured on top. The slope is predicted to flattens to 2.6% in 0.5km from the tower but this still allows to maintain 1% paste surface slope to draw rain and thaw water off. This is required to let the paste to dry solid. Clay like desiccation polygons will appear at the surface when the paste dries and but in contrast with clay the paste does not frail into dust.

Centrifugal pumps will be used to pump paste to a larger distance via a network of PVC pipes. For the planned operation scale the paste is expected to extend 2km from the tower and cover 0.95km^2 of non-intensive pasture land and an alternative dirt road to a Ayyr village. The village main road will be laid with tarmac as a replacement for this lost road as a part of this project.

The paste proliferation will be confined with a low water permeable barrier and 3 segments of a metal mesh fence of 2.2km total length. No traditional dams that create risk of breakage are required. Top soil from the open pit will be stored to be used later for reclamation on top of the dried paste. Because stored soil usually loses its seed bank and most invertebrates, seeding with the local ground stabilizing pioneer species will be conducted to promote adequate recultivation of the tailings.

As highlighted above, design of this project incorporated the application of the mitigation hierarchy, that is avoiding and minimizing impacts as part of design as opposed to the sole reliance on mitigation. Numerous portions of the design (including avoiding use of internal combustion engines, avoiding use of large haul trucks, avoiding the use of traditional tailings etc.) included the avoidance approach, even though this resulted in significantly higher capital costs. This approach will result in a significant benefit to EHS issues on this project.

2.1 ALTERNATIVES REVIEWED

2.1.1 No Development Option (Need for the Project)

The population of the project area was once engaged at Karagayly open pit copper mine that also had a designated worker town with the population of 10 300. After the mine employment was reduced to 1600, the workers had to leave the area in search for work. With no development option the population of this sparsely inhabited area will continue to decrease leaving behind pensioners and shepherds that for one or another reason cannot leave the area for a better life.

With no tax money and social help with the project, the local infrastructure and utilities will continue to deteriorate. Unable to maintain primary schools and access to smaller villages, the district council will

abolish them and people will have to move to the nearest larger villages with no help from the council. Such immigration will increase inequity and social tension.

2.1.2 Location

Location of the mine is dictated by the location of the available ore bodies. One alternative copper deposit at the outskirts of Karaganda city was considered. This deposit had similar proved volume and ore characteristics but Koktaszhal deposit had higher potential for presence of more ore under the proved volumes. From the environmental point of view selection of a remote deposit inside of a confined watershed with no environmentally or aesthetically sensitive areas being affected was more advantageous. As to the social aspect of this selection, bringing reliable source of employment, electric power and demand for the local farms production to the economically depressed area with historically accumulated skills for mining would bring many more benefits than a mine next to a large industrial city.

Two locations for the office and worker housing estate was reviewed: at the mine and in Terekty village 10km away. Although the mine location would cut traffic and travel time and allow closer control over the operation, it was ruled out because most of the projected staff will settle with their families and children that would need to attend the kindergarten and school, fresh water would have to be brought by a pipeline from the village which population would also not benefit from the estate social amenities.

Originally the office and worker housing was planned to be integrated inside Terekty village that had been fractured into several islands as people were leaving the area in search of work. This option would have reduced the risk of the camp/village confrontation involving teenagers in the future and provided the village with the camp amenities and infrastructure. Efforts to acquire the land for the construction were obstructed by high price set by the owners of uninhabited land plots . As a result an option of a separate estate on the outskirts of the village was selected. The village however is still to benefit from the new amenities and the infrastructure improvement albeit in lesser degree.

2.1.3 Layout and Scale

Open pit development was selected over underground mining mainly on the basis of metals concentration in the ore and its superficial location. Layout and scale was commanded by the projected layout and volume of the ore as well as financial considerations. The incremental approach was selected leaving future expansion of the open pit and possible underground mining of the deeper part of the ore body as an option.

The multilevel layout of the refinery plant was preferred over the one floor layout for the technical considerations. Such layout although seen from a distance, produces smaller footprint, better ergonomics and control including the control of working environment and safety.

2.1.4 Technology

The selected technical solutions are by far environmentally and socially more beneficial than the traditionally used ones. Practical absence of large diesel driven machinery preserves air quality and reduces waste related to the trucks tires and oil and risk of oil and diesel spills. Perhaps the most significant review of alternatives on this project included review of alternatives for the tailings. Traditional tailings with high water content is by far the cheapest alternative, This technology is water intensive and also requires long term maintenance of the tailings pond. Stability of tailings ponds can pose long term risks to local communities due to potential failure. Following a thorough review of alternatives, the company selected the more expensive approach to the use of paste tailings as this technology requires significantly less quantities of water and this results in a stable waste product as opposed to mobile wet tailings.

Out of two available tailings dehydration towers, the taller (15.5m) tower was selected because water extraction efficiency (72%) was 2% higher which corresponded to almost 700m^3 savings daily.

2.1.5 Mode of operation

Continuous mode of operation has to be maintained throughout the process to avoid ore sedimentation within floating part. However, the main reason for continuous mode are the losses in output during stoppages that accounted to ~€12 000 per hour.

Operating on the electric power for large mining equipment was preferred over the traditional mode based on diesel driven equipment. This decision practically eliminated the issue of air pollution, local roads degradation and noise, dust and vibration from heavy vehicles. This includes the use of the articulated conveyor belt system that prevents the use of diesel powered haul trucks.

2.1.6 Resources Used

Another alternative considered as part fo this project was the use of a local versus international labour force. In this regard the company has selected the option of using a local force. Bringing back specialists that have been dispersed over the country and providing them with permanent accommodation and good living conditions was preferred over bringing external labour in shifts. Social depravation at the time of mine closure as a result of this decision is not envisaged. It should also be stressed that in relying on the local labour force, the company is spending large amount of money upgrading the local social infrastructure, including the provision of a local community center with swimming pool, cafeteria, gymnasium etc, available for use by the entire community.

Another alternative reviewed was the source of electricity. The 220kV power line brought directly from Ekibastuz GRES provided ample resources for the local population growth and ancillary business development. Use of the existing 35kV line (while by far the cheapest option, and arguably with less environmental impacts) would inevitably reduce power availability for the locals and therefore the social impacts were considered to be unacceptable..

3 OVERVIEW OF PROJECT REGULATORY AND OTHER REQUIREMENTS

The project and impact assessment process shall be undertaken in accordance with the EBRD Environmental and Social Policy which assures that the project complies with local regulatory requirements and international best practice.

Based on the information available and review of similar projects, this project has been assigned Category A. The following was reviewed to define the project category:

- Project area of Influence and its environmental and social sensitivity to the project impact;
- Engineering design and layout;
- Project stakeholders and the likely impact on them.

According the EBRD environmental and social policy, Category A projects are characterised by their likelihood to have significant adverse environmental and/or social effects. Therefore such projects are subject to full Environmental and Social Impact Assessment (ESIA), evaluation of alternatives, including non-implementation, and recommendation of mitigation or other measures.

The company is required to design the project in line with the international best practice and use the best available technology. Standards relevant to the project includeEBRD Environmental and Social Policy (2008) and associated Policy Performance Requirements 1-4, 6, 8 and 10 and Kazakhstan legal requirements. These requirements are summarized in the EIA Supplement. PR 5 is not directly

relevant to the project because no gaps have been identified related to prior land acquisition and no further land acquisition, involuntary resettlement and economic displacement are envisaged. PR7 is not relevant to the project location.. PR9 does not apply to the project because no financial intermediaries are involved.

The AP environmental performance is controlled by the regional department of MEWR and the regional prosecution office. However, having been included by the Ministry of Industry and New Technologies in the Kazakhstan Industrialisation Roadmap, the project benefits from the simplified permitting and grace period for compliance. Below is the description of the compliance that the project is to achieve by the start of the operation:

1. Responsibility for all compliance issues of the project lies on AP. AP shall check licenses and emission permits of contractors and suppliers before signing the contracts.
2. EIA is required to include all project stages and components, acquired land and the immediate surroundings air, flora, fauna, surface and groundwater, social settings and archaeology. Assessment of cumulative impact and impact along the supply routes is not required. Some components may be reviewed separately from the EIA if their construction schedule substantially differs from the main development timeline (e.g. HVL 220kV)
3. A positive conclusion of the State Environmental Expertise (SEE) of the Ministry of Environment and Water Resources (MEWR) on the EIA shall be obtained before operation starts. Prior EIA approvals by other regulatory authorities (e.g. SES, ES) are required.
4. After the SEE positive conclusion is obtained and before the operation starts, an Emission Permit shall be obtained. The application for the permit shall include a maximum permitted emission project and an operational environmental control plan. The Emission Permit is to include the emissions made during construction.
5. Construction permits for each project component shall be obtained from the State Technical Expertise by the detailed design contractor;

Construction must be conducted in compliance with the RoK construction standards, international agreements ratified by the Republic of Kazakhstan and other regulations some of which are given below:

- Environmental Code #212-III from 9 January, 2007
- Concept of Environmental Safety for 2004-2015
- Water Code #481-II from 9.07.2003 amended on 24.12.2012
- Land Code from #442-II 20.06.2003 with changes and additions from 08.01.2013
- Act on People's Health and Health Care System #193-IV 3 from 18.09.2009
- Act on Industrial Safety on Dangerous Industrial Facilities #314-II from 3.04. 2002
- Fire Safety Act #48-I from 22.11.1996
- Act on Technical Regulation #1232from 14.12.2007
- Act on Protection, Reproduction and Use of Wildlife #593-II from 9.07.2004
- Resolution of the Government of the Republic of Kazakhstan #245 from 12.03.2008 on the list of best available technologies.
- Sanitary epidemiological requirements for industrial buildings and facilities #93 from 17.01.2012
- Sanitary epidemiological requirements for water sources, potable water intake and supply points, places of cultural and household water use and safety of water bodies #104 from 18.01.2012

Regulations used before enforcement of the Environmental Code are applied unless they contradict the Code.

International agreements ratified by the RoK have a priority over its local laws and are applied directly unless it requires enactment of corresponding law by the Constitution (Art. 4).

Within 150km of the site there is Bayanaul National Park (83km NW) and three lakes designated by the Birdlife International as important bird areas (IBAs): Balyktykol (36km SW IBAS criteria A4i, A4iii [2]), Karasor (47km SW IBAS criteria A1; A4i and A4iii) and Saumalkol (90km SW IBAS criteria A1; A4i and A4iii). The lakes are resting points for migrating waterfowl, some of which are listed as endangered by IUCN. Saumalkol and Karasor are also included in the List of the Objects of a Particular Ecological, Scientific and Cultural Significance (the Governmental Resolution of the Republic of Kazakhstan №521 from the 21st of June, 2007) but neither the list nor any other regulation or a regulatory body defines the lake sensitivities and constraints for use. The protected Saumalkol lake bares the same name as the lake which water is used by the project. The latter Saumalkol lake, situated 12km SW of the mine, is neither protected nor identified as an IBA.

4 ENVIRONMENTAL AND SOCIAL IMPACTS AND BENEFITS

Impacts and benefits are presented in the order or diminishing significance

4.1 SOCIAL-ECONOMICS

Physical and economical displacement is not expected and community safety and security will not be impaired. Land for placement of the HVL 220kV poles have been acquired from the communities involved on the basis of commercial interest. The poles do not interfere with pasture or hay harvesting activities.

Because the mine and the housing estate construction occurs outside the village and on a built up area, disruptions to the normal life are minimal and related to an increase in traffic along otherwise empty roads. In agreement with the local educational authorities and the school master, a third of the school building (an area not required for the school) is taken for a temporary accommodation for small number of AP own workers and visitors and for a canteen that also serves free food to 60 pupils of the year 1 to 4. The other 40 older children eat at home after school.

Notable impact on the traditional pasturing way of life is not envisaged. Pastures used for the cattle are far away from the mine and will not be affected by the mine activities. The pastures and water sources in the foothills are far superior to that land around the mine site, and therefore the mine site area is not and has not been used for grazing. In expectation of the increase in demand for meat and milk products, the local herds started to grow. Some farms already doubled their stock and plan to increase it further because the area does not limit the stock numbers neither in stables nor in water or hey. It should be noted however, that the herders that chose to be employed by the project would face significant change in their mode of life that would require higher discipline and responsibility.

Influx of about 260 workers (required for site operations) 100 of which will come with families would not create social unrest because practically all the workers and families are planned to be from the nearby villages or at least from Karaganda region. The influx is positioned as a 'Big Coming Back' movement. There is some potential for there to be tension between local youths and the worker housing estate and village areas which are distinctly separated. The company made an effort to prevent this tension from forming. The worker housing estate facilities will be available to all children for free. The teenagers will attend the same clubs, celebrate holidays at the same halls and not be segregated by income or profession.

[2] http://www.birdlife.org/datazone/sitefactsheet.php?id=19960 . A1 (the site is known or thought regularly to hold significant numbers of a globally threatened species, or other species of global conservation concern); A4i (site known or thought to hold, on a regular basis, >1% of a biogeographic population of a congregatory waterbird species.); A4iii (site known or thought to hold, on a regular basis, > 20,000 waterbirds or >10,000 pairs of seabirds of one or more species).

Relatively low salaries in relation to the industry and even the local incomes during construction are promised to increase once the production starts.

The social benefits by far outweigh temporary inconveniences related to the construction phase:

- Two remote farms have been connected to the mains as the power line was brought to the water pumps at the berm and the lake;
- Power supply became cheaper and more reliable for the local community;
- Water available at one well is now distributed by AP through the village in required volume on request;
- The roads surfaces are maintained and cleaned of snow in winter by AP;
- Plans are to allow the population access to the AP doctor and the ambulance
- Planned air strip creates an option of emergency evacuation of a critically ill to Karaganda;
- With high local demand, earnings on sale of meat will grow (provided by the local farmers) because local farmers will no longer needed to drive 350km to Karaganda and to sell meet there for highly variable and typically very lowprice;
- Appearance of a fire brigade with two fire engines and ample volume of stored water would improve house safety. Fires are not uncommon because hay is stored next to the houses.
- Locals that left in the past started to come back and build houses;
- Waste that was dumped on the street is now collected in the provided by AP and regularly emptied containers. There are plans to construct a local landfill and sewage treatment facility to eliminate waste impact on groundwater.

4.2 WASTE AND SEWAGE

Waste that was dumped on the street is now collected in the provided by AP and regularly emptied containers. There Company plans to construct a landfill and sewage treatment facility to eliminate waste impact on groundwater.

Sewage will be collected into underground reinforced concrete sumps and regularly emptied by the housing estate superintendent.

4.3 LANDSCAPE AND VISUAL IMPACT

The landscape is altered by the mine, its access roads, paste and waste rock disposal, 220kV power line towers (10.5-40.8m), the water berm and the paste making tower at the top of the mine hill (20m).

Over its 195.1km length the power line runs from Ekibastus industrial area mainly along an alternative road from Ekibastuz to Temirtau with pastures on the uninhabited hills (up to 200m high) around it. The line passes at 5km distance from Madani village and Bayanaul Nature Park and at 0.3km distance from one farm house before approaching Ayyr village passing at 0.2km from the nearest house. The hills hide some towers and the distance to the viewer significantly reduce visual impact. The line does not cross areas of a known aesthetic value where tourist may be present. Ayyr village inhabited by 83 people engaged in pasturing. The visual impact is reduced by the association of the power line with the improved power supply and the road.

The mine is 4km away from Ayyr village and 10km away from Terekty village. None of its components are seen from the villages or the roads to them.

The berm on Karasu River will change the view for Opyrmaly Farm family that associate its appearance with the appearance of electric power at their home. The berm also provides reliable source of cattle water and is likely to contain fish through the period when the river dries out. The pipeline 100m protrusion over 1m high dyke into Saumalkol Lake can only be seen by two herders of Balagazy Farm over 3km distance. It is not seen by the passers-by.

4.4 WILDLIFE AND PLANTS

There are no protected areas near the site, and no endangered species known to be in the vicinity of the site. The nearest protected areas to the site are the aforementioned Lake Balyktykol (36 km southwest) Lake Karasor (47 km southwest) and Lake Saumalkol (90 km west-southwest). These are protected as they serve as resting points for migrating waterfowl, some which are listed as endangered. The range of the Near Threatened *Ovis ammon* is mapped by the IUCN as being approximately 50 km south of the site. The project will not have linear objects that can obstruct daily or seasonal migration of animals. Intensification of traffic along 115km road to the nearest rail terminal will be insignificant to increase deaths on the road. The 220kV line has sufficient length of insulators to avoid electrocution of large birds.

Impact on the Karasor and Saumalkol lakes ecology will be studied during the next spring and autumn birds migration to augment the baseline of information known about local biodiversity. Provisionally, it is predicted that elimination of the high water surge at the Karasu River head 47km upstream from the lake will produce non-critical effect on the lake ecology. The water retention berm cuts off only 3 out of 16 tributaries that feed the river on the way to the lake and overall the amount of flow through the berm is minimal relative to the overall flow into the lake.

The quarry water extraction at 20-50m3/hour rate will depress groundwater level locally. This may affect ephemeral and ephemeroid plants that rely on thaw water. Other plants are accustomed to arid conditions and have superficial root system. No trees or shrubs inhabit

4.5 SURFACE AND GROUNDWATER

The main impact on surface water is envisaged from uptake of 255 640m^3 of water to start flotation process. The Company has undergone extensive study of the surface and groundwater dynamics, physical and chemical properties to ensure that this initial intake will not generate high significance impact. The combined volume of the saline lake Saumalkol and the berm at Karasy River by this time is expected to be 2.6Mm^3. The lake replenishes in spring by thaw water and further in the year by groundwater from fractures and springs. The replenishing rate is 2Mm^3 per year. During the normal operation water will be obstructed at the rate of 1800m^3 per day (0.66Mm^3/y) to replenish water lost with the tailing paste.

Table 3 shows that the lake water contains excessive amount of naturally occurring lead which partially remains in the paste. Other chemical characteristics of the paste are within the maximum permitted for domestic water.

Table 3 Analyses of Saumalkol Lake (2009-12) and process effluent water (2012) by Kazmekhanobr (mg/L).

	Saumalkol Lake			Coper concentrate	Paste	MPC water*
	15.12.2009	7.05.2010	2012			
Pb	0.63	0,39	0,62	0,25	0,18	0,03
Zn	0.08	0,17	1,10	0,05	0,05	5
Cu	0.10	0,68	0,04	0,96	0,30	1
As	<0.001	<0,001	<0,001	<0,001	<0,001	0,05
COD	7.84	7.84	7,84	150,0	116,9	15
Hardness, mg/eq	170	166.0	178,0	188,0	186,0	7
TDS (mineralisation)	28 222	26 630	20 486	24 760	26 586	1000
pH	7.05	7.25	7,25	7,32	7,28	6-9

* maximum permitted concentration for domestic and potable water

4.6 SOIL

Soil of the project area is the brown-solonetz type with predominant cereals and wormwood vegetation. Soil has been impacted by earthwork at the mine, crushing and plant area, the Karasu River berm, the railway station, the worker housing estate and along the water pipeline and the high voltage line. Recultivation has been completed along the pipeline and HVL already. The berm is made of rocks but dust may be formed at the other areas during the long dry and windy season.

Table 4 Concentration of toxic substances in non-commercial ore, waste rock heaps (mg/kg), the lake water and lake water extract from tailing paste (mg/L).

	Non-comm. ore		Waste rock		MPC
	Oxid.	Sulphid.	Oxid.	Sulphid.	soil
S	0	760	0	80	160
Pb	50	270	200	200	32
Zn	100	160	100	100	23
As	1	1	1	1	2

Sighting of non-commercial ore and waste rock is unlikely to generate dust as most of it will be in ∅3-30cm hard rocks. However, if sulphuric acid forms on the rock surface, it is likely to increase the rock disintegration and dust and toxic leachate formation. Table 4 compares the concentration of toxic substances to the maximum permitted concentration in soil showing concentrations above the MPC in red.

4.7 AIR QUALITY, NOISE, ELECTROMAGNETIC AND IONISING RADIATION

The air quality will be insignificantly impacted with blasting dust and few vehicles and heavy equipment involved in the pit bottom levelling, staff, consumables and the concentrate transport along the 10km access road and 91km road from the nearest railway terminal Burkity. The rest of the equipment and machinery will be electrical.

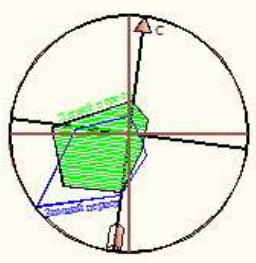

Figure 1 Wind rose from Kargalinsk weather station 92km SW of the mine showing prevailance of SW winds in winter (blue line) and W, SW and S winds in summer (green area).

Intensification of traffic along the road to the nearest rail terminal will not lead to the significant increase in noise pollution. The noise level at the SPZ boundary fully complies with the ecological and sanitary standards determined by the Kazakhstan legislations. No additional arrangements for the protection from the noise pollution are required.

The electric supply of the mine and the plant is provided by the 220kV power line directly from Ekibastuz GRES. The line is a source of electromagnetic and ionizing radiation, so the protection zones (5 meters on both sides of the line) are determined in compliance with the regulating documents to avoid the possible harmful effects on human health. No other significant electromagnetic and ionizing radiation sources are located on the site.

4.8 CULTURAL HERITAGE

Nine burial grounds are located near the mine site and the Karasu river. One of them is the modern (dates back to the 20th century) burial Karamola. is located close to the place of the designed berm near the Karasu River. It is not expected to be flooded if the berm to hold 0.6Mm^3.

A cemetery located near the Azimbek winter camp, 5 km to the north from the Terekty village is around 220 m long and from 20 to 50m wide and is enclosed by the fence. According to the information given by the native local population, the warriors fallen in the Kazakh-Dzungar war (17th - 18th centuries) are buried in it. The cemetery is not on the list of the protected cultural heritage objects.

5 IMPACT MITIGATION AND BENEFIT ENHANCEMENT MEASURES

Caspiecology with the assistance of SRK completed a detailed review of the existing project documentation, the EIA for the project and conducted a site visit that included interviews with local populations and administrative officials. The puspose of this work was to compare the design and implementation of the project to the requirements of the EBRD. While overall the company has completed a rigorous project design and assessment of potential environmental and social impacts associated with the project, there are some areas that require additional work in order to structure the project to be complaint with EBRD requirements. This is not surprising as the project has been designed and developed prior to EBRD involvement, and at the time of this writing, the project is over 90% constructed. Therefore, some gaps have been identified between current status of the project and the EBRD requirements. As part of this work. Caspiecology has developed a plan to address these gaps and discussed these with AP. The company has agreed to the actions required and will implement these starting immediately. The required action items have been developed in the Environmental and Social Action Plan (ESAP) which is also included in the disclosed documents for public review. Items included in the ESAP are listed below:

The Environment, Health and Safety (EHS) Integrated Management System (ISM) will be implemented according to ISO 14001 and OHSAS 18001:2007 recommendations by an experienced EHS manager who is accountable to the company director to avoid conflicts of HS and production interests. He will define legislative requirements, risk and impact aspects, develop the EHS plans (including environmental control and monitoring and resource use reduction plans) and report their implementation progress to the project stakeholders. The EHS manager will also control the contractors adherence to the company EHS rules. He will maintain EHS documentation at site in electronic form to be available at all branches of the company.

To provide support to the EHS manager from the all line managers, AP will draft the EHS policy with commitment to continuous improvement (based on the ISO standards) in EHS and resources use with the efforts scalable to the risks involved.

The Company will study the Karasu River and Saumalkol Lake ecology, soil, plants and animals and conduct archaeological survey of the affected area.

Thorough tests of the disposed rock and paste tailings for leaching will be conducted before disposal takes place. Groundwater wells will be installed to monitor water quality below the disposal sites.

To protect the workers interests, a collective agreement will be drawn and agreed with the workers representatives. An effective grievance mechanism will be developed for the workers.

To reduce risk of damage by fire, two fire engines will be purchased, the fire squad trained and firewater provided in required amount.

The company will seek the ways of safer collection and disposal of its waste and sewage.

A doctor and nurses will be employed and an ambulance purchased to control workers health and mobilise them to Kargalinsk hospital in emergencies.

The roads to Ayyr village and the Burkity railway station will be repaired, surfaced with tarmac and maintained in good order for the project duration.

A stakeholder engagement plan will be implemented by the appointed by the company Community Liaison Officer.