



**Preparation of Regional Pre-Investment Studies in the  
Eastern Sector of the Russian Arctic**

**Closure of the Tailings of the Kular Gold Mill  
Based on Sound Environmental and Health &  
Safety Principles**

**Pre-Investment Study**

April 5, 2010

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of the Russian Arctic**

**Final stage of consulting services provided under Contract  
No. CS-NPA-Arctic-08/2008 dated 20 August, 2008**

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Sound Environmental and Health & Safety Principles**

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Project 0090016

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ERM Eurasia Ltd confirms that this document has been prepared with all reasonable skill, care and diligence and in conformity with the professional standards as may be expected from a competent and qualified consultant acting as Environmental Consultant having experience in providing services for projects with similar scope of work, complexity, issues and scales.

This document has been prepared in accordance with the terms of the Contract concluded with the Client and in conformity with the commonly adopted practice of environmental consulting for the purposes foreseen in the Contract.

The conclusions and recommendations made in this document are based upon information obtained directly by the ERM Eurasia Ltd, as well as information provided by third parties, which we believe to be accurate.

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## *SUMMARY*

<b>PROJECT NAME</b>	Closure and reclamation of the tailings at the Kular gold mill.
<b>PROJECT DEVELOPER AND PROPOSED BENEFICIARY</b>	Governmental organization “Executive Directorate for Elimination of Consequences of Spring-Time Floods and Organization of Restoration Work in the Republic of Sakha (Yakutia)”
<b>PROJECT LOCATION</b>	6 km to the south of the abandoned community of Kular, in the northern part of the Ulakhan-Sis mountain range, in the upper reaches of the Burguat and Kuchchugai-Kyuegyulyur rivers, 80 km from the Laptev Sea coast and approximately 260 km north-west of the administrative center of the Ust-Yansk Ulus (District) – town of Deputatsky.
<b>PROJECT OBJECTIVE</b>	The main objective of the Project is to carry out closure of the tailings of the Kular gold mill as a source of the current pollution of surface waters in the Omoloy River basin based on sound environmental and health and safety principles and in compliance with the Russian and international standards and requirements set out for reclaimed tailings, as well as to restore the area of the reclaimed tailings and return the land to agricultural use.
<b>PROJECT CATEGORY</b>	Priority II: Clean-up of past environmental liabilities with actual or significant future major potential to add to Arctic pollution loads. Non-resolution of the issue associated with the Kular tailings storage facility implies high environmental risks and might result in adverse consequences for the whole region.
<b>DESCRIPTION OF THE PROJECT ACTIVITIES</b>	<p>The following measures are proposed (taking into account already initiated engineering surveys and preparation work for tailings closure):</p> <ol style="list-style-type: none"> <li>1. Development and approval of a detailed Declaration of Intent on the basis of this Pre-Investment Study;</li> <li>2. Preliminary assessment of scope of work, timing and a detailed stakeholder engagement plan;</li> <li>3. Development and implementation of a monitoring programme for all stages of the</li> </ol>

	<p>Project;</p> <ol style="list-style-type: none"> <li>4. Baseline, engineering geodesic, geological (geotechnical) and environmental surveys;</li> <li>5. Preparation of the Project Design and Detailed Engineering Design, as well as adjustment of the Project Design to the relevant international requirements;</li> <li>6. Preparation of the environmental sections and action plans according to the applicable international format;</li> <li>7. A series of public consultations and hearings;</li> <li>8. Obtaining of required licenses, approvals and permits;</li> <li>9. Supply of required equipment and machinery;</li> <li>10. Preparatory, engineering and construction work at the tailings, including drainage and treatment of contaminated water;</li> <li>11. Measures for clean-up of the area;</li> <li>12. Final land remediation works;</li> <li>13. Development and implementation of a monitoring programme for the period after completion of the planned work.</li> </ol>
<p><b>APPLIED TECHNOLOGY</b></p>	<p>As an example of advanced technology for hazardous waste management under permafrost conditions, innovative technologies for freezing of hazardous waste can be proposed, that were developed in the Nikolay Chersky Northern Mining Institute under the Siberian Division of the Russian Academy of Sciences, in Yakutsk, including freezing of ore processing waste by natural frost and capping it with an ice shield playing the role of a protective barrier. A layer of sandy silt soil is put over the ice shield to ensure insulation and then a layer of fertile soil. In summer, perennial grass species and shrubs are sown over the reclaimed surface of the tailings to protect it against erosion and retain the natural look.</p> <p>The tailings closure and remediation process will comprise the following phases:</p> <ul style="list-style-type: none"> <li>• Removal of water from the upper and</li> </ul>

	<p>lower sections of the tailings through the river-bed diversion ditch and water discharge ditch;</p> <ul style="list-style-type: none"> <li>• Backfilling of the upper and lower sections with earth material from an abandoned open pit of the gold mill;</li> <li>• Grading of the surface of the backfilled tailings;</li> <li>• Spreading of fertile soil over the surface;</li> <li>• Biological remediation (sowing of grass and shrubs).</li> </ul> <p>It is also planned to demolish the remains of the abandoned gold mill, with partial disposal of metal scrap in the tailings and partial removal of it to the Severny river port for further transportation by river for subsequent recycling. More detailed description of the technologies to be applied for mothballing of the tailings and waste rock dumps, as well as maintenance of the water diversion tunnels can be provided at the stage of the project design and engineering design preparation.</p>
<b>LEVEL OF DESIGN DEVELOPMENT</b>	Topographic and geodesic surveys were carried out as required for the project design development for tailings closure; the project design is being prepared.
<b>PRELIMINARY PROJECT COST ESTIMATE</b>	3,000,000 Euros
<b>EXPECTED ENVIRONMENTAL AND SOCIAL BENEFITS OF THE PROJECT</b>	<p>Implementation of the Project will ensure closure of the tailings of the former Kular gold mill which is currently a source of contamination of the Omoloy River basin posing serious threat to the fish resources in the river, as well as to the Omoloy nature reserve and health of residents of Khaiyr indigenous village.</p> <p>The closure of the Kular tailings will enable to use the reclaimed land as reindeer pasture.</p> <p>The target indicators for assessing the project performance are:</p> <ul style="list-style-type: none"> <li>• Reduction in the release of chemically contaminated surface waters to the Omoloy River basin, including: <ul style="list-style-type: none"> <li>○ Termination of discharge of</li> </ul> </li> </ul>



	<p>contaminated water from the tailings via the siphon outlet;</p> <ul style="list-style-type: none"> <li>○ Minimization of seepage through the retaining dam body.</li> </ul> <ul style="list-style-type: none"> <li>● Closure of the tailings based on sound environmental and health &amp; safety principles, ensuring: <ul style="list-style-type: none"> <li>○ Land remediation with subsequent restoration of it for use as reindeer pasture;</li> <li>○ Restoration of favourable conditions for natural vegetation growth and wildlife habitats;</li> <li>○ Possibility for people to visit the area without any limitations.</li> </ul> </li> </ul>
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## *1 INTRODUCTION*

This document has been prepared by ERM Eurasia Ltd. (ERM) in accordance with Contract on Consulting Services No. CS-NPA-Arctic-08/2008 dated 20 August 2008 with the Executive Directorate of the National Pollution Abatement Facility (NPAF) within the framework of the Project “Preparation and Implementation of Regional Pre-Investment Studies in the Eastern Sector of the Russian Arctic”.

This Project is Component 2 of the Project “Russian Federation – Support for National Programme for the Protection of the Arctic Marine Environment” (The NPA-Arctic Project) and is funded by the Global Environment Facility (GEF). The Executing Agency is the Ministry of Economic Development of the Russian Federation.

The main objective of the NPA-Arctic Project is to develop and establish a sustainable framework to reduce environment degradation of the Russian Arctic from land-based activities on a systematic basis by implementation of a Strategic Action Programme (SAP), which is being developed to comply with obligations of the Russian Federation under international conventions and agreements and taking into account decisions and programmes of the Arctic Council.

The ultimate goal of this Project was to prepare pre-investment studies (PINS) on the investment proposals selected by the NPA-Project in the Eastern Sector of the Russian Arctic, i.e. in the Republic of Sakha (Yakutia) and Chukchi (Chukotka) Autonomous Okrug.

## **2 PROJECT DESCRIPTION**

### **2.1 BACKGROUND AND OBJECTIVES OF THE PROJECT**

The project proposes environmentally safe closure of the tailings storage facility of the Kular gold mill, including decommissioning and demolition of the building of the abandoned gold mill, with subsequent remediation of disturbed lands.

The Project has the following objectives and goals:

- Closure of the tailings of the Kular gold mill as a current source of pollution of surface waters in the Omoloy River basin and prevention of further pollution;
- Minimisation of risks of washout and destruction of the tailings facility;
- Improvement of the sanitary and epidemiological situation;
- Reduction of adverse impact on fish resources in the Omoloy River basin and the Omoloy bioresource reserve;
- Bringing of the tailings facility into compliance with the Russian and international standards and requirements for remediated tailings facilities so that the land could become suitable for agricultural use.

### **2.2 HISTORY**

Ust-Yansk Ulus (District) of the Republic of Sakha (Yakutia) is the most industrially developed Arctic area of the Republic. A number of major tin ore and alluvial deposits (Deputatskoye, Churpunnya, Tirekhtyakh, Tenkeli, etc.) and gold deposits (Kular and Selennyakh gold fields) were developed in an intensive way during the period from the 1960s until the 1990s. There are tens of facilities associated with the mining sector, including the Deputatsky tin ore mining and processing plant (Deputatsky GOK), Kular gold mill, the mines of Tenkeli, Churpunnya, Tirekhtyakh, etc. Currently, most of the gold and tin mining facilities in the district have been abandoned without taking any closure and land remediation measures. The tailings disposal facilities of the Kular gold mill and the Deputatsky GOK have not been used for over ten years and pose a substantial threat to the environment.

The Kular alluvial gold deposit was discovered in 1963. It belongs to the Kular gold bearing district located in the northern part of the Yana-Omoloy interfluvial area. Abandoned gold miners' communities Kular, Vlasovo and Entuziastov are located within the mining area. Gold production was

commenced in the early 1970s. The alluvial mine was operated by the KularZoloto Gold Mining Complex (later restructured as a joint stock company); the company owned licenses for development of 46 alluvial gold deposits.

The gold mill was constructed in 1985 and was designed to process gold-bearing ore, but underground ore mining was not started. During some years the annual gold production was as high as 10 tonnes. Over 30 years of the operation, approximately 120 tonnes was produced. The gold mill operated until 1990, when the alluvial mining operations were terminated because of worsened economic situation.

Any information on the technology used was not available at the time of this study. It is likely that cyanides were used for gold refining.

In 1994, KularZoloto was closed because of deteriorating economic situation. According to a statement made by the State Committee of Geology and Subsoil Resources of the Republic of Sakha (Yakutia), resumption of geological prospecting and exploration at the alluvial deposits of the Kular gold-bearing district is not economically or geologically feasible. There are no undiscovered potential resources, therefore it does not appear feasible to carry out any large scale prospecting operations for alluvial gold in the Kular gold-bearing district.

Currently, gold is produced within the outlines of the former Kular alluvial mining operations only by the Omoloy nomadic Eveny community in accordance with the allocated annual quota of 20 kg.

After the gold production operations stopped, no land remediation was carried out.

In 1994 to 2005, the tailings of the Kular gold mill was abandoned and some maintenance was carried out occasionally by the Omoloy community; no funds were allocated for this purpose from the governmental budget. In July 2001, a hydrodynamic accident took place at the tailings facility as a result of the overfilling of the tailings and overflow over the main dam (see Section 1.4 below for more details).

After 2005, when the tailings were turned over for management to the Executive Directorate for Elimination of Consequences of Spring-time Floods and Organization of Restoration Work in the Republic of Sakha (Yakutia) (hereinafter referred as the Executive Directorate or ED), the Sakha Government emphasised repeatedly that the issue of the Kular tailings should be urgently addressed. The Kular tailings was recognized as one of the potentially most hazardous hydraulic engineering facilities in the Republic. Measures for ensuring its safety and for preparation of its closure were included in the governmental target programmes “Environmental Protection in Republic of Sakha (Yakutia) in 2003-2006” and “Environmental Protection in Republic of Sakha (Yakutia) in 2007-2011”. Measures to ensure

environmental safety of the tailings were included also in a consolidated Environmental Action Plan of the Sakha Environmental Protection Ministry for Environmental Safety of Tailings Facilities and Sediment Ponds of Industrial Enterprises for 2007 to 2011.

### **2.3** *DESCRIPTION OF THE FACILITY. TECHNICAL AND TECHNOLOGICAL CHARACTERIZATION. SITE LOCATION.*

The abandoned gold mill and the tailings are located at a distance of 6 km to the south of the abandoned settlement of Kular, in the northern part of the Ulakhan-Sis mountain range, in the upper reaches of the Burguat and Kuchchugai-Kyuegyulyur rivers (the basin of the Omoloy River and Buor-Khaya Bay of the Laptev Sea), 80 km from the Laptev Sea coast and approximately 260 km north-west of the administrative center of the Ust-Yansk Ulus (District) – town of Deputatsky.

The layout of the alluvial mine area is shown in Figure 1.1.

The Kular tailings facility was designed for storage of tailings generated in the process of gold refining at the gold mill and for water recycling. It was commissioned in 1965. The tailings facility is classified as a Class IV hydraulic engineering facility. Its total area is 105,300 m<sup>2</sup>. It is located in the old channel of the Nettik Stream. It has a rectangular configuration elongated in the direction from south to north. The tailings consist of two sections: an upper section with an area of 38,500 m<sup>2</sup> between the upstream dam and an intermediate dam and a lower section with an area of 56,600 m<sup>2</sup> between the intermediate dam and the main retaining dam. The tailings facility has been out of operation since 1990.

The bulk of tailings are stored in the upper section, which is filled up to an elevation of 99 m and has a natural gravel bed base at an elevation of 93-95m. The lower section is used for water clearing with subsequent water abstraction as a water supply source for the gold mill. The existing free capacity of the lower section of the tailings facility is 310,000 m<sup>3</sup>.

The tailings facility consists of the main retaining dam, upstream dam and intermediate dam, a diversion ditch for diverting the Nettik Stream, a hillside water diversion ditch, a water drainage ditch (No.1), a water recycling pump station (currently out of operation) and a siphon water discharge.

**The main retaining dam** is designed to create the lower section of the tailings facility and form a waterfront. The dam body is composed of sand and clay shale. The dam crest elevation is 100.50 m; the maximum dam height is 7 m; the dam is 230 m long with a crest 10 m wide. The dam wall slope is 1:1.7 at the back of the dam and 1:1.5 at the downstream side.

**The upstream dam** is designed to dam the Nettik Stream channel and create the upper section of the tailings. The dam body is composed of sand and clay

shale. The dam crest elevation is 107.00 m; the maximum dam height is 8 m; the dam is 130 m long with a crest 20 m wide. The dam wall slope is 1:1.7 at the back of the dam and 1:1.7 at the downstream side.

**The intermediate dam** divides the tailings into two sections: the upper section containing the bulk of tailings from the gold mill and the lower section designed for water clearing.

All dams are classified as Class IV.

**The water diversion ditch** is designed to divert the Nettik Stream. It is 5 m wide and 760 m long; its slope is 0.0175 m; the wall slope is 1:1. The throughput capacity is 19 m<sup>3</sup>/s with a water depth of 1 m.

**The hillside water diversion ditch** was put into operation in 2004. Its purpose is to collect and divert storm water runoff from the left-hand slope of the tailings to the afterbay of the main dam. The ditch is 460 m long.

**Water discharge ditch No.1** was put into operation in 2003. It is designed to release flood water from the upper section of the tailings to the water diversion ditch. It is 210 m long.

**The water recycling pump station** is located at the left-hand bank of the lower section of the tailings and is designed to supply clarified water to the gold mill. Currently, it is out of operation and submerged at a depth of 1.5 m.

**The siphon water discharge facility** was put into operation in 2004. It is located in the afterbay of the main retaining dam and serves for collection of flood water and storm water. Its throughput capacity is 540 m<sup>3</sup>/hour.

The layout of the tailings storage facility is shown in Figure 1.2.

#### **2.4 HYDROGEOLOGICAL, ENGINEERING GEOLOGICAL AND SEISMIC CONDITIONS OF THE AREA**

The geological structure of the area consists of rocks of the Upper Verkhoiansk Series including Upper Permian, Lower Triassic and Middle Triassic sediments, folded as an anticline with N-NE strike. Unconsolidated formations in the valley consist of:

- a vegetative layer;
- a lens of sands, silty sands, overlying mud, mudstones with thick veins of ice of Middle and Upper Quaternary age;
- gravel beds with sand and silty sand lenses (sediments of Temmirdek and Sergeyevskaia rock series) 6 m thick;
- alluvial gravelly schist, quartz, sandstone and clay with lignite interbeds (Omoloyskaia rock series) from 2 m to 22 m thick;
- sandy clay shale with sandstone interlayers.

The area is located within a massive permafrost zone. During the warm season, 2m to 5m thick subgelisols (*talik*) are present under the bed and in the floodplain of the Nettik Stream.

The maximum seasonal thawing depth varies under natural conditions from 0.3m to 1.5m on slopes and terraces above the floodplain under the vegetative cover and peat.

The freezing depth of the tailings is up to 2 m.

The seismic activity of the area at the settlement of Kular is rated 8 on the international MSK scale.

No data are available in relation to physical and mechanical properties of the material composing the dam bodies and dam bases. No data are available with respect to any engineering surveys conducted in the area.

## **2.5 OVERVIEW OF THE RISK ASSESSMENT AND ACCIDENT RISK PROBABILITY**

According to the accident and emergency risk assessment data contained in the Safety Declaration of the tailings storage facility of the Kular gold mill and a Safety Passport of the tailings storage facility of the Kular gold mill (2007) prepared by specialists of SakhaOlovo, a hydrodynamic accident at the tailings can potentially occur as a result of the following events:

- deformation (subsidence) of the main retaining dam crest, and
- overfilling of the lower section of the tailings.

An accident can be caused also by the following events:

- formation of an ice dam or land slide of the walls in the water diversion ditch or in water discharge ditches;
- washout of the upstream dam or the intermediate dam.

An emergency response plan should have been developed. But according to the available information, no such plan had been elaborated for the tailings.

A hydrodynamic accident took place at the tailings facility in July 2001 as a result of overfilling of the tailings and overflow over the crest of the main retaining dam. As a result, the dam crest failed and formed an opening 3 m wide and up to 0.5 m deep, through which up to 30,000 m<sup>3</sup> water drained from the tailings. The bulk of this water ran into the existing channel of the Nettik Stream. Since there were neither industrial facilities nor residential properties within the area affected by the flood, the damage caused by the accident was insignificant. The potential frequency of such events is assessed as unlikely and the risk for the personnel and local population as negligible. No data are available in relation to the damage inflicted to the environment and aquatic and biological resources.

The level of risk of a hydrodynamic accident at the tailings facility was assessed in the Declaration of Industrial Safety as follows:

- For the main retaining dam as **moderate** with a safety level rated as **low**;
- For the siphon water discharge facility as **low** with a safety level rated as **normal**.

For a scenario of a most probable accident, which will not result in hydrodynamic accident, an emergency situation is considered to be an **unlikely** event in relation to occurrence frequency.

For a scenario of a most severe accident, which will result in hydrodynamic accident, an emergency situation is considered to be a **unique** event in relation to the frequency of occurrence with a potential humanitarian damage assessed as **insignificant**.

In general, the risk level of a hydrodynamic accident at the Kular tailings facility had been assessed as **low** and the risk as **negligible**. It was declared that there was no need for any additional risk mitigation measures.

According to the SanPiN Norm 2.2.1/2.1.1200-03 “Sanitary Protection Zones and Sanitary Classification of Industrial Enterprises, Installations and Facilities”, a tailings storage facility is categorized as a sludge disposal facility associated with mining production of nonferrous metals. The width of a regulatory sanitary protection zone (SPZ) for such facilities is 500 m. A hazardous zone (an area that can be potentially affected by flooding) in case of a most dangerous scenario of emergency situations is less than 6 hectares with a potential humanitarian damage assessed as negligible because of the absence of any commercially significant facilities and structures, lands of specific value or protected areas territories within the SPZ and an area potentially affected by flooding.

The territory of the Kular gold mill is situated within the traditional lands of the Omoloy indigenous Eveny community.

## **2.6 PRIORITY CATEGORY FOR AN NPA-ARCTIC PROJECT**

Priority II: Priority II: Clean-up of past environmental liabilities with actual or significant future major potential to add to Arctic pollution loads.

Non-resolution of the issue associated with the Kular tailings storage facility implies high environmental risks and might result in adverse consequences for the whole region.



## **2.7 APPLICABLE NATURAL AND INTERNATIONAL REGULATIONS AND STANDARDS**

### **2.7.1 Applicable Russian Legislation**

The proposed activities for the closure of the tailings storage facility of the Kular gold mill are subject to the following Russian laws, regulatory acts and standards:

- Federal Law No.7-FZ dated 10.01.2002 “On Environmental Protection” (enacted by the State Duma on 20.12.2001);
- Federal Law No.52-FZ dated 30.03.1999 “On Sanitary and Epidemiological Welfare of Population” (enacted by the State Duma on 17.03.1999);
- Federal Law No.68-FZ dated 21.12.1994 (as amended on 30.10.2007) “On Protection of Population and Territories against Emergencies of Natural and Man-made Origin” (enacted by the State Duma on 11.11.1994);
- Federal Law No.117-FZ dated 21.07.1997 (as amended on 14.07.2008) “On Safety of Hydraulic Engineering Facilities” (enacted by the State Duma on 23.06.1997);
- Regulation on Composition of Sections of Project Design Documentation and Requirements to Their Contents (Approved by the Russian Government Decree No. 87 dated 16.02.2008);
- Decree No.33 dated 02.06.1999 by the Federal Mining and Industrial Inspection Agency “On Approval of the Instruction on Procedures for Closure and Mothballing of Hazardous Industrial Facilities Associated with Use of Subsoil Resources”;
- Government Decree No.876 dated 18.12.2001 “On Approval of the Rules for Estimating Required Financial Security for Civil Liability for Damage Caused by Accidents at Hydraulic Engineering Facilities”;
- Government Decree No.490 dated 23.05.1998 (as amended on 18.04.2005) “On Procedure for Establishment and Keeping the National Register of Hydraulic Engineering Facilities”;
- Safety Rules for Hydraulic Engineering Facilities Designed for Accumulation of Liquid Industrial Waste (PB 03-438-02);
- Safety Rules for Operation of Tailings, Sludge and Hydraulic Waste Disposal (PB 06-123-96);
- Methodological guidelines for organization of supervision over operational safety of hydraulic engineering structures at enterprises and facilities subject to supervision by the Russian Gosgortekhnadzor Agency (RD 03-141-97);

- Instruction on the procedure for monitoring of safety of hydraulic engineering facilities of enterprises and organizations subject to supervision by the Russian Gosgortekhnadzor Agency (RD 03-259-98);
- Guidelines for development of a design for monitoring of safety of hydraulic engineering facilities subject to supervision by the Russian Gosgortekhnadzor Agency (RD 03-417-01);
- Guidelines for risk analysis of hazardous industrial facilities (RD 03-418-01);
- Instruction on the procedure for assessment of safety criteria and status of hydraulic engineering facilities for accumulation of liquid industrial waste and subject to supervision by the Russian Gosgortekhnadzor Agency (RD 03-443-02);
- Procedure for estimation of damage potentially inflicted to life and health of individuals, property and legal entities as a result of accidents at a hydraulic engineering facility (RD 03-521-02);
- Recommendations for calculation of the process of occurrence of hydrodynamic accidents at liquid industrial waste accumulation facilities (RD 03-607-03);
- Procedure for estimation of the damage potentially inflicted to life and health of individuals, property and legal entities as a result of accidents at a hydraulic engineering facility (RD 03-626-03);
- Procedure for calculation of flooding zones in case of hydrodynamic accidents in industrial waste storage areas of chemical plants (RD 09-391-00);
- Instruction on issuance by the Federal Service for Supervision of Environment, Technology and Nuclear Management (Rostekhnadzor) of permits for operation of hydraulic engineering structures at industrial and energy facilities (RD-12-01-2004);
- Instruction on the procedure for registration by the Federal Service for Supervision of Environment, Technology and Nuclear Management of hydraulic engineering structures at industrial and energy facilities in the sectoral division of the National Register of Hydraulic Engineering Facilities (RD-12-02-2004);
- Decree No.105 dated 28.02.2003 by the Emergency Situations Ministry “On Approval of Requirements for Emergency Prevention at Potentially Hazardous Facilities and Life Support Systems” (Registered by RF Ministry of Justice, No.4291 dated 20.03.2003);
- Instruction on keeping the National Register of hydraulic engineering facilities (approved by the Ministry of Natural Resources, No.144; Ministry of Fuel and Energy, No.K-3357; Ministry of Transport, No.K-14/367-is; Gosgortekhnadzor No.01/229a of 12.07.1999) (Registered by Ministry of Justice, No.1858 dated 05.08.1999);

- Provisional guidelines for estimating the damage potentially possible as a result of an accident at a hydraulic engineering facility (RD 153-34.0-002-01);
- Provisional guidelines for estimation of prevented environmental damage, approved by the State Committee for Environment Protection on 09.03.1999;
- Guidelines for estimation of the environmental impact of hydraulic engineering facilities (RD 153-34.2-02.409-2003)
- Procedure for determination of safety criteria of hydraulic engineering facilities (RD 153-34.2-21.342-00);
- Instruction for Planning, Construction and Operation of Hydraulic Engineering Facilities in Areas Affected by Underground Mining Operations (SN 522-79);
- Determination of main calculated hydrologic characteristics (SP 33-101-2003);
- Hydraulic Engineering Facilities. Basic Provisions (Construction Norms and Rules SNiP 33-01-2003).

### ***2.7.2 Applicable International Requirements and Standards***

- Guide for Management of Tailings Facilities, The Mining Association of Canada, 1998
- Developing an Operations, Maintenance and Surveillance Manual for Tailings and Water Management Facilities, The Mining Association of Canada, 2003.

## ***2.8 ANALYSIS OF ALTERNATIVES TO THE PROJECT***

### **Zero Alternative**

If the current situation continues, the tailings storage facility will continue to exist as a source of persistent pollution of the Omoloy River basin with heavy metals. There will remain a threat to the health of residents of Khaiyr community, to biological resources of the Omoloy reserve and the fisheries of the Omoloy River. There will be also a risk of potential emergency situation at the tailings facility with potential implications at a regional scale.

### **Resumption of the gold mill operation**

The State Committee of Geology and Subsoil Resources of the Republic of Sakha (Yakutia) considers large scale gold production operations in the Kular gold-bearing district to be unprofitable. Currently, gold is produced from the

local alluvial placer deposits by private gold prospectors of the Omoloy indigenous community.

## **2.9** *CURRENT STATUS OF THE FACILITY*

The abandoned gold mill building is located on the western bank of the tailings at a distance of approximately 100 m from its lower section. Currently, there remains only the steel framework of the building. The site is covered with metal scrap and abandoned equipment and machinery. A grinding mill and crusher plant is located at a distance of 150 m from the tailings with a waste rock dump approximately 10 m high. The waste rock dump is reinforced with wooden logs, but the reinforcement is partially damaged.

The amount of metal scrap is estimated roughly at hundreds of tons; no accurate estimates have been made.

An unauthorized area used for storage of potentially hazardous chemicals was discovered at the abandoned gold mill site, with two containers of 1.3 m<sup>3</sup> capacity each used for ore transportation examined. Their lids are not closed tightly, the containers are filled with unidentified white powder. There are also four plastic bags filled with unidentified whitish-yellow material; some of the bags are damaged. According to the Ust-Yansk Environmental Inspection, the revealed chemicals had not been subjected to any analysis.

At the time of the site visit, the upper section of the tailings was not completely filled with water. The water level in the lower section was at an elevation of 94 m as compared with the normal maximum operating level at an elevation of 99.50 m.

The intermediate dam is composed of peaty ground and constitutes a temporary structure, which should have been reinforced in the process of the gold mill operation. According to the Omoloy community, who are a contractor commissioned to reinforce the walls of the tailings facility, the dam has a potential to fail during a spring-time flood period. In 2008, the dam became so thin that the pipes buried inside the dam were exposed (those pipes were used during the initial filling of the lower tailings section with water). According to the Omoloy community, budget funding allocated for the dam reinforcement is not sufficient.

The eastern wall of the tailings is also composed of peaty material. In the course of its examination it was discovered that it subsided for about 1.5 m. According to the Omoloy community, during a flood season the water level in the tailings rises up to the neck level, which may result in an overflow to the water diversion ditch. At the northern end the water level rises during floods as high as by 3-4 m, i.e. about 2 m short of the crest of the main retaining dam. In the process of the examination of the retaining dam, local distortions of the pond wall slopes were identified, namely subsidence blocks where the soil slid down into the pond.

No continuous monitoring of the tailings condition is being carried out. The tailings are examined from time to time by representatives of the Omoloy indigenous community. The earthmoving machinery and vehicles available in the community are not sufficient for prompt response in case of an emergency situation at the tailings storage facility.

There is a warning sign at the site indicating that the facility is under protection of the Sakha Government.

#### **2.10 LEVEL OF PROJECT DESIGN DEVELOPMENT**

In 2008, within the framework of the sub-programme “Mothballing of Tailings Ponds” under the programme “Environmental Protection in the Republic of Sakha (Yakutia) for 2007-2011”, the Omoloy indigenous community was contracted to carry out repair and preventive maintenance work to ensure the tailings are protected against spring-time floods.

In 2008-2009, a contractor organization, Yakutian Trust for Engineering and Construction Surveys (YakutTISIZ) carried out topographic and geodesic surveys in connection with the project design development for the tailings and remediation.

It is planned to carry out design development work in 2009 for the tailings closure and reclamation. The Project Design is being developed by Sprint LLC, who plans to complete the design development by the end of 2009.

#### **2.11 PROPOSED MEASURES**

This Project proposes the following measures (taking into account engineering surveys already initiated and preparation work for the tailings storage facility closure):

1. Development and approval of a detailed Declaration of Intent on the basis of this Pre-Investment Study;
2. Preliminary assessment of scope of work, timing and a detailed stakeholder engagement plan;
3. Development and implementation of a monitoring programme for all stages of the Project;
4. Baseline, engineering geodesic, geological (geotechnical) and environmental surveys;
5. Preparation of the Project Design and Detailed Engineering Design, as well as adjustment of the Project Design to the relevant international requirements;
6. Preparation of the environmental sections and action plans according to the applicable international format;

7. A series of public consultations and hearings;
8. Obtaining of required licenses, approvals and permits;
9. Supply of required equipment and machinery;
10. Preparatory, engineering and construction work at the tailings, including drainage and treatment of contaminated water;
11. Measures for clean-up of the area;
12. Final land remediation works;
13. Development and implementation of a monitoring programme for the period after completion of the planned work.

### **2.12 TECHNOLOGIES APPLIED**

The tailings closure and remediation process will comprise the following phases:

- Removal of water from the upper and lower sections of the tailings through the river-bed diversion ditch and water discharge ditch;
- Backfilling of the upper and lower sections with earth material from an abandoned open pit of the gold mill;
- Grading of the surface of the backfilled tailings;
- Spreading of fertile soil over the surface;
- Biological remediation (sowing of grass and shrubs).

It is also planned to demolish the remains of the abandoned gold mill, with partial disposal of metal scrap in the tailings and partial removal of it to the Severny river port for further transportation by river for subsequent recycling.

As an example of advanced technology for hazardous waste management under permafrost conditions, innovative technologies for freezing of hazardous waste can be proposed, that were developed in the Nikolay Chersky Northern Mining Institute under the Siberian Division of the Russian Academy of Sciences, in Yakutsk, including freezing of ore processing waste by natural frost and capping it with an ice shield playing the role of a protective barrier. A layer of sandy silt soil is put over the ice shield to ensure insulation and then a layer of fertile soil. In summer, perennial grass species and shrubs are sown over the reclaimed surface of the tailings to protect it against erosion and retain the natural look.

### **2.13 REQUIRED SUPPLIES AND MATERIALS**

The existing quarry and waste rock dumps will be used for reclamation of the tailings. The amount of the earth material for filling of the tailings and grading of the area will be determined at the engineering design development phase.

#### **2.14 LABOUR REQUIREMENT**

It is expected that about 50 persons will be employed for the works related to closure, clean-up and reclamation of the area. It will be possible to employ local residents (members of the Omoloy indigenous community) that will have a positive impact on the local employment situation.

#### **2.15 REQUIRED WATER RESOURCES**

The limits for consumption of process water will be determined according to a prescribed procedure.

#### **2.16 ELECTRIC POWER REQUIREMENT**

Electricity will be supplied using independent power supply sources with installed power of up to 40 kW.

#### **2.17 REQUIRED LAND RESOURCES**

Earthmoving operations will be carried out within the specified land area. Land plots for temporary use as required for the execution of the work will be allocated in conformity with the prescribed procedure.

#### **2.18 TRANSPORTATION**

The main type of transport will be trucks. There is a network of soil and winter roads within the area and in the surroundings for all-year traffic of off-road and heavy vehicles.

#### **2.19 ACCOMMODATION, SOCIAL AND GENERAL FACILITIES FOR PERSONNEL**

The involved personnel will be accommodated in the existing residential properties in Kular.

#### **2.20 WASTEWATER MANAGEMENT**

Compact mobile modular wastewater treatment units (of FIL D'EAU type, [http://www.vseslav-eco.ru/FIL\\_DEAU](http://www.vseslav-eco.ru/FIL_DEAU) or similar units) will be used.

#### **2.21 WASTE MANAGEMENT**

Waste generated during construction will be disposed of to the existing landfill in Kular. Detailed elaboration of waste management procedures will be performed in the process of the Project design development.

### **3 ENVIRONMENTAL AND SOCIAL ASPECTS OF PROJECT IMPLEMENTATION**

#### **3.1 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS IN THE AREA OF PROJECT IMPLEMENTATION**

##### **3.1.1 Environmental and Geographical Characteristics of the Area**

The area for the Project implementation is located on the Yana-Indigirka upland in Eastern Yakutia, in the Ulakhan-Sis mountains (Kular ridge system), at the water divide of the Yana and Omoloy rivers.

A characteristic feature of the area is non-uniform vertical and horizontal distribution of permafrost rocks; they are often interrupted by water-bearing subgelisols (*talik*). The thickness of permafrost rocks in the area of the Kular gold deposit reaches 300 m. The maximum depth of seasonal ground surface under natural conditions varies from 0.3 m to 1.5 m on slopes and terraces above floodplains under the vegetative cover and peat.

Winter is long (up to seven months) with extremely severe and persisting frosts; summer is short and rainy. In October (the first winter month) the average air temperature is approximately  $-15^{\circ}\text{C}$ . The average air temperatures in January are below  $-30^{\circ}\text{C}$ ; the air temperature can drop down to  $-50^{\circ}\text{C}$ . In March and April the temperature begins to rise. The warmest month is July. The average annual air temperature is  $-12^{\circ}\text{C}$ . The average annual precipitation rate is up to 300 mm. The prevailing winds throughout a year are westerly and north-westerly; during the warm period prevailing are north-easterly winds.

The major watercourses in the area are the Yana, Omoloy, Ulukhan-Kyuegyulyur and Kuchchugui-Kyuegyulyur rivers. A characteristic phases of the hydrologic conditions are the springtime floods, flash floods in summer and autumn, low water level in summer and winter, long and consistent period of river freezing (up to 240 days) and freezing of rivers down to the river bottom.

In the orographic respect, the area constitutes tundra upland with numerous lakes, rivulets and creeks. Characteristic is occurrence of both mountainous animal species (bighorn sheep, rosy finch, etc.) and tundra animal species (willow grouse, rock ptarmigan and reindeer).

The Omoloy nature reserve of regional significance is located 40 km to the east of the area.



### 3.1.2 Socioeconomic Characteristics of the Area

Ust-Yansk Ulus (District) was established on May 5, 1967 and is the most industrially developed area in the Arctic part of the Republic of Sakha (Yakutia).

The area of the district is 120,300 square km. The permanent population is 8,503 people as of 01.01.2009, including 4,756 residents living in urban areas and 3,747 residents in rural areas. The density of population is 0.07 per 1 km<sup>2</sup>.

There are ten settlements in the district, including the settlements of Deputatsky (with a population of circa 3,000), Kazachye, Ust-Yansk, Tumat, Khaiyr, Syiylyk, Yukagir, and Uyandino.

All these settlements accommodate, on the permanent and temporary basis, the indigenous ethnic population, mainly Evens, involved in traditional use of natural resources, including reindeer husbandry, fishing, and fur hunting. A significant portion of the land resources is classified as agricultural land and is used as reindeer pastures. There are extensive areas of traditional lands.

The average life expectancy of the population in 2008 was 53 years. The average life expectancy of women exceeded that of men. In the death rate structure, there is a high percentage of men dying in an economically active age (as a result of alcoholism or accidents). In 2008, 117 persons died, including 73 men and 29 women.

In the morbidity structure in the district, in 2008 prevailing were diseases of blood-vascular system (16.1%), breathing diseases (15.6%) and digestive system diseases (11.2%). An overall trend toward an increase in morbidity rates is reported.

A characteristic feature of the demographic situation in the district during the past decade has been an annual decrease in the population as a result of out-migration from the district due to decommissioning of the Deputatsky GOK, which is the largest industrial enterprise in the district. As a result of the closure of a number of alluvial and ore mining operations a number of settlements located within the territory of the ulus (Kular, Severny, Vlasovo, Entuziastov, Tenkeli, etc.) were abandoned. Among the closed industrial enterprises are the Deputatsky GOK (SakhaOlovo LLC), KularZoloto, etc. SakhaOlovo stopped operations in mid 2009 and sacked personnel. As a result of the closure of the leading industrial enterprises, the economic situation in the district, which was based on the mining sector, is currently extremely difficult. The unemployment is growing at a high rate, especially among young people, the level of habitual alcoholism is high; youth crime is on the rise.

The settlement of Deputatsky was established in 1954. Since 1958 it has had a status of an industrial community. Its population is approximately 3,000 (2009). The main occupation of the population is fishing. There is a fish processing cooperative. There are some administrative, logistics and transport organizations in the settlement, organizations in the housing and utilities supply sector,

departments of the Ministry of Interior, Federal Security Service and the Ministry of Defense, as well as retail trading and catering firms. There is a local airport with three to four regular flights by Yakutia and Polar Airlines. It is planned to commission a thermal mini-power plant in 2009.

The length of motor roads in the district is 1,654.9 km, including 748.9 km of roads of regional significance (of which 224.3 km with hard paving) and 906.0 km of roads of municipal significance, of which 83 km of roads in settlements. There are the following infrastructure facilities available in the area:

- A network of permanent and winter roads, including an all-year road between Ust-Kuiga and Deputatsky;
  - All-year road Severny – Kular - Entuziastov;
  - Yana winter road (Topolinoye - Khaiyr);
- Mooring facility of the abandoned settlement of Severnyi with a goods transfer base;
- Airport (non-operational since 1994).

### **3.2** *CURRENT ENVIRONMENTAL AND SOCIAL IMPACTS ASSOCIATED WITH THE FACILITY*

According to the results of the studies conducted by the Republican Environmental Monitoring Centre in 2008-2009, elevated concentrations of heavy metals were discovered in the water samples collected from the surface water in the Kular tailings. The reported concentrations exceeded the respective regulatory maximum permissible levels for fishery water bodies (MPC<sub>f</sub>) by the following factors: iron up to 5 MPC<sub>f</sub>, zinc up to 10 MPC<sub>f</sub>, copper up to 90 MPC<sub>f</sub>. The samples of bottom sediments collected in 2009 had an elevated mercury content of up to 5 MPC.

According to the Safety Passport of the Kular gold tailings prepared by SakhaOlovo in 2007, the water in the tailings contained 1,508 tons, the bottom sediments 148 tons and the upstream dam contained 442 tons of heavy metals respectively. In case of a most probable scenario of emergency situation (overflowing of the tailings and overflow over the crest of the main retaining dam with formation of an opening) about 1,500 tons of heavy metals would be released to the environment.

The tailings are filled with snow-melt water and flood water in an amount of up to 60,000 m<sup>3</sup> per year. In order to maintain a safe water level in the lower section of the tailings, water is discharged regularly via a siphon discharge facility (from a depth of 3-4 m) to the Nettik Stream, from where contaminated water flows to the Burguat and Omoloy rivers. The No.1 water discharge ditch is used to discharge water from the upper section to the Nettik Stream.

The following elevated levels of contaminants were reported by Republican Environmental Monitoring Centre in samples of natural water from the Omoloy River collected upstream of Khaiyr community: iron up to 9 MPC<sub>f</sub>, zinc up to 12 MPC<sub>f</sub>, manganese up to 41 MPC<sub>f</sub>, and copper up to 9 MPC<sub>f</sub>.

Water discharge via the siphon discharge facility is carried out without any permitting documents, including approved norms for wastewater discharge, or an NDS document for release of contaminants and microorganisms to water bodies, and a Decision for use of a water body). Given the threat of overflowing of the tailings, a decision to release water from the tailings via the siphon outlet is normally taken by the flood control commission headed by the head of the district administration..

The following is located within the zone potentially affected by the Kular tailings:

- Omoloy nature reserve, and
- Indigenous village of Khaiyr.

**Omoloy nature reserve** covers almost the entire area of the Omoloy River basin from the river outfall to the administrative border of the Bulunsky Ulus (District). The total area of the reserve is 332,500 hectares. With respect to the level of environmental and commercial value, the reserve is classified as an area of traditional use of natural resources. Recreational activities are allowed in some parts of the reserve. The reserve was established pursuant to Sakha Government Decree No.95 dated 06.03.1996 with the purpose to ensure conservation and reproduction of wild waterfowl, fur animals, wild hoofed mammals, rare and endangered plant and bird species, protection of unique natural phenomena, and restoration of the resources of valuable fish species in the Omoloy River basin. The distance from the tailings to the nearest border of the reserve is approximately 40 km.

**The indigenous village of Khaiyr** is located about 40 km from the tailings, on the right bank of the Omoloy River. Its population is 247 people (as of 01.01.2009), of whom 235 Evens and 12 Evenkis. The village is the centre of the Omoloy indigenous community involved in traditional occupations such as reindeer husbandry, fishing and fur hunting. During summer season, members of the community are involved on a smaller scale in gold production within the area of the abandoned Kular alluvial gold deposit.

### **3.3 ENVIRONMENTAL AND/OR SOCIAL ISSUES TO BE ADDRESSED BY THE PROJECT**

The Project will address the following potential significant environmental and social issues:

- 1 Adverse environmental impacts of ore processing waste and waste rock dumps, continued migration of contaminated water from the tailings, and persistent soil and surface water contamination with heavy metals;
- 2 Unsafe condition of the tailings storage facility and risk of hydrodynamic accidents;
- 3 Deteriorating sanitary and epidemiological situation, elevated level of risk of cancers and other environment associated diseases;
- 4 Unfavourable psycho-emotional situation in connection with a potential accident at the tailings;
- 5 Impact on biological resources in the protected nature area located within the area of influence of the tailings; limitations imposed on traditional use of natural resources,
- 6 Impact on the quality of fish resources and effects of factors associated with accumulation of heavy metals in tissues of living organisms.

### ***3.4 ASSESSMENT OF ENVIRONMENTAL RISKS ASSOCIATED WITH THE CURRENT SITUATION***

Environmental risks associated with the historical contamination with mercury and heavy metals, as well as a potential hydrodynamic accident, have been assessed as **high** and of **regional** scale of potential impacts. An accident at the tailings can entail severe environmental consequences for the Omoloy River basin, the Omoloy nature reserve and health of the residents of Khaiyr.

### ***3.5 PRELIMINARY ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF THE PROJECT***

Maximum environmental impacts are expected in connection with earthmoving operations for tailings closure and demolition of the abandoned gold mill facilities.

The major impact factor is expected to be the operation of construction and earthmoving machinery and hot works.

#### ***3.5.1 Air Pollution Assessment***

The main emission sources in the process of the Project implementation will be internal combustion engines and dust generated as a result of earthmoving operations.

Taking into account the limited area within which construction works will be performed, the impacts related to air emissions will be of local scale and quite insignificant.

### ***3.5.2 Assessment of Impact on Surface Relief and Landscapes***

Positive impacts are expected as a result of changes in the visual appearance of landscapes after removal of technogenic landscapes and restoration of the original visual characteristics.

### ***3.5.3 Assessment of Impact on Surface Waters***

Provided that the construction works will be performed in compliance with the applicable requirements and with the use of proper machinery and equipment, there will be no contamination of surface waters with petroleum hydrocarbons, except in case of accidental spills, which should be immediately cleaned up.

The positive effect of the Project in relation to the watercourses in the area will be termination of regular release of contaminants from the tailings to the Nettik and Burguat Streams and abatement of pollution of the Omoloy River basin.

### ***3.5.4 Assessment of Impact on Soils***

Negative impacts will be in the form of partial mechanical disturbance of soil horizons and local soil contamination.

No significant changes in the natural soil cover are expected in the process of construction and earthmoving operations.

Chemical impact of exhaust gas and petroleum hydrocarbons released from construction machinery and transport vehicles will be of insignificant scale without formation of any persistent anomalies of toxic microelements.

### ***3.5.5 Assessment of Impacts on Ecosystems and Biological Resources***

#### ***Impact on Vegetative Cover***

The Project will be implemented in an area already affected by human activities, where ruderal vegetation prevails. No valuable or rare plant species have been observed or reported at the site.

#### ***Impact on Wildlife***

Operation of construction machinery and the presence of construction personnel will cause temporary displacement of some mammal and bird species from the area.

The main disturbance factors will be noise from operating machinery, movement of people and vehicles and outdoor illumination.

It is also possible that some species will be lost within the area as a result of poaching.

### **3.5.6 Assessment of Impact of Harmful Physical Factors**

Construction works, operation of diesel generators and mobile machinery and vehicle traffic will potentially cause significant **noise impact** on the wildlife and the personnel's health. In order to avoid the impact, the works should be carried out in compliance with the applicable regulatory OHS requirements.

In general, the noise sources will cause noise pollution during the construction process on a local scale and not simultaneously.

Impact of **vibration** will be of local magnitude and limited to the construction sites.

No potential sources of **radioactive contamination** have been identified. In general, any changes in the radiological situation will be insignificant in comparison with the fluctuations of the baseline values.

**Impact of electromagnetic fields** might be caused by communications systems and operation of transformer substations and alternators of internal-combustion engines. It is unlikely that any electric equipment will be used, which causes strong electromagnetic fields, or any superhigh frequency (SHF) emission sources. No high voltage (500-700 kV) power networks causing intense impacts will be used.

The most significant impact of **illumination** can take place on roads, where death of birds and mammals will be possible, when they come into the light beam of vehicles. However, the scale of this impact will be minimal.

### **3.5.7 Assessment of Impacts on Land Use and Residential Areas**

No adverse impact of the Project on any residential areas is expected because of the remote location of the site.

### **3.5.8 Impacts on Socioeconomic and Cultural Environment**

Due to the absence of any sites of cultural, historical or architectural significance near the Project site, no adverse impacts on such sites are expected.

### **3.5.9 *Assessment of Impacts on Special Protected Nature Territories***

The construction work associated with closure of the Kular tailings will not cause any adverse impacts on the Omoloy protected nature area because of its far location from the site.

### **3.5.10 *Brief Analysis of Potential Accidents and Emergency Situations and Their Magnitude***

With respect to potential industrial accidents, most hazardous during the construction phase are storage tanks used for storage of potentially hazardous flammable substances (diesel fuel).

Industrial accidents can also take place in connection with:

- Demolition of the abandoned gold mill building;
- Operation of construction machinery;
- Traffic of vehicles.

The scale of such accidents may be rated as local and their consequences can be promptly addressed.

After the completion of construction and land remediation, all adverse impacts will become close to zero and, at the same time, environmental and social benefits of the Project implementation will be ensured (see Section 2.6 below).

## **3.6 *EXPECTED ENVIRONMENTAL AND SOCIAL BENEFITS OF THE PROJECT***

Implementation of the Project will ensure closure of the tailings of the former Kular gold mill which is currently a source of contamination of the Omoloy River basin posing serious threat to the fish resources in the river, as well as to the Omoloy nature reserve and health of residents of Khaiyr indigenous village.

The closure of the Kular tailings will enable to use the reclaimed land as reindeer pasture.

The target indicators for assessing the project performance are:

- Reduction in the release of chemically contaminated surface waters to the Omoloy River basin, including:
  - Termination of discharge of contaminated water from the tailings via the siphon outlet;
  - Minimization of seepage through the retaining dam body.

- Closure of the tailings based on sound environmental and health & safety principles, ensuring:
  - Land remediation with subsequent restoration of it for use as reindeer pasture;
  - Restoration of favourable conditions for natural vegetation growth and wildlife habitats;
  - Possibility for people to visit the area without any limitations.

### **3.7 NATIONAL AND INTERNATIONAL ENVIRONMENTAL PRIORITIES COMPLYING WITH THE OBJECTIVES AND TARGETS OF THE PROJECT**

Measures for closure of the Kular tailings agree with the main objectives and goals of the Strategic Action Programme for Protection of the Russian Arctic Environment (SAP-Arctic) approved by the Maritime Board of the Russian Government on 19.07.2009.

Within the framework of the main long-term goal of SAP-Arctic, i.e. implementation of measures for prevention, elimination and abatement of consequences of negative environmental impacts in the Russian Arctic, the Project addresses a number of issues within two main components of the SAP-Arctic, namely:

- Prevention and abatement of pollution of the coastal and marine environments in the Russian Arctic, including the transboundary transport of pollutants with aquatic and atmospheric flows oil, chemical, and radiation contamination;
- Conservation and improvement of the quality of the environment, living conditions of the small indigenous people and conditions for traditional nature use by native small nations of the North.

Under the first component, the Project follows the following objectives:

- Reducing the negative environmental impacts in the hot spots in the Russian Arctic;
- Developing/improving financial and economic mechanisms for attracting investments to solve environmental problems in the Russian Arctic;
- Developing international cooperation among the Arctic countries in the area of environmental protection in the Russian Arctic.

Under the second component, the following main objectives will be reached (in particular with respect to remedying past environmental damage on land and in the coastal zone of the Arctic seas):



- Expanding public-private partnerships to improve effectiveness of environmental protection;
- Developing and implementing investment projects aimed at remedying past environmental damage on land and in the coastal zone of the Arctic seas;
- Using the existing and developing new international instruments for attracting investments into the implementation of environmental projects in the Russian Arctic.

The Project also agrees with the main objectives of the Government Policy in the Arctic defined in the Basic Provisions for the National Policy of the Russian Federation to 2020 and onwards (approved by President on 18.09.2008). In particular, in the field of environmental safety the Project aims at one of the main objectives of the Russian Arctic Policy, i.e. conservation and protection of the natural environment in the Arctic, elimination of environmental consequences of human activities under the conditions of intensification of economic efforts and global climate change. The Project shall ensure the following measures in order to reach the goals of the Russian Arctic Policy in the field of environmental safety in the Russian Arctic region:

- Remediation of natural landscapes;
- Processing of toxic industrial wastes;
- Ensuring of chemical safety.

The need for measures aimed at clean-up of environmental liabilities and remediation of areas in critical environmental condition, efficient control of threats to environmental safety and establishment of economic instruments for environmental liability clean-up is defined in the Programme of Socioeconomic Development of the Russian Federation on a Medium-term Perspective (2006-2008) approved by the Government Decree No. No.38-r dated 19.01.2006. The Programme sets out the following essential objectives of the governmental environmental policy:

- Efficient control of threats associated with deterioration of the environmental situation in connection with an increase in industrial waste generation;
- Implementation of measures for remediation of the areas in critical environmental condition, including governmental support for any work aimed at reducing the past environmental liabilities;
- Creation of economic instruments and mechanisms for clean-up of past environmental liabilities and appropriate compensation.

The closure of the Kular tailings is one of the targets defined in the sub-programme “Mothballing of Tailings” under the governmental target-oriented programme “Environmental protection in the Republic of Sakha (Yakutia) in 2007-2011”. This sub-programme is aimed at ensuring safety of abandoned tailings of closed mines, in particular, the tailings of the Deputatsky GOK, the Kular gold mill, and the Lebedinskaya gold mill, as well as environmental safety of the adjacent areas.

The sub-programme includes, *inter alia*, also the following measures:

- Completion of the design studies for mothballing of tailings of closed mining operations;
- Mothballing and remediation of tailings.

The sub-programme’s target indicators include the following results:

- Tailings mothballing and remediation project designs;
- Industrial and environmental safety of tailings;
- Elimination of threats for the local residents living in the vicinity of tailings.

### **3.8 STAKEHOLDER ENGAGEMENT PROCESS**

#### **3.8.1 Administrative and Supervisory Organizations**

- **Government of the Republic of Sakha (Yakutia) and Administration of Ust-Yansk Ulus (District) Municipality**

Approvals relating to land issues, compliance with the objectives defined in the sub-programme “Mothballing of Tailings” within the governmental target-oriented programme “Environmental protection in the Republic of Sakha (Yakutia) in 2007-2011”.

- **Governmental organization “Executive Directorate for Elimination of Consequences of Spring-time Floods and Organization of Restoration Work in the Republic of Sakha (Yakutia)”**
- Legal successor of KularZoloto
- **Ministry of Environmental Protection of the Republic of Sakha (Yakutia)**

Surveillance measures, permitting documents, state environmental review of projects at the regional level, environmental monitoring.

- **Department of the Federal Service for Supervision of Natural Resource Usage of the Republic of Sakha (Yakutia)**  
*(RosPrirodNadzor)*

Supervision over environmental protection measures, approval of survey programmes, issue of permitting documents, project review, environmental monitoring.

- **Department of Water Resources Management, Lena Basin Division of the Federal Agency of Water Resources**

Approval of survey programmes and projects, issue of permits and resolutions relating to water abstraction and water use.

- **Lena Department of the Federal Service for Supervision of Environment, Technology and Nuclear Management**  
*(RosTekhNadzor)*

Surveillance functions, approval of survey programmes, licensing, permitting documents, and experts' review.

- **Yakutian Department of Hydrometeorology and Environmental Monitoring (Yakutia UGMS)**

Licensing of activities in the field of hydrometeorology and environmental monitoring, hydrometeorological review, collection of data from weather stations, provision of hydrometeorological data, performance of hydrometeorological surveys, and participation in monitoring programmes.

- **Yakutian Subsidiary of the Territorial Data Fund for the Far Eastern Federal Region, RF Ministry of Natural Resources**

Collection of archive data.

- **Territorial division of the Federal Service of State Statistics for the Republic of Sakha (Yakutia) (RosStat)**

Collection of statistical archive data.

- **Far Eastern Service for Supervision over compliance with legislation in the field of cultural heritage conservation (RosOkhranKultura)**

Approvals and collection of archive data.

- **Border Guard Service, Federal Security Service of Russia**

Approval of performance of surveys and other activities, issue of permits for entry of foreign citizens.

### 3.8.2 *Non-governmental organizations potentially operating in the area*

#### *International and National NGOs:*

- Greenpeace-Russia;
- WWF-Russia;
- International Union for Conservation of Nature-Russia;
- Socio-Ecological Union International (SEUI);
- Commission of the Public Chamber for ecological safety and environmental protection;
- Alliance of public organizations – Russian Ecological Congress (REC);
- Green Patrol;
- Russian Society of Ecological Economics (ROEE).

#### *Regional organizations NGOs:*

- **Center for Environmental Education of the Republic of Sakha (Yakutia) – Eige**

A non-governmental organization promoting and implementing environmental education and research programmes (public environmental monitoring, consulting, publishing, etc.) and supporting public initiatives for sustainable development of the civil society in the Republic of Sakha (Yakutia).

- **Public Environmental Center of the Republic of Sakha (Yakutia)**

The oldest public environmental organization in the Republic of Sakha (Yakutia). Currently, it performs public environmental monitoring of the construction of the trunk oil pipeline East Siberia – Pacific Ocean, major hydropower projects, and environmental impacts of the diamond and gold mining operations.

- **Yakutian division of the Russian Nature Conservation Society**

Projects on environmental education, public environmental surveillance, public environmental review of projects, etc.

- **Public Environmental Monitoring Network of the Republic of Sakha (Yakutia)**

Public environmental monitoring of conditions in residential areas, forests, water bodies, as well as supervision over environmental performance of enterprises using natural resources.

- **Association of Evenkis in the Republic of Sakha (Yakutia)**

Restoration and conservation of Evenki culture and language, activities aimed at expanding local self-government of Evenki communities, protection of legal rights of indigenous ethnic minorities in the Republic of Sakha (Yakutia).

### **3.8.3 Potential Sponsors**

- **Ministry of Natural Resources and Environment of the Russian Federation**

Evaluation of the PINS using criteria developed under the Elimination of Past Environmental Liabilities in Russia project, approval of putting the Kular project on the list of PEL sites requiring urgent actions to eliminate historic pollution.

- **World Bank**

Co-financing of the Elimination of Past Environmental Liabilities in Russia project.

- **Nordic Environmental Finance Corporation (NEFCO)**

Fund Manager of the Arctic Council's Project Support Instrument which is likely to be used to finance development of pre-feasibility studies, environmental impact assessments, business plans, financing plans, technical projects, tender documents or supplies of equipment and services for the project.

The Project Developer and potential beneficiary is the State Organization (GU) “Executive Directorate for Elimination of Impacts of Spring-time Flood and Organization of Restoration Work in the Republic of Sakha (Yakutia)” (hereinafter referred to as the Executive Directorate, or ED).

The Executive Directorate was established in conformity with the Civil Code of the Russian Federation and pursuant to Decree No.1416 dated 22.05.2001 by the President of the Republic of Sakha (Yakutia) “On priority measures for economic recovery, indemnification of damage and protection of residential areas against natural disasters in connection with the spring-time flood of 2001”. It reports to the President and the Government of the Republic of Sakha (Yakutia), as well as to the Special Commission for Restoration Work in the city of Lensk and other residential areas of the Lensk Ulus (District).

The founder of the Executive Directorate is the Republic of Sakha (Yakutia). The functions of the founder in relation to the objectives, subject and type of activities and guidance of the Executive Directorate are performed by the President’s Administration and the Government of the Republic of Sakha (Yakutia); the functions relating to the Directorate’s property management are performed by the Ministry of Property Management of the Republic of Sakha (Yakutia), within the framework of their competence defined in the relevant legal acts specifying their status.

The main objective of the Executive Directorate is to coordinate and guide the work addressing consequences of floods, mobilize and use on a centralized basis the material, technical and financial resources allocated for restoration of vital facilities in residential areas affected by floods in the Republic of Sakha (Yakutia).

The Executive Directorate plans its activities and outlines the prospects for future operations in coordination with the President’s Administration and the Government of the Republic of Sakha (Yakutia).

The Executive Directorate is obliged to:

- consider and submit for approval to the President’s Administration and the Sakha Government all documents relating to industrial activities and social development;
- provide compensation for damage caused by any unsustainable use of land and natural resources, non-compliance with the safety rules, sanitary norms and requirements to protection of health of personnel and consumers of products.

The tasks to be fulfilled by the Executive Directorate include the following:

- implementation of measures aimed at preventing negative impacts of floods on residential areas;
- coordination of various aspects of investment and construction policy within the framework of the activities performed by the Executive Directorate;
- acting as a state client and developer in relation to facilities being constructed under federal and regional target programmes, and arrangement of emergency response and restoration work in the Republic of Sakha (Yakutia);
- participation in development and implementation of joint programmes and projects on prevention of, and response to, adverse impacts of floods in the Republic, including those implemented at the federal level; and
- implementation of measures aimed at ensuring environmental safety of hydraulic engineering facilities.

Within the framework of the above objectives the Executive Directorate ensures coordination of restoration work relating to motor roads, communications lines, residential properties and social facilities (such as hospitals, schools, pre-school educational institutions). Emergency response and restoration activities and measures for flood prevention are performed by external contractor organizations commissioned on the basis of tenders and in accordance with the Federal Law “On Placement of Orders for Supplies of Goods, Execution of Work and Provision of Services for Needs of the State” (No.94-FZ). The Executive Directorate also manages budget spending allocated as compensations for residents (certificates for housing, social benefits) and for state and municipal organizations (on a gratuitous basis) affected by floods.

The activities of the Executive Directorate are supervised by the President’s Administration and the Government of the Republic of Sakha (Yakutia), taxation and other agencies.

In the course of the permitted independent commercial activities, the Executive Directorate manages at its own disposal the profits obtained from its operations and property acquired at the cost of such profits which are accounted for on an independent basis within its overall accounting system.

**The legal details of the Executive Directorate:**

Full name:	Governmental organization “Executive Directorate for elimination of consequences of spring-time flash floods and organization of restoration work in the
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	Republic of Sakha (Yakutia)”
Legal address:	13, Kirova Street, City of Yakutsk, 677022
Actual address:	11, Kirova Street, City of Yakutsk, 677022
Telephone/Fax:	Telephone: +7 (4112) 43 51 85 Fax: +7 (4112) 42 06 86
e-mail:	<a href="mailto:pavodok@gov.sakha.ru">pavodok@gov.sakha.ru</a>
State registration certificate of a legal entity:	No. 3845 dated 27.06.2001
OGRN	1021401058722
INN	1435120440
KPP	143501001
Director	Mr. Vladimir Lyubchenko
Chief accountant	Ms. Olga Voloshkina

### **Structure of financial and commercial operations of the Executive Directorate**

The property of the Executive Directorate is state-owned property of the Republic of Sakha (Yakutia) and is allocated to the Executive Directorate for operative management.

The sources of property and financial resources are as follows:

- budget and extrabudgetary funds;
- Profits obtained from services provided and other types of activities performed by the Executive Directorate;
- Depreciation deductions;
- Other sources in accordance with the applicable Russian and Sakha legislation.

In the process of the operative management the Executive Directorate is obliged to:

- utilize the available property in an efficient way;



- ensure good condition of the property and prevent any deterioration of its technical condition (except for rated depreciation);
- avoid transactions, which result in alienation or burdening of the property allocated for the needs of the Executive Directorate.

Any property can be withdrawn in the following cases:

- Liquidation or restructuring of the organization;
- Failure to use any property or its use for purposes other than prescribed.

The Executive Directorate has a license for construction of buildings and structures of Categories I and II of responsibility in accordance with the relevant state standard within the territory of the Russian Federation.

### **Legal basis for assigning the tailings of the Deputatsky GOK to the Executive Directorate**

Pursuant to Para. 1 of the Decree by the Sakha Government No.1419-r of 12.11.2005 “On Measures Aimed at Ensuring Environmental Safety of Hydraulic Engineering Facilities of the Lebedinskaya Gold Mill, Kular Gold Mill and the Deputatsky GOK” the Sakha Ministry of Property Management issued an order (No.R-44 dated 18.01.2006) for transfer of the hydraulic engineering facilities of the above enterprises to the balance sheet of the Executive Directorate (see Appendix A to ERM Stage 3 Report under this Contract). On the basis of that order the tailings was turned over to the Executive Directorate for operative management in accordance with an acceptance act dated 16.01.2007 (Appendix A) with the following estimate (in roubles):

Balance-sheet value	1,504,232.00
Depreciation	123,000.00
Salvage value	1,381,232.00

## 5 SUBSTANTIATION OF INVESTMENTS AND FINANCING PLAN

### 5.1 TOTAL COST OF THE PROJECT

The total cost of the Project has been estimated preliminarily at approximately 3,000,000 Euros.

### 5.2 PRELIMINARY PHASES FOR PROJECT IMPLEMENTATION AND BREAKDOWN OF THE PROJECT BUDGET

It is assumed that the Project will be implemented in three phases (taking into account the work already commenced in relation to the design development for the tailings closure and reclamation financed from the regional budget):

- Phase 1 (1<sup>st</sup> – 2<sup>nd</sup> year of Project implementation): surveys and preparation of design and engineering documentation, including an environmental protection section in international format;
- Phase 2 (3<sup>rd</sup> year of Project implementation): implementation of preparatory, engineering and construction measures and site remediation;
- Phase 3 (4<sup>th</sup> – 9<sup>th</sup> year of Project implementation): an integrated set of final reclamation operations and measures for long-term monitoring.

Ser. Nos.	Tentative deadline	Component	%% of the total amount of financing/ cost (Euro)	Source of financing
	1 <sup>st</sup> – 2 <sup>nd</sup> year of Project implementation	Development on the basis of this PINS and approval of a detailed declaration of intent	0.1/3,000	Extrabudgetary
	1 <sup>st</sup> – 2 <sup>nd</sup> year of Project implementation	Preliminary assessment of the scope and time schedule of the work and development of a detailed plan for involvement of interested parties (stakeholders)	0.1/3,000	Extrabudgetary
	1 <sup>st</sup> – 2 <sup>nd</sup> year of Project implementation	Development and implementation of a monitoring programme for all phases of the Project	0.5/15,000	Extrabudgetary
	1 <sup>st</sup> – 2 <sup>nd</sup> year of Project implementation	Performance of baseline and engineering environmental surveys	4/120,000	Extrabudgetary

Ser. Nos.	Tentative deadline	Component	%% of the total amount of financing/ cost (Euro)	Source of financing
	1 <sup>st</sup> – 2 <sup>nd</sup> year of Project implementation	Engineering topographic and engineering geological (geotechnical) surveys	1.5/45,000 *	Budget
	1 <sup>st</sup> – 2 <sup>nd</sup> year of Project implementation	Preparation of design and engineering documentation for all object involved in the Project and adjustment of the Project design to bring it into compliance with the relevant international requirements	1.7/50,000 * 0.6/20,000	Budget Extrabudgetary
	1 <sup>st</sup> – 2 <sup>nd</sup> year of Project implementation	Development of environmental protection sections and plans in conformity with the applicable international format	1/30,000	Extrabudgetary
	1 <sup>st</sup> – 2 <sup>nd</sup> year of Project implementation	Public consultations and hearings	0.5/15,000	Extrabudgetary
	1 <sup>st</sup> – 2 <sup>nd</sup> year of Project implementation	Arrangement needed to obtain required licenses, approvals and permits	0.7/19,000	Extrabudgetary
	1 <sup>st</sup> – 2 <sup>nd</sup> year of Project implementation	Supplies of required equipment and machinery	10/300,000	Extrabudgetary
	3 <sup>rd</sup> year of Project implementation	Preparatory, engineering and construction work at the tailings, including drainage and treatment of accumulated contamination water	43.3/1,300,000	Extrabudgetary
	3 <sup>rd</sup> year of Project implementation	Measures for the site remediation	25/750,000	Extrabudgetary
	4 <sup>th</sup> – 9 <sup>th</sup> year of Project implementation	Finishing reclamation work	5/150,000	Extrabudgetary
	4 <sup>th</sup> – 9 <sup>th</sup> year of Project implementation	Development and implementation of a monitoring programme for the period after the completion of the project	6/180,000	Extrabudgetary
		<b>Total:</b>	<b>100/3,000,000</b>	

\* RUR/Euro exchange rate 1/45 was assumed for the calculations.

### **5.3 SOURCES OF FINANCING IDENTIFIED**

In identifying potential sources of financing for the Project, a number of factors critical for potential sponsors were taken into consideration as follows:

- Non-commercial nature of the Project which is basically unprofitable from the perspective of potential investments;
- Gaps in legal and regulatory base for the public finance of measures on elimination of environmental liabilities in Russia at the moment of preparation of the PINS;
- Lack of a uniform methodology for the risk assessment of environmental liability sites, and
- Limited regional budget financing.

#### **5.3.1 Sources of Budget Financing**

The Project will be financed partially from the budget of the Republic of Sakha (Yakutia). The amount of budget financing is indicated in the state target programme “Environmental protection in the Republic of Sakha (Yakutia) for 2007-2011” and is approximately 95,000 Euros.

During the meeting with Mr. Andrei Peshkov of the Russian Ministry of Natural Resources and Environment and Mr. Vassili Rodionov of the World Bank in the World Bank office in Moscow on February 11, 2010 regarding potential funding of the Project under the the Elimination of Past Environmental Liabilities in Russia project, it was noted that evaluation of this PINS was necessary using criteria of environmental liability inventory that are currently being developed in the framework the Elimination of Past Environmental Liabilities in Russia project.

In case priority PEL elimination measures are considered necessary as a result of such evaluation, budget funding for the Project can be made available in the course of 2011 to 2012.

#### **5.3.2 International Financing Sources**

Following discussions with Mr. Henrik Förström and Mr. Amund Beitnes of NEFCO held in August 2009 to February 2010, it was confirmed that the Project is in line with the priorities of the Arctic Council’s Project Support Instrument which will be managed by NEFCO as soon as the PSI is commissioned in the first half of 2010.

This PINS has been submitted to NEFCO and is currently under review in the PSU Unit headed by Amund Beitnes.

#### 5.4 ORGANIZATIONS TO BE INVOLVED IN PROJECT IMPLEMENTATION

The Project Developer (Beneficiary) will act through the Executive Directorate / Project Coordinator. Organizations for execution of the work will be commissioned by the Project coordinator on the basis of sub-contracts for implementation of individual components of the Project:

1. During Phase 1, relevant research and design organizations will be commissioned on the basis of a tender:

- **Sprint LLC**

Project Design development for the tailings closure.

- **Yakutian Trust for Engineering and Construction Surveys (YakutTISIZ)**

Engineering surveys

- **Nikolay Chersky Northern Mining Institute of the Siberian Division of the Russian Academy of Sciences**

Participation in engineering surveys and design development work

- **Permafrost Research Institute, Siberian Division of the Russian Academy of Sciences**

Participation in engineering surveys and design development work

- **International engineering consulting company**

Project management, technical design development

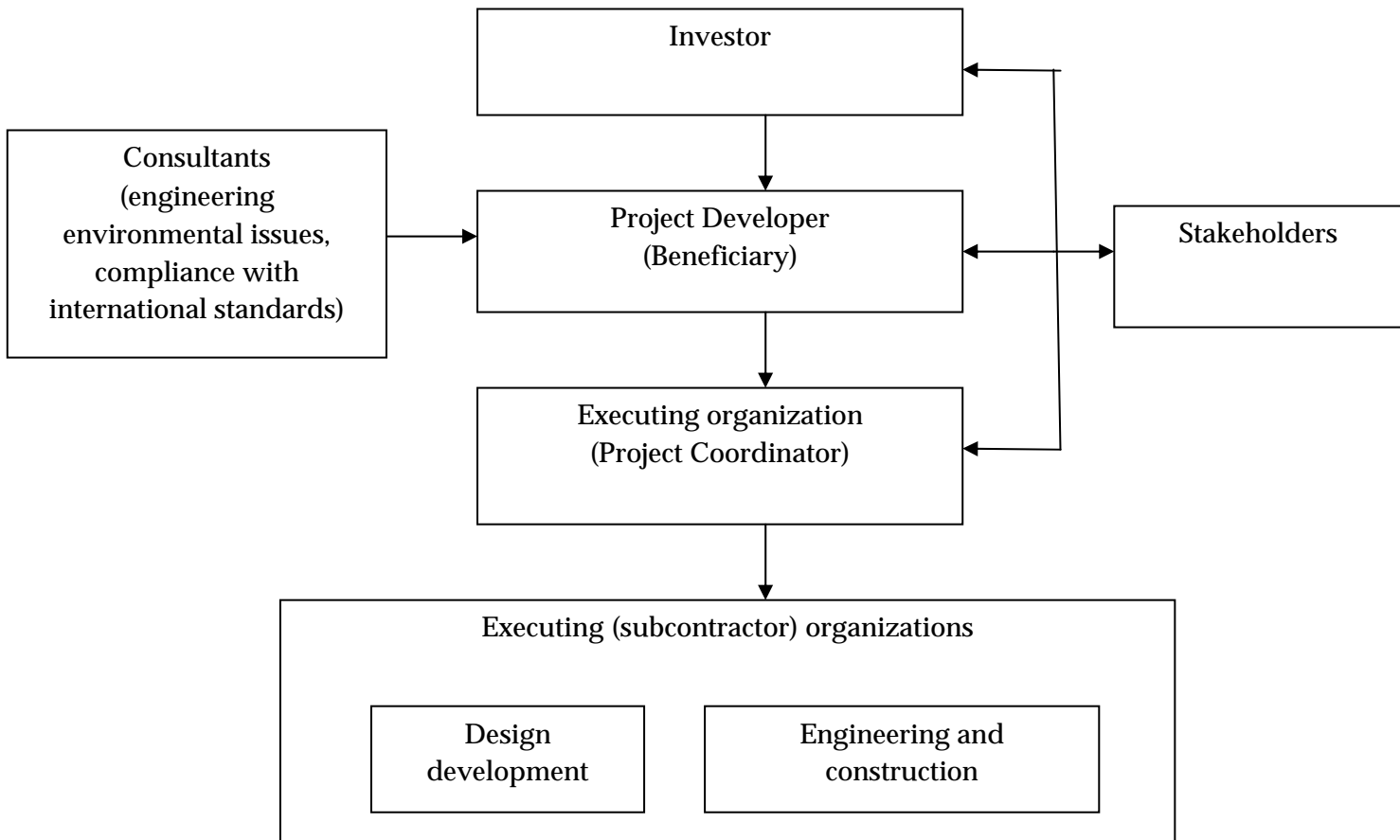
- **International engineering consulting company**

Participation in raising of international financing, arrangement and coordination of baseline and engineering environmental surveys, preparation of environmental sections of the Project design documentation in Russian and international formats.

2. During Phase 2 and partially Phase 3 (integrated final reclamation work), relevant research engineering and construction firms and organizations will be commissioned on the basis of an open tender.

3. Monitoring within the scope of Phase 3 will be performed by the staff of the district inspection division of the Rospotrebnadzor Agency with target-oriented financing and with participation of recommended duly accredited laboratories.

The Project management structure is schematically shown in Figure 4.1.



**6**      ***FINANCIAL AND ECONOMIC INDICATORS OF THE BENEFICIARY***

This information can be obtained from the NPA Arctic Project Office or from the Executing Agency

7.1 *ISSUES REQUIRING SPECIAL ATTENTION IN THE PROCESS OF THE PROJECT PLANNING*

7.1.1 *Financial and Economic Aspects*

- Remote location of the Project area in relation to main transport networks (there is only a single all-year road Severnyi – Kular; connection to the city of Yakutsk: by river in summer and winter road in winter);
- High transportation cost and seasonal character of logistics plans;
- High operating costs;
- Need for a reliable mechanism for supervision over the target-oriented spending of the available financing.

7.1.2 *Technical Aspects*

- Extremely severe operating conditions for materials, equipment and machinery.

7.1.3 *Institutional Aspects*

- Governmental purchase procedures are not open and not transparent.
- State border zone with certain limitations.

7.1.4 *Environmental Aspects*

- The current wastewater discharge to a surface water body (the Nettik Stream) without permits, including approved NDS document and a Decision for use of a water body, which is a serious non-compliance with the applicable environmental legislation;
- Vulnerability of tundra ecosystems;
- Long winter period with harsh weather conditions;
- Presence of abandoned potentially toxic chemicals.



### **7.1.5 Social Aspects**

- The area is located within the outlines of the land designated for traditional use by the indigenous ethnic community.

## **7.2 MAIN RISKS AND MITIGATION MEASURES**

### **7.2.1 Main Risks**

The following risks are associated with implementation (non-implementation) of the Project and able to have a significant effect on the outcome of the Project:

*Financial and Economic Risks:*

- Lack of interest from identified potential donors;
- Decision of one or several sponsors to give up the Project;
- Shortage of the funds originally planned in the budget; unpredicted increase in the cost of the Project.

*Social risks:*

- Lack of skilled labour among the permanent residents of the region.

### **7.2.2 Risk Mitigation Measures**

The implementation of the Project implies the following measures for mitigating the identified risks:

*Financial and Economic Measures:*

- Consultations with a wide range of potential donors with due consideration of the geographic aspects of their financial assistance (conducted by ERM at the PINS preparation stage);
- Development and approval of an acceptable time schedule of payments, elaboration of a procedure and timely adjustment of plans relating to financing of the Project;
- Expansion of the mechanisms of the state/private partnership and encouragement of involvement of national and foreign investors;
- Attraction of reputable design development organizations and contractors for preparation of Project design and engineering documentation and for supply of equipment;

- Obtaining of guarantees of target-oriented spending of the raised funds from the RS (Ya) Government.

*Social risk mitigation measures:*

- Employment of skilled personnel for implementation of the Project.

***FIGURES***

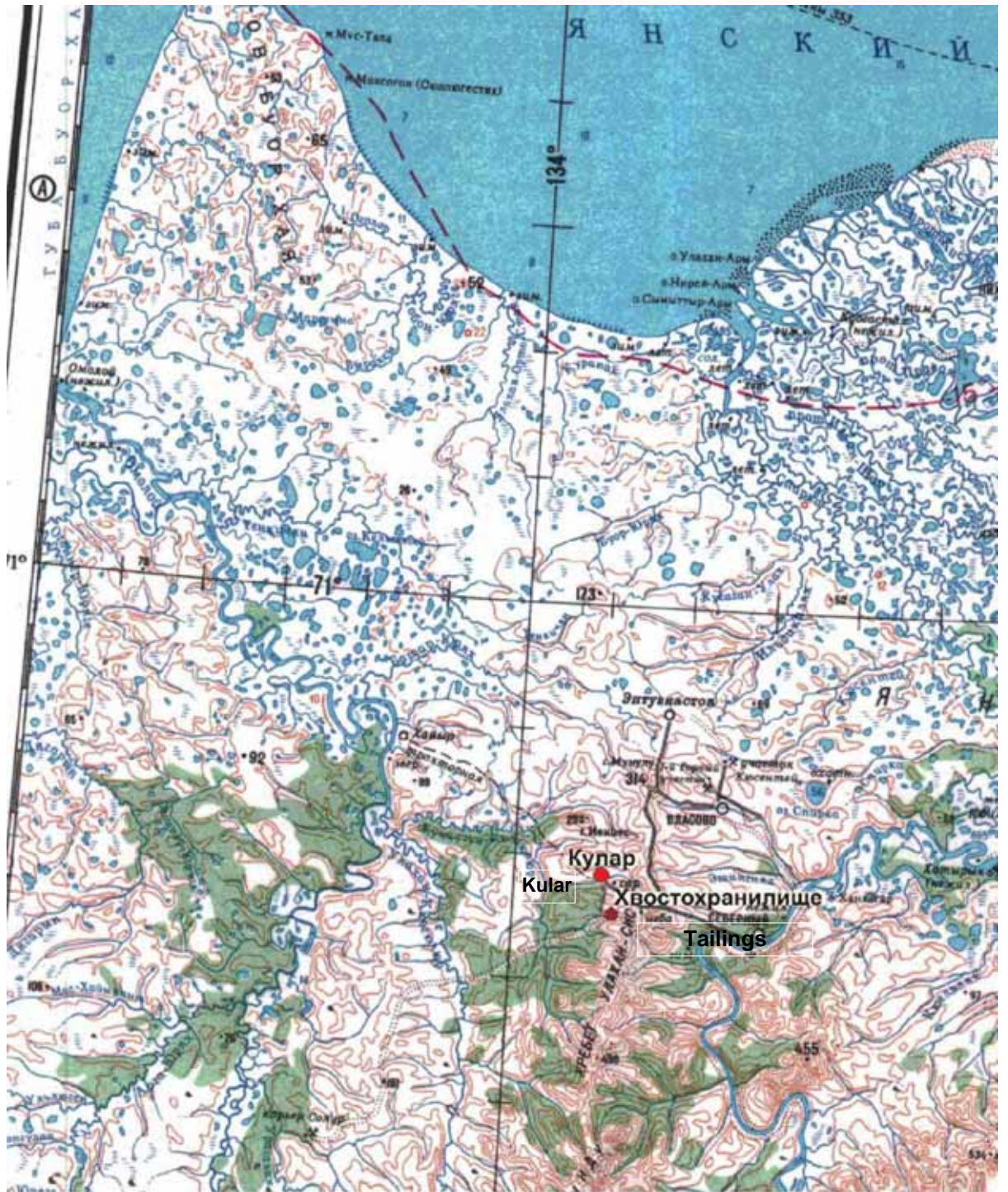
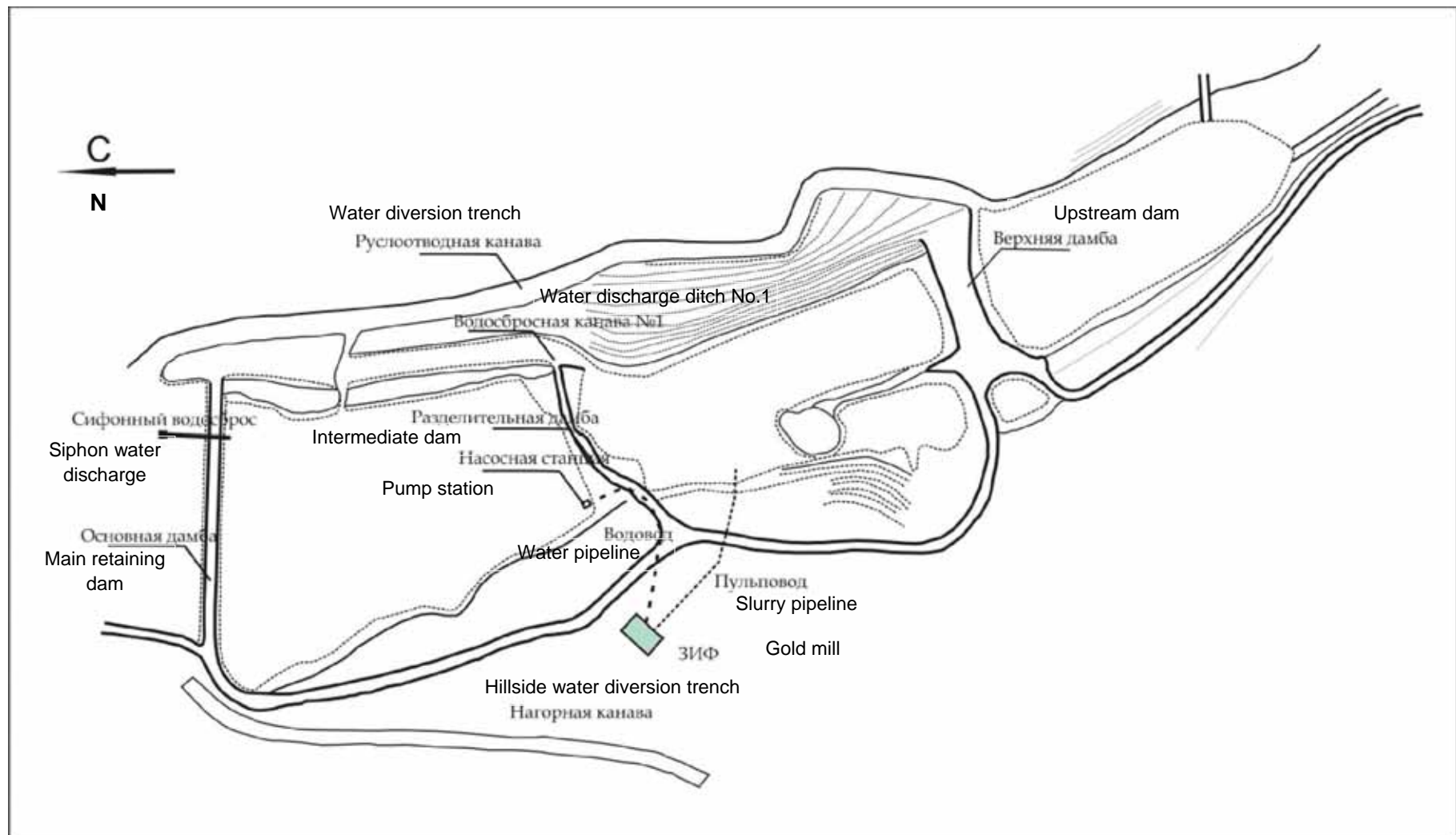


Figure 1.1. Location of the Kular gold mining area



**Figure 1.2. Schematic layout of the tailings of the Kular gold mill**

*PHOTOLOG*

*Photo 1 Building of the abandoned Kular gold mill*



*Photo 2 View of the lower section of the Kular tailings and metal scrap dump site*



*Photo 3 Upper section of the tailings*



*Photo 4 Intermediate dam built of peaty ground*





*Photo 5 Lower section of the tailings with the non-operational pump station*



*Photo 6 Metal scrap dump site on the tailings bank*



*Photo 7 Subsidence blocks in the main retaining dam, where the ground slides into the tailings*

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*Photo 8 Unauthorised area for storage of abandoned potentially hazardous chemicals at the gold mill site*

