Sual Komi B.V.

Komi Aluminium Project

Executive Summary of Phase 1(a) Environmental Assessment Documentation

MIDDLE TIMAN BAUXITE MINE

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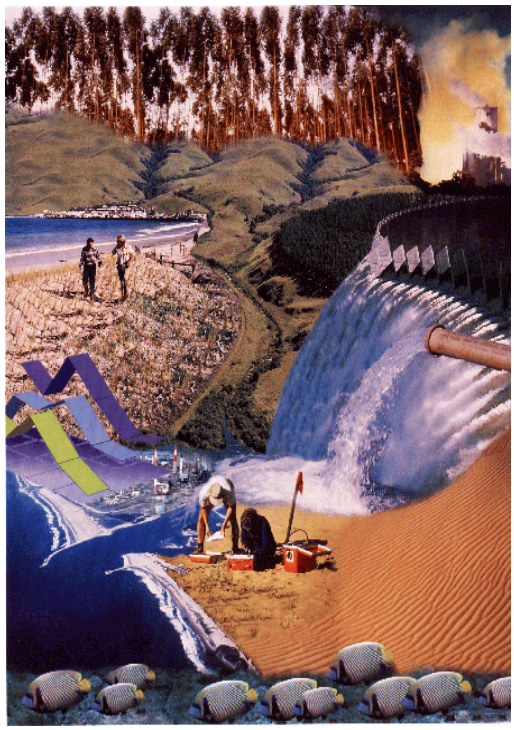

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1 INTRODUCTION AND OVERVIEW

SUAL Komi B.V. (SUAL Komi), a member of the SUAL group of companies (SUAL) controlled by SUAL International Limited, is currently contemplating an integrated aluminium production development in the Komi Republic, Russian Federation. The project, which is known as the 'Komi Aluminium Project', is made up of three broad phases namely:

- Phase 1
    - 1a – continued expansion of the Middle Timan Bauxite Mine (MTBM) to 2.5 million tonnes per year. It is anticipated that this will be achieved in mid-2004.
    - 1b – additional expansion to 6.0 million tonnes per year. It is anticipated that this expansion will commence in 2005 and be completed by 2007.
- Phase 2 – Reviewing the potential for construction of an Alumina Refinery at Ukhta or Sosnogorsk with proposed capacity of 1,400,000 tonnes per year. This potential project will commence in 2004.
- Phase 3 - Reviewing the potential for construction of an Aluminum Smelter at Pechora with a proposed capacity of 300-500 ktpa. The potential construction timeframe has not yet been decided.

As part of this proposed expansion, the European Bank for Reconstruction and Development (EBRD) and the International Finance Corporation (IFC) have been requested by SUAL Komi to extend a loan for a phased project. IFC's policy on environmental assessment (OP 4.01 – Environmental Assessment), and similar EBRD policies states that all projects proposed for IFC/EBRD financing require an Environmental Assessment (EA) to ensure that they are environmentally and socially sound and sustainable. The breadth, depth and type of environmental assessment varies according to the type of the project. This proposed phased investment has been categorized as an A project.

At SUAL's request, IFC/EBRD has hired the CSIR, a South African based research and development company with extensive experience in the aluminium industry, to conduct an Environmental and Social Due Diligence audit as the first step in evaluating the environmental and social consequences of the MTBM expansion project. The audit has been concluded with an environmental and social action plan (ESAP), developed to mitigate negative impacts and enhance positive impacts of the operations, together with a Public Consultation and Disclosure Plan (PCDP) for the proposed mine expansion (from current level of 1.0 mtpa up to 6.0 mtpa).

The purpose of this executive summary is to provide a summary of the above-mentioned documents together with a summary of the previous Russian language EA document (i.e. OVOS) that was completed at MTBM for an expansion to 2.5 mtpa. In addition it must be noted that a public consultation and disclosure strategy is being developed currently for the later phases of the Komi Aluminium Project (specifically the possible refinery and smelter), and this will be disclosed in the near future.

2 THE MIDDLE TIMAN BAUXITE MINE

The Middle Timan Bauxite Mine (MTBM) was established in 1996 in the northern part of the Knyazhpogost District, near the boundaries of the Ust-Tsilemskoye and Udorskoye Region in the Republic of Komi (Fig. 1). The nearest village is Chin'yavoryk (approximately 150 kilometers from the mine). The closest large city is Ukhta (150 km southeast of the mine).

Figure 1: Map of Komi Republic, showing the districts (Knyazhpogodski highlighted) and other key locations for the purpose of this report namely Ukhta, Chin'avoryk, Emva and Syktyvkar as well as the position of MTBM.

In the initial years of the mine's operations, bauxite was transported by truck using a haul road that extends for some 160 km from the mine, to the village of Chin'yavoryk. In 2002 a railway line was completed and the bauxite is now transported by rail directly from the mine to Chin'yavoryk and from there on to the Uralsk Aluminium Refinery (UAZ) (1755 km) and the Bogoslovsky Alumina Refinery (BAZ) (1815 km).

MTBM is owned and operated by OAO Bauxite Timana (BT), which was registered on December 29, 1992 (Resolution No. 435, Knyazhpogostsky District). This registry was later updated to include the Komi Republic Government and SUAL. BT is now a subsidiary of SUAL Komi. SUAL Komi is a member of the SUAL group of companies, a major Russian integrated aluminum producer ("SUAL") currently controlled by SUAL International Ltd.

BT has held a license to mine since 1996 (License No. СЫК № 00203 ТЭ, 4/26/03) and mined almost 176,000 tonnes in 1998, its first year of full production. In 1999 the company developed a feasibility study that was approved (Approval No. 43, Komi Republic Environmental Committee, 6/15/99) for a two-phased project that included:

- An increase in production to 500,000 tonnes per year; and,
- An additional increase in production to 2,500,000 tonnes per year.

By the end of 2002 the BT had mined almost 3,000,000 tonnes (total from 1996) and is currently on pace to mine an additional 1,000,000 tonnes in 2003. Additionally, BT is proposing an additional expansion from the current, approved 2,500,000 tonnes per year to 6,000,000 tonnes per year in the context of the Phase 1b of the Komi Aluminium Project. This last phase of expansion will be commissioned only in 2005 at the earliest but is obviously an important part of the overall project, should the decision be made to proceed with the refinery and the smelter.

2.1 The mining process

The bauxite mining process is essentially an open-cast operation that is made up of six key activities. These activities are

- Development drilling - in which the area to be mined is defined as a function of the ore body contours.
- Overburden stripping – in which blasting is used to break up the overburden before it is excavated and loaded mechanically for removal to temporary overburden piles.
- Bauxite mining – in which the ore mass is broken up by blasting and then excavated by mechanical excavators and loaded onto trucks for transport.
- Transport – in which the bauxite is transported from the mine pit to the central blending yard.
- Blending – in which oversize bauxite is separated and crushed, and different grades of bauxite blended before being loading into rail cars for transport to the refineries
- Transport to the refineries to be processed to produce alumina.

There is no *in situ* rehabilitation of the mine workings as a result of the need to access different part of the mine face in response to the requirements for different ore grades. The overburden and topsoil are stockpiled for later return to the mine pits. Mine infrastructure consists of the mining pits, overburden stockpiles, a road network within the mine, the central blending yard and rail siding, living quarters (and kitchen), maintenance facilities and workshops (central industrial area), an artesian well that supplies water to the mine, wastewater treatment facility and explosives storage. Off-site infrastructure includes the mine access road and the railway line which includes a bridge over the Vym' River.

2.2 Environmental and Social Baseline

The Komi Republic is situated in north-eastern Russia on the eastern side of European Russia. It is bordered on the east by the Polar Ural Mountains, on the north and west by the Arkhangelsk oblast (province), and on the south by the Kirov and Perm provinces. Komi has an area of 415,900 km2 with the geographical center of the republic at 54°16' E and 63°53' N. The capital of the republic is Syktyvkar which has a population of 230,000 people. Komi has a population of 1,228,100 (1994 estimate), some 75 per cent of whom live in the main urban areas including Vorkuta, Ukhta, Inta, Pechora, Sosnogorsk, and Mikun.

Komi is largely flat but has highlands in the Timan mountain range and the mountains of the Northern Polar Region and the Polar Urals. The highest point of the Timan range is Chetlasskii Kaman; the highest peak in the republic (and indeed the Urals as a whole) is Mount Narodnaya (1,894 m) of the Polar Urals. Major rivers are the Pechora and its tributaries the Usa and Izhma; the Vychegda with the Sysola and the Vym; and the Mezen with the Vaska. The Pechora is the largest river in northern European Russia and is navigable for more than 1,500 km.

The climate of the region is sharply continental with temperatures reaching 34 Celsius in June and dropping to -55 Celsius in January. Annually there are 70 days per year between frosts and average temperatures are below zero for 191 days per year. Permafrost covers 13 per cent of the territory but there is no permafrost in the vicinity of the mine. At the mine, the average depth of freeze is 2.3 meters. There are 215 days per year with precipitation. The total amount of annual precipitation is 565 mm (primarily during the summer period). The land for the mine was originally classified as forestry use. When the initial reserves were approved in 1997, the land was reclassified for industrial use.

2.2.1 Geology

The area around MTBM has been explored since 1969 and consists of the Vorykvinskoya group of bauxites that developed along the axis of the northwest-southeast trending Timan topographic ridge. The deposits have formed on the north eastern flank of an anticline - an arching of the rock layers. Other bauxites, the Svetlinskoye, Valodinskoye and Zaostrovskoye groups are situated to the north west of the Vorykvinskoya group, also located on the northeast flank of the anticline.

The bauxites have formed by very intensive weathering of Pre-Cambrian basement rocks aged between 1300 and 1600 million years old. At the time of weathering, these rocks had already been eroded into a platform with a typical Karstic topography. This is because they consist of dolomites with around thirty percent of clay. Dolomites are carbonates and therefore soluble and their erosion results in a topography with sharply defined platforms, ridges and hollows which, in the Vorykvinskoya region, result in sharp topographic cliffs and a variation in elevation of the buried basement surface of up to three hundred meters.

The bauxite is not a continuous layer but a series of lenses up to ten, but generally around one to three kilometres long and from a few hundred meters to a kilometre wide. The long axis tends to have formed parallel with the anticlinal axis, (i.e., trending northwest). Ridges in the topography in the Devonian times seem to be responsible for the gaps between the lenses. This is not because they actually protrude above the bauxite layer, but is probably because they produced ridges in the water table at the time and bauxite will only form above the water table.

The thickness of the bauxite layer varies up to fifty meters but averages from four to eleven meters for individual lenses. The very thick formations have formed over depressions in the basement dolomite and are up to three hundred meters long and two hundred wide. Elsewhere the thickness tends to vary considerably with the thicker parts also formed over valleys in the basement surface. In cross sections the bauxite appears as an undulating layer of widely varying thickness.

2.2.2 Water resources

The hydrographic basin of the Vorykvinsky bauxite region belongs to the Vym River basin and includes the rivers: Vorykva, Chin'yavoryk and its left, large tributary: Cherny Creek (Fig. 2). The rivers Chin'yavoryk, Vorykva and Cherny Creek all belong to the category of waterways as small, flatland waterways. The Vorykva River begins on the southern slopes of the Chetlasski Kaman and flows south 2-5 km west of the site. The entire river length is 174 kilometers and occupies a length of 34.2 kilometers within the bauxite deposit.

The catchment area is 256.4 km^2 and has an elevation drop of 68.6 meters. The coefficient of sinuosity is 1.6 and the width is 10-15 meters in places. The river bottom is bouldery-coarse gravel and in places sandy-coarse gravel. The depth of the river during low flow does not exceed 0.7 meters in depth but there are pools that have a depth or 1.5 to 2.0 meters. The velocity of flow during low flow is 0.3 up to 0.74 meters per second. The flow of water in the summertime low flow is 1.8 m^3/hr.

Cherny Creek is a large, left tributary of the Vorykva River, which intercepts the east site of the bauxite deposit and merges with the Vorykva 33.3 kilometers from the headwaters. Cherny Creek is 13.7 km long and has a catchment of 53.4 km2. The river bed is muddy, clayey with a depth of 1-2 meters. The creek is slow-flowing and has a low flow volume of 0.08 m3/sec. The average flow at the mouth is 0.625 m3/sec. The chemical composition of the waterways in the region is characterized as bicarbonate with a predominance of magnesium or calcium. The mineralization does not exceed 0.1-0.3 g/l.

2.2.3 Ecology

Forest dominates the vegetation of the Komi Republic with 69% of its area consisting of taiga (spruce and pine forest). North of latitude 66°N the taiga is replaced by forest tundra consisting of spruce-birch light forest. The MTBM lies in a belt of forest-tundra between the tundra in the north and the taiga to the south. It contains peat bogs, spruce forests and, in some places, fir forests. The majority of the mine license area was covered with forests with primarily spruce (50%), pine (20%), and the remaining portion (30%) – larch, birch, and in the low-lying areas – dwarf birch.

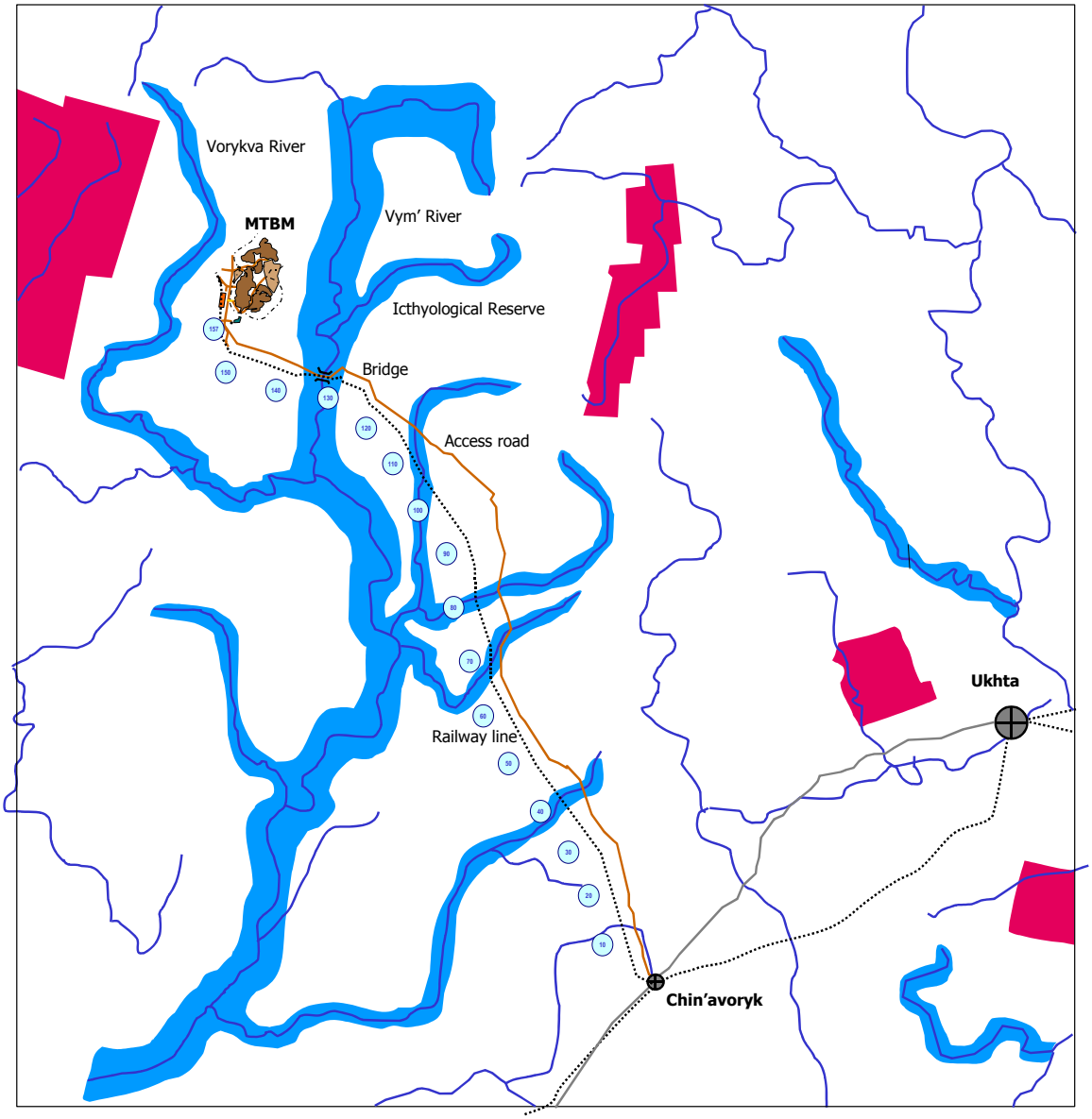

Figure 2: Map illustrating the position of the mine relative to the major river systems, the ichthyological reserve and other protected areas.

A review of the area wildlife indicates that there are near 300 species of vertebrate animals including more than 50 species of mammals and more than 200 types of birds. Additionally, there are several thousand species of invertebrates. There are many types of mammals that have a commercial significance including squirrel, beaver, Siberian chipmunk, muskrat, hare, wolf, otter, martin, weasel, fox, elk, northern reindeer and others. Birds of commercial value include the Western Capercaillie, Northern Black Grouse, Northern Hazelhen, Rock Ptarmigan, Common Goldeneye Duck, Common Merganser, and others. There were no Russian Redbook species listed in the approvals provided by the Russian regulatory authorities.

The ichthyofauna of the rivers near the deposit includes the following types of fish along the entire length: grayling, pike, perch, roach, minnow, and sculpin. Additionally, in the lower and middle reaches of the Vorykyva one finds whitefish and burbot. The sculpin is listed as a rare fish in the Russian Red Book. The river Vorykva is a main salmon spawning river in the Vymsky Basin. Every year, based on visual observations, 140-170 salmon go up the river to spawn. The fish productivity of the waterway is 0.5 fish/km^2.

2.2.4 Hydrogeology

The hydrogeology of the region is very complex. The geological cross-section can be divided into 5 water-bearing zones all having different amounts of water and with different characteristics of connectivity between each other and the surface water. Most of the hydrogeological work that has been completed to date centres around the ore bodies. Information outside of these areas is considered weak. Because of this, MTBM is currently conducting extensive hydrogeological monitoring that will be used to implement an appropriate pit de-watering program during future operations.

2.2.5 Social

Russians make up almost 60 per cent of the population of the Komi Republic, with indigenous Komi people (about 23 per cent) and Ukrainians (8 per cent) being the other major population groups. The Komi, who call themselves Komi Mort (Komi person) or Komi Voityr (Komi people), speak Komi or Zyrian, a language with several dialects that belongs to the Permian group of the Finnic division of the Ural-Altaic languages. In 1991 the Komi Republic became part of the newly independent Russian Federation and is currently governed by the Head of Komi Republic, Vladimir Torlopov and the Government of Komi Republic (and the Ministries under the Komi Government, including the Ministry of Natural Resources and Environmental Protection).

The Knyazhpogost district, in which MTBM is situated, occupies an area of 24,600 km^2 and has a population of 33,100 spread throughout 53 settlements. The district capital is the city of Emva. Knyazhpogost District is principally rural with no cities – the main settlements are the villages of Sindor, Tract, Meschura, Vet'yu, Chin'yavoryk, Seregovo, Shoshka and Knyazhpogost.

Key industries in the district are forestry and timber production, which make up some 85% of total production. Other industries include food production (4.5%), light industry (6.5%), machinery and metal-working (3.1%). There are 75 businesses registered with the Knyazhpogost Administration including MTBM, with 20 SMEs and 634 individual businessmen registered. The official level of unemployment is 3.5% (630 persons). This number includes the only the number of people that have registered as unemployed. This number does not include people that are under-employed or those that are working only on a part-time basis.

There are no communities in close proximity to the mine and the nearest formal settlement is located at Chin'avoryk. Along the access road, there is a prison where convicts are held, as well as a lower security prison 'settlement' (Makaov's Halt). People are free to move around within the settlement, but may not leave the settlement. They are generally employed within the timber industry. It is important to emphasize that no forced or convict labor is allowed and both SUAL and BT expressly prohibit forced labour in all of their activities. The social infrastructure of the area around the mine is underdeveloped and does not support any type of educational, cultural or medical facilities.

3 ENVIRONMENTAL ASSESSMENT OF THE MTBM EXPANSION (2.5 MTPA).

As described earlier, MTBM recently completed a full environmental assessment on the expansion on the mine from 1.0 to 2.5 mtpa within the Russian regulatory framework. This included a Declaration of Intention and Investment and Construction OVOSs (final SER conclusion received 1/30/03). Because the OVOS documents provide important addition information on the environmental and social context within which the expanded mine will operate, it has been decided to include an English executive summary of the OVOS for public disclosure. The executive summary (in Russian) is provided as Attachment A. A short English summary is presented in the section that follows:

3.1 Project Description

The first phase of mining (Phase 1), for which a mine plan has been developed, is designed to last 20 years, commencing in 2004 with an annual production of 2.5 million tonnes per year of bauxite (1,900,000 tonnes of Bayer bauxite, 450,000 tonnes of agglomerated bauxite, and 200,000 tonnes of refractory bauxite). It is estimated that the ore reserves that will be mined during Phase 1, are approximately half of the ore reserves that have been identified in the area of the mining license. During this time, the total overburden to be removed is 67,780,000 m^3. Total ore to be mined is almost 48,000,000 tonnes (46,000,000 tonnes of Bayer grade and agglomerated bauxite and 1,800,000 of refractory bauxite). The ore to be mined during Phase 1 will be accessed by four separate pits: No.1 MZhB , No. 1 (ore body No. 1), No. 2 (orebody No. 2), and No. 3 (orebody No. 3).

3.2 Impacts

The OVOS for 2.5 million tonnes identified impacts associated with air quality, terrain, soils, hydrogeology, groundwater quality, surface water hydrology, surface water quality, vegetation, fauna, aesthetics and visual resources, noise and vibration, socio-economics, archaeology and wildlife reserves.

3.2.1 Air Pollution

Air Pollution emission sources at the mine include:

- Drilling for blasting;
- Blasting;
- Loading of ore in the pit;
- Transfer of material from the pit;
- Transfer of ore in the pit and stockpiles;
- Crushing using the Lokotrack mobile crusher;
- Formation of stockpiles of bauxite;
- Loading of product into railcars;
- Repair work;
- Diesel generator;
- Boiler;
- Petroleum product storage;
- Wasterock piles; and,
- Diesel engines.

There are 24 pollutants emitted[1] to atmosphere with primary emissions including: dust, NO_2, CO, hydrocarbons, SO_2, and soot. The total estimated annual amount is 5511.6 tonnes of which most is total suspended solids (25%), inorganic dust with an SiO_2 content between 20 and 70% (17%), CO (20%), SO_2 (14%), NO_2 (11%), soot (6%) and hydrocarbons (3%).

Dispersion modelling (EKOLOG V. 2.5) shows that the maximum concentration found at the edge of the sanitary protection zone for the summation group ($NO+NO_2+SO_2+$ residual ash) was 0.52 (maximum summertime allowable limit) and 0.58 (maximum allowable wintertime limit). This is completely in compliance with Russian air emission requirements. A direct comparison with the WBG guidelines cannot be made due to the averaging periods, criteria pollutants, and the way the Sanitary Protection Zone is calculated. It can be stated that the Russian guidelines are, in general, much more stringent than the WBG requirements and, therefore, WBG guidelines will most likely be met at the property boundaries.

[1] As listed within the Russian regulations.

3.2.2 Water Use and Pollution

The source of process water and drinking water for the employee camp is the water-bearing horizon of the Vorykvinsky and Pav'yugansky formations of the upper reef. The wells are two artesian wells from which water is pumped to 2 lift stations via reservoirs equipped with sterilization equipment, and linked to the external network lines. The location of the wells excludes the possibility of chemical and bacteriological sources. Water consumption (both process and fire water needs) has been estimated (based on Russian methodologies) at 1000 m^3/day. Drinking water is in compliance with Russian guidelines and World Bank Group (WBG) requirements. Surface water discharges from the site include domestic wastewater and surface water runoff.

Domestic wastewater discharge has been estimated to be a maximum of 723 m^3/day. This water is currently treated in a septic system and discharged. This is not in compliance with the design submitted to the regulatory authorities (biorotator and sand filtration). Wastewater from the mine is principally domestic wastewater and sewage discharge from the living quarters and kitchen. The sewage effluent is channelled to a solids separator where it is also dosed with chlorine before being discharged into the environment. This disposal system is inappropriate for the current loadings. Based on the design permitted in the OVOS, the predicted water quality for domestic wastewater treatment (using a biorotator and sand filtration) is provided in Table 1.

Table 1: Predicted water quality[1] for domestic wastewater treatment.

Pollutant	Concentration of Pollutants (mg/l)	
	Before Treatment	After Treatment
Suspended Solids	136.9	3.0
BOD Total	158.0	3.0
Ammonium (N)	16.9	0.4
Phosphates	7.0	0.2
Chlorides	19.0	19.0
Detergents	5.3	1.1

[1]Based on the design proposed in the OVOS approved by the Russian regulatory authorities.

The rainwater runoff system includes a system for the Central industrial area and the Timan railway station and includes a proposed system of settlement ponds followed by discharge to the settlement pond in the pits. It is estimated that the water quality discharging from the rain settlement pond is 10 mg/l suspended solids and 5 mg/l petroleum products. Additionally, the repair area is supposed to be equipped with an oily water separator that removes petroleum products prior to discharge to the environment.

Water is captured in the pits during normal operations. The source of this water is atmospheric and groundwater. The chemical composition of this water is similar to the chemical composition of the groundwater. The composition of this mixture is in compliance with the MAC except for suspended solids and petroleum products, which are proposed to be reduced by treatment. The proposed treatment for suspended solids and petroleum products is the addition of a coagulant in the settlement pond and a 3 stage filtering system to reduced suspended solids. The anticipated quality of pit-water is provided in Table 2. When operated properly, this system would provide water quality in compliance with WBG guidelines and the conditions of the Russian Water Use and Discharge Permit.

Table 2: Proposed quality of pit-water prior to discharge

Pollutant	Concentration of Pollutants (mg/l)		Efficiency
	Before Treatment	After Treatment	
Suspended Solids	Up to 200	4.0	89%
Petroleum Products	0.31	0.05	84%
Anion Cl-	5.89	5.89	
Cation Na+	4.25	4.25	
Cation Ca ++	19.7	18.0	
Cation Mg ++	16.47	15.0	

The proposed water consumption for the employee camp (built for 1500 persons) is calculated, using Russian methodologies, to be 515 m^3/day. The Central Industrial Facility consumes 298 m^3/day. Additional water is used for fire protection, cooling water and automobile washing. Dust control consumes 127800 m^3 per year. The proposed surface water runoff catchment and treatment facility was to serve the Central industrial area; the bauxite transfer station; the Timan railway station, and the employee camp. The estimated wastewater generated from the employee camp and other ancillary facilities is 722 m^3/day or 120 m^3/hour. In the original design, the wastewater treatment system included biological treatment, a pumping station, a sludge deposition area; and sand filtration.

3.2.3 Solid Waste Generation

Solid waste generation was estimated during development of the feasibility study for mine expansion. Solid waste generation at the site consists primarily of non-hazardous materials that are stored in accordance with the requirements set forth by the Sanitary and Epidemiological Committee. Wastes include:

- Class 1 hazards: 0.095 (mercury lamps);
- Class 2 hazards 6.986 tonnes (oil sludge);
- Class 3 hazards 53.468 tonnes (used oil);
- Class 4 hazards: 5584.604 tonnes (coal ash , sewage material)

A total complete list of estimated waste generation is provided in Table 3.

Table 3: Estimated waste generation.

Waste	Class	Amount (tonne/yr)
Used luminescent lamps	1	0.016
Used mercury lamps	1	0.079
Oil Sludge	2	4.351
Spent batteries	2	2.635
Used oil	3	1.700
Compressor oil	3	0.101
Used motor oil	3	46.441
Used industrial oil	3	2.895
Oil saturated wood product	3	0.150
Oil rags	3	1.782
Soil with diesel fuel	3	0.399
Sludge from settlement pond near garage	4	6.00
Soil with petroleum products	4	1.575
Oil filters	4	0.003
Wastes from the site	4	115.990
Solids from sewage	4	834.050
Used brake pads	4	0.578
Ash from coal	4	3101.626
Metal shavings	4	2.6
Oily metal	4	21
Scrap metal	4	6.3
Copper pipe	4	4.0
Scrap metal shavings	4	75.0
Domestic waste	4	229.650
Tires	4	206.2
Sewage solids	4	780.00

3.2.4 Land Disturbance

During Phase 1, more than 575 hectares will be disturbed due to mining operations. The overall area for reclamation is summarised in Table 4.

Table 4: Summary of the areas that will require reclamation following the closure of the mine.

Location	Area (ha)
Central road	7.6
Roads	6.3
Pit #1 (MZhB)	28.2
Pit #1	146.5
Pit #2	176.0
Pit #3	125.7
Overburden stockpiles	43.0
Employee camp and central industrial area	23.5
Construction base	12.3
Central blending yard	5.1
Water well	2.4
Total	**576.6**

Currently, no rehabilitation is undertaken as the mine areas have been kept active for the purpose of blending bauxite to achieve consistent product quality from the mine.

3.3 Environmental mitigation measures

The major impacts that need to be mitigated during the project are:

- air quality – there will be short-term, episodic, localized impacts due to dust from the exposed surface areas, stockpiles, and wind erosion;
- terrain – there will be additional land disturbance during operations that will be reduced by an aggressive reclamation plan;
- surface water quality – there will be an increased sediment loading during operations that will be mitigated by using an aggressive surface water diversion and water treatment system; and,
- land disturbance – there will be increased erosion and soil impacts associated with operations due to land disturbance. An aggressive program for reclamation can mitigate these impacts.

The major mitigation measure for air pollution is dust suppression. The following areas are watered periodically: pit faces; ore storage; active areas of the pit; the receiving area at the blending piles, and access roads during the summer months. Dust reduction is estimated to be some 70%. Drilling is completed using dry dust collectors with an effectiveness of 90-95% and mining is frequently conducted without having to blast. This reduces the amount of nitrates that pollute the water and lessens the dust and gas in the atmosphere. All mobile equipment is imported and equipped with catalytic converters to maximize their effectiveness.

All of these measures are used to ensure that the air pollution limits are met within the working zone and at the boundary of the Sanitary Protection Zone.

Surface water runoff from the Central Industrial Area, contaminated with petroleum products, is proposed to be directed to settlement ponds. Process water is diverted to the treatment facility for pit water. The amount of pit water that undergoes treatment and is discharged to the river is up to 500 m^3/hr. The size of the settlement ponds are for the 1st years of operation, after this the loading and water quality will be verified to determine of the settlement ponds need to be expanded. There are to be no upset discharges from the settlement ponds. In the event of overtopping the mine pumps must be shut off.

MTBM developed a Reclamation Plan that calls for all reclaimed areas to be returned to forestry use (approximately 4000-5000 trees/hectare must be planted). At the same time, the site must plant (once off) grasses along with organic and mineral fertilization. Pits will be backfilled after Phase 1. Biological reclamation includes the need to have an upper layer of no less than 10 cm thick of substrate that is effective for natural revegetation. Monitoring must be completed during the first 2-3 years after reclamation to ensure that the reclamation has succeeded in mitigating impacts. Total estimated costs of reclamation are 1.77 million rubles for earthworks, 2.4 million rubles for seedlings, and 2.6 million rubles for beautification of the site.

3.4 Social impacts

The overall social impacts from the MTBM are expected to be positive due to the high unemployment rate and current economic difficulties being experienced in the region. Shifts are currently 2-11 hour shifts for 4 weeks at a time. At the end of July 2003, MTBM employed 212 people. Of these 175 were direct employees with the other 37 employees being maintenance contractors in the workshops (23) and the building site (14). Other than these figures there are no direct indications as to the social benefits of the proposed mine expansion. Nevertheless it should be recognised that there will be social benefits and TB must make every effort to ensure that these are maximised as far as possible including maximising the employment benefits of the proposed mine expansion.

3.5 Environmental monitoring

The primary purpose of the monitoring programme is to ensure that the project complies with Russian operating permits and environmental regulations and to evaluate the effectiveness of the environmental mitigation measures described above. The results of the monitoring program will be reviewed by project management on a periodic basis. If adverse environmental changes occur because of the project, appropriate remedial measures will be implemented to reduce or eliminate project-related effects. Specific details of any mitigation measures associated with unforeseen project-related effects will be developed based on the results of the monitoring.

Environmental monitoring is proposed for the following environmental components and mine facilities:

- Site meteorology/air quality;
- Groundwater quality;
- Surface water quality;
- Aquatic resources;
- Tailings impoundment;
- Waste management;
- Noise levels;
- Health and safety; and,
- Reclamation success.

4 ENVIRONMENTAL AND SOCIAL DUE DILIGENCE AUDIT (EXISTING OPERATION)

The due diligence audit consisted of two broad components namely the mine itself as well as a one-day visit to the UAZ refinery and smelter in Kamensk-Uralsky. The audit of the mine consisted of interviews, and documentation review at the mine's head office in Ukhta as well as a site visit and situation assessment. The mine audit was based on the principle of identifying the environmental aspects of the various mine activities and related potential impacts and their significance. Mitigation to prevent/reduce those impacts was then assessed and where this was considered inadequate specific gaps between the mine's environmental and social performance and best practice identified. These gaps were also assessed in the context of the regulatory framework within which the mine operates. The major highlights of the audit report are provided in the following sections.

4.1 Environmental aspects of the mining operation

4.1.1 Greenhouse gas contributions

The mine is not a significant source of greenhouse gases either directly or indirectly from energy generated for the mine.

4.1.2 Water resource protection

Water is sourced from an artesian well for the mine and is used for domestic purposes only. Effluents from the mine are limited to domestic waste water and sewage, which is treated in rudimentary sewage treatment system. No dewatering is required currently from the mine pits because water entering the pits simply soaks through the surface but there is a need to better understand the changes in hydrodynamics of this process and possible impacts on groundwater recharge, baseflow to rivers and changes to groundwater chemistry.

There are a number of areas where bauxite handling present a risk of high sediment loading in stormwater runoff most notably in the CBY where there is no provision to divert or contain stormwater. The same holds true for the overburden stockpiles, road and rail embankments and the clearing of forest ahead of mining and/or the establishment of further stockpiles. Given the icthyological reserve status of the surrounding rivers increased turbidity as a result of suspended solids in stormwater could result in an impact of moderate significance. As far as monitored results are comparable with WBG guidelines, these are in compliance.

4.1.3 Air pollution emissions

Mechanically generated and wind blown dust is the principal air pollutant from the mine. Other air pollution emissions are principally a function of fuel combustion in diesel generators, boilers, other plant and vehicles. These and emissions from the blasting operation are controlled through the prescription of Maximum Permissible Emissions (MPE) in the air emissions permit issued for the mine. Emissions from the mine's various activities remain below the prescribed MPEs, and this is especially true of the boiler where a diesel-fired boiler was introduced rather than the permitted coal-fired boiler. There is no directly monitored air quality data that can be compared to WBG guidelines, but given the relatively small scale of emissions, it is considered unlikely that the mine is not in compliance.

4.1.4 Noise and vibration

There are a number of noise sources across the mine but given the absence of receptors for whom such noise could cause a nuisance, noise management is limited to the occupational health and safety only. The only significant source of vibration from the mine is from the blasting, but again there are no receptors in close enough proximity to be affected by the blasting.

4.1.5 Waste management

There is a range of waste types generated by the mine but these occur in relatively small volumes. These include hazardous wastes (used mercury lamps and used oil and oil/fuel contaminated waste) and municipal solid waste (including putrescible waste). The mine has an approved waste management plan and is in compliance with that plan, but currently has no formalised disposal facility for municipal solid waste.

4.1.6 Ecology

MTBM lies in the forested transition zone between the tundra to the north and the taiga to the south. The mine is situated between the Vym' and Varykva Rivers, which collectively make-up an icthyological reserve known as 'Vymski' – much of the environmental management function at the mine is focussed on ensuring that there are no impacts on the reserve. As an example of this the bridge that crosses the Vym' was extended and the central support pillar excluded from the bridge design to reduce possible impacts on the river.

There are patches of forest dieback along the length of the access road and railway line, which appear to have been caused by poor drainage. What is less certain is the degree to which the poor drainage has been caused or exacerbated by the road and railway line. Because the affected area is probably larger than are directly affected by the mine, this is impact is considered of high significance. In a similar vein it is considered that unnecessarily large tracts of forest are cleared for mining areas and overburden storage.

4.1.7 Reclamation/rehabilitation

There is no *in situ* reclamation and the overburden is simply stockpiled for later use in reclamation. In addition the top soil and overburden are not separated reducing the value of the top soil for reclamation. There are also a series of quarries and borrow pits that have been ostensibly used in the construction of the road and railway line- these too have not been rehabilitated.

4.1.8 Hazardous materials management

There are few formalised procedures, facilities or other process for the proper management of hazardous materials. In general terms regulatory prescription in this regard is limited to occupational health and safety provision rather than environmental requirements. There is the risk of spillage from the fuel storage tanks, with no bunding or other spill control measures in place. There is also ad hoc vehicle maintenance that poses a risk of oil spillage. Although there is no evidence of these spills having an impact on groundwater it is clearly desirable that such spills be prevented.

4.1.9 Social Assessment

Although there are no communities directly affected by the mining, the village of Chin'avoryk is affected by the access road and railway line. Beyond the directly affected Chin'avork community, social issues tend to focus more on the potential benefits of the mine in the form of additional jobs and social investment. Environmental NGOs with an interest in the mine include Komi Kotyr, the association Komi Voityr, the Safe Pechora Committee, the Memorial, Greenpeace (Russia) and the Association of Small Business Development. BT provides support to a local school, hospital and church but the contributions are largely ad hoc and simply demand driven. Although there was public participation as part of the mine expansion and bridge environmental assessment processes, there is no established consultation programme.

Public consultation held in China'voryk and Emva highlighted several concerns related to the mine access road, borrow pits that were, according to the local people, used in the construction of the railway, rail crossings, perceived radio-activity in the bauxite, and jobs and social investment. Additional issues that have emerged in the audit include concerns regarding the institutional capacity of the local authorities to manage the public participation process and how this may limit the effectiveness of communication with communities. The promotion of small business is a key potential benefit but there are several barriers to that happening including a focus on SME promotion in the urban rather than the rural areas, lack of credit access, the generally higher prices charge by local small businesses, lack of incentives and several others.

There is also some sensitivity regarding the proximity of the prison and prison settlement to the mine and a perception of forced labour. The mine uses no forced labour, the use of forced labour is expressly prohibited by SUAL and no forced labour is acknowledged in Russia. Following a detailed assessment presented in the audit report it has been concluded that there is no risk of direct impact on indigenous people as a result of the mine's activities. There are native Komi in China'voryk, but the mine's activities do not impact on their traditional lifestyles. However, IPs will be addressed as one of vulnerable groups in the Social Impact Assessment to be completed for the project, along with other vulnerable people such as women, elderly, youth and so forth.

4.1.10 Monitoring of environmental performance

The mine conducts extensive environmental quality monitoring on a range of variables that can be divided into two broad groupings, namely industrial (on-site) environmental monitoring (focusing on environmental aspects of the mine's operation) and integrated environmental monitoring (focusing on the broader environment in which the mine operates. Industrial environmental monitoring includes air pollution emissions, ambient air quality (up to the boundary of the SPZ and within the operational area of the mine), snow analysis and bacterial and chemical analyses of drinking water.

For the most part the monitoring indicates that the environmental aspects of the mine's activities are not resulting in an impact on the environment. This is apart from one area of concern where elevated concentrations of iron have been detected in various media. Further investigations, with special focus on Al and Fe will be needed to ascertain the degree to which the mine's activities contribute to these elevated concentrations.

4.1.11 Health and safety

The mine has prepared and implemented a health and safety management protocol as well as a Safety Declaration on 'dangerous industrial objects', which provides for the management measures required by regulations. The types of hazards at the mine include dangerous materials (particularly explosives), blasting, electrical facilities, plant and vehicle movement and fire risk. The attendant requirement for personal protective equipment (PPE) is both recognised by the mine and provided to employees.

4.2 Environmental management at SUAL

4.2.1 Corporate environmental management

There is currently neither dedicated specialist nor staff overseeing corporate level environmental management and permitting issues for exploration, development, and operations. SUAL is currently looking at recruiting a Corporate Environmental, Health and Safety Senior Manager in the first half of calendar year 2004. At the same time, SUAL Komi proposes to hire an Environmental Manager with environmental and mining experience, and a strong Russian regulatory knowledge. Responsibilities will include:

- Management of the project ESIA and OVOS preparation, documentation, consultation and approval processes
- Training local persons;
- Ensuring subcontractors complete work to international standards;
- Hiring of the local environmental staff in Russia; and,
- Assisting the corporate office with any other SHEC issues at other Sual Holding operations.

Environmental training will be conducted using specialists from Russia and abroad that are familiar with both Russian and World Bank Group (WBG)/EBRD guidelines to ensure compliance with all permitting requirements. This training will take place as needed throughout the first two field seasons (May-August 2004-2005) and will be extended to include Community Liaison, Community Relations, and Community Development.

4.2.2 Uralsky Aluminium (UAZ)

CSIR was asked by the lenders to carry out a one-day visit to the Uralsky Aluminium refinery and smelter as part of this audit to gain an impression of the overall environmental and social management practice of SUAL. To that end one of the key findings of this visit was the fact that there is no overarching safety health and environmental and community management system for the UAZ operation. In general terms, and not unexpectedly given the mix of modern and older technology used at the facility emissions of sulphur dioxide, fluoride, polyaromatic hydrocarbons and dust, and energy consumption are all higher than global norms for similar industrial operations.

Additional items requiring attention are the disposal of spent pot linings (which are currently stockpiled pending the identification of a safe means of disposal), red mud disposal and improved waste segregation and classification prior to disposal. Although there were no reported exceedances of Russian regulations, the monitoring of liquid effluent discharges from the facility, is limited to a select group of variables that do not adequately characterise the effluent quality. Stormwater management and control needs to be improved with special attention to the unpaved areas of the facility where infiltration of water can occur.

In terms of occupational health and safety, the facility boasts good OHS statistics with no fatalities, three lost time injuries and limited incidents of work related illness. Workers are trained in OHS and receive the necessary PPE but several areas for improvement in OHS management were identified including visitor inductions, strict PPE enforcement (including harnesses), raising the height of handrails, improved signage and reverse hooters on vehicles. Finally UAZ provides support to the local community through a range of social investment programmes.

4.2.3 HSEC Capacity at SUAL

Currently SUAL does not have a dedicated corporate safety, health, environment and community (HSEC) function but is reportedly in the process of establishing such a function. Once established the function would be one of coordinating HSEC issues amongst the various companies in the group to ensure a sustained and systematic process of improved performance within the group. The same is true for SUAL Komi as the custodians of the future Komi Aluminium Project, where an overall HSEC manager will be required to ensure the implementation of the various environmental and social actions as the project unfolds.

Finally, the existing full-time environmental management function for MTBM is delivered by one individual, the mine ecologist who focuses principally on environmental issues (augmented by outsourced monitoring activities). It will be necessary to increase the scope of this function to include all HSEC issues, and in order to do so it will be necessary to increase the staff complement to include two full-time site HSEC officers. This will free up the site ecologist to fulfil a broader HSEC management function and effectively implement the ESAP.

Therefore it is planned to extend the environmental management function on the mine by hiring two additional environmental staff to work on rotation at the mine. Their responsibilities will include:

- Monitoring all environmental parameters;
- Ensuring compliance with all regulatory guidelines and permits;
- Developing annual reports as required under Russian and IFC/EBRD guidelines;
- Developing annual budgets for the environmental department at the mine; and,
- Developing long-term programs to ensure protection of the environment
- Community Liaison/Community relations, Community Development/Social Investment Programme? Training or organising locals for future facilities.

4.3 Audit Gap analysis

The gaps identified during the audit are summarised in Table 5 below and presented together with the significance of each gap.

Table 5: Summary of the gaps identified during the due diligence audit.

Category	Gaps	Significance
Water resource protection	Inadequate sewage and domestic effluent disposal	Low
	No formalized drainage and suspended solids control	Moderate
	Soil erosion from areas cleared for mining and overburden	Moderate
	Erosion of soil from road and rail embankments	Moderate
Air pollution emissions	Diesel-fired rather than coal-fired boiler	Low
	Incorrectly calculated air emissions from diesel generators	Low
Waste management	No formal disposal facility for municipal sold waste (MSW)	Moderate
	Ongoing accumulation of used tyres	Low
	Scrap metal stockpiles in an around the mine	Low
	Containers not clearly separated and marked	Moderate
Ecology	Road and rail infrastructure disruption to surface hydrology	High
	Excessive forest clearing and resultant ecosystem loss	High
Reclamation/ rehabilitation	Current practice of no reclamation/rehabilitation	Moderate
	Borrow pits not rehabilitated	Moderate
	No statement on mine *closure*	High
Hazardous materials management	Ad hoc and scattered vehicle and plant maintenance	Moderate
	No spill containment structures	Moderate
	Scattered accumulations of scrapped equipment	Low
	Chlorine management	Low
Social	Community misconceptions	Moderate
	Requirement for education and training programmes	High
	NGO concerns – impact on Vorykva river	High
	NGO concerns - 'big business' will benefit.	High
	Institutional capacity	High
	No established forums for ongoing consultation	Moderate
	Limited SME development efforts in rural district like Knyazhpogost	High
	Barriers to SME development	High
	Social investment largely *ad hoc*	Moderate
	Limited socioeconomic baseline information	Moderate
Environmental monitoring	No monitoring of surface water runoff	Moderate
	Approved air quality monitoring is not fully implemented yet.	Moderate
	More focused impact monitoring is necessary with specific focus on iron and aluminium concentrations.	High

4.4 Environmental and Social Action Plan (ESAP)

There are a number of actions required to address the gaps identified in the audit. These have been structured into an Environmental and Social Action Plan (ESAP) for implementation by the MTBM. The key requirement is to develop an overarching HSEC Management System that can be used to properly structure the management approach. The ESAP has been structured to reflect a generic HSEC management system within which the specific action items arising from the audit can be incorporated. The system includes establishing a policy, planning, implementation, checking and management review. The ESAP requirements are shown in Table 5.

The implementation of the ESAP will have direct and indirect cost implications for MTBM, Komi Aluminium and SUAL. The cost implications are estimated at some USD852 000 to establish all the corrective actions with some USD200 000 being required per annum to maintain the corrective actions. It is estimated that the ESAP can be completed by approximately January 2007.

4.5 Public Consultation

During development of the impact assessment for the expansion to 2.5 million tonnes, SUAL conducted public consultation in accordance with Russian requirements. This included:

- General public meetings to discuss the contents of the OVOS;
- Separate meetings for NGO's; and,
- Separate meetings with regulatory authorities to ensure all comments were resolved.

In accordance with IFC and EBRD requirements, SUAL and BT are developing a Public Consultation and Disclosure Plan (PCDP) based on technically sound and culturally appropriate measures that can be implemented during project life to ensure timely and effective communications with affected stakeholders. The PCDP outlines local and IFC/EBRD requirements for public consultation, identify key stakeholders, outline consultation schedules, describe implementation, and describe documentation and reporting.

As part of the integrated, phased approach for implementation of this project, CSIR has assisted BT and SUAL in developing a detailed PCDP for the MTBM. The PCDP will be disclosed by both the IFC (WB Info Shop) and the EBRD and is provided as Attachment C (in English).

4.6 Compliance with Russian Regulatory and IFC/EBRD requirements

In general terms, activities at MTBM are materially in compliance with the Russian Regulatory and IFC/EBRD requirements. However, there are some areas where this is not directly the case and these include:

- Sewage treatment: The current sewage treatment facility is unlikely to comply with the IFC/EBRD guidelines for waste water discharge although there is no direct monitoring data to support this assertion.
- Waste disposal: The current waste disposal practice of disposing of MSW on the overburden stockpile does not comply with Russian Regulatory and IFC/EBRD requirements.
- Occupational health and safety: There is a range of issues (such as signage, PPE compliance, visitor induction and so forth) that contradict the IFC/EBRD requirements regarding OHS, although the mine is technically in compliance with the Russian Regulatory requirements.

The further expansion of the mine (from 2.5 to 6.0 Mtpa) will entail the preparation of a "Construction" OVOS – there is already sufficient information for the "Investment" OVOS to be readily prepared. This audit did not identify any fatal flaws that will prevent the expansion of the mine to 6.0 Mtpa. The support for the expansion is likely to be enhanced through the implementation of the recommended management systems. In addition an Environmental and Social Impact Assessment (ESIA) in English will be prepared as well as an update of the current ESAP.

Table 6: Implementation plan for Environmental and Social Action Plan.

	Description	Item	Detailed Requirements	Schedule	Estimated budget (US$'000)	
					Up front	Recurrent (annually)
1	Integrated HSEC management system	1-1	Design and implement integrated HSEC management system	December 2005	30	5
2	Immediate health and safety interventions	2-1	Emergency Response plan	March 2004	5	2
		2-2	Safety signage and barriers	March 2004	5	1
		2-3	PPE	March 2004	20	5
		2-4	Fire protection	March 2004	20	5
		2-5	Visitor induction	March 2004	2	-
		2-6	Hazard warning on vehicles	March 2004	5	2
		2-7	Improved housekeeping	March 2004	15	NA
		2-8	Safety handbook	March 2004	2	NA
3	Sewage treatment plant	3-1	Design, construct and operate	December 2005	50	5
4	Spill management plan	4-1	Hazardous materials register	March 2004	2	NA
		4-2	Bunding for storage tanks, filler connections and loading/unloading areas	December 2004	30	2
		4-3	Consolidation of outdoor maintenance areas	December 2004	10	2
		4-4	Seal maintenance area floor	December 2004	10	2
		4-5	Oily water separators	December 2004	5	2
5	Erosion management	5-1	Stormwater management strategy	March 2005	15	NA
		5-2	Design, construct and operate stormwater retention dam	December 2006	100	5
		5-3	Contour undeveloped areas	March 2005	25	10
		5-4	Stabilise road and rail embankments	January 2007	Unknown	Unknown

	Description	Item	Detailed Requirements	Schedule	Estimated budget (US$'000)	
					Up front	Recurrent (annually)
6	Aspects characterisation	6-1	Identify and classify all aspects and impacts as component of OVOS for 6 Mtpa expansion project	May 2004	NA	NA
7	Waste transition station and landfill	7-1	Design, construct and operate waste transition station	September 2005	30	5
		7-2	Design, construct and operate landfill facility	December 2006	100	10
		7-3	Tyre disposal solution	December 2005	5	NA
		7-4	Consolidation of scrap metal	December 2005	30	5
8	Reclamation	8-1	Assess viability of *in situ* reclamation on existing pits	September 2004	15	NA
		8-2	Experimental rehabilitation trials	December 2006	40	10
9	Ecological impacts	9-1	Assess impact of road and rail line on forest ecology	December 2004	15	NA
		9-2	Mitigate (as necessary)	March 2005	Unknown	Unknown
		9-3	Programme to minimise forest clearing	September 2005	1	1
		9-4	Rehabilitation of unnecessarily cleared areas	December 2006	Unknown	Unkown
10	Communication strategy	10-1	Stakeholder identification	March 2004	5	1
		10-2	Stakeholder engagement mechanisms	September 2004	10	2
		10-3	Implement strategy	September 2005	25	10
11	Employment strategy	11-1	Develop strategy	December 2004	10	1
		11-2	Implement strategy	Ongoing	100	20
12	Consolidation of social investment	12-1	Consolidation of social investment into a single programme	September 2004	5	NA
13	Private enterprise promotion	13-1	Develop SME strategy	March 2004	10	2
		13-2	Train SME	September 2004	50	10
		13-3	Create market space opportunities for SME's	September 2004	NA	NA

	Description	Item	Detailed Requirements	Schedule	Estimated budget (US$'000)	
					Up front	Recurrent (annually)
14	Socio-economic baseline	14-1	Conduct socio-economic baseline	May 2004	20	NA
15	Employ HSEC manager and officers	15-1	Appoint 2 full-time HSEC officers	March 2004	NA	50
16	Improved monitoring	16-1	On-site monitoring of air quality	December 2003	NA	2
		16-2	Monitoring of surface water runoff	December 2003	NA	2
		16-3	Establish indicator parameters (specifically aluminium, iron) rather than measuring/data collection of wide range of the parameters.	December 2005	NA	6
		16-4	Other environmental parameters (as defined by HSEC MS)	December 2004	30	15
				Total	**852**	**200**