

KMML BLOCK III (PART-A)

SI NO:	INDEX	PAGE NO:
1	APPLICATION FORM-1	2-32
2	APPROVAL OF MINING PLAN	33-34
3	MINING PLAN	35-161
4	MINING PLAN - ANNEXURES	162-211



The Kerala Minerals and Metals Ltd.

(A Govt. of Kerala Undertaking)

Mineral Separation Unit

Kovilthottam, Chavara

Kollam- 591583, Kerala, S. India.

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KMML/MS/Mines/MOEF/320-B/2013

—/10/2013

06/11

To

The Member Secretary,
Kerala Coastal Zone Management Authority,
Sastra Bhavan, Pattom
Thiruvananthapuram- 695 004
Phone No: 91-(0) 471-2548258, 2548316
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Received
State
SHINE, A. MANI
Under Secretary I
Mining & Technology Dept.
Thiruvananthapuram

Sir,

Sub:-Application for Clearance under CRZ Notification (Submission of Form-I, Mining plan and CRZ Status report etc. for the proposed EIA study) for renewal of Mining lease for Mining of Beach sand minerals of Mineral Separation (MS) Unit at Kerala Minerals and Metals Ltd, lease Block No. III-regd.

The Kerala Minerals and Metals Ltd, Chavara (KMML) is a Kerala Government undertaking engaged in Mining and processing of beach sand minerals located at Chavara, Kollam District, Kerala. The Kerala Minerals and Metals Ltd was formed in 1972 by taking over the Mining and processing business of M/s. F.X.P Minerals, which had been mining beach sand since 1932. The Mineral Separation (MS) Unit of the company employs about 450 persons directly and about 800 persons indirectly for mining activities.

The mining scheme for KMML for mining of beach sand deposits is by dredging. Minerals like Ilmenite, rutile, zircon & sillimanite are produced and tailings generated will be used for refilling the dredge pond to reclaim the mined out areas. The end products from these minerals find various uses in a variety of industries like - paints, ceramics, aero space industry, atomic energy, defense, submarine, under sea pipe works, Jewellery, Titanium metal, Zirconium metal etc.

Indian Bureau of Mines has already approved the mining plan for mining and processing of Sillimarite. In connection with CRZ Clearance, we have already

received the status report from CESS (Center for Earth Science Studies) - Thiruvananthapuram, Government of Kerala, approved agency for the same.

As minerals like Ilmenite, rutile and zircon are specified as Atomic Minerals in Part B of the first schedule of the Mines and Minerals (Development & Regulation) Act 1957, we have already submitted application for approval of mining plan to Atomic Minerals Division of the Department of Atomic Energy, being the competent authority to approve the mining plan for three minerals and is under process.

A lease deed was executed by KMML with Department of Mining & Geology in 1985 valid for a period of 20 years. On expiring of the lease in 2005, we applied for renewal of the same. After various stages, Government of Kerala vide G.O. (MS) No: 175/2010/ID; Dated: 12/08/2010 and subsequently amended vide G.O. (MS) No: 214/2011/ID; Dated: 24/10/2011 has approved renewal of mining lease subject to the condition that EIA study has to be conducted.

The proposed mining lease area does not come under "Forest land". Tailings generated in mining will be used to refill the mined out areas. No effluents or solid waste are generated during mining operation.

As part of renewal of our mine lease, we propose to carryout EIA study for the above mentioned block i.e. KMML Block No: III. The total lease area is 88.119 Hectares. The consultant for this study is CSIR -NIIST, Trivandrum, which is a NABET accredited EIA consultant, a Government of India organization.

We are herewith enclosing the following documents seeking Clearance under CRZ Notification, 2011

- a) Form-1 (As per annexure-IV of the notification), which includes proposed TOR,
- b) Rapid EIA report including marine and terrestrial component: Form-1 includes TOR detailing scope of work for the EIA studies. This TOR includes marine & terrestrial ecological survey.
- c) Comprehensive EIA with cumulative studies for projects in the stretches classified as low and medium eroding by MoEF based on scientific studies and in consultation with the State Governments :

The comprehensive EIA shall include management measures and post project monitoring plan which address measures for coastal erosion management. The draft EIA study report will be presented in the public hearing and views and suggestions of the affected people will be addressed in the final EIA before submission for appraisal.

- d) Disaster Management Report, Risk Assessment Report and Management Plan: This will form part of the draft EIA report.
- e) CRZ map indicating HTL and LTL demarcated by CESS (Center for Earth Science Studies) - Thiruvananthapuram, Government of Kerala, approved agency for the same in 1:4000 scale.: Enclosed
- f) Project layout superimposed on the above map indicated at (e) above: Not applicable.
- g) The CRZ map normally covering 7 km radius around the project site: Enclosed.
- h) The CRZ map indicating the CRZ-I, II, III and IV areas including other notified ecologically sensitive areas: Enclosed.
- i) No Objection Certificate from the concerned State Pollution Control Board for the projects involving discharge of effluents, solid waste, and sewage: No effluents / Solid waste or sewage is generated due to this project. Hence this clause is not applicable for this project.
- j) The approved mining plan from IBM : Enclosed

On hearing from you, we will be glad to send the copy of Form -I and aforesaid documents to the other appraisal committee members.

Hope, you will consider the above proposal positively.

Thanking you in anticipation,

Yours faithfully,

For The Kerala Minerals and Metals Ltd,

P. Michael Vetha Siromony
Managing Director

P. Michael Vetha Siromony IAS
Managing Director

Encl: i). Form-1 with TOR

ii). Mining Plan.

iii). CRZ status report involving demarcation of HTL, LTL and CRZ-I, II, III and IV

iv). CRZ map normally covering 7 km radius around the project site.

FORM- 1**(For seeking clearance for project attracting CRZ notification)****KMML BLOCK NO: III****(I) Basic Information**

Name of the Project : Renewal of Mining lease for Mining of Beach sand minerals including mechanized dredge mining at KMML lease Block No: III covering an area of 88.119 Hectares in Kollam District [G.O.(MS) No: 175/2010/ID; dated:, Thiruvananthapuram 12/08/2010]

Location /site : Chavara/Panmana/Vadakkumthala Villages, Chavara (Post), Karunagapally (Taluk), Kollam (District), Kerala (State), Nearest Railway Station: Karunagapally (10 KM), Nearest Airport: Thiruvananthapuram, International Airport (71 KM),

Sl.No	LONGITUDE	LATITUDE
1	76°31'10.20"E	9°1'5.52"N
2	76°31'20.42"E	8°59'42.68"N
3	76°31'22.44"E	9°1'4.80"N
4	76°31'26.04"E(Kovilhottam Church)	8°59'43.44"N

Alternatives under consideration : There is no scope of selecting alternative land as this area is selected based on the exploration done by Atomic Minerals Directorate (AMD)]. Also this block is allocated for mining of heavy minerals by Government of Kerala.

Typical Analysis of mineral sand from Block No. III

Mineral	Wt %
	Beach Extn
Ilmenite	29.14%
Leucocxene	6.10%
Rutile	2.54%
Zircon	2.56%
Sillimanite	4.63%
Kyanite	0.15%
Monazite	0.43%
Silica	54.45%

Size of the Project : The total extent of land in Block No: III of KMML is 88.119 Hectares.

- District : Kollam
- Taluk : Karunagapally
- Villages : Vadakkumthala, Chavara, Ponmana
- Block : III
- Survey No : 1 to 121, 31 to 632
- Area in Hectares : 88.119

CRZ classification of the area: Being a gram panchayat the CRZ other than CRZ I and CRZ IV is CRZ III. The seasonal beach between the HTL and LTL (intertidal zone), wherever it is present, is CRZ I (B). The mangroves are CRZ IA. The water bodies and the bed are CRZ IV. Mangroves (CRZ IA) are not in the active mining area.

Expected cost of the project: - No capital investment is envisaged as we are going to shift the existing dredger and pre-concentration plants to the proposed new site.

Contact Information:
(Administration) **MANAGING DIRECTOR**
THE KERALA MINERALS AND METALS LTD
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Kollam, Kerala
Pin: 691 583
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PhoneNo: +91 476- 2686722, (2686722 to 2686733)
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Officer-in-charge:
(Technical) **Georgekutty Thomas, HOD (MS), M.S.Unit**
THE KERALA MINERALS AND METALS LTD
Phone No: 0476-2680047, 48 ; Fax No: 91-476-2686442
Mob: 9496012546

(II) Activity

1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data.
1.01	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)	Yes	<p>Temporary change in land use. Almost the entire mined out area shall be reclaimed to a planned original topography by refilling the dredge pit with the reject sand from the pre concentrator and from the M.S Plant in order to turn the same to an acceptable alternative land use.</p> <p>Reclamation of land affected by mining will go hand in hand with mining operations.</p>
1.02	Details of CRZ classification as per the approved Coastal Zone management Plan?	Yes	The mining sites have CRZ IB and CRZ III. Being in a grama panchayat, the CRZ other than CRZ I and CRZ IV is CRZ III. The seasonal beach between the HTL and LTL (intertidal zone) is CRZ I (B). The patches of mangroves (though not mapable here due to scale limitations) are CRZ IA. The water bodies and the bed are CRZ IV. In the proposed mining sites, there are no mangroves.
1.03	Whether located in CRZ-I area?	Yes (CRZ IB)	The seasonal beach between the HTL and LTL (intertidal zone) is CRZ I (B). Part of mining site is in CRZ IB.

1.04	The distance from the CRZ-I areas.	No	The mining activities shall be carried out by leaving a buffer zone of 50 m away from the HTL i.e. Sea wall, wherever it is applicable. Part of mining is from CRZ IB (intertidal zone).
1.05	Whether located within the hazard zone as mapped by Ministry of Environment and Forests/ National Disaster Management Authority?	No	
1.06	Whether the area is prone to cyclone, tsunami, tidal surge, subduction, earthquake etc.?	Yes	→ Cyclone, earthquake } Moderate → Tsunami } Prone → No construction However, specific emergency plans will be laid down before working in this Block.
1.07	Whether the area is prone for saltwater ingress?	No	
1.08	Clearance of existing land, vegetation and buildings?	Yes	Land (210.40 acres is in possession of KMML) needs nominal clearance of homestead area with coconut cultivation, barren land. There is no forest land. The place of worship, burial ground, educational institutions, canals and other public utilities will be excluded from mining.
1.09	Creation of new land uses?	Yes	In post mining phase, reclaimed land would be suitable for tourism development, agriculture, and housing. However, the detailed plans for land utilization will be worked out with the consent from State Government.

1.10	Pre-construction investigations e.g. bore houses, soil testing?	Yes	<p>The mineralogical analysis is based on work done by Australian Mineral Development Laboratories (AMDEL) for KMML in 1977. AMDEL's computation is based on prospecting work done by Dr. Rao of AMD in 1972 & 1973 -1974. This was based on data for 245 beach bore holes and 236 bore holes in eastern extensions. From these data, the average composition for the whole block was calculated as per the table given below.</p> <p>Mining is limited to a depth of 8mt below MSL. Between Block No-1 & Block No-3, the intervening plot has been mined by dredging to a depth of 8mt below MSL by Indian Rare Earths Ltd for the last 15 years. Hence the deposit is well known and there is no need for further prospecting. So no exploration programme is envisaged.</p> <p>Typical Analysis of mineral sand from Block No. III</p> <table border="1" data-bbox="841 1285 1256 1742"> <thead> <tr> <th data-bbox="841 1330 948 1366">Mineral</th> <th data-bbox="1094 1285 1256 1361">Wt % Beach Extn</th> </tr> </thead> <tbody> <tr> <td data-bbox="841 1413 948 1449">Ilmenite</td> <td data-bbox="1127 1413 1240 1449">29.14 %</td> </tr> <tr> <td data-bbox="841 1453 980 1489">Leucoxene</td> <td data-bbox="1127 1453 1240 1489">6.10 %</td> </tr> <tr> <td data-bbox="841 1494 932 1529">Rutile</td> <td data-bbox="1127 1494 1240 1529">2.54 %</td> </tr> <tr> <td data-bbox="841 1534 932 1570">Zircon</td> <td data-bbox="1127 1534 1240 1570">2.56 %</td> </tr> <tr> <td data-bbox="841 1574 980 1610">Sillimanite</td> <td data-bbox="1127 1574 1240 1610">4.63 %</td> </tr> <tr> <td data-bbox="841 1615 948 1650">Kyanite</td> <td data-bbox="1127 1615 1240 1650">0.15 %</td> </tr> <tr> <td data-bbox="841 1655 964 1691">Monazite</td> <td data-bbox="1127 1655 1240 1691">0.43 %</td> </tr> <tr> <td data-bbox="841 1695 932 1731">Silica</td> <td data-bbox="1127 1695 1240 1731">54.45 %</td> </tr> </tbody> </table>	Mineral	Wt % Beach Extn	Ilmenite	29.14 %	Leucoxene	6.10 %	Rutile	2.54 %	Zircon	2.56 %	Sillimanite	4.63 %	Kyanite	0.15 %	Monazite	0.43 %	Silica	54.45 %
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1.11	Construction works?	Yes	<p>Nominal construction of shiftable pre-construction plant very close to dredger for improving the mineral concentrate, so that bulk of the sand can be discarded at the site and this sand can be used for back filling the dredge pit.</p>																		

1.12	Demolition works?	Yes	Nominal demolition of company's acquired old houses. The place of worship, burial ground, educational institutions, Canals and other public utilities will be excluded from mining.
1.13	Temporary sites used for construction works or housing of construction workers?	No	No construction of houses.
1.14	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations	No	There will not be surplus excavated material as the same is needed to raise the dredged mined out pit to original level.
1.15	Underground works including mining or tunneling?	No	
1.16	Reclamation works?	Yes	The mine pit will be reclaimed simultaneously by the mine rejects.
1.17	Dredging/reclamation/land filling/disposal of dredged material etc.?	Yes	For dredging the portion of the deposit away from the beach, the company proposes to use a combination of pontoon mounted submersible pump (50 HP capacities) and cutter suction dredger powered by diesel generators.
1.18	Offshore structures?	No	
1.19	Production and manufacturing processes?	Yes	No chemical process involved. The concentrate from pre-concentrator is treated in the old MS Plant by physical separation of desired minerals.

1.20	Facilities for storage of goods or materials?	Yes	The pre-concentrate will be transported to Mineral Separation plant on day to day basis. The rejects will be dumped back for reclamation of the mined area.
1.21	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	In this block, mining is proposed by inland mining using pontoon mounted submersible pump and by mechanized dredge mining Dredge mining with a combination of pontoon mounted submersible pump and cutter suction dredges. No overburden or mineral rejects are encountered in dredge mining and pre concentration area. About 55% to 85% of the raw sand is rejected as tailing in pre concentration operation. This mineral is used to refill the back side of dredging pond as the dredge moves forward.
1.22	Facilities for long term housing of operational workers?	No	
1.23	New road, rail or sea traffic during construction or operation?	No	Existing kachcha road will be used for transportation of beach sand, concentrate generated from pre concentrator plant to old mineral separation Plant, situated at a distance of 2 Km.
1.24	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No	
1.25	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No	

1.26	New or diverted transmission lines or pipelines?	No	
1.27	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No	No change in water quality is expected because no chemical are added to the water system during dredging. Water from the adjoining canal will be used to form a pond in which the dredge / pontoon mounted submersible pump will be floated, water used in dredge and pre concentrator will be re-circulated back to the pond. However, hydrological study will be carried out in the area as part of EIA study.
1.28	Stream and river crossings?	No	
1.29	Abstraction or transfers of water form ground or surface waters?	Yes	Water supplied by existing nearby T.S Canal for dredge/ pontoon mounted submersible pumps
1.30	Changes in water bodies or the land surface affecting drainage or run-off?	No	Insignificant changes in hydrology because of dredge Mining.
1.31	Transport of personnel or materials for construction, operation or decommissioning?	Limited	
1.32	Long-term dismantling or decommissioning or restoration works?	No	
1.33	Ongoing activity during decommissioning which could have an impact on the environment?	No	

1.34	Influx of people to an area in either temporarily or permanently?	Low	About 30 workers will be taken temporarily from the areas nearby and will attend duties as required.
1.35	Introduction of alien species?	No	
1.36	Loss of native species or genetic diversity?	No	
1.37	Any other actions?	No	

2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):

S.No.	Information/checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data.
2.1	Land especially undeveloped or agricultural land-(ha)	No	
2.2	Water (expected source & competing users) unit: KLD		In the case of dredging, the mining area is away from the beach but close to the T.S. Canal and canal water will flow in to the dredge pond through the barrier as seepage.

2.3	Minerals (MT)		<p>Raw sand production inland Block III (in MT)</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Dredge Combine-1</th> <th>Dredge Combine-2</th> <th>Total Inland Production</th> </tr> </thead> <tbody> <tr> <td>Year 1 (2012-13)</td> <td>2,00,000</td> <td>2,00,000</td> <td>4,00,000</td> </tr> <tr> <td>Year 2 (2013-14)</td> <td>2,50,000</td> <td>2,50,000</td> <td>5,00,000</td> </tr> <tr> <td>Year 3 (2014-15)</td> <td>3,80,000</td> <td>3,80,000</td> <td>7,60,000</td> </tr> <tr> <td>Year 4 (2015-16)</td> <td>4,00,000</td> <td>4,00,000</td> <td>8,00,000</td> </tr> <tr> <td>Year 5 (2016-17)</td> <td>4,00,000</td> <td>4,00,000</td> <td>8,00,000</td> </tr> </tbody> </table>	Year	Dredge Combine-1	Dredge Combine-2	Total Inland Production	Year 1 (2012-13)	2,00,000	2,00,000	4,00,000	Year 2 (2013-14)	2,50,000	2,50,000	5,00,000	Year 3 (2014-15)	3,80,000	3,80,000	7,60,000	Year 4 (2015-16)	4,00,000	4,00,000	8,00,000	Year 5 (2016-17)	4,00,000	4,00,000	8,00,000
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2.4	Construction material - stone, aggregates, sand / soil (expected source - MT)	No																									
2.5	Forests and timber (source - MT)	No																									
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)	Yes	<p>Electricity will be available from state Electricity board for the operation of pre-concentrator at a total connected load of 250KW. In the case of pontoon mounted submersible pump (DP 50HP) operation, source of energy will be from Diesel operated DG set 100KVA at a total connected load of 38.50 KW.</p> <p>Total connected load is approximately 467 KW, maximum demand will come around 375 KVA.</p> <p>Two numbers dredge proposed to be used will be powered by a diesel engine giving 308 KW each.</p>																								
2.7	Any other natural resources (use appropriate standard units)	No																									

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data.
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and water supplies)	No	
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	No	
3.3	Affect the welfare of people e.g. by changing living conditions?	No	Most of the residents have left the area as their lands have been purchased by KMML.
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.,	No	
3.5	Any other causes, that would affect local communities, fisher folk, their livelihood, dwelling units of traditional local communities etc		

4. Production of solid wastes during construction or operation or decommissioning (MT/month)

S. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
4.01	Spoil, overburden or mine wastes	No	About 55% to 85% of the raw sand is rejected as tailings in pre concentration operation. This material is used to refill the back side of dredger's pond as the dredge moves forward.
4.02	Municipal waste (domestic and or commercial wastes)	No	No colony. Only two offices.
4.03	Hazardous wastes (as per Hazardous Waste Management Rules)	No	Monazite, the radioactive mineral is disposed off as per a procedure approved by Atomic Energy Regulatory Board.
4.04	Other industrial process wastes	No	
4.05	Surplus product	No	
4.06	Sewage sludge or other sludge from effluent treatment	No	
4.07	Construction or demolition wastes	No	During land clearance, generation of debris of acquired building will be minimal and the same will be used for back filling.
4.08	Redundant machinery or equipment	No	

4.09	Contaminated soils or other materials	No	
4.10	Agricultural waste	No	
4.11	Other solid wastes	No	

5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)

S. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	No	
5.2	Emissions from production processes	No	Due to wet process, there will not be any emissions.
5.3	Emissions from materials handling including storage or transport	Low	Dredging will not produce any dust or fumes. The loading and unloading operations also do not produce dust because the sand is wet. Trucking routes will be sprayed manually with water to prevent dust generation.
5.4	Emissions from construction activities including plant and equipment	Limited	Emission from diesel engines due to operation of pontoon mounted submersible pumps, dredge and Earth moving equipments will be minimal. As the impact is very minimal, the only mitigation measures proposed is improved maintenance of engines of trucks and other mining machinery.

5.5	Dust or odours from handling of materials including construction materials, sewage and waste	No	No odours. Dusting will be minimum because the sand being handled is free of dust and is moist. Trucking routes will be sprayed manually with water to prevent dust generation, if necessity arises.
5.6	Emissions from incineration of waste	No	
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	No	
5.8	Emissions from any other sources	--	

6. Generation of Noise and Vibration, and Emissions of Light and Heat:

S. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/ rates, wherever possible) with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Minimal	No major change is expected in noise levels. The increase in sound level will be only from the engines of dredge, trucks and wheel loaders used to handle the raw sand, concentrate and waste sand. There will not be any residential house near the working area. Noise will be kept to the minimum by proper maintenance (sturdy foundations and barriers) of the dredge and other mining machinery.

6.2	From industrial or similar processes	No	Low and limited due to working motor only.
6.3	From construction or demolition	No	From demolition of acquired houses, it is nominal.
6.4	From blasting or piling	No	No drilling or blasting.
6.5	From construction or operational traffic	Low	Management plans shall be suggested as part of FIA
6.6	From lighting or cooling systems	No	
6.7	From any other sources	-	

7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:

S. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials	No	The radioactive material, Monazite shall be disposed in trenches and topped with Silica rich sand in accordance with the guidelines prescribed by the AERB. Seepage water from canal used in dredge and pre concentrator will be re-circulated back to the pond. No change in water quality is expected because no chemicals are added to the water system during dredging and pre concentrating.

7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	No	
7.3	By deposition of pollutants emitted to air into the land or into water	No	
7.4	From any other sources	No	
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	No	

8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment

S. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances	No	No use of explosives. Fire fighting precautions will be planned to implement as per the guide lines of DGMS circulars for Mining Machineries.
8.2	From any other causes	No	
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. Floods, earthquakes, landslides, cloudburst etc)?	Yes	→ Cyclone, earthquake } Moderate → Tsunami } Prone → No construction However, specific emergency plans will be laid down before working in this Block.

9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality

S. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/ rates, wherever possible) with source of information data
9.1	Lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g: <ul style="list-style-type: none"> • Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.) • housing development • extractive industries • supply industries • other 	No	
9.2	Lead to after-use of the site, which could have an impact on the environment	No	The mined out refilled area will be suitable for habitation and cultivation or any other purpose like tourism etc or as decided by the state Government.
9.3	Set a precedent for later developments	Yes	This land will be available for various other developments as decided by the State Government.
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	No	

(III) Environmental Sensitivity

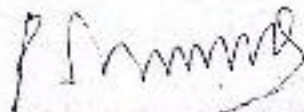
S.No.	Areas	Name/ Identity	Aerial distance (within 15 km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	No	
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Yes	The area falls under CRZ. However, the applicant will undertake / comply all statutory rules, regulations, orders made by central and state Government statutory organization, courts etc, and also obtain specific permissions wherever necessary from concerned authorities.
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	No	
4	Inland, coastal, marine or underground waters	Yes	The proposed lease hold borders Arabian Sea at West and T.S Canal at East. However, safe barrier will be left as per the direction of concerned authorities between dredging pond and sea or T.S Canal.

5	State, National boundaries	No	
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas.	Yes	There is one temple, one church and one cemetery close to the road used for transport. The area is free from human settlement because the surroundings extent of land has already been purchased or acquired by the company.
7	Defense installations	No	
8	Densely populated or built-up area	No	The density of the project area is less as compared to other coastal area of Kerala. However, detailed social impact assessment will be carried out as part of the EIA study.
9	Areas occupied by sensitive man-made land uses (<i>hospitals, schools, places of worship, community facilities</i>)	Yes	The Places of worship and other sensitive locations will not be disturbed.
10	Areas containing important, high quality or scarce resources (<i>ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals</i>)	No	
11	Areas already subjected to pollution or environmental damage. (<i>those where existing legal environmental standards are exceeded</i>)	No	

12	Areas susceptible to natural hazard which could cause the project to present environmental problems <i>(earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)</i>	No	
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Date: 06-11-2013

Place: CHAVARA



Signature of the applicant **P. Michael Vetha Siromony IAS**
Managing Director

With name and full address

(Project Proponent/Authorized Signatory)

Annexure 1

BLOCK NO: III

TERMS OF REFERENCE

1.1 OBJECTIVE

The objective of the study is to get environmental clearance for mine lease area KMML Block III (88.119 ha).

The study will include the existing beach washing & existing inland mining using pontoon mounted submersible pumps & proposed mechanized dredge mining in these leases. The study shall include identification of environmental impacts on the lease areas due to the proposed mining activity. The study will identify the existing environmental conditions, predict impacts and suggest environmental safeguards and develop post project monitoring programme to ensure environment friendly mining and transportation of the concentrate.

1.2 PLAN OF APPROACH AND METHODOLOGY

The significant areas of a sand / dredge mining include air emissions due to transportation, change in Land use, noise generation, traffic, sea erosion and social impact assessment including R&R. Other minor aspects include geology indicating seismic zone, water body ecology, flora & fauna, surface drainage pattern, vehicular traffic density, hydrology, baseline meteorology and occupational safety and health and radiation studies. Based on the data collection, Coastal Regulation Zone map issued from CESS and mining plan, the impacts on air, water, noise, land, socio-economic environment and ecology will be assessed. For mitigation of adverse impacts, an Environmental Management Plan will be prepared. For monitoring of critically affected parameters, monitoring programme will also be designed. Rehabilitation & Resettlement plan as per the approved KMML pattern will be formulated.

In addition to EIA experts, the team shall include (1) Mining engineer with valid license as RQP from Indian Bureau of Mines, Government of India (2) Geologist experience in geological mapping and mineral surveys, field measurements to study the GWF pattern and impact of open sand mining in the ground water conditions (3) Sociologist / NGO group with more than 5 years experience in carrying out Social Impact Assessment studies for the mine leases (4) Ecologists and (5) Marine Ecologist for carrying out aquatic ecological survey of TS canal which includes measurement of primary productivity, density of planktons, macro and micro fauna etc

1.3 Baseline Meteorological and Air Quality data

Although dredge mining has little impact on air quality, the existing ambient air quality of the area is important for evaluating the overall impact of mining. Baseline air quality data available with adjacent mine (IRE) shall be collected. Secondary data available will also be collected and compiled in the report.

In the absence of stack (point emission source) the ambient air quality is expected to be affected only in and around mining areas and transportation routes up to a limited distance depending on wind speeds / direction.

A programmable microprocessor based wind monitor will be setup in the buffer zone. This data will be used for identification of pollutant dispersion and air quality modeling. Wind rose pattern shall be plotted season wise based on Trivandrum IMD data. Data on temperature, relative humidity shall also be recorded during the study period. Two ambient air quality monitoring stations shall be in the core zone and one in the mine lease area. The predominant wind direction will be considered by studying the wind rose pattern in the study area. Ambient Air Quality will not be monitored during rains.

Baseline ambient air quality measurement of SPM, RSPM, SO₂ and NO_x, shall be made at a minimum of three locations in the buffer zone covering this KMML Block No. III. The samples will be collected and analyzed as per IS: 5182 guidelines. The monitoring will be carried out for four months (twice a week) covering one season,

1.3.1 Land use

The land use pattern will be studied from the maps and GIS analysis. The data will be classified into the following land use/land cover categories for this KMML Block-III.

- ◆ Build up area
- ◆ Agricultural land
- ◆ Forest
- ◆ Waste Land
- ◆ Water bodies
- ◆ Mining
- ◆ Others.

1.3.2 Water Quality

Mining and related activities in an area exert its influence on surface as well as the ground water resources. Therefore water availability and water quality are two major aspects to be considered for base line status of water environment. A sampling network for surface as well as groundwater shall be designed. The aim of the design will be so as to characterize the water quality of the area. The samples will be collected once in pre-monsoon and in post monsoon season over a period of one year at a minimum of 5 (five) stations per buffer zone. The following parameters shall be analyzed:

Temperature	TSS	Phosphates	Copper
Taste and Odor	Total Hardness	Calcium	Zinc
Turbidity	Chlorides	Magnesium	Oil & Grease
Dissolved Oxygen	Free Chlorine	Sodium	Cadmium
BOD	Sulphates	Potassium	Mercury
pH	Fluorides	Iron	Lead
TDS	Nitrates	Manganese	MPN

1.3.3 Water Quantity

To assess the surface water potential in the project area, the following aspects will be studied in the buffer zone;

- Field monitoring of well details
- Hydro geological characteristics from the available literature.
- Review of hydrological records/field studies and analysis

Surface water: The contours will be generated in the ML area and distance to water bodies will be marked in a map. Seasonal fluctuations that is along summer (April) post monsoon season August (south-west monsoon) will be studied. The water sample from available surface water and ground water from both core as well from the buffer zone shall be collected, and the analytical results for surface water and ground water shall be presented separately and interpretation of the water quality shall be done comparing with the drinking water specification IS 10500 and CPCB water quality criteria.

Ground water: Hydro geological characteristics of the study area shall be collected from the available literature/review of hydrological records/studies on collection of samples and analysis of data available. The study area falls within coastal zone where the aquifer systems discharge ground water to the sea or estuarine portion. The intra coastal canals and lacustrine extensions of the tidal effect add complexity of the hydrodynamic equilibrium of the coastal tract. The dug wells mostly tap the phreatic aquifers in the recent sediments. Field studies shall be made by the observation of the open wells in the mine lease blocks and the surroundings to assess the existing hydro geological conditions. Seasonal fluctuations i.e. along summer (April) post monsoon season August (south-west monsoon) will be monitored. The samples of ground water from both core as well from the buffer zone shall be collected. The observation of surface water bodies as well as water levels in the open wells will be made in the mine leases blocks to assess the hydro geological condition.

1.3.4 Geology & Soil characteristics

The baseline data on geology shall be collected from the available literature. Regional geology with type of ore formation shall be discussed and also the tectonic history and seismicity of the region. The seismic zone to which the study area belongs shall be indicated. The local stratigraphical sequence of the mining area shall be interpreted from the geological map. The lithological sequence of the mining area shall be interpreted from the existing mines, open wells and cuttings. Geological map of the study area shall be prepared and geologic cross sections (longitudinal and transverse) shall be drawn. The topics such as natural and geologic features, terrain topography, geological disturbance, ore grade, mineable reserves, production rate, and estimated life of mine shall be dealt. The average mineralogical composition in percentage shall be given. The depth of the deposit at final pit limit to be mined and overburden thickness (maximum and minimum) shall be assessed. The year wise development plan and year wise production plan for the 1st five years and method of hauling over burden shall also be discussed.

Representative soil sampling in the core zone and buffer zone covering 10 kms radius from each mine lease shall be conducted. The depth of sampling shall depend upon nature of soil profile, type of

structures, land use/cover etc. The soil samples are to be collected at the rate of one each representing different land use areas. Total 15 samples will be analyzed during the full period of study representing all leases. The agricultural crop in the study area shall be mentioned collecting the data from the concerned departments/agencies and limited ground truthing by field survey.

The physical parameters that will be analyzed for soil are colour, texture, water holding capacity, Electrical conductivity, Permeability, and Porosity. The chemical properties shall include pH, Chloride, Sodium, Absorption Ratio.

1.3.5 Demography & Socio-economics

Mining activity in an area has long term irreversible impact on local, sociological, cultural and economical situation. In order to evaluate socio-economical impact of the project, an extensive study on the existing socio-economic status will be carried out. The project may also bring benefits to local people. The displacement of people and loss of livelihood are the major impact of the mining projects.

The report shall cover the following for each mine lease:

1. Demographic growth profiles and Socio-economic status of all the villages in the affected mine lease area
2. Collection of details of religious places and historic monuments in the mine leases
3. Determine opinions, expression on the project;
4. Assess the nature of existing resources and means of livelihood
5. Ascertain reasons and various social and political driving forces causing complaints and obstruction of existing and proposed activity;
6. Examine possible impact of the project on local population due to their displacement; loss of land, and other means of livelihood.
7. Work out mechanism for consultation with all stakeholders and influential forces in order to address issues related to the proposed activity
8. Evolve suggestions, creative recommendations for getting the co-operation of local communities and work out guidelines for an effective R&R of the 'project affected persons' (PAPs) under focus.
9. Delineate R&R based on the result of the survey and in line with government and KMML policy.

1.3.6 Terrestrial Ecology

As a part of the study the phyto-geographic region in which the relevant part of the project area lies will be identified through field studies. A one season study on inventory of the common flora & fauna shall be prepared. Presence of rare and endangered species if any will also be assessed. Data from previous studies with respect to buffer zone shall also be analyzed.

1.3.7 Aquatic ecological survey

The T.S canal ecology shall be researched through literature survey and field studies. As part of the study, primary productivity, the densities of phytoplankton, zooplankton, benthic macro-invertebrates, fish and macrophytes will also be assessed. Sample location will be selected representing each mine lease area and blank location near Amrita Madam.

The data on the prevailing fish species will be collected from local fisheries offices, publications of Zoological Survey of India. Information on fish production, total catch, as well as on the number of fishermen and their income shall be collected from local, Central/State/NGO offices, Fishermen's Co-operatives (e.g. Matsya Federation etc.).

1.3.8 Noise

Noise level value measurement shall be undertaken by using integrated sound level. A total of 100 measurements will be carried out covering the buffer zone.

1.3.9 Topography & Drainage

Topography of the study area shall be shown in topographical map and analyzed to describe the terrain. The physiographical features of the study area shall be explained by using satellite imagery. The ASTER DEM data will be overlaid with Land use layer to analyze the physiographic conditions of the mining areas.

1.3.10 Environmental Radioactivity

Natural background radiation data shall be collected from the existing data available with the KMML and IREL. Data also will be collected for the ML area under study from Natural Background Radiation Registry (NBRR) project located at Neendakara.

1.3.11 Coastal erosion

Assessment of coastal erosion

In order to protect the beaches from sea erosion, most of the coastal stretch except the mining sites and fishing gaps has been provided with sea walls. Alternate sea erosion abatement methods suitable for this area will be worked out.

KMML beach washing at Block No.III is prone to loss of land due to beach erosion. In order to ascertain the facts, it is essential to carry out the actual rate of loss of land at least for the last 10 years. This analysis will be carrying out using satellite Imagery. Analysis of data for five years (2005 to 2010) could give an indication of coast line stabilization based on the production rate.

1.3.13 Traffic

Vehicular traffic during mine development and operation may result in excessive use of existing public infrastructure and may cause congestion and pollution. Baseline information / data on existing public utility infrastructure and service shall be collected.

The traffic survey will monitored at various locations to find the total traffic at various village roads connecting the mine lease areas. Assessment and carrying capacity analysis for the increase in traffic due to the proposed mining activity will be assessed. Alternate management plans will be formulated to minimize the impact due to traffic.

1.4 Impact Assessment

In the proposed KMML leases, the option of alternate site has little relevance since it is mainly guided by mineral deposits. Identification of all potential environmental impacts due to a project is an essential step of Environmental impact Assessment. These are critically examined and major impacts (both beneficial & adverse) will be further studied. In case of this particular project activity the significant impacts are on air emissions due to transportation, increased vehicular traffic, impact on flora & fauna due to clearance of natural vegetation and mining related social impact assessment and R&R. The nature and characteristics of impacts are required to be taken into consideration while evaluating the magnitude of impacts.

The impacts of the project on air, water, traffic, land use, ecology, and socio-economic environment shall be assessed. BEES' environmental evaluation will be carried out for evaluation of impacts.

Based on the project details, field's studies, the impacts with regard the following shall be assessed:

- ◆ Anticipated impact on the land environment
- ◆ Impact on water environment
- ◆ Impact on Air environment
- ◆ Impact due to vehicular traffic
- ◆ Impact on the biological environment
- ◆ Impact on Noise
- ◆ Impact on workers health
- ◆ Impact on socio-economic environment
- ◆ Social Impact Assessment

1.5 Environmental Management & Monitoring Plans

A management plan to mitigate the adverse impacts will be suggested. The various issues to be addressed are:

- Dust emission control
- Traffic
- Land use and mine closure
- Socio-economic conditions of the region
- Human settlement and rehabilitation
- Scheme for top soil management
- A forestation plans
- Occupational Safety & Health
- Organization and methods for environmental management
- Post-project monitoring programme for critical environmental parameters
- Estimation of cost required for management and monitoring plans

1.6 Risk Analysis and Disaster Management Plan

Risk Assessment aims at prevention of accidents and to take necessary steps to prevent it happening. The main components that will be covered in all the MLs will be

- ✓ Protect workers in mines from accident
- ✓ Prevent or reduce the incidence and severity of injury during mining operations
- ✓ To respond immediately and adequately in case of an accident

1.7 Public Hearing

The final report shall include the issues raised by the people during public hearing and the response of the project proponent together will form the final EIA report.

REGISTERED PARCEL

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES
OFFICE OF REGIONAL CONTROLLER OF MINES

FAX : (080) 23371027 / 23373287
Tel : 080-23371027 / 23375366 / 67
Email ID: ro.bangalore@ibm.gov.in
roomong@rediffmail.com

29, Industrial Suburb, II Stage,
Tumkur Road, Goruguntapalya,
Yeshwantpur,
Bangalore-560 022.

No.279/1054/2011/BNG

Dated: 12.2012

2-1-13

To
M/s.Kerala Minerals and Metals Ltd.
(A Govt. of Kerala Undertaking)
Mineral Separation Unit
Kovithottam, Chavara
Kollam 691 583,
Kerala State.

Sub: Approval of Mining Plan (Including Progressive Mine Closure Plan) in respect of Chavara Beach Sand Heavy Minerals over an area of 203.802 ha in Neendakara & Other Villages, Karunagapally Taluk, Kollam district, Kerala State of M/s.KMML under Rule 24A of MCR 1960 .. Public / A cat (OTFM) / Renewal / Non-forest.

Ref: Your letter No.KMML/MS/IBM/169/2012/408 dated 16.11.2012 submitting therewith final copies of mining plan.

Sir,

In exercise of the power conferred by the clause (b) of sub-section (2) of Section 5 of the Mines and Minerals (Development & Regulation) Act, 1957 read with Government of India Order No.S.O.445 (E) dated 28.04.1987, I hereby approve the aforesaid Mining Plan (including Progressive Mine Closure Plan) for Sillimanite mineral only. This approval is subject to the following conditions:

- (i) That the Mining Plan (including Progressive Mine Closure Plan) is approved without prejudice to any other law applicable to the mine/area from time to time whether made by the Central Government, State Government or any other authority.
- (ii) That this approval of the Mining Plan (including Progressive Mine Closure Plan) does not in any way imply the approval of the Government in terms of any other provision of the Mines & Minerals (Development & Regulation) Act, 1957 or the Mineral Concession Rules, 1960 or any other law including Forest (Conservation) Act, 1980, Environment Protection Act, 1986 and the rules made there under.
- (iii) That this Mining Plan (including Progressive Mine Closure Plan) is approved without prejudice to any other order or direction from any court of competent jurisdiction.

Contd...2

- 2 -

No.279/IC54/2C11/BNG

- (iv) The details of execution of renewal of lease by the State Government whenever such an order is passed may be intimated to the Regional Controller of Mines, Indian Bureau of Mines, Bangalore.
- (v) Provisions of the Mines Act, 1952 and Rule & Regulations made there under including submission of notice of opening, appointment of manager and other statutory officials as required by the Mines Act, 1952 shall be complied with.
- (vi) The execution of Mining Plan / Scheme of Mining shall be subjected to vacation of prohibitory orders / notices, if any.
- (vii) The department does not undertake any responsibility for fixing of boundary pillars on the ground and correctness of the lease boundaries as given in lease sketch & other plans furnished by the applicant.
- (viii) The contents of circular No: 2/2010 issued by the Chief Controller of Mines, IBM, Nagpur vide his letter No.11013/3/MP/90- CCCM Vol-VII dated 06/04/2010 shall be complied with, within a period of six months from the date of approval of this scheme of mining, failing which the approval shall be deemed to have been withdrawn.
- (ix) A copy of the Study Report on Replenishable Reserves carried out by Centre for Earth Science Studies (CESS) should be submitted to this office within 24 months from the date of approval of this Mining Plan.
- (x) The proposed mining operations (production) from replenishable resources (beach washings) are not permitted. You may submit the modifications in the approved mining plan for estimation of replenishable resources (as per UNFC) and mining as per the findings of the CESS Scientific Study. If the modifications are not submitted within a period of 24 months from the date of approval of this mining plan, this approval shall be deemed to have been withdrawn.
- (xi) If anything is found to be concealed as required by the Mines Act in the contents of the Mining Plan and the proposals for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.
- (xiii) The validity period of the Financial Assurance of Rs 2,00,000/- expires on 31.03.2016 should be renewed before the expiry of the same and should be submitted to the Regional Controller of Mines, Indian Bureau of Mines, Bangalore.

Yours faithfully,


Encl: Two copies of approved Mining Plan
(including Progressive Mine Closure Plan)


(B RAM MOHAN)
REGIONAL CONTROLLER OF MINES

Copy for kind information to:

1. The Director of Mines & Geology, Govt. of Kerala, Kesavadasapuram, Pattom Palace, Trivanzthapuram 695 004
2. The Director, Bangalore Region, Directorate General of Mines Safety, Plot No.27, 24th Main, 17th cross, Adjacent to IDBI Bank, J.P.Nagar, V Phase Bangalore, along with a copy of the approved Mining Plan.
3. The Controller of Mines (SZ), Indian Bureau of Mines, Bangalore, along with a copy of the approved Mining Plan.
4. Sri Jacob Punnen, RQP, No.A-24, Kanaka Nagar, Trivandrum 695 003.

Encl: as above


(B RAM MOHAN)
REGIONAL CONTROLLER OF MINES



MINING PLAN
FOR
BEACH SAND

(Ilmenite, Rutile Leucoxene, Zircon and Sillimanite)
FOR APPROVAL BY IBM IN RESPECT OF SILLIMANITE MINERAL ONLY

**Submitted under Rule 24(A) of Mineral Concession Rules 1960 &
PROGRESSIVE MINE CLOSURE PLAN
Submitted under Rule 23(B) of MINERAL CONSERVATION & DEVELOPMENT
RULES 1988**

FOR
KERALA MINERALS AND METALS LTD
(State Public Sector Unit), Chavara, Kollam, Kerala
Under G.O. (MS) NO. 175/2010/ID & 214/2011/ID

Over an area of 203.802 Ha in
NEENDAKARA, CHAVARA, PANMANA, KULASEKHARAPURAM,
VADAKKUMTHALA AND PUTHUPALLY VILLAGES
KERALA

NON FOREST LAND (Without drilling and blasting, lease over area worked earlier, UNFC Classification 112 to 332 for different Blocks)

Submitted under Rule 22(4) and 22(5)(Va) of MCR 1960. "A" Class Mine (without drilling and blasting), Patta land purchased/being purchased by the Company, falling under CR Zone, for the period 2011-12 to 2015-16, Lease hold over existing Mining lease Under G.O.No. 175/2010/ID for mining (Ilmenite, Rutile Leucoxene, Zircon and Sillimanite)

PREPARED BY:

JACOB PUNNEN
MINING ENGINEER
A-24, KANAKANAGAR
TRIVANDRUM - 695 003
RQP / BNG / 028 / 88 / A
AMD / MPA/RQP / 5 / 2010
July 2012

JACOB PUNNEN B.Tech. (Hons), M.Tech., F.I.E.
 Consulting Engineer
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 Vellayambalam, Trivandrum
 Pin : 695 003

Tel : 0471 2314195
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 Fax: 0471 3919263

<ljacobsd@vsnl.com>, <ljacobsd@asianetindia.com>

INDIAN BUREAU OF MINES RECOGNITION NO. RQP/BNG/028/88A
 ATOMIC MINERALS DIRECTORATE FOR EXPLORATION & RESEARCH
 REGN NO.AMD/MPA/RQP/ 5/2010



25/7/2012

CERTIFICATE

This is to Certify that Mines Act, Rules and Regulations made thereunder have been complied within the preparation of this Progressive mine closure plan for M/s. Kerala Minerals and Metals Ltd for Beach Sand deposit in 203.802 hectares. In Block Nos. I, III V and VII in Neendakara, Chavara, Panmana, Vadakkumthala, Kulasekharapuram and Puthupally Villages of Karunagappally Taluk and whenever specific permissions are required, the applicant will approach the Director General of Mines Safety.

It is also certified that the information contained in this plan is true to the best of my knowledge.


JACOB PUNNEN

RQP/BNG/028/88A

AMD / MPA/RQP / 5 / 2010.

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 INDIAN BUREAU OF MINES RECOGNITION. NO. RQP/BNG/028/88A
 ATOMIC MINERALS DIRECTORATE FOR EXPLORATION & RESEARCH

REGN NO.AMD/MPA/RQP/5/2010

25/7/2012

CERTIFICATE

This is to Certify that provisions of Mineral Conservation and Development Rules 1988 have been complied with in the preparation of mining plan and Progressive mine closure plan for Beach sand in 203.802 hectares. In Block .No I,III,V and VII in Neendakara, Chavara, Panmana , Vadakkumthala, Kulasekharapuram and Puthupally Villages of Karunagappally Taluk in Kollam District. Applied for by M/s. Kerala Minerals and Metals Ltd and whenever specific permissions are required, the applicant will approach concerned authorities at Indian Bureau of Mines/ Atomic Minerals Directorate for Exploration and Research.


JACOB PUNNEN
 RQP/BNG/028/88A

AMD / MPA/RQP/5/2010.



The Kerala Minerals and Metals Ltd.

(A Govt. of Kerala Undertaking)

Mineral Separation Unit

Kovilthottam, Chavara

Kollam - 691585, Kerala, S. India

Ph : 0476-2686442, 2686048, 2682727

Fax : 0476-2686442

E-mail : kmmms@kmmml.com



MS/MINES/MINING LEASE/71 A/2012
15/3/2012

CERTIFICATE

I certify that this Mining Plan and Progressive Mine Closure Plan for Beach sand for our lease hold in Karunagapally Taluk, Kollam District, has been prepared by Shri. Jacob Punnen, Mining Engineer, A-24, Kanaka Nagar, Thiruvananthapuram – 695 003 (Reg. No. RQP/BNG/028/88A) in consultation with me and I have understood its contents.

I agree to comply with the same in accordance with the law.

George Kutty Thomas,

Asst. General Manager (MS).

Kerala Minerals and Metals Ltd

Authorized by Managing Director, Kerala Minerals and Metals Ltd

Vide letter No. MS/Mines/Mining Lease/71A/2009 of 06/06/2009.



The Kerala Minerals and Metals Ltd.

(A Govt. of Kerala Undertaking)

Mineral Separation Unit

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Fax : 0476-2686442

E-mail : mgm@kmmml.com



MS/MINES/MINING LEASE/71 A/2012
15/03/2012

CERTIFICATE

This is to Certify that Progressive Mine Closure Plan for lease hold in Neendakara, Chavara, Panmana and Vadakkumthala, Kulasekharapuram and Puthupally Villages, Karunagappally Taluk, Kollam District complies with all statutory rules, regulations and that orders by Central and State Governments, Statutory organization and Courts have been taken into consideration & wherever specific permission is required, the lessee will approach to the concerned authority. All measures proposed in Progressive Mine Closure Plan for mining Lease will be implemented in a time-bound manner as per proposed.

George Kutty Thomas,

Asst. General Manager (MS).

Authorized by Managing Director, Kerala Minerals and Metals Ltd

Vide letter No. MS/Mines/Mining Lease/71A/2009 of 06/06/2009.



The Kerala Minerals and Metals Ltd.

(A Govt. of Kerala Undertaking)

Mineral Separation Unit

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E-mail : sgms@kmmml.com



MS/MINES/MINING LEASE/71 A/2012
15/3/2012

CERTIFICATE

This is to Certify that Mines Act, Rules and Regulations made there under have been complied within the preparation of this Progressive mine closure plan for M/s. Kerala Minerals and Metals Ltd for Beach Sand deposal in 203.802 hectares, in Block .Nos. I,III V and VII in Neendakara, Chavara, Panmana, Vadakkumthala, Kulasekharapuram and Puthupally Villages of Karunagapally Taluk and whenever specific permissions are required, we will approach the Director General of Mines Safety.

It is also certified that the information contained in this plan is true to the best of my knowledge.

George Kutty Thomas,

Asst. General Manager (MS).

Authorized by Managing Director, Kerala Minerals and Metals Ltd

Vide letter No. MS/Mines/Mining Lease/71A/2009 of 06/06/2009.



The Kerala Minerals and Metals Ltd.

(A Govt. of Kerala Undertaking)

Mineral Separation Unit

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MS/MINES/MINING LEASE/71A/2012
15/03/2012

UNDERTAKING

I undertake that I shall within a period of 90 days from the date of approval of Scheme of Mining shall comply with the Provision of Circular No. 2/2010 of Chief Controller of Mines, Indian Bureau of Mines, Nagpur issued side letter No. N-11013/3MP/90-CCOM VOL-VII dated 06/04/2010.

George Kutty Thomas,

Asst. General Manager (MS).

Authorized by Managing Director, Kerala Minerals and Metals Ltd

Vide letter No. MS/Mines/Mining Lease/71A/2009 of 06/06/2009.

Mining Plan For M/s.Kerala Minerals and Metals Ltd.
List of Contents

Sl.No.	Items	Page No
1.0	Introduction	1
2.0	LOCATION AND ACCESSIBILITY	5
	PART - A	
3	GEOLOGY AND EXPLORATION	8
4.0	MINING	14
A	BEACH SAND WASHING	17
4.0 (A)	MINING	21
5.0	BLASTING	27
6.0	MINE DRAINAGE	28
7.0	STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE	29
8.0	USE OF MINERAL	29
9.0	OTHER	30
10.0	MINERAL PROCESSING	31
11.0	ENVIRONMENTAL MANAGEMENT PLAN	36
B		42
	<u>Dredge Mining in Block No. III and Block No. I</u>	
12.0	DREDGE MINING	51
13.0	BLASTING	59
14.0	MINE DRAINAGE	59
15.0	STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE	60
16.0	USE OF MINERAL	60
16.0 (A)	OTHER	61
17.0	MINERAL PROCESSING	61
18.0	ENVIRONMENTAL MANAGEMENT PLAN	63
C		70
	PROGRESSIVE MINE CLOSURE PLAN	
20.0	Introduction	70
20.1	Reasons for closure of mine	70
20.2	Statutory Obligations	70
20.3	Closure Plan Preparation	71
20.4	Geology	71



Sl.No.	Items	Page No
20.5	Reserves	71
20.6	Mining Method	71
20.7	Mineral Benefication	71
21.0	Review of Implementation of Mining Plan	71
22.0	Closure Plan	72
22.1	Mined- out land	72
22.2	Water Quality Management	75
22.3	Air quality Management	77
22.4	Waste Management	78
22.5	Topsoil Management	78
22.6	Tailing Dam Management	78
22.7	Infrastructure	79
22.8	Disposal of Mining Machinery	79
22.9	Safety & Security	79
22.10	Disaster Management and Risk Assessment	80
22.11	Care and maintenance during temporary discontinuance	80
23.0	Economic Repercussions of closure of mine and manpower retrenchments	81
23.1	Number of local residents employed in the mine., Status of the continuation family occupation and scope of joining the occupation back	81
23.2	Compensation given or to be given to the employees connecting with sustenance of himself and their family members	81
23.3	Satellite occupations connected top the mining industry	81
23.4	Continued engagement of employees in the rehabilitated status of mining lease area and any other remnant activities	81
23.5	Envisaged repercussion on the expectation of the society around due to closure of mine	81
24.0	Time scheduling for abandonment	81
25.0	Abandonment cost	82
26.0	Financial Assurance	82



LIST OF TABLES

1.	Production last six years'	
2	Details of land in Block III	87
3	Area or mining lease Block I to IV	88
4	Summary of lease area	4
5	Mineralogy of Block III	11
6	Geological reserve in Block I	88
6A	Geological reserve in Block V	89
6B	Geological reserve in Block VII	89
7	Typical analysis of Mineral sand from Block I	90
8	Geological Reserve in Block III	91
9	Raw sand production in last five years	13
10	Proposed Raw sand production programme	14
11	Mineralogical Analysis of concentrate from Beach washing	19
12	Proposed production of Raw sand from beach washing	22
13	Yearly production Block III Pontoon & Dredge -I	44
14	Yearly production Block III Pontoon & Dredge -II	44
15	Total Dredge production block -3	45
16	Area mined and reclaimed Block -3	46
17	Production and area mined in Block -1	48
18	Mineral combination in Block -1	48
19	Mineral combination Block -3 Dredge mining	48
20	Summary of machinery	63
21	Minable Reserves of Block III	92
22	Meteorological Data	93
23	Yearly production Plan in Dredge Mining in Block III	94

LIST OF ANNEXURE

I	Geology of KMML Block II	95-102
II	UNFC	103-114
III	G.O.(MS)No. 175/2010/ID	115-118
IV.	Radiation Survey	119-122
V	Approval from Kerala State Pollution Board	123-131
VI	Rehabilitation procedure as per minutes of discussion with Hon. Minister for Industries, Govt. of Kerala	132-135
VII	Details of temperature, rainfall for last 2 years	136-140
VIII	Licence from Atomic Energy Regulatory Board	141-142
IX	RQP and AMD Certificate	143-144
X	Details of Modernization of Mineral Separation Plant	145-146
XI	Annual return filed with Registrar of Companies	147-156
XII	Consent of Govt. of India for Mining Lease	157
XIII	Authorization Georgekutty Thomas AGM (MS)	158
XIV	Photo ID Card Georgekutty Thomas AGM (MS)	159
XV	G.O.(MS).No. 195/70/ID dated 30/5/1970	160-162
XVI	G.O.(MS).No. 355/72/ID dated 11/12/1972	163-164
XVII	Lease Agreement dated 09/07/1985	165-198
XVIII	Feasibility Report for Block III	199 to 219
XIX	Notification of appointment of Mining Engineer under Rule 42 (i)(b)(ii)of MCDR	220
XX	Details of Board of Directors	221



XXI	Size distribution of Major mineral fractions	222
XXII	Mineralogical analysis of major mineral fractions	223
XXIII	Application for renewal of Mining Lease	224-232
XXIV	G.O.(MS)N0. 214/2011/ID dated 24/10/2011	233-234
XXV	Atomic Energy Regulatory Board License License for Handling Prescribed substances	235-238
XXVI	Letter to CESS , Thiruvananthapuram for study on availability of beach sand for beach washing collection	239-243
XXVII	Reply from CESS, Thiruvananthapuram on study of sand availability	244
XXVIII	AMD Approval for Mining Plan dated 13/5/2003	245-246
XXIX	Organization chart of MS Unit KMML	247
XXX	Bank guarantee	248-249
XXXI	Undertaking to reassess the renewable resources based on report from CESS, Trivandrum	250

LIST OF PLATES

No	Name
1.	Lease Sketch of Block I
2	Lease Sketch of Block III
3.	Lease Sketch of Block V
4	Lease Sketch of Block VII
5	Key Plan
6	Geological map of Block III
7	Geological section of Block III
8	Geological map of Block I
9	Geological section of Block I
10	Yearly production Block I
11	Layout of Dredge operation.
12	Layout of dredge path
13	Drawing of Pontoon of dredge
14	Yearly production Plan Block III
15	Yearly Production sections Block III
16	Flow sheet of pre-concentration Plant
17	Flow Diagram and material Balance of MS Plant
18	Conceptual plan
19	General layout and Composite plan
20	Surface plan of Block No. I
21	Surface Plan of Block No. III
22	Surface Plan of Block No. V
23	Progressive Mine Closure Plan & Afforestation Plan Block III
24	Surface Plan of Block No, VII
25	Geological Plan of Block No. V
26	Geological Plan of Block No. VII



**MINING PLAN
(IN THE FORMAT FOR A & B CATEGORY MINES)
As per MCDR,1988**

INTRODUCTORY NOTES

Introduction

Kerala Minerals and Metals Ltd or KMML is a company owned by Government of Kerala. The company is engaged in Mining and processing of beach sand minerals and manufacture of Rutile grade pigment from Ilmenite mineral found in beach sand. The company was incorporated in 1972 to take over the beach sand mining and processing operations of M/s FXP Minerals, which had been operating a mineral processing plant here since 1932.

The production of various items in KMML for the last six years has been as below:

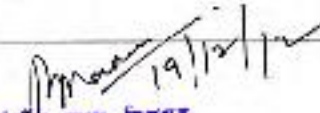
TABLE I

YEAR	2005-06	2006-07	2007-08	2008-09	2009-10	2010-2011
RAW SAND CONSUMED IN MT	230,815	273,155	266,406	289,490	271,020	260,209
ILMENITE IN MT	51,430	52,500	49,225	42,510	44,300	38,920
RUTILE IN MT	2,789	2,676	2,997	2,890	3,335	2,413
ZRCON IN MT	1,854	1,764	2,175	2,445	2,592	2,838

The area has been under mining from around 1900 by various companies. From 1930's, the mining in this plot was done by M/s FXP Minerals. This unit was taken over by K.M.M.L. which is a Public Sector Unit under Kerala Govt. Other beach sand operations in the area were taken over by M/s. Indian Rare Earths Ltd. (IRE), a Central Public Sector Unit under the Department of Atomic Energy. K.M.M.L and IRE held Mining Lease for the area stretching from Neerdakara to Kayamkulam

Mining plan is approved
subject to conditions laid
down in letter No. 279)

1057/2011 BNG. DL... 19.12.12


 क्षेत्रीय खान नियंत्रक
 Regional Controller of Mines
 भारतीय खान ब्यूरो
 Indian Bureau of Mines
 बंगलूरु Bangalore-560027



Mining Plan for Kerala Minerals and Metals Ltd, Chavara

Fozhi in Kollam District. The stretch was divided into 8 blocks and mining lease for Blocks 1, 3, 5 and 7 was granted to Kerala State Industries Development Corporation (KSIDC) and mining lease for block 2, 4, 6 and 8 was granted M/s. Indian Rare Earths Ltd., a Govt of India undertaking under Department of Atomic Energy, vide G.O.No. 195/70/ID of 30/05/1970. Subsequently the mining lease issued KSIDC was canceled as per G.O.NO.713/72/ID of 18/07/1972. Mining lease for the same area was issued to KMML for 20 years, vide Govt. order G.O. (MS) 355/72/ID dated 11-12-1972. Lease Deed for the area was executed on 9th July 1985. Copy of the Lease agreement is enclosed as Annexure XVII. Mining Plan for the area for five years from 1998 to 2003 was approved vide Letter No. AMD-2C(2)/90-PMSG/67 Dated 25TH March 1998 from Atomic Minerals Divn, Dept of Atomic Energy. Subsequently, the Mining Plan for the leasehold for 5 years 2003-2008 was approved by Atomic Minerals Directorate for Exploration and Research, Department of Atomic Energy, Govt. of India, vide letter No. AMD/MPA/3M(KMML)/03/829 dated 13/5/2003. (Attached as Annexure XXVIII) Details of the Blocks are given as Appendix to G.O.No. 195/70/ID of 30/05/1970 which is attached as Annexure XV. The company had applied for renewal of the Mining lease. Govt. of Kerala has issued a G.O No. 175/2010/ID of 12/8/2010 sanctioning a mining lease for 20 years over an area of 203.802 Ha. , as per approval from Govt. of India as per Letter No. 4/30/2009/MIV dated 11/5/2010 from the Ministry of Mines, Government of India. Copy of G.O. No. 175/2010/ID of 12/8/2010 & letter 4/30/2009/MIV dated 11/5/2010 from Govt. of India are enclosed as Annexure III & XII respectively. The Govt order was subsequently modified vide G.O.No.214/2011/ID of 24/10/2011,(Annexure No XXIV) This mining plan is submitted for approval under Rule 24(A) of Mineral Concession Rules, 1960, for the new Mining Lease order. Approval is sought from Indian Bureau of Mines in respect of Sillimanite Mineral.



Mining Plan for Kerala Minerals and Metals Ltd, Chavara

Page 3

a) Name of the applicant	The Kerala Minerals and Metals Ltd.,
Address	Mineral Separation Unit, Kovilthottam, Chavara, Kollam
District	Kollam
State	Kerala
Pin Code	691 583
Phone	04762686722 / 0476 686047
Fax	0476 2686721 / 2680101
Gram	
Telex	
e-mail	kmml@md3.vsnl.net.in
Nominated Owner	Georgekutty Thomas, AGM(MS),
Office Address	M/s. Kerala Minerals and Metals Ltd., Mineral Separation Unit, Chavara, Kollam.
Permanent Address	Annexure XIV
Proof	
b) Status of the applicant	
Private individual	No
Cooperative Association	No
Private Company	No
Public Company	No
Public Sector Undertaking	yes
Joint Sector Undertaking	No
Other (pl. specify)	Not applicable
c) Mineral(s) which are occurring in the area and which the applicant intends to mine	Minerals, sand containing Ilmenite, rutile, Leucoxene monazite, Zircon, Sillimanite with quartz gangue mineral
d) Period for which the mining lease is granted / renewed / proposed to be applied	20 years



Mining Plan for Kerala Minerals and Metals Ltd, Chavara

Page 4

DETAILS OF MINING LEASE(S) HELD BY THE APPLICANT (INCLUDING THIS ONE)

Sl.No	Lease reference No & Date	Area	Postal Address/ Location	Type of mineral	Working or non working	Status of approval of mining plan	Date of execution and date of expiry	Remarks
1	G.O.No. 175/2010/D of 12/8/2010	203.802 Hectors	Karunagappally Taluk	Minerals Ilmenite, Rutile, leucozene, Zircon & Silliminate	Working	Mining plan under submission Mining scheme for the area was approved by AMD in 2003. Fresh mining plan is being submitted.	09/07/1985 expiry 08/7/2005	Fresh mining lease sanctioned

TABLE IV

SUMMARY OF LEASE AREA

Sl No.	Blocks	Area	Village	Sy.No.
1	I	34.285 Hectares	Neendakara	25 to 112A
2	III	88.1193 Hectares	See Table -2	
3	V	28.899 Hectares	Karunagappally	91 to 220 less 218
4	VII	52.499 Hectares	Kulasekharapuram Puthupally	1 to 199 1 to 151
Total		203.802 Ha		

e) Name of the RQP preparing the mining plan

Jacob Punnen

Address

A- 24, Kanaka Nagar,



Mining Plan for Kerala Minerals and Metals Ltd, Chavara

Page 5

Phone	Thiruvananthapuram, 695 003 0471- 2314195 / 09447031419
Fax	0471- 3919263
e-mail	ljacobsd@vsni.com
Telex	
Registration No. IBM	RQP/BNG/028/88/A
Date of grant / renewal	26/06/2010
Valid upto	25-5-2020 (Annex IX)
Registration No. with Atomic Minerals Directorate for Exploration and Research	AMD/MPA/RQP/5/2010
Date of grant / renewal	12/11/2010
Valid upto	11/11/2012
(f) Name of the prospecting agency	The area was prospected in detail by Atomic Minerals Directorate for Exploration and Research (AMD). The area has been mined for the last 70 years by the applicant and its predecessor organizations
Address	Atomic Minerals Directorate for Exploration and Research, 1-10-153-156, Begumpet, Hyderabad
Phone	
g) Reference no. and date of consent letter form the State Govt.	G.O.No. 175/2010/ID of 12/8/2010 and G.O.No.214/2011/ID of 24/10/2011 (copy enclosed)

2. LOCATION AND ACCESSIBILITY

a) Details of area (with location map)

District and State	Kollam, Kerala State
Tahaka	Karunagapally
Village	Neendakara, Chavara, Panmana, Karunagappally, Vadakumthala , Kulasekharapuram and Puthupally



Khasra No./ Plot No./ Block Range /
Felling Series etc.

Details of land are in Table II and III. The area is not forest area, hence Felling Series is not applicable.

Lease Area (hectares)

Summary is given Table IV; Details are given in Table II & III

The area indicated above is the correct extent of land falling inside the lease sketch. In the earlier lease order, the lease area was indicated to be less, probably due to inaccurate survey. Lease sketches are given in plate No. 1 to 4 . Key Plan is given plate No. 5

Existence of public road / railway line, if any nearby and approximate distance

The plot No. 1 is adjacent to NH 47 (now renumbered as NH 66). Block No. 3 is about 3 kms to the west of NH 47. Block No. 5 & 7 are 5 to 6 Km to West of NH 47(66). The broad gauge railway line is about 8 kms to the east of NH 47(66). The nearest railway station is Karunagappali station at a distance of about 20 kms from Block No. 3

M/s Kerala Minerals and Metals Ltd (KMML), maintains a Guest house near Chavara. M/s. Indian Rare Earths Ltd. Chavara maintains a guest house near the processing plant at Chavara, about 5 kms south of the KMML office. Nearest Govt Guest house and PWD Rest House are in Kollam city, about 30 km south of the site. The nearest major railway station is at Kollam.

Whether the area is recorded to be in forest (please specify whether protected , reserved etc.)

The area is not recorded as forest.

Ownership / Occupancy

- The leasehold has the following types of land holding:
 1. private patta lands
 2. land purchased by the applicant (KMML)
 3. land acquired for the company by the state Government
 4. Govt. puramboke land.



5. Govt land - illegally encroached /occupied by private persons.

Existence of public road / railway line, if any nearby and approximate distance

National Highway No 47 (66) passes to the eastern side of the leasehold. In certain areas, the NH is close to the lease area. Details can be seen in plate 5. The Kollam to Kayamkulam railway line is to the east of the area at a distance of 5 to 15 Kms

Toposheet No. with latitude and longitude

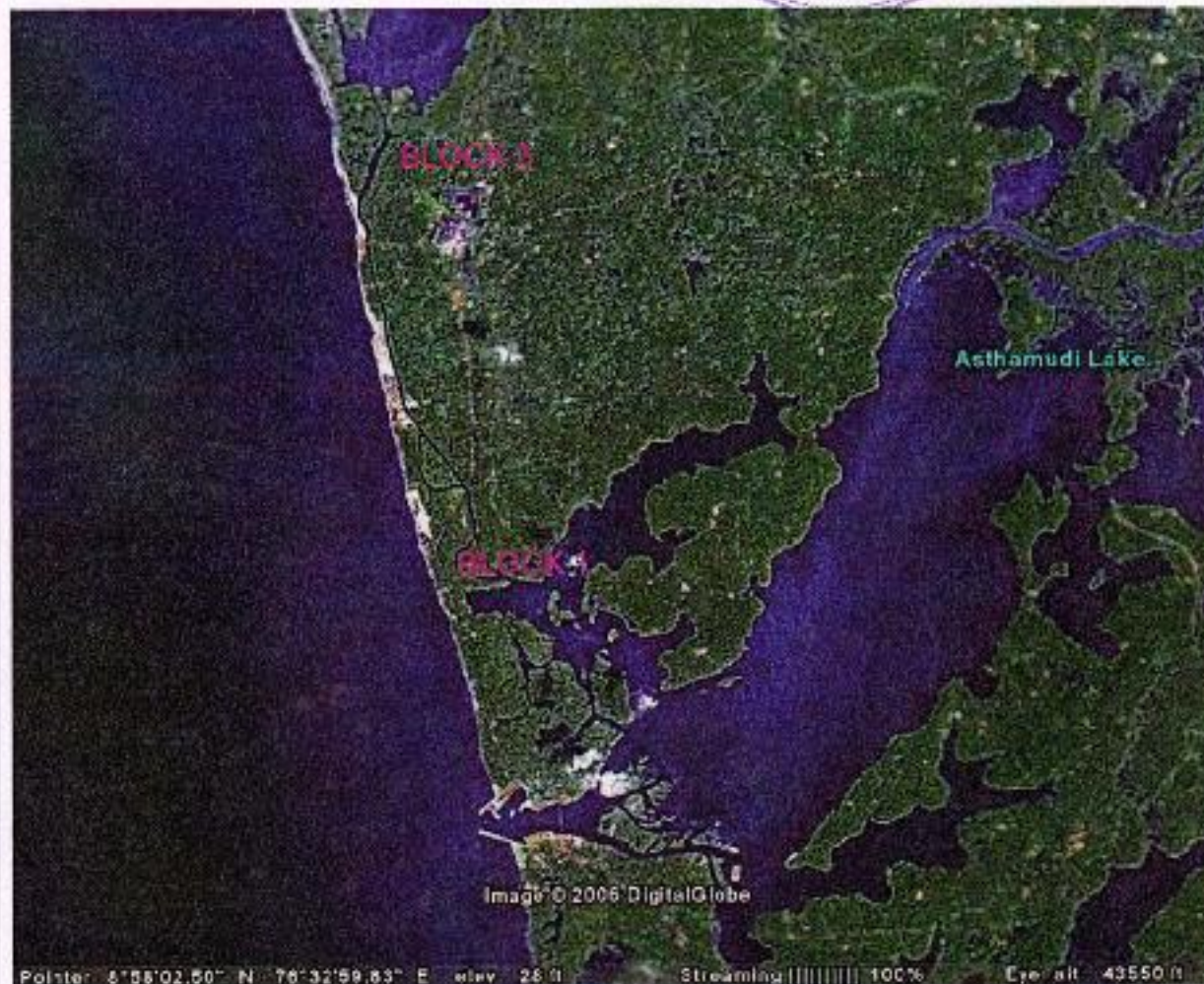
58 C/ 8, 58C/12 and 58D/9. The area extends from Neendakara (8°56'03"N, 76°32'34"E) to Azikal (9° 08'24" N, 76°27'36"E)

Land Use Pattern (Forest, Agricultural, Grazing, Barren etc.)

1. Homestead area with coconut cultivation
 2. barren lands
- There is no forest land. There is no Grazing land.

b) Attach a general location and vicinity map showing area boundaries and existing and proposed access routs. It is preferred that the area to be marked on a Survey of India topographical map or a cadastral map or forest map as the case may be. However if none of these are available, the area should be shown on an accurate sketch map on scale of 1 : 5000.

Lease sketches of block 1, Block 3, Block 5 & Block 7 are shown in Plates 01 to 04 respectively.. **Key Plan** is given plate No. 5. Surface Plan of Blocks 1, 3, 5 and 7 are shown in plates 20, 21, 22 and 24 respectively. As the area is within 75 Km of national maritime boundary, Survey of India topo sheets of the area are "classified" and are not available to the Public.



A SATELLITE VIEW SHOWING BLOCKS 1 AND 3

PART A

3. GEOLOGY AND EXPLORATION

a) Briefly describe the topography and general geology and local / mine geology of the mineral deposit including drainage pattern.

General Description of the Deposit

Extract from report by: G. Prabhakar Rao, Officer-in-charge, Sand Investigations
Cell, Atomic Minerals Division, (Currently, Beach sand and Offshore



Investigations group, Atomic Minerals Directorate for Exploration and Research)/DAE. Government of India, Trivandrum. 1975

The Chavara Beach sand deposit, also known as the Neendakara-Kayamkulam deposit, is a barrier beach extending over a length of 22.54 Kms (14 miles) between two tidal channels, the southern at Neendakara of the Ashtamudi estuary and the northern at Kayamkulam of the Kayamkulam lagoon. It has been the only deposit so far on the Indian coast having heavy mineral contents ranging as high as 60 to 70 %. Consequently this deposit has been under intensive mining for nearly sixty years and is reputed as one of the most important production and export centers of ilmenite in the world.

A detailed summary of the report is enclosed as Annexure I.

There is a good summary of the Geology of the area in the paper "HEAVY MINERAL SAND DEPOSITS OF KERALA" by S. Krishnan, G. Viswanathan and K. Balachandran in Special Issue on Beach and Inland Heavy Mineral Sand Deposits of India', Exploration and Research for Atomic Minerals, Vol. 13, Pp 111-146. 2001.

KMML has conducted Mining only in Block No 3 (KMML.2) till now. Block No 1 (KMML 1) was mined for a short time. In view of this, only blocks 1 & 3 will be discussed in detail in the following paragraphs.

Physiography

Block No 1

The plot falls between the Arabian Sea and National Highway 47 (now renumbered as NH66) . The ground gradually rises from sea level and reaches a height of about 3.0 m above the sea level. Most of the seashore is protected by sea walls of 4 m height.



There are no roads or streams passing through the plot. As the plot is connected to Arabian Sea, the area drains easily.

Block No 3.

The plot falls between the Arabian Sea and Trivandrum Shertalai Canal (T.S.Canal). The ground gradually rises from sea level and reaches a height of about 2.50 m above the sea level. Part of the seashore is protected by sea walls of 4 m height. There are no streams passing through the plot. As the plot is connected to T.S.Canal and Arabian Sea, the area drains easily.

Block No. 5 :

This plot falls between the Arabian sea and T.S.Canal. It has North of Paninikarkadavu Bridge on the Karunagappally Alappad road. The area is flat and has maximum elevation of only 2.5 M. The entire area has sea wall of 3 M to 4 M made of granite boulders. There are no streams passing through the Plot. The Plot opens to Arabian Sea on West and T.S.Canal on the east, hence the area is well drained. A Satellite Photo of the Plot is given below. The plot is connected to National High way through Panikkarkadavu Bridge.

Block 7 :

This block also has between the Arabian Sea and the T.S.Canal. The Western side of the plot is protected by granite Sea-walls of 3 M to 4 M height. The area is flat with maximum elevation of 2.0 meters. There is a road through the plot which connect to Panikkar Kadavu bridge and on the National High way of Karunagappally.

**Heavy Mineral Content:-****Ore Reserve Assumptions:-**

The calculation of reserves given later are worked out with the following assumptions:

1. The strip of land used for beach sand mining will be used as a barrier against the sea for dredge mining.
2. The mineral mined by beach sand washing collection is replaced by the sea and hence the concept of ore reserve is not applicable for beach washing collection.
3. It was decided that the whole minable area of the deposit should be mined upto a depth of 8M below MSL.

Mineralogical Data:

Mineral constituents in the heavy mineral content of the area to be obtained by dredge mining will be generally as below:

TABLE V

MINEROLOGY OF BLOCK 3

MINERAL	WT % IN CONCENTRATE
Ilmenite	68
Rutile	7
Leucoxene	2
Zircon	6
Monazite	1
Sillimanite & Kyanite	14
TOTAL	98

Note: The mineralogical analysis is based on work done by Australian Mineral Development Laboratories (AMDEL) for KMML in 1977. AMDEL's computation is based on prospecting work done by Dr. Rao of AMD in 1972 and 1973-74. This was based on data for 245 beach



bore holes and 236 bore holes is Eastern extension. This was grouped into 20 sets of five composite samples for Beach bore holes and 9 set of five composite samples for Eastern extension. From these data, the average composition for the whole block was calculated as per the table above

Balance material will be silica sand.

b) The topographic plan of the lease area prepared on a scale of 1 : 1000 or 1 : 2000 with contour interval of 3 to 10 m. depending upon the topography of the area should be taken as the base plan for preparation of geological plan. The details of exploration already carried out including evidences of mineral existence should be shown on the geological plan.

Topographical plans of the lease areas are enclosed as geological plan, Block 1 as Plate No 8 and Block 3 as Plate No. 6. The area is flat and the elevation difference is less than 3.0 meters. As the plots are very large, a higher scale is used to get a manageable plan. A request for using a higher scale is submitted separately.

c) Geological sections should be prepared at suitable intervals on a scale of 1: 1000 / 1 : 2000.

Geological Plan and sections based on the work by Atomic Minerals Directorate for Exploration and Research is given in plate No 8 & 9 for Block 1 and Plates 6 & 7 for Block 3. The area is flat and the elevation difference is less than 3.0 meters. As the plots are very large having length up to 2300 meter, a higher scale is used to get a manageable plan. Separate application is made to Chief Controller of Mines IBM, for permission to reduce the scale of the plans.

d) Broadly indicate the year-wise future programme of exploration, taking into consideration the future production programme planned in next five years

The area has been prospected in detail by Atomic Minerals Directorate for Exploration and Research. Mining is limited to a depth of 8 meters below M.S.L. For Block 1 and Block 3, the intervening plot has been mined by dredging to a depth of 8 M below MSL by Indian Rare Earth Ltd, for the last 15 years. Hence the deposit is well known and there is no need for further prospecting. So no exploration program is envisaged.

e) Indicate geological and recoverable reserves and grade, duly supported by



standard method of estimation and calculations along with required sections (giving split up of various categories i.e. proved, probable, possible). Indicate cut-off grade. Availability of resources should also be indicated for the entire leasehold.

Geological reserve in Block 1 is given in table 6 based on site observation and inferences from workings in adjacent plot of M/s IRE Ltd. Result of trial mining conducted in the area in 2005 to 2007 has also been useful in this estimation.

In Block 3, there will be sand mining by way of collection of Beach washings. The mineral deposited on the beach is collected to a short depth. Subsequently, more minerals are deposited by wave action to bring the beach area to the original level. The wave action will concentrate the deposit and improves the concentrates of heavy minerals in the sand is the collection area. Once these work has progressed sufficiently the strip of sand deposited is collected again. The material is brought in continuously by the sea.. The quantity of raw sand collected in the last 6 years has averaged about 260,000 tons. This is not the maximum quantity available, but is the maximum collection achieved in the unit. Maximum production achievable in any year is worked out on page 23 to be 4,50,000 tons per year. As this figure is a born out by actual mining operation, the availability of beach washing collection for the next five years may be taken to be $5 \times 260,000 = 1,300,000$ tons. Considering such replenishable deposition of beach sand minerals, the reserve can be categorized under 121 (probable reserves) of UNFC Further, in order to obtain an independent assessment of availability of raw sand in beach washing collection, KMML has engaged Center for Earth Science Studies (CESS), Trivandrum, to conduct a study of sand availability. This study is in progress and CESS expects the study to take about 34 months more. The work order issued to CESS and their latest estimate of time frame required are enclosed as Annexure XXVI and XXVII.

Geological reserve of Block 3 and near bye area including the canal is worked out in Table 8. The area is divided into fields of 137 meters X 275 meters. The grade as determined by AMD is used to calculate the density of the minerals in the block using a specific gravity of 4.2 for the heavy minerals and 2.6 for silica sand. 30 % voids are assumed in the deposit.



The reserve calculations are dependent on the method of mining and will be discussed later. For area under Beach washing, the mineral is replenished by the sea and the concept of Mineral reserve is not applicable. However, the availability of beach washing minerals for collection for the next five years may be taken to be $5 \times 260,000 = 1,300,000$ tons.

Maximum quantity collectable is worked out on page 23.

The minable reserves inside the block are worked out after leaving barriers and leaving out areas of the canal. This is worked out in Table 21. The minable reserves are seen to be 9.181 Million Tons. The HM content of the reserves is seen to be 1.64 million Tons. No barriers are left at the canal because the canal is periodically dredged at the request of Inland Water Authority of India (IWA) to maintain the depth of the canal for water transport. The Company proposes to provide a rip-rap wall at the canal border after dredging. For this approval will be obtained from IWA.

For UN frame work classification (UNFC) of the deposit, please see Annexure II

f) Indicate minable reserves by slice plan / level plan method, as applicable, as per the proposed mining parameters.

Mineable reserve for Block 3 has been worked out in earlier para as 9.181 Million Tons.

4.0 MINING

Summary of Mining Proposal:-

KMML has been mining by collection of beach sand washing. The production during last five years has been as below.

TABLE 9

RAW SAND PRODUCTION IN LAST FIVE YEARS

Year	Production (MT)
------	-----------------



2005-2006	258,251
2006-2007	279,426
2007-2008	265,724
2008-2009	269,490
2009-2010	271,020
2010-11	260,209

In order to meet the increased requirement of beach sand minerals, the following scheme of mining is being implemented:

TABLE 10

PROPOSED RAW SAND PRODUCTION PROGRAM						
	Year	2012-2013	2013-2014	2014-2015	2015-2016	2026-2017
LOCATION	METHOD	MT	MT	MT	MT	MT
BLOCK 3	BEACH WASHING	400,000	320,000	240,000	120,000	100,000
BLOCK 3	DREDGING	335,000	415,000	550,000	650,000	670,000
BLOCK 1	DREDGING	50,000	50,000	40,000	40,000	40,000
TOTAL RAW SAND		785,000	785,000	910,000	890,000	890,000

- 1. Increase Beach sand washing collection to 400,000 TPA of raw sand and later reduce it as inland mining picks up. (Part A)**
- 2. Introduce dredge mining in Northern part of Block 3 using Toyo Pump and dredge to produce up to 670,000 TPA of raw sand. (Part B)**
- 3. Introduce Dredge mining with Toyo pump and dredge in Block 1 for 50,000 TPA of raw sand. (Part B)**



(All tonnages are Metric tones)

As the three schemes are different in nature of mining adopted, details of the three schemes are discussed separately in parts A&B.

Progressive Mine Closure Plan will be discussed in Part C.

a) Briefly describe the existing / proposed method for developing / working the deposit with all design parameters.



A. BEACH SAND WASHING

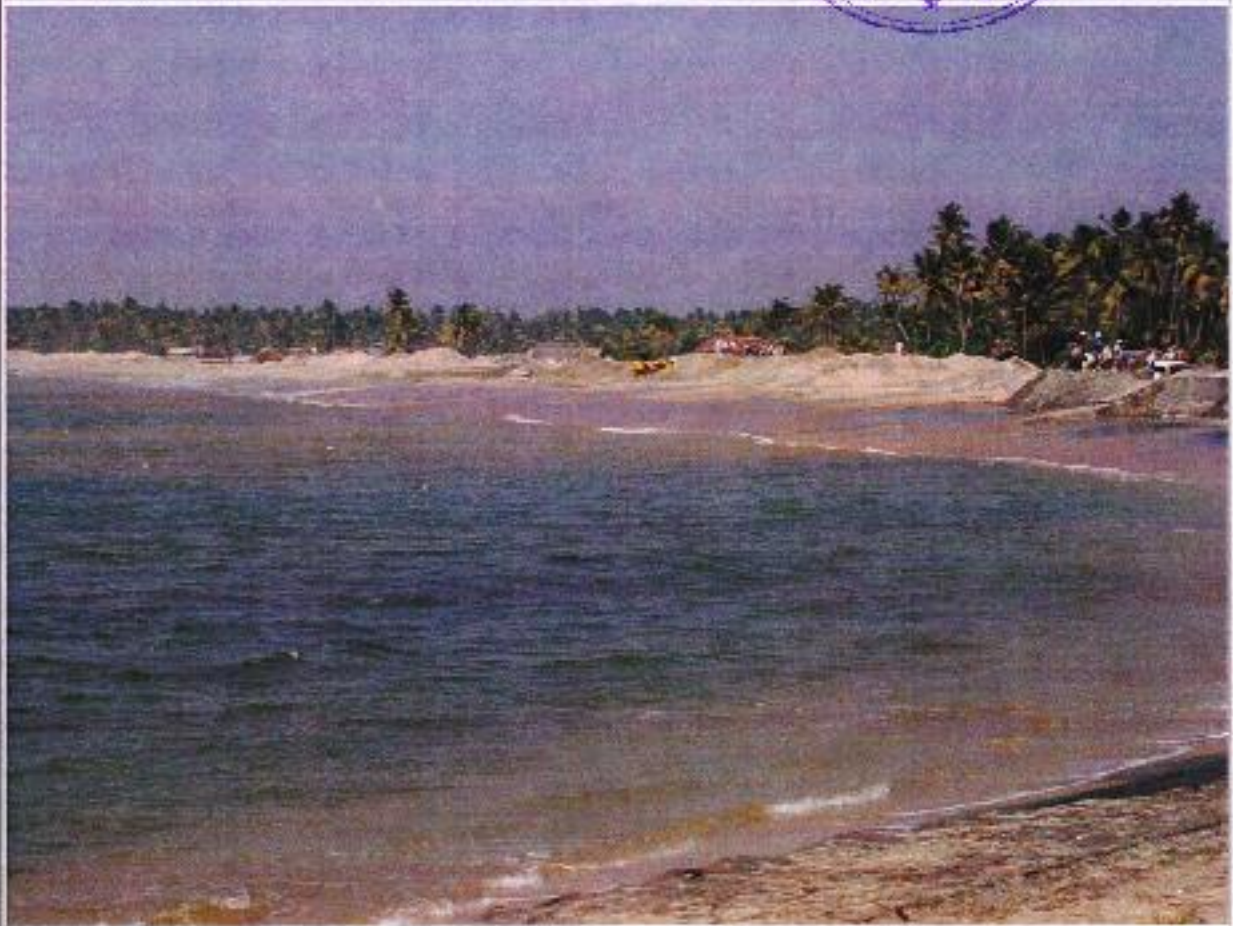
Beach washings will be collected along the beach of Block No 3. Geology as relevant to this operation is discussed below:

1. *Briefly describe the topography and general geology and local / mine geology of the mineral deposit including drainage pattern.*

A general description of the topography and geology of Block 3 has been given earlier. In this operation, beach sand is collected from the beach. Beach topography is gently sloping to the sea. Part of the seashore is protected by sea walls of 4 m height. There is no sea wall in the area of beach washing collection. There are no public roads or streams passing through the plot. As the plot is connected to Arabian Sea on the west and to T.S.Canal on the east, the area drains easily.

Ore Reserve Calculations

The sand that is mined is replaced by the sea and concentrated by wave action. Hence the concept of ore reserve is not applicable. The minerals are brought in and deposited by the ocean current. They are taken away by the sea, if not collected in time.



A VIEW OF AREA USED FOR BEACH WASHING COLLECTION

Mineralogical Data:-

The Heavy minerals in the concentrate made from this area has the following analysis. Total HM content of beach washing varies from 35 % to 60 %.

SAMPLING & ANALYSIS DETAILS



**TABLE 11
MINEROLOGICAL ANALYSIS OF CONCENTRATE FROM BEACH WASHING**

MINERAL	WT% IN CONCENTRATE FROM BEACH WASHING
ILMENITE	40.8
LEUCOXENE+ MONOZITE	3.1
RUTILE	4.8
ZIRCON	20.3
SILLIMANITE	29.1
KYANITE	1.9
TOTAL	100

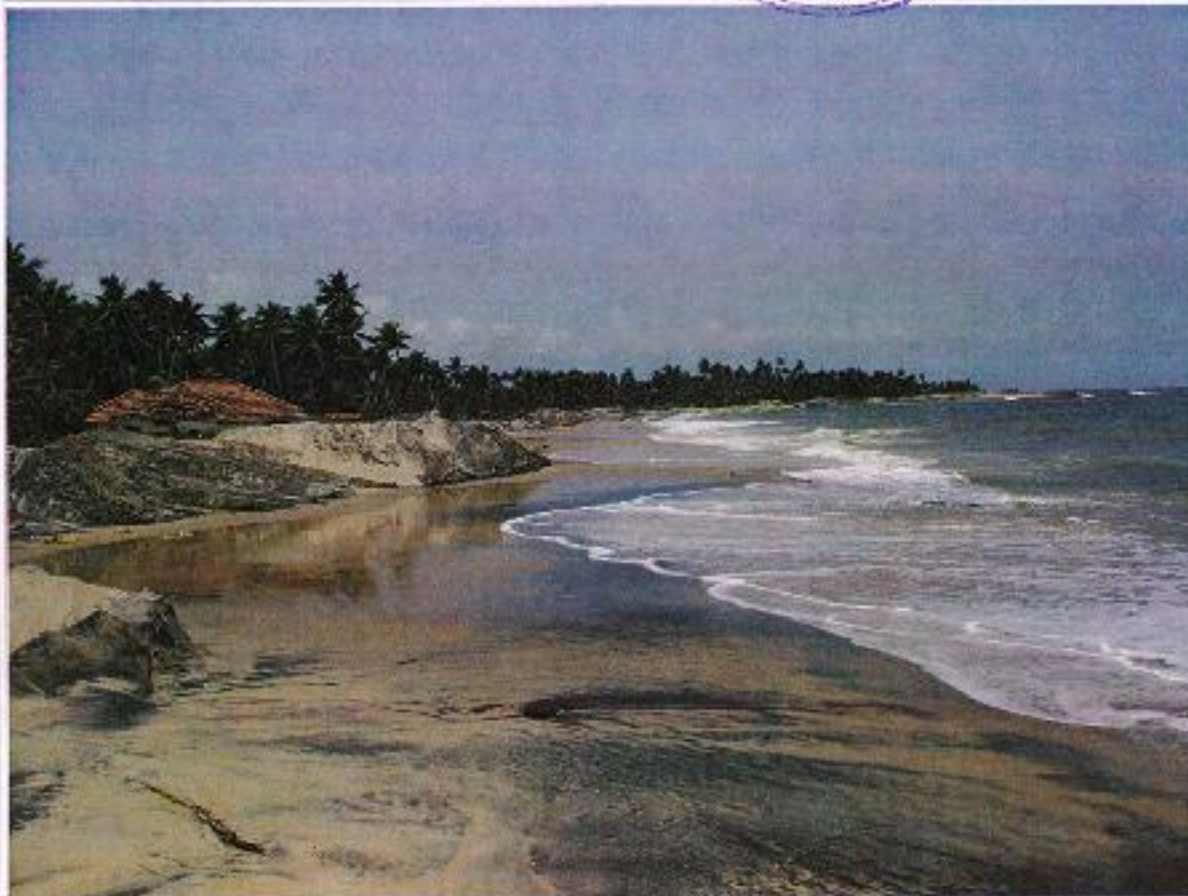
Small incremental samples are collected daily from each truck load of each site separately and make composite sample for each site for every month and analyzed. The above data are the Weighted Monthly Average for 12 months from APRIL 2008 to MARCH 2009.

b) The topographic plan of the lease area prepared on a scale of 1 : 1000 or 1 : 2000 with contour interval of 3 to 10 m. depending upon the topography of the area should be taken as the base plan for preparation of geological plan. The details of exploration already carried out including evidences of mineral existence should be shown on the geological plan.

Topographical plans of the beach area is shown on Geological Plan of the area on Plate No 6. The area is gently sloping to the west and the elevation difference is less than 3.0 meters.

c) Geological sections should be prepared at suitable intervals on a scale of 1: 1000 / 1 : 2000.

The mineral that is mined is a renewable deposit on the beach surface. The accompanying photographs indicate the terrain.



A CLOSER VIEW OF AREA USED FOR BEACH WASHING COLLECTION

d) Broadly Indicate the year wise future programme of exploration, taking into consideration the future production programme planned in next five years

The area has been prospected in detail by Atomic Minerals Directorate for Exploration and Research. However, the inland reserves are not related to beach sand collection. It is not feasible to explore the deep sea deposits which are, possibly, the source of beach sand deposition. Hence there is no need for further prospecting. So no exploration program is envisaged.

e) Indicate geological and recoverable reserves and grade, duly supported by standard method of estimation and calculations along with required sections (giving split up of various categories i.e. proved, probable, possible). Indicate cut-



off grade. Availability of resources should also be indicated for the entire leasehold.

For area under Beach washing, the mineral is replenished by the sea and the concept of Mineral reserve is not applicable. However, for calculation purposes, we can assume a deposit of 3.0 M thickness and 40 M width over length of 2000 meter of beach front gives a deposit volume of 240,000 cubic meters. A bulk density of 2.0, the reserve available for mining is 4,80,000 Tons. The quantity mined will be lower than this. As mentioned earlier, the sand is being deposited in the beach front and it is not necessary to mine down to the depth indicated.

f) Indicate minable reserves by slice plan / level plan method, as applicable, as per the proposed mining parameters.

As will be explained below, mining is limited to a layer deposited by the sea and the concept of Mineral reserve is not applicable.

4 (A). MINING

a) Briefly describe the existing / proposed method for developing / working the deposit with all design parameters.

In the beach area, the present system of beach sand collection will be continued. In other areas, new mining methods will be introduced. These are described in part B (page 40).

The beach sands will be collected by open cast method. Along the seashore, the washing will be collected generally up to a depth of 30 cm. After this, the area is brought to original height by wave and tidal action by deposition of fresh minerals. The length of beach used for beach washing collection is 900M. Existing and proposed beach washing collection areas are indicated in Plate No. 6. The beach length for collection will be 900 m and the average width of collection area is 50 m and collection thickness 35 CM. This would yield a volume of $900 \times 50 \times 0.35 = 15,750$ cubic meter with a bulk density of 2T/cubic meter of dry material, the yield is 31,500T rounded to 30,000 tons. After removal of this strip, the beach washings are again deposited by the sea in the same area. By this method, it is possible to collect at least



15 such slices or a total of 4,50,000 tons in one year. Actual production will be regulated at the requirement of the Processing plant.

Note : In case of pocket deposits, sequence of development / working may be indicated on the same plan.

b) Indicate quantum of development and tonnage and grade of production expected pit wise as in table below :-

Because of the specific nature of this mining operation, no development work is required here.

Required Production from beach washing collection will be as below:

TABLE 12

PROPOSED PRODUCTION OF RAW SAND FROM BEACH WASHING

Year	Raw sand production Tons/year
01 (2012-2013)	400000
02 (2013- 2014)	320000
03 (2014-2015)	240000
04 (2015-2016)	120000
05 (2016-2017)	100000

**c) Attach - Individual year wise plans and sections. In case of 'A' class mines
Composite plans and year wise sections in case of 'B' class mines**

The existing collection area and proposed collection area are indicated in Plate No.6. As the beach sand is replenished in the mining area by wave action and ocean currents, there is no change in the profile or cross section of the area. Hence, there is no change in the plan & section from year to year.

d) Attach supporting composite plan and section showing pit layouts, dumps, stacks of sub-grade mineral, if any, etc.

The mining operation will be by collection of beach sands. There is no mining pit as in ordinary mining. There will be no sub-grade mineral. Hence there will be no dumps of sub-



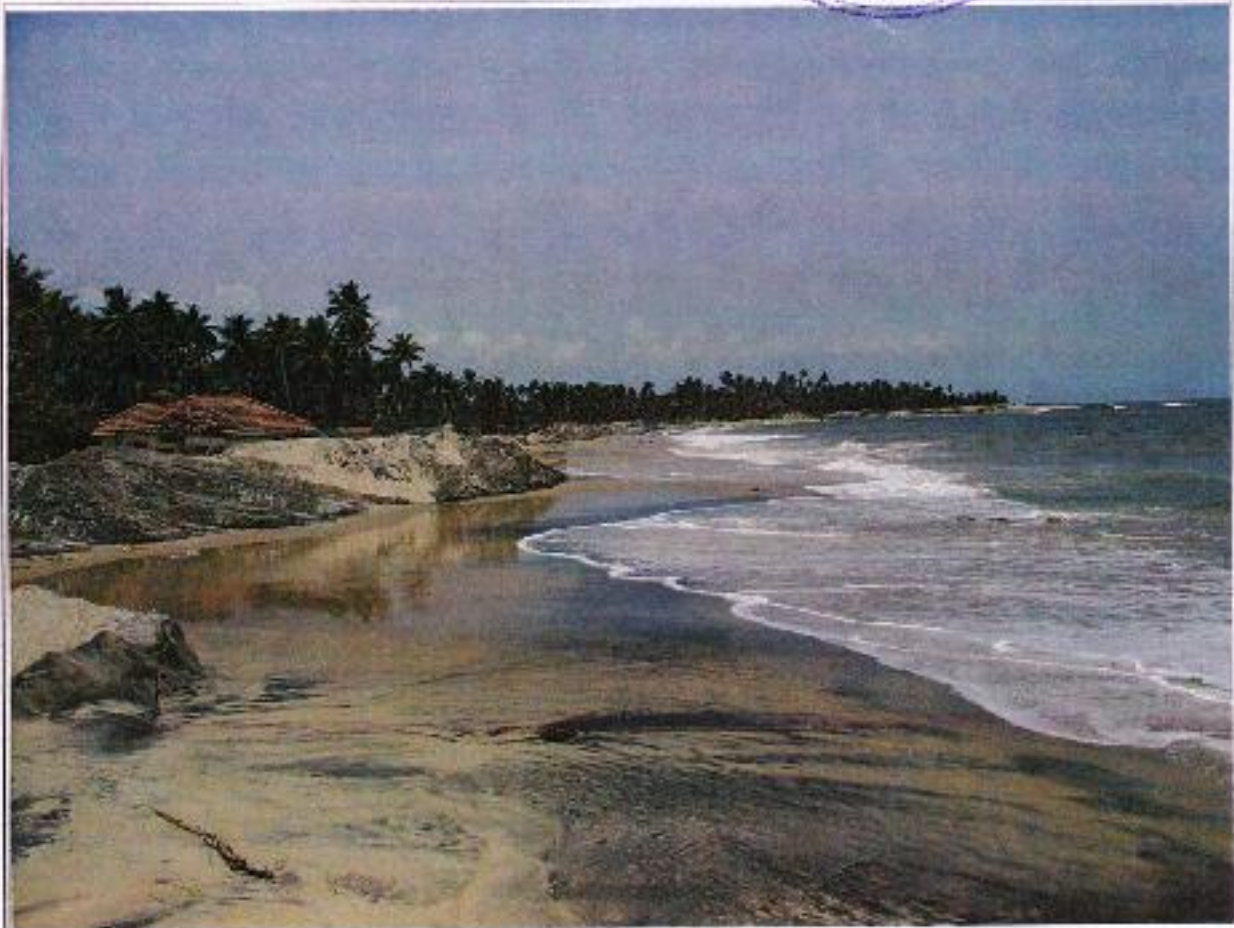
grade mineral.

e) Indicate proposed rate of production when the mine is fully developed, and the expected life of the mine and the year from which effected.

The applicant has been mining up to 2,50,000 Tons to 2,80,000 Tons / Year by beach washing collection from the block. As shown in following paragraph, it is possible to increase the production rate to 4,50,000 Tons by increasing the frequency of collection and also to sustain this rate/ Also, with the increase in in-land mining, the need for sea washing collection will come down and the quantity of beach sand collection can be reduced as shown in Table 10. The Beach sand that is mined is being replenished in every season. Hence it is not feasible to compute the total minable reserves or anticipated life of mine. But the quantity of beach sand required for 5 years operation is worked out in Page 13. the anticipated total quantity of beach washing collection for the next 5 years is only 1,180,000 tons only.

f) Attach a note furnishing a conceptual mining plan for the entire lease period (for 'B' Category mines) and upto the life of the mine (for 'A' Category mines) based on the geological, mining and environmental considerations.

It is proposed that the existing method of collection is to be continue till the end of the lease period. The beach sands will be collected by open cast method. Along the seashore, the washing will be collected generally up to a depth of 35 cm. After this, the area is brought to original height by wave and tidal action and ocean currents by deposition of fresh minerals. The beach length for collection of washings will be 900 and the average width is 50 m. This would yield a volume of 15,750 cubic meter with a bulk density of 2.0T of dry material per cubic meter, the yield is 31,500 tons rounded to 30,000 tons. After removal of this strip the beach washings are again deposited by the sea in the same area. By this method, it is possible to collect at least 15 such slices or a total of 4,50,000 tons in one year. Actual production will be regulated at about 400,000 tons / year or the requirement of the Processing Plant. Conceptual plan of of the block is enclosed as Plate 18.



A VIEW OF BEACH WITH SAND SUITABLE FOR COLLECTION

g) Opencast mines

i) Describe briefly giving salient features of the mode of working (mechanized, semi-mechanized, manual)

Beach washing from the Beach front is collected and heaped using Bulldozers and wheel loaders. The heaped sand is loaded into tipping Trucks manually. The sand is then transported to the stockyard of the Mineral separation Plant. The stocked sand is fed to the plant by using wheel loaders to the Raw sand bins in the Mineral separation plant

ii) Describe briefly the layout of mine workings, the layout of faces and sites for disposal of overburden / waste. A reference to the plans enclosed under 4(b) and 4 (d) will suffice.



Conceptual plan of beach washing collection is same as in plate 18.

h) Underground mines :

The operation will be by open cast only. There will be no underground mining

i) Extent of mechanization

describe briefly including the calculation for adequacy and type of machinery and equipment proposed to be used in different mining operations.

Beach washing from the Beach front is collected and heaped using Bulldozers and wheel loaders. The heaped sand is loaded into tipping Trucks manually. The sand is then transported to the stockyard of the Mineral separation Plant. The stocked sand is fed to the plant manually and by using wheel loaders to the Raw sand bins in the Mineral separation plant.



A VIEW OF BEACH WASHING COLLECTION BY WHEEL LOADER AND MANUAL



Mining Plan for Kerala Minerals and Metals Ltd, Chavara

Page 26

LOADING

Equipments proposed to be used are the following:

EQUIPMENT	LOCATION	NUMBER
Wheel Loader BL 200 or equivalent	Plant area	2
Bulldozer D_50 or equivalent	Plant area	2
90 HP Wheel Loader BL 200 or equivalent	Mining area	2
Bulldozer D_50 or equivalent	Mining area	2

(1) Drilling Machines

There will be no drilling in the operation. The sand is loose and can be collected without blasting.

(2) Loading Equipment

All loading in the mine will be manual

(3) Haulage and Transport Equipment

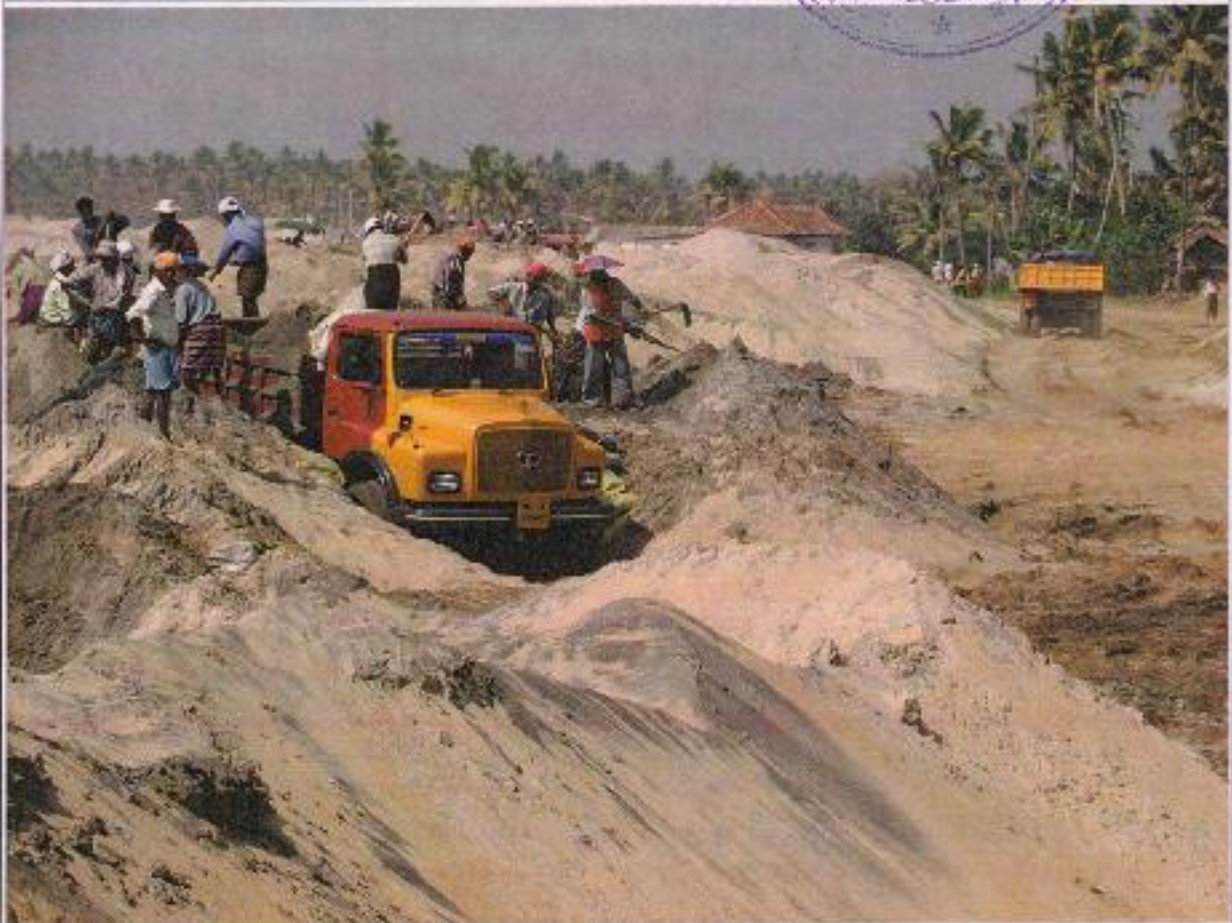
(a) Haulage within the mining leasehold

Type	Nos. *	Size / capacity *	Make *	Motive Power	H.P.
Tipping trucks	6	10 tons	Tata 1210	Diesel	120

* Actual number and Model will be decided by the contractor depending on market conditions.

whether the dumpers are fitted with exhaust conditioner should be indicated

No. The dumpers will meet the Pollution Control Board norms for exhaust gases.



MANUAL LOADING OF BEACH WASHINGS

(b) Transport from mine head to the destination

There will be no transport of Raw sand outside the leasehold.

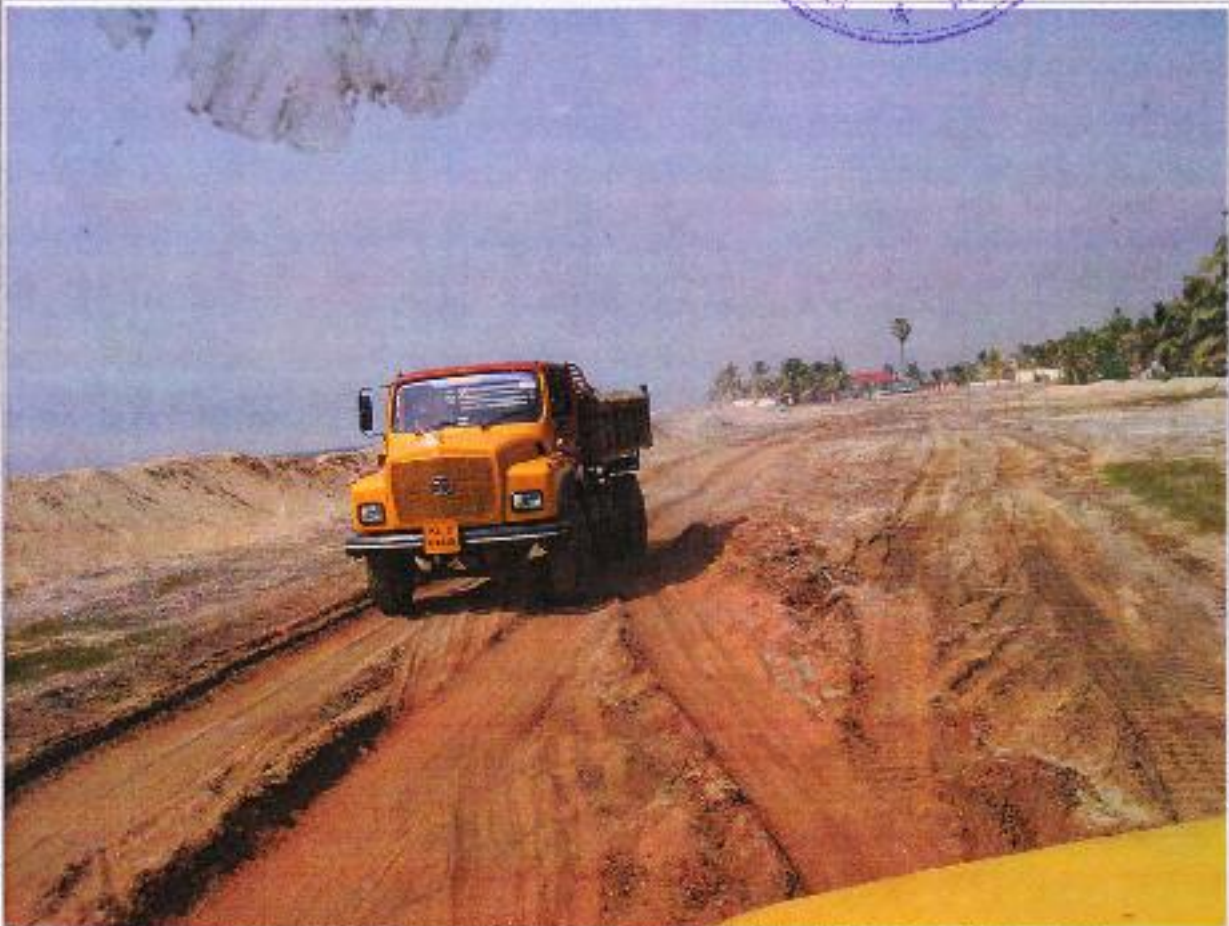
(4) Miscellaneous

describe briefly any allied operations and machineries related to the mining of the deposit not covered earlier.

There are no miscellaneous operations

5. BLASTING

No blasting is required for beach sand collection because the sand is loose and unconsolidated.



TRUCK TRANSPORTING BEACH WASHING TO MS PLANT

6. MINE DRAINAGE

Mining will be conducted on the sea beach close to the sea level. So no specific steps or provisions are required for drainage in beach sand mining

a) *likely depth of water table based on observations from nearby wells and water bodies*

Not applicable because the operations take place close to the sea and does not affect water table in anyway

b) *workings expected to reach below water table by the year*

Not applicable as there is no change in the area or depth of operation from year to year.



c) quantity and quality of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged

As explained earlier, the working level does not go down. There is no need for special arrangements to drain the mining area.

7. STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE

a) indicate briefly the nature and quantity of top soil, overburden / waste and mineral rejects likely to be generated during the next five years :

No top soil or overburden/Waste is involved in the mining . All mineral collected in the mining face is transported to the processing plant. There will be no mineral rejects.

b) land chosen for disposal of waste with proposed justification

As no top soil or overburden/Waste is involved in the mining, there is no need to choose any land for disposal of waste

c) attach a note indicating the manner of disposal and configuration, sequence of build up of dumps along with the proposals for the stacking of sub-grade ore, to be indicated year wise

No sub-grade mineral is encountered here. Hence procedure for disposal of sub-grade mineral is not required.

8. USE OF MINERAL

a) describe briefly the end-use of the mineral (sale to intermediary parties, captive consumption, export, industrial use)

PRODUCTS INFORMATION

2. Ilmenite, Leucoxene and Rutile are minerals containing mainly TiO_2 and Iron

Oxides. Actually the grains of these minerals contain TiO_2 varying from around 55 %.

The fraction that contains an average TiO_2 content of about 60 % is called Ilmenite,

75% is called Leucoxene and 95 % is called Rutile.

ZIRCON

Zircon is Zirconium Silicate - $ZrO_2 \cdot SiO_2$

SILLIMANITE

It is Silicate of Alumina - $Al_2O_3 \cdot SiO_2$.



MONAZITE

It is a complex phosphate of Thorium and Rare Earth Minerals

$(Ca, La, Pr, Nd, Th, Y)PO_4$

. This is Radio Active

All ilmenite, rutile & Leucoxene are consumed by the TiO_2 Pigment Plant, of KMML located at a distance of 3 KM from the lease hold (Block No. 3). and Zircon is used in refractory, ceramic and other industries. Part of rutile is also sold outside.

b) indicate physical and chemical specifications stipulated by buyers.

Specification of Products.

- a. Ilmenite - TiO_2 58% Min.
- b. Rutile - TiO_2 -92% Min.
- c. Zircon – ZO_2 – 64% Min.
- d. Monazite - TiO_2 - 0.25% Max

The main products, that is ilmenite, Leucoxene and rutile are generally not sold to any buyer and are consumed by the Pigment division of the company. The consuming division does not lay down any other physical and chemical specifications. For other minerals also, the buyers do not stipulate any specifications.

c) Give details in case blending of different grades of ores is being practiced or is to be practiced at the mine to meet specifications stipulated by buyers.

No Blending is practiced here.

9. OTHER

Describe briefly the following :

a) Site services :

The area is under mining for the last 70 years. All necessary site services are provided in Mine Office

**b) Employment potential :****Manpower of Mines & Old MS Plant**

Officers 28

Workers

Permanent - 118 (including Female 16)

Casual - 447 (including Female 112)

Mining Staff

Mines Manager & Assistant Managers 5 -(including a Mining Engineer appointed under Rule 42(b)(1) of the MCDR).

Mines Foreman 3

Mines Mate 3

10. MINERAL PROCESSING

a) If processing / beneficiation of the ore or minerals mined is planned to be conducted on site or adjacent to the extraction area, briefly describe the nature of the processing / beneficiation. This should indicate size and grade of feed material and concentrate (finished marketable product), recovery rate.

The ore will be treated in the existing MS plant.

PHYSICAL PROPERTIES

The minerals are separated by various physical means depending on their properties viz.

- Magnetic Susceptibility
- Electrical Conductivity and
- Specific Gravity.

Ilmenite, Leucoxene and Monazite are magnetic materials. The magnetic susceptibility of these materials is different. Ilmenite is more magnetic and Leucoxene and Monazite are feebly magnetic.



Regarding Electrical conductivity, all the Titanium containing minerals (i.e. Ilmenite, Leucoxene and Rutile) are conducting and all others are non-conducting.

The specific gravity the various Minerals are: -

1. Monazite - 5.20
2. Zircon - 4.70
3. Rutile - 4.25
4. Ilmenite - 4.2
5. Leucoxene - 3.50
6. Sillimanite - 3.30
7. Quartz - 2.60

SEPARATION OF MINERALS

A flow sheet of the process followed here is enclosed as Plates No.16 and 17.

Existing Plant has been modified and renovated .

The production capacity of the existing dry minerals separation plant was increased by addition of a wet concentration plant, a fluidized bed dryer and an additional dry mill during 2002-2003. The Flow sheet of Pre concentration Plant is given in Plate No. 16. Flow diagram and material balance of MS Plant is given on Plate No. 17.



A VIEW OF MINERAL SEPARATION PLANT

ILMENITE

The largest constituent of the raw sand is Ilmenite. Its Magnetic Susceptibility is more than that of Leucoxene and Monazite, the other two magnetically susceptible materials. So using a low intensity magnetic separator can separate this material. In the first stage around 70 % of the Ilmenite contained in raw sand can be separated. The balance Ilmenite can be separated in the down stream side.

RUTILE



As Ilmenite, Leucoxene and Rutile are electrically conducting materials, these can be separated from other minerals using High Tension Separators or Electrostatic separators. Of these conducting materials, Ilmenite is highly magnetic, Leucoxene is feebly magnetic and Rutile is non magnetic. Ilmenite can be removed by using a low intensity magnetic separator, the Leucoxene by a high intensity magnetic separator and the non-magnetics left behind will be Rutile.

LEUCOXENE

The fraction obtained as magnetics of High Intensity Magnetic Separator is theoretically Leucoxene. This will contain Ilmenite, Rutile and a small percentage of non-conductings. However since the Leucoxene content in raw sand is very low, this can be sent along with Rutile without affecting the guaranteed TiO_2 content of Rutile.

The non-conducting fraction composed of Monazite, Zircon, Sillimanite, and Quartz along with non-recovered portion of Ilmenite, Leucoxene and Rutile can be processed further to separate the minerals. The non conductings are again treated on screen and HT separators remove any remaining titanium minerals. Air table will remove the lighter minerals and magnetic separator removes impurities giving clean Zircon product.

Due to shortage of equipments and low capacity of equipments due to their old age., KMML presently separates only Ilmenite, Rutile and Zircon from the raw sand. The monazite recovered is stored in trenches as directed by Atomic Energy Regulatory Board, with a sand cover of 1.5 M thickness. The Company does not have sufficient storage space for storing the un-recovered minerals along with the associated gangue minerals. Hence the un-recovered mineral and gangue materials are now discharged into the sea. Once it becomes financially and administratively viable to separate these minerals for specific markets, these minerals can be recovered by installing additional equipments. As explained earlier, modernization project is under review presently. Detailed note on the proposed modernization is given in Annexure No X. Flow sheet of Modernization Project is also shown in Plate No17.



b) Explain the disposal method for tailings or waste from the processing plant (quantity and quality of tailings proposed to be discharged, size and capacity of tailing pond , toxic effect of such tailings, if any, with process adopted to neutralize any such effect before their disposal and dealing of excess water from the tailing dam).

Tailings from the Mineral Separation Plant will consist of quartz grains (sand), and unrecoverable minerals . There include small quantity of ilmenite, zircon, rutile, leucoxene, sillimanite etc. The Company does not have sufficient storage space for storing the un-recovered minerals along with the associated gangue minerals. Hence the un-recovered mineral and gangue materials are now discharged into the sea. KMML is considering modifying the Dry Zircon plant to a unit which will recover sillimanite and Zircon. As explained earlier, modernization project is under review. Monazite content is less than 1% of the raw sand. At present there is no demand for monazite, so all the monazite generated is buried as per a procedure approved by Atomic Energy Regulatory Board. The quantity of Monazite generated has been about 2000 tons per year. During the next five years, the annual raw sand production is estimated to increase to 840,000 MT per year and monazite generation will touch 8000 Mt per year. If there is no demand for the mineral, this quantity will have to be disposed of as prescribed by AERB.

Once the dredging operations are stabilized, the tailings from the processing plant will be returned to the dredging site to refill the dredge pit. The quantity of tailings will help in filling the dredged area to the original level.

c) A flow sheet or schematic diagram of the processing procedure should be attached.

Flow diagram attached as plate no 16 and 17.

d) Specify quantity and type of chemicals to be used in the processing plant.

No chemicals are to be used in the processing plant.

e) Specify quantity and type of chemicals to be stored on site / plant.

No chemicals are to be stored on site / plant.

f) Indicate quantity (cu.m. per day) of water required for mining and processing and



sources of supply of water. Disposal of water and extent of recycling.

The effluent discharge is as per Kerala State Pollution Control Board's approval No W/02/055/97 . Copy attached as Annexure V. Fresh water requirement is equal to the quantity discharged i.e.30 M³/day. Latest renewed approval does not indicate the quantities

11. ENVIRONMENTAL MANAGEMENT PLAN

a) Attach a note on the status of baseline information with regard to the following :
 - existing land use pattern indicating the area already degraded due to quarrying / pitting, dumping, roads, processing plant, workshop, township etc in a tabular form.
 Land utilization is as below

(a) Area used for beach sand mining 12 Hectares (Including area proposed to be brought under beach washing collection and the area used for sand heaps etc)

(b)Area used for storage of raw sand 4 Hectares

(c)Area occupied by processing plant (Old MS Plant)5.60 Hectares

(d) Area used for mine roads 6.0 Hectares

(e)Area of the Company now under sea 4 Hectares

(e)Balance area: Area owned by private persons under various stages of Land acquisition

Total area of Block 3 is 88.1193 Hectares (including Old MS Plant)

water regime

The area for beach sand mining is close to the sea and is under wave action of the sea. So, the area can be considered to be under saline water.

flora and fauna:

The beach had no flora or fauna. Nearby areas had a few coconut trees. Most plants cannot grow here due to high salinity of sea water. There is no visible fauna in the area except small crabs, rats and few birds. There are no species that are specific to this area.

- quality of air, ambient noise level and vibration

The area was under mining operations for the last 70 years. However, there is no appreciable degradation in the quality of air, ambient noise level and vibration. There is no drilling or blasting in connection with mining operations. Hence vibration is minimal.

- climatic conditions



- The area has tropical climate. Details of temperature, rainfall etc for 5 years is shown in Annexure VII. The nearest stations where weather data is available are Alappuzha for temperature and Kollam and Kayamkulam for rainfall.

- public buildings, places of worship and monuments

There is one temple close to the road used for transport. KMML is trying to see if the temple can be shifted, observing tantric rituals. Other than that, there are no public buildings, places of worship and monuments near the area used for beach sand mining and roads used for transport.

- **human settlements** There are no human settlements near the area used for beach sand mining or near roads used for transport. Places of worship will be shifted away from the mining area with the consent of all stakeholders.

- Socio economic factors

- KMML is the largest employer in the locality and the economy of the area depends very much on the well being of the company. Earlier, fishing and associated operations were the main economic activity. Now the fishing operations are concentrated on Fishing Harbors which were opened recently in Thangassery and Neendakara.

- attach plans showing the locations of sampling stations

- Sampling points will be selected in consultation with the agency undertaking the EIA study.

- Environment Monitoring Cell of the Company shall continue monitoring ambient air quality, dust fall rate, water quality, soil sample analysis and noise level measurements on various stations established for the purpose both in the core zone and buffer zone, as per department of Environment guidelines and keeping in view IBM's Circular No. 3/92, season-wise every year or by engaging preferably the services of an Environmental laboratory approved by MOEF/CPCB. The data so generated will be maintained in a bound paged register kept for the purpose and the same shall be made available to the inspecting officer on demand.

- does area (partly or fully) fall under notified area under Water (Prevention & Control of Pollution), Act, 1974

Yes



b) Attach an Environmental Impact Assessment Statement describing the impact of mining and beneficiation on environment on the following over the next five years (and upto conceptual plan period for 'A' category mines)

KMML is arranging to get an EIA and EMP is prepared by a specialized agency. National Institute for Interdisciplinary Studies (formerly Regional Research Laboratory) Trivandrum has already started this work. As the operations are proposed to continue upto conceptual plan period in the same manner, the EIA will be the same as outlined above.

i) Land area indicating the area likely to be degraded due to quarrying / pitting, dumping, roads, workshop, processing plant, of beach washing collection township etc.

No change from baseline data as the operation that are going on for the last 70 years is to continue

ii) Air quality

No change from baseline data as the operation of beach washing collection that are going on for the last 70 years is to continue. An additional area of 3.0 Hectares will be used for beach washing collection, if necessary..

iii) Water quality

No change from baseline data as the operation of beach washing collection that are going on for the last 70 years is set to continue

iv) Noise levels

No change from baseline data as the operation of beach washing collection that are going on for the last 70 years is to continue

v) Vibration levels (due to blasting)

There will be no blasting and hence blast induced vibrations will be nil

vi) Water regime

No change from baseline data as the operation do not effect the water regime only activities that were going on for the last 70 years is to continue.

vii) Socio-economics

No change from baseline data as the operation of beach washing collection that are going



on for the last 70 years is to continue

viii) Historical monuments etc.

There are no historical movements or similar structures in the area.

c) Attach an Environmental Management Plan (supported by appropriate plans and sections) defining the time bound action proposed to be taken with sequence & timing in the following areas (or diagrams should be used) :

- temporary storage and utilization of topsoil

- There is no topsoil in the area. Hence there is no need to arrange for temporary storage and utilization of topsoil.

- year wise proposal for reclamation of land affected by abandoned quarries and other mining activities during first five years (and upto conceptual plan period for 'A' category mines) clarifying the extent of back filling and re contouring and / or alternative use of unfilled / partially filled excavations / road sides / slopes and mine.

The mineral will be replenished by the sea. So the same area will continue to be used. Hence the proposal does not envisage abandonment of any area.

In case abandoned quarries / pits are proposed to be used as reservoir, their size , water holding capacity and proposal for utilization of such water be given.

The proposal does not envisage abandonment of any area. So the proviso is not applicable.

- programme of afforestation, year wise for the initial five years (and upto conceptual plan period for 'A' category mines) indicating the number of plants with name of species to be afforested under different areas in hectares.

The proposal does not envisage abandonment of any area. The mining area is right on the sea beach and there is no de-forestation for mining. Also no afforestation is planned in the area.

- stabilization and vegetation of dumps along with waste dump management year wise for the first five years (and upto conceptual plan period for 'A' category mines).

- There will be no waste dump. Mining does not generate any waste material. The tailings from Old Mineral Separation plant is now sent back to the sea and are taken away by wave action. On commencement of Dredge mining, this tailings will be used to refill the dredge pond, along with the tailings from the wet concentration plant attached to dredging pontoon.



- measures to control erosion / sedimentation of water courses.

- The mining activities do not affect any watercourse and does not cause any erosion or sedimentation.

- treatment and disposal of water from mine.

- As explained earlier, the mining is carried out on the beach and there is no water that is generated in the mine. Hence procedures for treatment and disposal of water from mine are not necessary.

- measures for minimizing adverse effects on water regime.

- As explained earlier, the mining is carried out on the beach and there is no water that is generated in the mine. Hence measures for minimizing adverse effects on water regime from mine are not necessary.

- protective measures for ground vibrations / air blast caused by blasting.

- As explained earlier, the mining is carried out on the beach and there is no ground vibrations / air blast caused by blasting in the mine. Hence protective measures for ground vibrations / air blast caused by blasting, measures for minimizing adverse effects on water regime from mine are not necessary.

- measures for protecting historical monuments and for rehabilitation of human settlements likely to be disturbed due to mining activity.

- As explained earlier, the mining is carried out on the beach and there are no historical monuments in the area. Also, no human settlements are close to the mining area that can be disturbed due to mining activity in the mine. Hence measures for protecting historical monuments and for rehabilitation of human settlements likely to be disturbed due to mining activity are not necessary.

-socioeconomic benefits arising out of mining.

The mining operation sustains the pigment (TiO₂) plant of the company. Mining unit and pigment units employ a large number of local people. The company is a prominent public sector unit of the State Government.

d) Monitoring schedules for different environmental components after the commencement of mining and other related activities. (for 'A' category mines only)



- Sampling points will be selected in consultation with the agency undertaking the EIA study (National Institute for Interdisciplinary Studies, Trivandrum of CSIR).
- Environment Monitoring Cell of the Company shall continue monitoring ambient air quality, dust fall rate, water quality, soil sample analysis and noise level measurements on various stations established for the purpose both in the core zone and buffer zone, as per department of Environment guidelines and keeping in view IBM's Circular No. 3/92, season-wise every year or by engaging preferably the services of an Environmental laboratory approved by MOEF/CPCB. The data so generated will be maintained in a bound paged register kept for the purpose and the same shall be made available to the inspecting officer on demand.

Note : Ground vibration studies are to be carried out for virgin area / new leases after one year from the commencement of mining activities. (for 'A' category mines only)

As there is no drilling or blasting or any activity that can cause ground vibrations, such studies may be unnecessary.



B .Dredge Mining in Block No. 3 and Block No. 1:

In order to supplement the production of beach sand washing and to utilize the on-shore deposits, KMML plans to extract sand by dredging the leasehold. Parameters relevant to this operation is discussed below: There will be two units working in Block 3 and one unit in Block 1.

2. ***Briefly describe the topography and general geology and local / mine geology of the mineral deposit including drainage pattern.***

Discussed in Para 3 on Page no 6

Ore Reserve Assumptions:-

The calculation of reserves in the area to be used for dredge mining are worked out with two assumptions:

- i. The strip of land used for beach sand mining will be used as a barrier against the sea for dredge mining.
- ii. It was decided that the whole minable area of the deposit should be mined upto a depth of 8 M below MSL.

Ore Reserves:-

For Block 3. The area is divided into cells of 137 m X 275 meters (450 ft X 900 ft). As the area is generally flat, the volume of reserve in all the cells is approximately the same. The dry bulk density of reserves in each cell will vary depending on the grade or HM content which varies from 8% to 35 %.



An average HM density of 4.1 tons/ M3 is used to calculate dry bulk density and voids content is taken as 30 %. The reserve tonnage of each cell is shown in Table 8, Geological Reserves in Block III.. This includes the lease area and its eastern extension, including the canal. The total reserve of the locality is seen to be 43,638,640 tons . The average reserve in each cell is seen to be 715,380 tons.

The minable reserves inside the block are worked out after leaving barriers prescribed in G.O. No. 214 /ID/2011 of 24/10/2011 and leaving out areas of the canal. This is worked out in Table 21. The minable reserves are seen to be 6,125,800 Tons. The HM content of the reserves is seen to be 772,120 Tons. Later, KMML proposes to approach the Govt to relax the stipulation of 50 M barrier with the canal. No barriers need to be left at the canal because the canal is periodically dredged at the request of Inland Water Authority of India (IWAI) to maintain the depth of the canal. The Company proposes to provide a rip-rap wall at the canal border after dredging the canal and its border.. For this, approval will be obtained from Inland Water Authority of India (IWAI) and the Govt of Kerala.

The Yearly production of raw sand mined by dredging in the area for 01-05 year Mining by dredge 1 is worked out in Table 13 and by dredge 2 is worked out in Table 14 below:



TABLE 13

YEALY PRODUCTION BLOCK3, PONTOON & DREDGE 1

YEARLY PRDDUCTION BLOCK 3, PONTOON & DREDGE 1					
PONTOON 1 AND DREDGE 1 COMBINATION					
BLOCK	5E	5D	4D	4E	TOTAL FOR THE YEAR
	Production MT	Production MT	Production MT	Production MT	Production MT
YEAR 1 (2012-13)	200000				200000
YEAR 2 (2013-14)	125,890	124110			250000
YEAR 3 (2014-15)		380000			380000
YEAR 4 (2015-16)		83410	316590		400000
YEAR 5 (2016-17)			195437	204563	400000
TOTAL	325890	587520	512027	204563	1630000

TABLE 14

YEARLY PRODUCTION BLOCK 3, PONTOON & DREDGE 2							
PONTOON 2 AND DREDGE 2 COMBINATION							
BLOCK	1D	1E	1F	2G	2F	2E	TOTAL FOR THE YEAR
	Production MT	Production MT	Production MT	Production MT	Production MT	Production MT	Production MT
YEAR 1 (2012-13)	136000	64000					200000
YEAR 2 (2013-14)		215055	34945				250000
YEAR 3 (2014-15)			110608	98319	171073		380000
YEAR 4 (2015-16)					356607	43393	400000
YEAR 5 (2016-17)						400000	400000
TOTAL	136000	279055	145553	98319	527680	443393	1630000



TABLE 15

RAW SAND PRODUCTION INLAND BLOCK 3

YEAR	TOYO DREDGE COMBINE 1 TPA	TOYO DREDGE COMBINE 2 TPA	TOTAL INLAND PRODUCTION TPA
YEAR 1 (2012-13)	200000	200000	400000
YEAR 2 (2013-14)	250000	250000	500000
YEAR 3 (2014-15)	380000	380000	760000
YEAR 4 (2015-16)	400000	400000	800000
YEAR 5 (2016-17)	400000	400000	800000

As the individual cell tonnage are generally within 10% of the average quantity, this average quantity is taken from calculating yearly production.

The quantity of sand mined from the area from 01 to 05 year is worked out in Table 13 and table 14.

Area mined by dredge -pontoon combination in Block 3 will be as below



TABLE 16

AREA MINED AND RECLAIMED BLOCK 3			
YEAR	TOYO DREDGE COMBINE1	TOYO DREDGE COMBINE2	TOTAL
	HECTARES	HECTARES	HECTARES
YEAR 1(2012-13)	1.09	1.09	2.17
YEAR 2 (2013-14)	1.19	1.52	2.71
YEAR 3(2014-15)	2.07	2.07	4.13
YEAR 4 (2015-16)	2.18	2.18	4.35
YEAR 5 (2016-17)	2.18	2.18	4.35
		TOTAL	17.72



LAND IN BLOCK 1 BEFORE MINING

For Block 1 : The area is seen to have sand deposit. Mining will be done upto a depth of 8 meters below sea level by pontoon dredge combination, or a a total thickness of 9 meters. As the area is close to the sea beach, the entire thickness is expected to contain minable concentration of Heavy Minerals.



TABLE 17

PRODUCTION AND AREA MINED AND RECLAIMED IN BLOCK1		
YEAR	PRODUCTION QUANTITY TONS	AREA MINED M2
YEAR 1 (2011-12)	50,000	3,770
YEAR 2 (2012-13)	50,000	3,770
YEAR 3 (2013-14)	40,000	3,016
YEAR 4 (2014-15)	40,000	3,016
YEAR 5 (2015-16)	40,000	3,016
TOTAL	220,000	16,588

TABLE 18

MINERAL COMBINATION IN BLOCK 1.



MINERAL	WT% IN BLOCK 1
ILMENITE	24.0
LEUCOXENE + MONOZITE	1.3
RUTILE	1.8
ZIRCON	3.8
SILLIMANITE	6.2
KYANITE	0.4
TOTAL HEAVY MINERALS	37.5

The analysis is based three samples taken from the area at a depth of one meter.

Total Heavy Mineral Content from block 3 is expected to have the following mineral distribution .

TABLE 19

MINERAL COMBINATION IN BLOCK 3 DREDGE MINING

MINERAL	WT % IN CONCENTRATE
Ilmenite	68
Rutile	7
Leucoxene	2
Zircon	6
Monazite	1
Sillimanite & Kyanite	14
TOTAL	98

Note: The mineralogical analysis is based on work done by Australian Mineral Development Laboratories (AMDEL) for KMML in 1977. AMDEL's computation is based on prospecting work done by Dr. Rao of AMD in 1972 and 1973-74. This was based on



data for 245 beach bore holes and 236 bore holes is Eastern extension. This was grouped into 20 sets of five composite samples for Beach bore holes and 9 set of five composite samples for Eastern extension. From these data, the average composition for the white block was calculated as per the table above

b) The topographic plan of the lease area prepared on a scale of 1 : 1000 or 1 : 2000 with contour interval of 3 to 10 m. depending upon the topography of the area should be taken as the base plan for preparation of geological plan. The details of exploration already carried out including evidences of mineral existence should be shown on the geological plan.

Topographical plans of Block 1 and Block 3 of the lease areas are enclosed. The area is flat and the elevation difference is less than 3.0 meters.

c) Geological sections should be prepared at suitable intervals on a scale of 1: 1000 / 1 : 2000.

Geological Plans and sections of Block 3 and block 1 based on the work by Atomic Minerals Directorate for Exploration and Research are given in plates No 6 to 9.

Geological Plans of Block 5 and block 7 are given in plates No25 and 26

The area proposed to be mined under dredge mining will be shown on a scale of 1:2000 and the vertical scale will be exaggerated. The geological plans of area proposed for dredge mining in 01 to 05 years is shown in plate no 6 & 8.

d) Broadly indicate the year wise future programme of exploration, taking into consideration the future production programme planned in next five years

The area has been prospected in detail by Atomic Minerals Directorate for Exploration and Research. Mining is limited to a depth of 8 meters below M.S.L. For Block 1 and Block 3, the intervening plot (Block 2) has been mined by dredging by Indian Rare Earth Ltd, for the last 15 years. Hence the deposit is well known and there is no need for further prospecting. So no exploration program is envisaged.

e) Indicate geological and recoverable reserves and grade, duly supported by standard method of estimation and calculations along with required sections (giving split up of various categories i.e. proved, probable, possible). Indicate cut-off grade. Availability of resources should also be indicated for the entire leasehold.

Geological reserve in Block 1 is given in table 6 based on site observation and inferences from workings in adjacent plot of M/s IRE Ltd. Geological reserve in Block 3 is worked out in Table 8. Geological reserve in Block 5 is worked out in Table 6A. Geological



reserve in Block 7 is worked out in Table 6B.

f) Indicate minable reserves by slice plan / level plan method, as applicable, as per the proposed mining parameters.

The minable reserves will be the same as calculated in table 6 and table 21.

12. DREDGE MINING

a) Briefly describe the existing / proposed method for developing / working the deposit with all design parameters.

For dredging the portion of the deposit away from the beach, the company proposes to use a combination of Toyo pumps and cutter suction dredges. Toyo pumps are pontoon mounted pumps. Each of them will work in conjunction with an Ellicot or equivalent dredge. It is proposed to operate three such mining units, one in Block 1 and two in Block 3. There will also be a Pre-concentration plant with spirals with each these units, so that bulk of the sand can be discarded at the site and this sand can be used for back filling part of the dredge pit.

The unit consists of one submersible cutter suction "Toyo" pump of 50 HP capacity and a plant feed pump with a storage cum constant pulp density tank and a skid mounted spiral plant. The Toyo pump will be mounted on a Pontoon and has hoisting and lowering arrangement on board to lower the pump so as to maintain proper output. Hand operated mechanical winches are be fitted on Pontoon and anchored to the shore for movement of the Pontoon.



TOYO PUMP AND PONTOON ASSEMBLY IN CANAL

Dredge proposed to be used is an Ellicott 370 HP dredge with a cutting depth of 9 meters or equivalent. It will have an overall weight of 25 tons and hull draft of 0.82 meters. Overall length will be 30 meters. It will be powered by a Caterpillar 3406B or similar diesel engine giving 308 KW. Dredge pump will also supply the material to the Spiral assembly. Any equivalent make of Dredge can be used.

The slurry from the Toyo pump and the dredge will be pumped to the feed pump tank on the share. This pump will, in turn, pump the slurry into the skid mounted spiral plant. The two stage plant consists of 36 starts of HG - 10 spirals and a



middlings scavenger circuit of 12 MG5 spirals (HG - 10 and MG 5 are model Nos. of Roche Mining, Australia. Equivalent spirals of reputed manufacturers may be used). This plant can recover 95% of VHM (very heavy minerals, i.e. - Ilmenite, Rutile, Zircon, Sillimanite and Monazite) from the mined areas and make a concentrate having a minimum of 75% Heavy Mineral Content. The balance from the plant (Tailings) can be used to fill back the mined out areas. It is environment friendly operation and the land will be back-filled and reclaimed as the Pontoon & Dredge plant advances. The skid mounted plant will be moved as and when necessary by towing with a Dozer / Loader, which will be available in the area. The heavy minerals, thus produced, will be de-watered using a Hydro-cyclone and the de-watered heavy mineral concentrate (with about 5-7% moisture) will be taken to the present Wet Mill Plant to get a good concentrate throughput.



PHOTOGRAPH OF CUTTER SUCTION DREDGE

The flow diagram for pre concentration unit is shown in Plate No.16.

Note : In case of pocket deposits, sequence of development / working may be indicated on the same plan.

b) Indicate quantum of development and tonnage and grade of production expected pit-wise

No development work is required because there is no overburden.

**Block 3**

Year	Pit No.(s)	Overburden	ROM Ore Tons	Sale-able Ore	Sub- grade Ore	Mineral Rejects	Ore to Overburden ratio
First 2011-12	Pond No 1 & Pond No 2	NIL	'400,000	NIL	NIL	NIL	No overburden
Second 2012-13	Pond No 1 & Pond No 2	NIL	'497,994	NIL	NIL	NIL	No overburden
Third 2013-14	Pond No 1 & Pond No 2	NIL	'767,000	NIL	NIL	NIL	No overburden
Forth 2014-15	Pond No 1 & Pond No 2	NIL	'800,000	NIL	NIL	NIL	No overburden
Fifth 2015-16	Pond No 1 & Pond No 2	NIL	800,000	NIL	NIL	NIL	No overburden

Block 1

Year	Pit No.(s)	Overburden	ROM Ore Tons	Sale-able Ore	Sub- grade Ore	Mineral Rejects	Ore to Overburden ratio
First 2011-12	Pond No 1	NIL	'50,000	NIL	NIL	NIL	No overburden
Second 2012-13	Pond No 1	NIL	'50,000	NIL	NIL	NIL	No overburden
Third 2013-14	Pond No 1	NIL	'40,000	NIL	NIL	NIL	No overburden
Forth 2014-15	Pond No 1	NIL	'40,000	NIL	NIL	NIL	No overburden
Fifth 2015-16	Pond No 1	NIL	'40,000	NIL	NIL	NIL	No overburden

Capacity of Pontoon pump is 30 TPH or 180,000 Tons/year.
Capacity of Dredge is 50 TPH or 300,000 Tons/year.

The proposed layout the dredge is given in the following drawings on Plate No. 11.
c) Attach - Individual year wise plans and sections. In case of 'A' class mines



Composite plans and year wise sections in case of 'B' class mines

Year wise plans for Block 3 are attached as Plate 14 and sections on Plate No. 15.

Yearwise Plan and sections for Block 1 are attached as Plate No. 10.

d) Attach supporting composite plan and section showing pit layouts, dumps, stacks of sub-grade mineral, if any, etc.

General layout and Composite plan is shown in Plate No 19. There are no dumps or stock, or sub grade minerals.

e) Indicate proposed rate of production when the mine is fully developed, and the expected life of the mine and the year from which effected.

Each toyo and dredge system will have a capacity of (50 +30) 80 tons/ hr of sand or 480,000 tpa of raw sand. There will be two units working in Block 3 and the production capacity per year will be 960,000 tons and actual production, maximum, will be 800,000 tons per year from Block 3 inland mining. The reserves in Block 3 is 43,638,640 tons and the deposit will have life of 54 years. Minalbe reserves with provision of the barrier is 6,125,800 tonns (Table 21). The life of this reserves will be 10 years. In the meantime, the stipulation of barrier can be get reduced in the interest of mineral conservation, increasing the life of the block.

f) Attach a note furnishing a conceptual mining plan for the entire lease period (for 'B' Category mines) and upto the life of the mine (for 'A' Category mines) based on the geological, mining and envrionmental considerations.

The area is proposed to be mined by pontoon mounted submersible pumps and dredges. The slurry pumped from the submersible pumps and dredges will be sent to skid mounted pre-concentrators. The heavy mineral content which is 10% in raw sand will be increased to 75% to 80% using spirals and hydro-cyclones. Most of the gangue minerals will be separated in pre-concentration. These will form the rejects and will be used to refill the dredged area. In this way, refilling will proceed hand in hand with mining operation. The concentrates will be transported to Mineral separation plant in tipping trucks.

g) Opencast mines :

l) Describe briefly giving salient features of the mode of working (mechanized, semi-mechanized, manual)

The operation will be mechanized using slurry pumps and dredges . The rejects will be refilled into the mined area by using a wheel loader.



AREA TO BE DREDGE MINED IN KMML BLOCK 3

ii) Describe briefly the layout of mine workings, the layout of faces and sites for disposal of overburden / waste. A reference to the plans enclosed under 4(b) and 4 (d) will suffice.

Layout mine workings is given in Plates 14 for Block 3 and in Plate No.10 for Block 1.

h) Underground mines :

There will be no underground workings

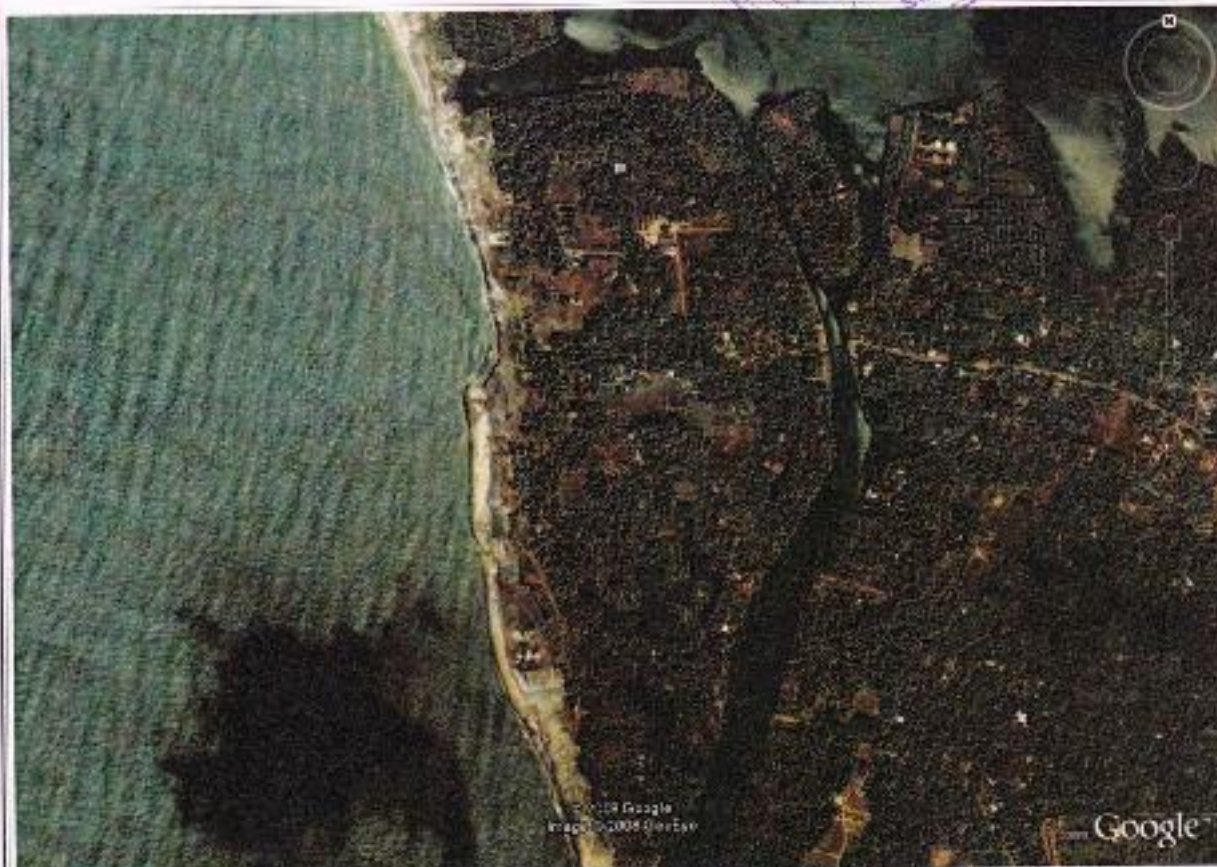
i) Extent of mechanization

describe briefly including the calculation for adequacy and type of machinery and equipment proposed to be used in different mining operations.

(1) Drilling Machines

There will be no drilling machine because there will be no drilling or blasting. The material is loose sand which can be mined without drilling and blasting.





AN ARIEL VIEW OF LAND PROPOSED FOR DERDIGE MINING IN BLOCK3

(2) Loading Equipment

Product from the pre-concentrator will be loaded by wheel loaders for transport to MS Plant. The same loader will be used for progressive refilling the dredge pond.

(3) Haulage and Transport Equipment**(a) Haulage within the mining leasehold**

Type	Nos. *	Size / capacity*	Make*	Motive Power	H.P.
Tipping trucks	6	10 tons	Tata 1210	Diesel	120



* Actual number and Model will be decided by the contractor depending on market conditions.

whether the dumpers are fitted with exhaust conditioner should be indicated No

(b) Transport from mine head to the destination

Block 3. There will be no transport of the sand outside the leasehold.

Block 1 The product of Pre-concentrator will be transported to MS Plant

Type	Nos.*	Size / capacity *	Make*	Motive Power	H.P.
Tipping trucks	6	10 tons	Tata 1210	Diesel	120

* Actual number and Model will be decided by the contractor depending on market conditions.

(4) Miscellaneous

Describe briefly any allied operations and machineries related to the mining of the deposit not covered earlier.

There are no miscellaneous operations.

13. BLASTING

There will be no blasting because the sand is loose and can be dredged without blasting.

14. MINE DRAINAGE

a) likely depth of water table based on observations from nearby wells and water bodies

The mining operations will take place by dredging in a pool made with surface water. The water in the pool will be at Sea level.

b) The level of ground water and time of reaching the water table.

NOT APPLICABLE



c) quantity and quality of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged

The mining operations will take place by dredging in a pool made with surface water. The water in the pool will be at Sea level. Hence there is no need for pumping arrangements.

15. STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE

a) Indicate briefly the nature and quantity of top soil, overburden / waste and mineral rejects likely to be generated during the next five years :

No top soil or overburden or mineral rejects are encountered in dredge mining and pre-concentration area. About 85 % to 90 % of the raw sand is rejected as tailing in pre-concentration operation. This material is used to refill the back side of dredge's pond as the dredge moves forward.

b) land chosen for disposal of waste with proposed justification

There will be no waste material. About 85 % to 90 % of the raw sand is rejected as tailing in pre-concentration operation. This material is used to refill the back side of dredge's pond as the dredge moves forward. Hence special land need not be chosen for waste disposal

c) attach a note indicating the manner of disposal and configuration, sequence of build up of dumps along with the proposals for the stacking of sub-grade ore, to be indicated year wise

As explained above, there will be no sub grade minerals, Hence there will be no build up of dumps for sub-grade minerals.

16. USE OF MINERAL

a) describe briefly the end-use of the mineral (sale to intermediary parties, captive consumption, export, industrial use)

PRODUCTS INFORMATION is given in Para 8 of part A. There will be no change in the product generated in dredge mining.

b) indicate physical and chemical specifications stipulated by buyers

PRODUCTS INFORMATION is given in Para 8 of part A. There will be no change in the



product generated in dredge mining.

c) give details in case blending of different grades of ores is being practiced or is to be practiced at the mine to meet specifications stipulated by buyers.

No specific blending is planned.

16(A) . OTHER

Describe briefly the following :

a) Site services :

Site services are provided in Mine Office

b) Employment-potential :

Manpower of Mines & Old MS Plant

Officers 28

Workers

Permanent 118 including Female 16

Casual 447 including Female 112

Mining Staff

Mines Manager & Assistant Managers 5 (including a Mining Engineer appointed under Rule 42(b)(1) of the MCDR).

Mines Foreman 3

Mines Mate 3

Manpower, as required, will be diverted from the existing pool of manpower. Organization chart is enclosed as Annexure XXIX

17. MINERAL PROCESSING

a) If processing / beneficiation of the ore or minerals mined is planned to be conducted on site or adjacent to the extraction area, briefly describe the nature of the processing / beneficiation. This should indicate size and grade of feed material and concentrate (finished marketable product), recovery rate.

The concentrate from Pre-concentrator will be treated in the old MS plant. Details of the MS Plant are as given in para 10 of Part A



HEAP OF RAW SAND IN M.S. PLANT

b) Explain the disposal method for tailings or waste from the processing plant (quantity and quality of tailings proposed to be discharged, size and capacity of tailing pond , toxic effect of such tailings, if any, with process adopted to neutralize any such effect before their disposal and dealing of excess water from the tailing dam).

Details are as given in para 10 of Part A

c) A flow sheet or schematic diagram of the processing procedure should be attached.

Details are as given in para 10 of Part A

d) Specify quantity and type of chemicals to be used in the processing plant.

No chemicals are used in the Processing Plant

e) Specify quantity and type of chemicals to be stored on site / plant.



No chemicals are used in the Processing Plant. Hence there is no need to store chemicals on site/plant.

f) Indicate quantity (cu.m. per day) of water required for mining and processing and sources of supply of water. Disposal of water and extent of recycling.

Details are as given in para 10 of Part A

Machinery to be added as part of mechanization is summarized below.

**TABLE 20
SUMMARY OF MACHINERY**

Machinery	Block III	Block I	Total
Pontoon & Dredge	2	1	3
Pre concentration skid	2	1	3
Loader for concentrate and reject handling	3	2	5
Tipping trucks for concentrate transport	2	4	6

18. ENVIRONMENTAL MANAGMENT PLAN

a) Attach a note on the status of baseline information with regard to the following :
- existing land use pattern indicating the area already degraded due to quarrying / pitting, dumping, roads, processing plant, workshop, township etc in a tabular form.

Land utilization in Block 3 is as below

(a) Area used (including any additional area) for beach sand mining 9 Hectares

(b)Area used for storage of raw sand 4 Hectares

(c)Area occupied by processing plant (Old MS Plant)5.60 Hectares

(d) Area used for mine roads 6.0 Hectares

(e)Area of the Company now under sea 4 Hectares

(e)Balance area: Area owned by private persons under various stages of acquisition . This area is to be utilized for dredge mining. About 17.72Ha of land will be mined in the first 5



years. Details of the area mined is shown in Table 16. Almost all the land will be reclaimed by refilling. In Block I, area mined will be 1.66 Ha in the first 5 years.

Total area of the Block 3 is 88.1193 Hectares (including Old MS Plant)

water regime

The area for beach sand mining is close to the sea and the T.S. Canal. So, the area can be considered to be under saline water.

flora and fauna:

The beach and near by areas had a few coconut trees. Most plants cannot grow here due to salinity of water. There is no visible fauna in the area. There are no species that are specific to this area. Detailed environmental study is being conducted by National Institute for Interdisciplinary Studies, (CSIR), Trivandrum

- **quality of air, ambient noise level and vibration**

The area was under mining operations for the last 70 years. However, there is no appreciable degradation in the quality of air, ambient noise level and vibration. There is no drilling or blasting in connection with mining operations. Hence vibration is minimal.

- **climatic conditions**

The area has tropical climate. Details of temperature, rainfall etc for 5 years is shown in Annexure VII. The nearest stations where weather data is available are Alappuzha for temperature and Kollam and Kayamkulam for rainfall.

- **public buildings, places of worship and monuments**

There is one temple close to the road used for transport. KMML is trying to see if the temple can be shifted, observing tantric rituals. Other than that, there are no public buildings, places of worship or monuments in or near the area proposed to be used for dredge mining and near the roads used for mineral transport.

- **human settlements** Before commencing the dredge mining, the required area will be taken over by land purchase/ acquisition. Places of worship if any will be shifted away from the mining area with the consent of all stakeholders.

- **Socio economic factors**

KMML is the largest employer in the locality and the economy of the area depends very much on the well being of the company. Earlier fishing and associated operations were the main economic activity. Now the fishing operations are concentrated on Fishing



Harbors which were opened recently in Thangassery and Neendakara.

- attach plans showing the locations of sampling stations

- Sampling points will be selected in consultation with the agency undertaking the EIA study.

- Environment Monitoring Cell of the Company shall continue monitoring ambient air quality, dust fall rate, water quality, soil sample analysis and noise level measurements on various stations established for the purpose both in the core zone and buffer zone, as per department of Environment guidelines and keeping in view IBM's Circular No. 3/92, season-wise every year or by engaging preferably the services of an Environmental laboratory approved by MOEF/CPCB. The data so generated will be maintained in a bound paged register kept for the purpose and the same will be made available to the inspecting officer on demand.

- does area (partly or fully) fall under notified area under Water (Prevention & Control of Pollution), Act, 1974

Yes

b) Attach an Environmental Impact Assessment Statement describing the impact of mining and beneficiation on environment on the following over the next five years (and upto conceptual plan period for 'A' category mines)

i) Land area indicating the area likely to be degraded due to quarrying / pitting, dumping, roads, workshop, processing plant, township etc.

In Block 3. During the next five years, area mined by pontoon dredge combination will be 17.72 hectares as given in Table -16. Almost the entire area will be reclaimed by refilling the dredge pit with the reject sand from the pre-concentrator and from the MS plant.

In Block 1. During the next five years, the pontoon pump and dredge combination will be mining about 1.6 Hectares. Almost the entire area can be reclaimed by refilling the dredge pit with the reject sand from the pre-concentrator and from the MS plant.

ii) Air quality

No Major change in air quality is expected. Dredging will not produce any dust or fumes. The Loading and transport operations also do not produce dust because the sand is wet. Fumes produced by the equipments will be minimal because the equipments will be required to have



Pollution -under-control Certificates.

iii) Water quality

No change in water quality is expected because no chemicals are added to the water system during dredging. The sand does not contain soluble constituents. During dredging and pre-concentration, water is used only as a medium and is returned to the pond for re-use.

iv) Noise levels

No major change is expected in noise levels because dredging is done under water. The increase in sound level will be only from trucks and loaders used to handle the concentrate and waste sand. There will not be any residential house near the working area.

v) Vibration levels (due to blasting)

There will be no blasting and no vibration due to blasting.

vi) Water regime

No change in water quality is expected. Water from the adjoining canal will be used to form a pond in which the dredge will be floated. Water used in dredge and pre-concentrator will be recirculated back to the pond. Hence there will be no change in water regime.

vii) Socio-economics

There will be no effect of socio-economics of the area. Most of the residents have left the area as their lands have been purchased by KMML. KMML continues to be the major economic activity of the area.

viii) Historical monuments etc.

There are no historical monuments in the area or near it.

c) Attach an Environmental Management Plan (supported by appropriate plans and sections) defining the time bound action proposed to be taken with sequence & timing in the following areas (or diagrams should be used) :

- temporary storage and utilization of topsoil

there is no topsoil Hence, action plans for temporary storage and utilization of topsoil are not required.

- year wise proposal for reclamation of land affected by abandoned quarries and other mining activities during first five years (and upto conceptual plan period for 'A'



category mines) clarifying the extent of back filling and re contouring and / or alternative use of unfilled / partially filled excavations / road sides / slopes and mine. In case abandoned quarries / pits are proposed to be used as reservoir, their size , water holding capacity and proposal for utilization of such water be given.

Reclamation of land affected by mining will go hand in hand with mining operations. Tailings rejected in pre-concentration plant and MS plant will be used for refilling the mined out area. The MS plant will be generating waste sand from treatment of beach washings also. Hence the quantity of sand available for reclamation will be sufficient for reclamation of the dredged area.

- programme of afforestation, year wise for the initial five years (and upto conceptual plan period for 'A' category mines) indicating the number of plants with name of species to be afforested under different areas in hectares.

No area has been deforested for mining the area. However, trees will be planted in the reclaimed area as per long term land utilization plan for the area. The detailed plans for land utilisation will be worked out with the consent from state Government.

- stabilization and vegetation of dumps along with waste dump management year wise for the first five years (and upto conceptual plan period for 'A' category mines).

Any material rejected during concentration of the raw sand is utilized for refilling the mined out area. Hence there will be no waste dumps. So plans for stabilization and vegetation of dumps and for waste dump management are not necessary.

- measures to control erosion / sedimentation of water courses.

In the proposed method of operation, there will be no erosion / sedimentation of water courses. Hence Measure to control erosion / sedimentation are not necessary.

- treatment and disposal of water from mine.

There will not be any discharge of water from the mine. The dredge is working in a pond and water used for dredging is recirculated back to the pond. No chemicals are added to the water during operation. Hence no treatment is required for the mine water.

- measures for minimizing adverse effects on water regime.



No change in water quality is expected. Water from the adjoining canal will be used to form a pond in which the Pontoon and the dredge will be floated. Water used in dredge and pre-concentrator will be recirculated back to the pond. Hence no special measures for minimizing adverse effects on water regime.

- protective measures for ground vibrations / air blast caused by blasting.

There will be no blasting and no vibration due to blasting, Hence special protective measures for ground vibrations / air blast caused by blasting are not needed.

- measures for protecting historical monuments and for rehabilitation of human settlements likely to be disturbed due to mining activity.

There are no historical monuments in the locality. The area will be free from human settlements by the time the dredge mining is in full swing because the required extent of land will be purchased or acquired by the company before commencing dredging. The company follows a generous rehabilitation scheme approved in meeting chaired by the Minister for Industries of Kerala State. Minutes of the meeting is enclosed as Annexure VI. Hence special measures for protecting historical monuments and for rehabilitation of human settlements likely to be disturbed due to mining activity are not needed.

-socioeconomic benefits arising out of mining.

KMML is the largest employer of the area. Mining has been going on in the area for the last 70 years. Dredge mining will help KMML to increase production of beach sand minerals. In this case, KMML will be self sufficient for raw material for its pigment plant.

d) Monitoring schedules for different environmental components after the commencement of mining and other related activities. (for 'A' category mines only)

- Sampling points will be selected in consultation with the agency undertaking the EIA study.
- Environment Monitoring Cell of the Company shall continue monitoring ambient air quality, dust fall rate, water quality, soil sample analysis and noise level measurements on various stations established for the purpose both in the core zone and buffer zone, as



per department of Environment guidelines and keeping in view IBM's Circular No. 3/92, season-wise every year or by engaging preferably the services of an Environmental laboratory approved by MOEF/CPCB. The data so generated will be maintained in a bound paged register kept for the purpose and the same will be made available to the inspecting officer on demand.

Note : Ground vibration studies are to be carried out for virgin area / new leases after one year from the commencement of mining activities. (for 'A' category mines only)

As there is no drilling or blasting or any activity that can cause ground vibrations, such studies may be unnecessary.

19. Conceptual Plan:

The lease hold is divided into 4 blocks. Block No. 1 will be mined by dredge mining. Block No. 3 will be mined by dredge mining and beach washing collection. Subsequently, Block No. 5 and Block No. 7 will be mined by dredge mining and beach washing collection. Dredge mining involves refilling of the mined area using tailings from pre-concentration plant and Mineral Separation Plants. The mining methods adopted here is capable of yielding very high production rates required for the companies pigment plant and other downstream units. The minerals mined by beach washing collection are replaced by the sea. Hence this reserve is not depleted. The on - shore deposits are very substantial and will last for quite some time even at high production rates. Both methods of mining ensures that the area is restored to the original ground level. The beach area will be required to continue the mining, but the area mined and reclaimed by dredge mining can be utilized for other applications as decided by the State Government.



Mining Plan for Kerala Minerals and Metals Ltd, Chavara Page 70

PART -C

PROGRESSIVE MINE CLOSURE PLAN

Submitted under Rule 22(5)(Va) of Mineral Concession Rules 1960

20.0 INTRODUCTION:

Name of the Lease	M/s. Kerala Minerals and Metals Ltd
Extent	Total 203 802 Hectares
Type of Lease	Renewal
Land use pattern	Non forest
Location and Accessibility	
Village	Neendakara, Panmana, Chavara, Vadakumthala Alappad, Karunagappally, Puthuppally, Kulasekharapuram
Taluk	Karunagapally
District	Kollam
ii) Method of Mining	Open cast method A combination of beach sand mining, dredging of inland deposits,

20.1 Reasons for closure of mine: The area is leased in favor of M/s. Kerala Minerals and Metals Ltd & lease is valid for 20 years. Hence , the progressive Mine closure plan is prepared and submitted for approval.

20.2 Statutory Obligations: The applicant has agreed to undertake/comply all statutory rules, regulations, orders made by Central & State Governments Statutory Organizations, Court etc., and also obtain specific permissions wherever necessary



from concerned authorities.

20.3 Closure Plan Preparation:

Name & Address of the Applicant	M/s. Kerala Minerals and Metals Ltd
Recognized Qualified Person	Jacob Punnen I.B.M. REGN NO.RQP/BNG/028/88A A.M.D.REGN NO.AMD/MPARQP/5/2010 A 24, Kanaknagar, Trivandrum, 695003
Key Person	Jacob Punnen
Telephone No,	0471 - 2314195 094470 31419 (Mobile) Fax – 0471 3919263

iii) MINE DESCRIPTION:

i) Physiography : For details please refer para 4.0, Page – 9

20.4 Geology : For details please refer Para 'e' at Pages 12

20.5 Reserves : The total in situ geological reserves of beach sand is given in Table No 6 and 8.

20.6 Mining Method : For details Please refer Para 4.0, Page No 12 to 22 and 42 to 45

20.7 Mineral Beneficiation : Please refer Para 10.0, Page No. 29, Page 47-48

21.0 REVIEW OF IMPLEMENTATION OF MINING PLAN / SCHEME OF MINING

INCLUDING FIVE YEARS PROGRESSIVE CLOSURE PLAN UPTO THE FINAL

CLOSURE OF MINE : The previous mining Plan /scheme was approved by Atomic Minerals Directorate for Exploration and Research , Department of Atomic Energy, Govt.



of India vide letter No. AMD/MPA/3M(KMML)/03/829 dated 13/5/2003. Under this plan only beach sand mining was envisaged. No progressive mine closure plan was attached to the said plan as it was not a statutory requirement then. Also, the land used for beach sand mining continues to be used for the same purpose as the deposit gets replenished and the deposit is not depleted. So progressive closure of the mining area was not possible. Hence, the question of review does not arise at this stage.

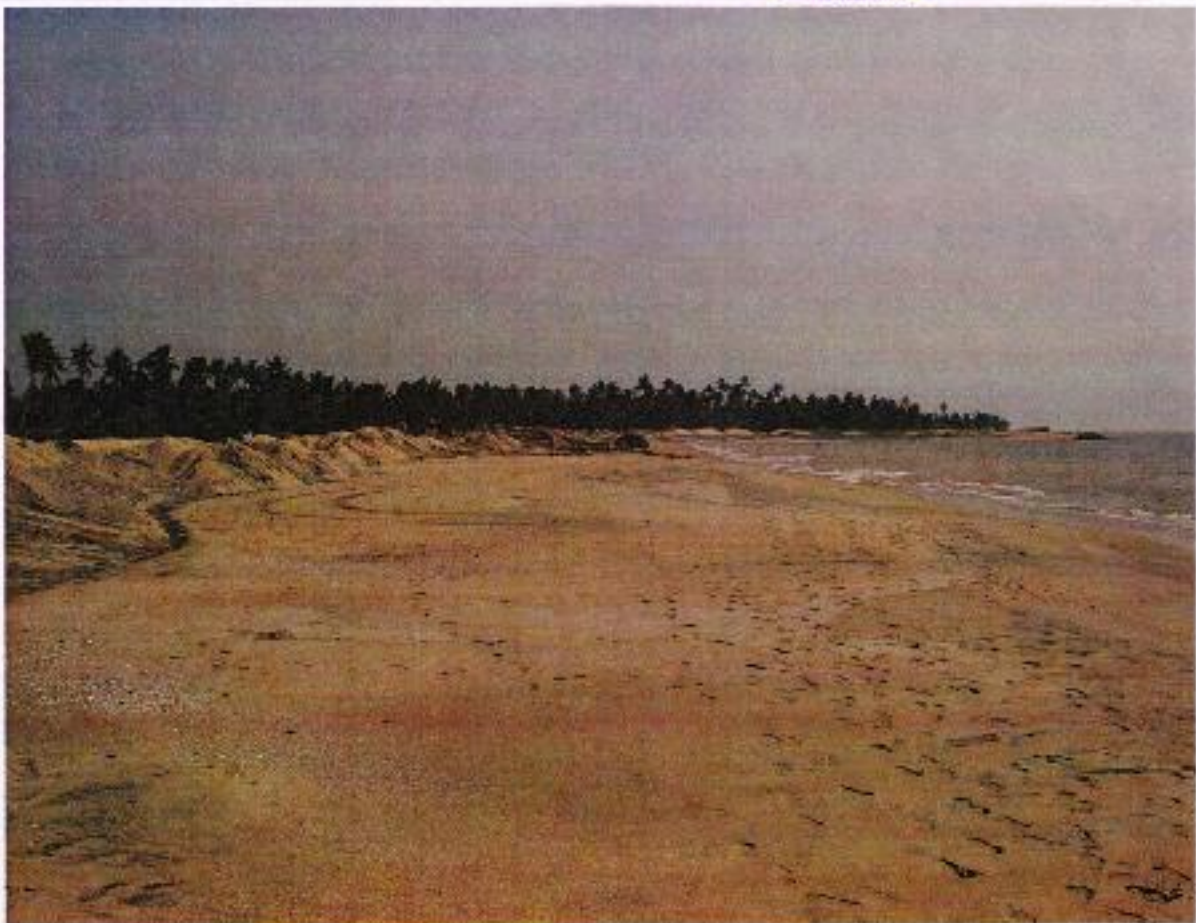
22 . Closure Plan:

22.1 Mined-Out Land : Describe the proposals to be implemented for reclamation and rehabilitation of mined-out land including the manner in which the actual site of the pit will be restored for future use. The proposals should be supported with relevant plans and sections depicting the method of land restoration/reclamation/rehabilitation.

Beach washing collection.

The area used for Beach washing collection does not run out of mineral because the mineral is replenished periodically by the sea. So the same area continues to be used for beach sand washing collection for the last 70 years.

So the area is never mined out. Hence the area cannot be reclaimed or rehabilitated as a mined out area. Even after 70 years of mining, the profile and characteristics of the area is same as it was before the mining. No change is anticipated during the period of this mining plan.



AREA UNDER BEACH WASHING COLLECTION FOR MORE THAN 40 YEARS

Dredge mining in Block 3.

As explained in earlier sections, the dredge unit incorporates a wet pre- concentration plant. In this unit, the raw sand is concentrated to 85 to 90 % H.M. Content. This requires rejection of 75 % of the dredged sand as tailings in the dredge unit itself.



HOUSE BUILT ON AREA MINED BY DREDGE AND REFILLED BY M/S IRE LTD IN ADJACENT BLOCK

This tailings are discharged at the rear end of the dredge pond and will refill the pond progressively. Hence the mining method incorporates progressive reclamation of the mined area. In the refilled area, the tailings from the Old MS plant is also deposited by tipping trucks. The refilled area is leveled with bulldozers. It is proposed that the refilled area will be afforested and converted into a suitable landscape. It is estimated that the area dredged during the first five years will be approximately 17.72 Ha and almost same extent of land will be reclaimed. The only un-reclaimed area will be the active dredging pond with an area of 0.30 hectares.



AREA REFILLED AFTER DREDGING BY IRE LTD IN ADJACENT BLOCK

Mining in Block 1

Mining in this block will be by pontoon pump dredge combination. Mining will be up to a depth of 8 meters below sea level. Due to this, no specific action is required in progressive mine closure plans. The only un reclaimed area will be the active dredge pond of area about 0.30 Ha. The area that is mined out will be fully reclaimed. Total area mined will be 1.6588 Hectares as detailed in Table 17.

22.2 Water Quality Management: Describe in detail the existing surface and ground water bodies available in the lease areas and the measures to be taken for protection of the same including control of erosion, sedimentation, siltation, water treatment, diversion of water courses, if any, measures for protection of contamination of ground water from leaching etc. Quantity and quality of surface water bodies should also be indicated and corrective measures proposed to meet the water quality conforming the permissible limits should also be



described. Report of hydrological study carried out in the area may also be submitted. The water balance chart should be given, If there is potential of Acid Mine Drainage the treatment method should be given.

Beach washing collection.

The material that is handles in beach washing collection has been washed by the sea many times. So it is free of slimes or any soluble chemicals. During mining of this material, there will be no release of slimes or chemicals into the water. Water level will not be affected. Hence, there will be no adverse impact on quality of surface water or ground Water due to Beach washing collection.

Dredge mining in Block 3.

During dredge mining, a pond will be made with saline water from adjoining T.S. Canal. The water in the pond will be used for floating the Toyo pump pontoon and dredge and also as medium for the process of dredging and pumping the sand into the concentrating unit on the dredge. After processing, the concentrate, along with some water will be pumped to the new concentrating plant. No chemicals are added to the process water during the operation. The sand is generally granular and is free from slime. Hence the water is not contaminated in any way during the operation. Hence specific steps for protection water bodies and ground water are not called for.

Mining in Block 1

It is planned that the area will be mined by the Toyo pump pontoon and dredge. Water for forming the pond will be taken from the sea. The location is very close to the sea and sea water will flow into the dredge pond though the barrier as seepage. In the pontoon and dredge mining, the considerations listed for Block 3 will be applicable and no specific step is required for protection of water bodies or ground water.



22.3 Air Quality Management: Describe the existing air quality status. The corrective measures to be taken for prevention of pollution of air should be described.

Beach washing collection.

There will be no pollution of air. The sand being handled is free of dust and is moist. Hence it will not raise any dust during operations. Trucking routes will be sprayed with water to prevent dust generation.

Dredge mining in Block 3.

There will be no pollution of air. The sand is handled as a slurry with water. Hence there is no chance of dust generation.

Mining in Block 1

There will be no pollution of air. The sand being handled is free of dust and is moist. Hence it will not raise any dust during operations. Trucking routes will be sprayed with water to prevent dust generation. During dredging, the sand is handled as a slurry with water. Hence there is no chance of dust generation.

The mining activity is likely to have minimal impact in quality of air prevailing in the area. The Canal is used by Tourist House boats, Passenger ferries, private boats etc. All these have diesel engines which emit SPM, NO_x & SO₂. The addition in SPM, NO_x & SO₂ emission due the operation of Toyo pump and Dredge and earth moving equipments will be minimal compared to the existing emissions. The Toyo pump and dredge will be powered by diesel engines. As the impact is very minimal, the only mitigation measures proposed is improved maintenance of engines of trucks and other mining machinery.

NOISE : There will be some noise from the engines of Dredge and other mining machinery.

This is very minimal. The dredge is located in a man-made pool. The sound does not affect the growth of fish in the canal or in the sea. The operational areas are far away from inhabited areas. Noise will be kept to the minimum by proper maintenance of the Dredge and other mining machinery. There is considerable traffic in NH 47 (now renumbered as



NH66) adjacent to Block 1. The activity that is proposed for Block 1 will not raise noise or vibration comparable to that generated in the NH..

22.4 Waste Management: Describe the type, quality and quantity of overburden, mineral reject etc. available and their disposal practice. If no utilization of waste material is proposed, the manner in which the waste material will be stabilized should be described. The protective measures to be taken for prevention of siltation, Erosion and dust generation from these waste material should also be described. If toxic and hazardous elements present in the waste material the protective measures to be taken for prevention of their dispersal in the air environment, leaching in the surface and ground water etc should be described.

Beach washing collection

There is no overburden. No waste is generated in the mining operations.

Dredge mining in Block 3.

There is no overburden. Tailings generated by concentrating the raw sand is used for refilling the dredge pond. No toxic waste is generated here.

Mining in Block 1

There is no overburden. No waste is generated in the mechanized mining operations.

Tailings are generated by concentrating the raw sand. These tailings are used for refilling the dredge pond. No toxic waste is generated here.

22.5 Topsoil Management: The topsoil available at the site and its utilization should be described.

There is no topsoil in the mining area. Hence specific steps for topsoil management are not required here.

22.6 Tailing Dam Management: The steps to be taken for protection and stability of tailing dam, stabilization of tailing material and its utilization, periodic de-silting measures to prevent water pollution from tailings etc, arrangement for surplus water overflow along with detail design, structural stability studies, the embankment seepage loss into the receiving environment and ground water contaminant if any should be described.

Tailings are generated in dredge mining and in MS Plant. The method handling the tailings has been described earlier. There is no tailing dam and specific steps for protection and stability of tailing dam, stabilization of tailing material and its utilization, periodic de-silting measures to prevent water pollution from tailings etc, are not required. Any Monazite which cannot be sold will be disposed off as prescribed by Atomic Energy Regulatory Board.



22.7. Infrastructure: The existing infrastructural facilities available such as roads, aerial rope-ways, conveyor belts, railways, power lines, buildings&structures, water treatment plant, transport, water supply sources in the area etc. and their future utilization should be evaluated on case-to-case basis. If retained, the measures to be taken for their physical stability and maintenance should be described. If decommissioning proposed, dismantling and disposal of building structures, support facilities and other infrastructure like electric transmission line, water line, gas pipeline, water works, sewer line, telephone cables, underground tanks, transportation infrastructure like roads, rail, bridges, culverts etc, electrical equipments and infrastructures like electrical cables, transformers to be described in connection with restoring land for further use.

The only infrastructure that is left behind will be the roads. Beach washing operations do not need any other infrastructure. For dredge mining, infrastructure like power supply are movable and will move with the dredge to new areas.

Hence specific steps for their decommissioning or retention are not required here.

22.8 Disposal of Mining Machinery : The decommissioning of mining machineries and their possible post mining utilization, if any, to be described.

The machinery used here are the following:

- Dredge assembly
- earth moving equipments
- trucks.

All these equipments are movable. In the event of a mine closure, they can be moved to a new site.

Hence specific steps for decommissioning of mining machineries are not required here.

22.9 Safety & Security: Explain the safety measures implemented to prevent access to surface openings, excavations etc and arrangements proposed during the mine abandonment plan and up to the site being opened for general public should be described.

In beach washing collection, there is no mine opening. In other operations, the mining area will be kept fenced. After mining, the area will be refilled and will be like any other part of the shore and there is no need to restrict public access to the mined out area. As indicated in para- the area mined out and refilled with dredge is suitable for habitation and cultivation. Hence specific safety measures are not required here.

In dredge mining and mining in Block 1, the mine opening will be kept fenced and public access will be restricted, till the area is refilled.



22.10 Disaster Management and Risk Assessment: This should deal with action plan for high risk accidents like landslides, subsidence flood, inundation in underground mines, fire, seismic activities, tailing dam failure etc. and emergency plan proposed for quick evacuation, ameliorative measures to be taken etc. The capability of lessee to meet such eventualities and the assistance to be required from the local authority should also be described.

The leasehold is close to the sea. There is no possibility of high risk accidents like landslides, subsidence flood, inundation in underground mines, fire, seismic activities, tailing dam failure etc. Hence there is no need for emergency plan proposed for quick evacuation, ameliorative measures etc. Even in the Tsunami incident of December 2004, only Block 7 was affected. Specific emergency plans will be laid down before working in that Block. No special precautions are required in Block 1 & Block 3. Person to be contracted / responsible in case of disaster or emergency is

Mines Manager,

MS Unit,

Kerala Minerals and Metals Ltd,

Kovilthottom, Chavara,

Kollam -691 583.

Tel Ns. 0476 - 260047 / 2081998

Fax - 0476 - 2680101.

22.11 Care and maintenance during temporary discontinuance: For every five yearly review (as given in the mining scheme), an emergency plan for the situation of temporary discontinuance or incomplete programme due to court order or due to statutory requirements or any other unforeseen circumstances, should include a plan indicating measures of care, maintenance and monitoring of status of unplanned discontinued mining operations expected to re-open in near future. This should detail item wise status monitoring and maintenance with periodicity and objective.

Beach washing collection Dredge mining in Block 3 Mining in Block 1

In the event of any temporary discontinuance or incomplete programme due to court order or due to statutory requirements or any other unforeseen circumstances, the dredge can be withdrawn from the leasehold. Alternately, the dredge can be taken for maintenance. The dredge pond and mining area in Block 1 will be kept fenced and the fence will be maintained properly. In Beach washing collection area, no maintenance work is required.



23.0 ECONOMIC REPERCUSSIONS OF CLOSURE OF MINE AND MANPOWER RETRENCHMENTS

Man power retrenchment, compensation to be given, socio-economic repercussions and remedial measures consequent to the closure of mines should be described, specifically stating the following.

23.1 Number of local residents employed in the mine, status of the continuation family occupation and scope of joining the occupation back.

Beach washing collection Dredge mining in Block 3 Mining in Block 1 There are no communities in the immediate vicinity. The manpower engaged here are from various parts of the district and From other districts. The company is a public sector unit and it has no plans of retrenchments of its mining staff, even if it has to suspend or close the mines.

23.2 Compensation given or to be given to the employees continuing with sustenance of himself and their family members.

In view of the explanation given above, the question of sustenance Compensation does not arise. In the unlikely event of a lay-off, compensation eligible under the law will be paid.

23.3 Satellite occupations connected to the mining industry-number of persons engaged therein – continuance of such business after mine closes.

There are no satellite occupations and there is no other economic activity near by.

23.4 Continued engagement of employees in the rehabilitated status of mining lease area and any other remnant activities.

The employees are permanent or regular casual employees of the company. The beach washing operations will never be worked out as the minerals are being replenished by the sea. As for dredge mining, Block 3 has a life of more than 50 years. Once any part of the leasehold is worked out, they will be transferred to other areas of the leaseholds.

23.5 Envisaged repercussions on the expectation of the society around due to closure of mine.

The company is prestigious Public sector unit of the State Government. The society around expects the company to provide sustained employment. It very unlikely that the mine will be closed any time now. In the unlikely event the mine is closed, the employees may be laid off as provided under the law.

24. TIME SCHEDULING FOR ABANDONMENT:



The details of time schedule of all abandonment operations as proposed in para 4 should be described here. The manpower and other resources required for completion of proposed job should be described. The schedule of such operations should also be supplemented by PERT (programme Evaluation & Review Technique), Bar chart etc.

As mentioned in earlier para, the mine is not scheduled to be closed in near future.

Even in the event of a closure, there will not be any specific activity except shifting the dredge-washing plant system, which is a routine activity. Hence there is no need for details of time schedule of abandonment operations, PERT chart, Bar chart etc

25. ABANDONMENT COST:

Proposed year wise expenditure in Rupees

Cost to be estimated based on the activities required for implementing the protective and rehabilitation measures including their maintenance and monitoring programme.

As mentioned in para 4, the mine is not scheduled to be closed in near future. Even in the event of a closure, closure, there will not be any specific activity except shifting the dredge plant system to another leasehold, which is a routine activity. Hence there is no need for working out the cost of abandonment at this stage.

26. FINANCIAL ASSURANCE:

Beach washing collection.

Sl . No.	Head	Area put on use at start of plan (in Hectare.)	Additional requirement during plan period (in Hectare)	Total (in Hectare)	Area considered as fully reclaimed and rehabilitated (in Hectare)	Net area considered for calculation (in Hectare)
1	Area under Mining	9	3.	12	12	0
2	Storage for top soil	Nil	Nil	Nil	Nil	Nil
3	Overburden/du mp	Nil	Nil	Nil	Nil	Nil
4	Mineral storage	4	Nil	4	4	Nil
5	Infrastructure (workshop,	Nil	Nil	Nil	Nil	Nil



Mining Plan for Kerala Minerals and Metals Ltd, Chavara Page 83

Sl. No.	Head	Area put on use at start of plan (in Hectare.)	Additional requirement during plan period (in Hectare)	Total (in Hectare)	Area considered as fully reclaimed and rehabilitated (in Hectare)	Net area considered for calculation (in Hectare)
	administrative, building etc.)					
6	Roads	6 Ha	Nil	6 Ha	6 Ha	Nil
7	Railways	Nil	Nil	Nil	Nil	Nil
8	Green belt	Nil	Nil	Nil	Nil	Nil
9	Tailing pond	Nil	Nil	Nil	Nil	Nil
10	Effluent Treatment plant	Nil	Nil	Nil	Nil	Nil
11	Mineral separation plant	5.6	Nil	5.6	5.6	Nil
12	Township area	Nil	Nil	Nil	Nil	Nil
13	Others to specify	Nil	Nil	Nil	Nil	Nil
	Grand Total	24.6	3	27.6	27.6	Nil

In beach washing collection, there is no permanent damage to any area of the beach. The area under collection is restored to original profile by the sea.

Dredge mining in Block 3.

Sl. No.	Head	Area put on use at start of plan (in Hectare)	Additional requirement during plan period (in Hectare)	Total (in Hectare)	Area considered as fully reclaimed and rehabilitated (in Hectare)	Net area considered for calculation (in Hectare)
1	Area under Mining	0	18	18	17.7	0.3
2	Storage for top soil	Nil	Nil	Nil	Nil	Nil
3	Overburden/du	Nil	Nil	Nil	Nil	Nil



Mining Plan for Kerala Minerals and Metals Ltd, Chevvara Page 84

Sl. No.	Head	Area put on use at start of plan (in Hectare)	Additional requirement during plan period (in Hectare)	Total (in Hectare)	Area considered as fully reclaimed and rehabilitated (in Hectare)	Net area considered for calculation (in Hectare)
	mp					
4	Mineral storage	Nil	Nil	Nil	Nil	Nil
5	Infrastructure (workshop, administrative, building etc.)	Nil	Nil	Nil	Nil	Nil
6	Roads	Nil	Nil	Nil	Nil	Nil
7	Railways	Nil	Nil	Nil	Nil	Nil
8	Green belt	Nil	Nil	Nil	Nil	Nil
9	Tailing pond	Nil	Nil	Nil	Nil	Nil
10	Effluent Treatment plant	Nil	Nil	Nil	Nil	Nil
11	Mineral separation plant	Nil	Nil	Nil	Nil	Nil
12	Township area	Nil	Nil	Nil	Nil	Nil
13	Others to specify	Nil	Nil	Nil	Nil	Nil
	Grand Total	0	18	18	17.7	0.3

Dredge mining in Block 1

Sl. No.	Head	Area put on use at start of plan (in Hectare)	Additional requirement during plan period (in Hectare)	Total (in Hectare)	Area considered as fully reclaimed and rehabilitated (in Hectare)	Net area considered for calculation (in Hectare)
1	Area under Mining	0	1.7	1.7	1.4	0.3
2	Storage for top soil	Nil	Nil	Nil	Nil	Nil



Mining Plan for Kerala Minerals and Metals Ltd. Chavara Page 85

Sl. No.	Head	Area put on use at start of plan (in Hectare)	Additional requirement during plan period (in Hectare)	Total (in Hectare)	Area considered as fully reclaimed and rehabilitated (in Hectare)	Net area considered for calculation (in Hectare)
3	Overburden/du mp	Nil	Nil	Nil	Nil	Nil
4	Mineral storage	Nil	Nil	Nil	Nil	Nil
5	Infrastructure (workshop, administrative, building etc.)	Nil	Nil	Nil	Nil	Nil
6	Roads	Nil	Nil	Nil	Nil	Nil
7	Railways	Nil	Nil	Nil	Nil	Nil
8	Green belt	Nil	Nil	Nil	Nil	Nil
9	Tailing pond	Nil	Nil	Nil	Nil	Nil
10	Effluent Treatment plant	Nil	Nil	Nil	Nil	Nil
11	Mineral separation plant	Nil	Nil	Nil	Nil	Nil
12	Towship area	Nil	Nil	Nil	Nil	Nil
13	Others to specify	Nil	Nil	Nil	Nil	Nil
	Grand Total	0	1.7	1.7	1.4	0.3

About 0.3 Ha of land each in Block 1 & Block 3 (a total of 0.6 hectares) will be left without refilling at the end of 05 year. But when the dredge mining is continued, this area will be refilled and reclaimed. Because of the peculiar nature of the leasehold and the nature of mining operation, no specific action is required in progressive mine closure. Even though mined area will be reclaimed by end of Mining operation, as per the statutory provisions the lessee will have to provide the minimum Financial Assurance of Rs. 2 lakhs, which is more than the amount payable at the rate of Rs. 25,000/per hectare for the area that needs to be refilled. Hence the minimum amount of Financial Assurance is being provided as a bank guarantee..



Mining Plan for Kerala Minerals and Metals Ltd, Chavara

Page 86

JACOB PUNNEN
RECOGNIZED QUALIFIED PERSON
RQP/BNG/028/88
AMD/MPA/RQP/5/2010

क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines
बंगलूर Bangalore-560022

Mining plan is approved
subject to conditions laid
down in letter No. 279/

1254 / 2011 BNG. Dt. 19.12.12

**TABLE 2****DETAILS OF LAND IN BLOCK NO. 3**

Taluk : Karunagappali

District : Kollam

State : Kerala

The total area in block-3 within the same boundaries & survey numbers included in the lease as per GO dt 11-12—1972 is 88 Ha 11 Ares 93 Sq meters, presently spread over four revenue villages as per the details stated below.

Sl. No.	Village	Survey Nos.	Hectares	Ares	Sq. Mts.
1	Panmana	6 to 60	70	69	70
2	Vadakunthala	695	1	97	77
3	Chavara	1 to 23	15	26	76
4	Chavara	24	0	17	70
		Grand Total	88	11	93
		Area for renewal	88	11	93

TABLE 3**AREA OF MINING LEASE (REVISED)**

Taluk : Karunagappali

District : Kollam

State : Kerala



Sl No.	Blocks	Area	Village	Sy.No.
1	I	34.285 Hectares	Neendakara	25 to 112A
2	III	88.1193 Hectares	See Table - I	
3	V	28.899 Hectares	Karunagappally	91 to 220 less 218
4	VII	52.499 Hectares	Kulasekharapuram Puthupally	1 to 199 1 to 151
Total		203.802 Ha		

TABLE 6

TABLE - 6 GEOLOGICAL RESERVE BLOCK -1

AREA SQ.METERS	AVERAGE THICKNESS METER	VOLUME OF RESERVES CUB.METER	TONNAGE TONS	RECOVERY %	TONNAGE OF MINABLE SAND TONS
342850	11	3,771,350	7,542,700	95	7,165,565

TABLE 6A



TABLE – 6 A GEOLOGICAL RESERVE BLOCK -V

AREA SQ.METERS	AVERAGE THICKNESS METER	VOLUME OF RESERVES CUB.METER	TONNAGE TONS	RECOVERY %	TONNAGE OF MINABLE SAND TONS
28899	11	317,889	635,778	95	603,989

TABLE 6B

TABLE – 6B GEOLOGICAL RESERVE BLOCK -VII

AREA SQ.METERS	AVERAGE THICKNESS METER	VOLUME OF RESERVES CUB.METER	TONNAGE TONS	RECOVERY %	TONNAGE OF MINABLE SAND TONS
52499	11	577,489	1,154,978	95	1,097,229



TABLE 7

TYPICAL ANALYSIS OF MINERAL SAND FROM BLOCK I

MINERAL	WT % IN BLOCK 1
ILMENITE	24.0
LEUCOXENE+ MONOZITE	1.3
RUTILE	1.8
ZIRCON	3.8
SILLIMANITE	6.2
KYANITE	0.4
TOTAL HEAVY MINERALS	37.5

The analysis is based three samples taken at a depth of one meter from the area.



TABLE 8
RESERVES IN BLOK 3

Ore Block No.	AREA	VOLUME	GRADE	DRY BANK DENSITY	RESERVE	RECOVERY	MINABLE TONNAGE
	SQ METER	CUB METER	% H.M.	TONS PER CUB METER			
1-C	37,675	357,913	33.28	2.18	780,639	94	730,000
1-D	37,675	357,913	14.66	1.98	709,185	94	670,000
1-E	37,675	357,913	14.65	1.98	708,292	94	670,000
1-F	37,675	357,913	8.64	1.91	684,953	94	640,000
1-G	37,675	357,913	7.63	1.80	681,031	94	640,000
1-H	37,675	357,913	8.68	1.89	677,342	94	640,000
10-A	37,675	357,913	52.56	2.30	855,510	94	800,000
10-B	37,675	357,913	40.22	2.34	835,656	94	790,000
10-C	37,675	357,913	13.01	1.85	701,923	94	650,000
10-D	37,675	357,913	10.46	1.93	692,021	94	650,000
10-E	37,675	357,913	7.71	1.80	681,341	94	640,000
10-F	37,675	357,913	8.46	1.91	684,254	94	640,000
10-G	37,675	357,913	10.25	1.93	691,205	94	650,000
2-C	37,675	357,913	35.1	2.20	787,706	94	740,000
2-D	37,675	357,913	16.73	2.00	716,369	94	670,000
2-E	37,675	357,913	8.43	1.91	684,137	94	640,000
2-F	37,675	357,913	6.31	1.80	675,905	94	640,000
2-G	37,675	357,913	7.47	1.90	680,409	94	640,000
2-H	37,675	357,913	6.39	1.89	676,215	94	640,000
2-I	37,675	357,913	6.9	1.80	678,196	94	640,000
3-C	37,675	357,913	28.65	2.13	782,659	94	720,000
3-D	37,675	357,913	9.64	1.92	686,835	94	650,000
3-E	37,675	357,913	6.8	1.80	677,808	94	640,000
3-F	37,675	357,913	6.49	1.89	678,604	94	640,000
3-G	37,675	357,913	8.71	1.91	685,225	94	640,000
3-H	37,675	357,913	7.66	1.91	682,273	94	640,000
3-I	37,675	357,913	7.81	1.90	681,730	94	640,000
4-C	37,675	357,913	35.66	2.21	789,681	94	740,000
4-D	37,675	357,913	12.63	1.96	700,447	94	680,000
4-E	37,675	357,913	10.68	1.94	692,875	94	650,000
4-F	37,675	357,913	9.14	1.92	686,685	94	650,000
4-G	37,675	357,913	8.26	1.91	683,555	94	640,000
4-H	37,675	357,913	7.41	1.90	680,176	94	640,000
6-B	37,675	357,913	30.6	2.15	769,643	94	720,000
6-C	37,675	357,913	26.38	2.11	753,844	94	710,000
6-D	37,675	357,913	10.33	1.93	691,516	94	650,000
6-E	37,675	357,913	8.68	1.91	685,108	94	640,000
6-F	37,675	357,913	8.68	1.91	685,108	94	640,000
6-G	37,675	357,913	7.02	1.90	678,862	94	640,000
6-H	37,675	357,913	6.02	1.89	674,779	94	630,000
7-B	37,675	357,913	41.69	2.27	813,288	94	760,000
7-C	37,675	357,913	29.57	2.14	786,231	94	720,000
7-D	37,675	357,913	10.8	1.94	683,341	94	650,000
7-E	37,675	357,913	8.02	1.91	682,545	94	640,000
7-F	37,675	357,913	8.46	1.91	684,254	94	640,000
7-G	37,675	357,913	11.29	1.94	695,244	94	650,000
7H	37,675	357,913	12.35	1.95	699,360	94	660,000
8-B	37,675	357,913	59.48	2.47	882,382	94	830,000
8-C	37,675	357,913	26.04	2.10	752,523	94	710,000
8-D	37,675	357,913	13.51	1.97	703,865	94	680,000
8-E	37,675	357,913	7.02	1.90	678,862	94	640,000
8-F	37,675	357,913	12.6	1.95	700,331	94	650,000
8-G	37,675	357,913	13.14	1.96	702,428	94	650,000
8-H	37,675	357,913	11.32	1.94	685,360	94	650,000
9-A	37,675	357,913	50.63	2.37	848,791	94	800,000
9-B	37,675	357,913	53.13	2.40	857,723	94	810,000
9-C	37,675	357,913	10.85	1.94	693,535	94	650,000
9-D	37,675	357,913	10.46	1.93	691,982	94	650,000
9-E	37,675	357,913	7.42	1.90	680,215	94	640,000
9-F	37,675	357,913	13.99	1.87	705,729	94	660,000
9-G	37,675	357,913	11.83	1.95	697,729	94	660,000
				TOTAL	43,638,640		41,010,000



TABLE 21

MINABLE RESERVES IN BLOCK 3					
(1)	(2)	(3)	(4)	(5)	(6)
FIELD NO	AREA MNABLE %	RESERVE IN THE FIELD	HM %	MINABLE RESERVES IN THE FIELD	Minable HM content
		metric tons		metric tons	metric tons
1F	25	640,000	9	160,000	13,824
1E	49	670,000	15	328,300	48,096
1D	22	670,000	15	147,400	21,933
2G	17	640,000	7	108,800	8,127
2F	97	640,000	6	620,800	39,172
2E	98	640,000	8	627,200	52,873
3G	44	640,000	9	281,600	24,527
3F	100	640,000	6	640,000	41,536
3E	100	640,000	7	640,000	43,520
4F	44	650,000	9	286,000	26,140
4E	99	650,000	11	643,500	68,726
4D	86	660,000	13	567,600	71,688
5E	54	710,000	26	383,400	101,141
5D	96	720,000	31	691,200	210,816
	TOTAL	9,210,000		6,125,800	772,120

$$(5) = (3) \times (2)$$

$$(6) = (5) \times (4)$$



**TABLE 22
METEOROLOGICAL DATA**

Wind Speed:	13.2 km/hr (max). Calm (min)
Temperature:	35°C (max) 20°C (min)
RH	96 (max) 44 (min)
Cloud Cover	4 (max) Clear (min)
Rainfall (av.)	3099 mm (IMD data)
Noise Level	
Maximum:	55 dB (A)
Minimum:	52 dB (A)

MONTHLY MEAN MAXIMUM TEMPERATURE(°C)												
	STATION:					ALAPPUZHA						
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2004	32.6	34.2	34.0	33.7	30.1	29.7	29.3	28.9	30.8	30.8	32.3	32.9
2005	32.6	32.9	32.8	32.9	33.6	30.4	29.2	30.4	28.7	31.1	31.2	31.2
MONTHLY MEAN MINIMUM TEMPERATURE(°C)												
	STATION:					ALAPPUZHA						
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2004	20.7	21.7	23.6	23.5	22.1	22.0	21.5	21.3	22.0	21.6	21.6	20.9
2005	23.8	23.8	25.6	23.7	24.1	21.9	21.3	22.6	23.9	23.7	23.7	23.1



TABLE -23

DREDGE MINING IN BLOCK III									
YEARLY PRODUCTION PLAN									
PONTOON - I AND DREDGE 1									
Cell No.	Volume	Tonnage	Minable area %	Recovery %	Minable Tonnage	Year	Quantity mined from the cell	Total production For the year	Plate No.
	cum. Meter	MT			MT		MT	MT	
4F	357,913	686,895	12	70	82,427	1	82,427		
4E	357,913	682,875	65	80	450,369	1	117,573	200,000	14
4E						2	250,000	250,000	15
4E						3	82,796		16
4D	357,913	700,447	100	85	700,447	3	297,204	380,000	17
4D						4	320,447		18
3D	357,913	688,836	100	85	688,836	4	78,553	400,000	
3D						5	400,000	400,000	
PONTOON - 2 AND DREDGE 2									
Cell No.	Volume	Tonnage	Minable area %	Recovery %	Minable Tonnage	Year	Quantity mined from the cell	Total production For the year	Plate No.
	cum. Meter	MT			MT		MT	MT	
1E	357,913	708,292	90	85	643,849	1	200,000	200,000	14
1E						2	250,000	250,000	15
1E						3	193,849		16
1F	357,913	684,953	80	80	547,962	3	186,151	380,000	
1F						4	361,811		17
1G	357,913	681,031	20	70	136,206	4	38,189	400,000	18
1G						5	98,018		19
2G	357,913	680,409	90	85	612,368	5	301,982	400,000	19

Year 1 = 2012-13

Year 2 = 2013-14

Year 3 = 2014-15

Year 4 = 2015-16

Year 5 = 2016-17

ANNEXURE



Mining Plan for Kerala Minerals and Metals Ltd, Chavara

Page 95

ANNEXURE I

Geology of KMML Block 2.

(In this paper Block 3 is referred to as KMML Block 2)

(Summarized from: Report by G. Prabhakar Rao, Officer-in-charge, Sand Investigations Cell, Atomic Minerals Division, (Currently Beach sand and Offshore Investigations group, Atomic Minerals Directorate for Exploration and Research), DAE, Government of India, Trivandrum.) 1975.

Locality:

The Chavara beach sand deposit is located near the town of Quilon, which is north of Trivandrum on the western side of the southernmost tip of India (Fig .4.2.1). The heavy mineral deposit as a whole extends for about 23 Km (14 miles) between Kayamkulam in the north (N9°8'24", E76°27'36") and Neendakara in the south (N9°56'03"; E76° 32'34").

The deposit has been sub divided into 8 blocks, 4 of which have been assigned for development to The Kerala Minerals and Metals Ltd and 4 to Indian Rare Earth Corporation. This report deals only with K.M.M.L Block II (Panmana) and its easterly extension.

4.2.2 Regional Geology:

The heavy mineral beach sand deposit extends inland from the present coast across a low coastal plain which is covered by Recent sands overlying Pleistocene Varkala Formations consisting of laterites, sandstones, clays and lignite's (Rao, 1968 a; 1968 b). The high ground to the east is composed of Archean crystalline rocks.

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The heavy mineral province has been known since 1909 (Tipper, 1914) and extends southwards into Sri Lanka (Vantage, 1970) and up the east coast of the Peninsula (Mahadevan, 1958). The beach sands of the Travancore district have been described by Bhole et al (1958), Mahadevan et al (1958) and Rao (1968 a, 1968 b, 1972-1974 and 1974-1975).

(6) Chavara deposit:

The deposits have been worked for more than 50 years and beach sand mining operations are currently carried out at Chavara by The Kerala Minerals and Metals Limited and Indian Rare Earth Corporation.

The economically valuable minerals ilmenite, rutile, zircon, leucoxene, monazite, sillimanite and kyanite plus significant non-valuable garnet, staurolite, spinel and trace tourmaline, amphibole, pyroxene and andalusite were originally derived from the Archean crystalline basement to the east but have undergone recycling through the Varkala or other sediments from which they have been re-concentrated in Recent deposits.

The coastal plain on which Chavara is located extends inland for some miles. It is an exhumed (raised) marine plain and is marked by retreat dunes, which extend inland for some distance. The present coast is marked by a raised barrier dune behind which there is a canal which links a series of lagoons between the tidal channels at Neendakara on the Ashtamudi estuary and at the Kayamkulam lagoon.

Block 2, Chavara has been divided into two major parts: the beach Zone (consisting of the



beach-front and the mid-zone) and the easterly extension.

The economically valuable minerals occur dominantly in the beach Zone where they form the highest grade deposit as a strip 2.8 km long with a width between 122 and 183 m and an area of 44.70 hectares (Rao, 1972-74). Valuable minerals extend to the west for a mile or so under the waters of the Arabian Sea (Rao 1968 b) and an unknown distance to the east across the coastal plains. Part of this zone, particularly in the vicinity of the existing K.M.M.L. Plant, has been mined to a shallow depth for many years. The evidence indicates that the largest reserves and highest grades occur in this zone and that economic grades occur up to about 8 m (25 ft) above a clay bottom.

The beach is subject to intermittent marine erosion and to replenishment of heavy minerals from abundant off-shore, submarine deposits (Rao, 1968 b). The K.M.M.L. has required that a buffer zone (the beach front, 150 ft wide above high water level) be reserved in order to protect the mining operations from marine attack.

The lower grade eastern extension has a length of 2.8 km a width of 610 m (1500 ft) and an area of 184.2 ha but its eastern boundary marks only the limit of exploration, not necessarily the eastern limit of the deposit. It is thought probably that economically valuable minerals could occur intermittently for some miles to the east across the plain. The mineralized layer is of the order of 7 m (22 ft) deep but the grades are generally much lower than those of the beach zone.

Information on distribution, grade and depth of mineralization is entirely restricted to two exploration reports by Rao (1972-74; 1974-75) of the Sand Investigation Cell, Atomic



Minerals Division of Government of India's Department of Atomic Energy. Details of the exploration program were given in AMD Progress Report No. 1 but to summaries, 3 to 4 samples at 4 ft intervals, were taken from drill holes on a 200 ft by 100 ft grid in the beach zone and at 400 ft by 200 ft in the eastern extension. This exploration program is not sufficiently detailed to provide a detailed knowledge neither of the deposit nor to allow detailed mine planning but is quite adequate to allow the calculation of ore reserves and the planning of a mining and treatment program. The whole of the exploration program including measurement of bulk densities, mineralogical compositions and particle-size distributions has been carried out by Dr. Rao. AMD has checked the mineralogical data by analyzing duplicate samples in its own laboratories and is satisfied that, although some minor discrepancies exist, the data provided are satisfactory for ore reserve calculations and for the determination of economic feasibility.

The beach zone is very rich and grades near 90% total heavy minerals are found near the surface. The average grade of the 150 ft buffer (beach front) zone is 45.7% and that of the remainder of the zone (the mid zone) is 38.3% heavy mineral

The eastern extension is lower in grade with a rare sample at 65%, a few around 40% and the majority of the higher grade samples around 20%. There are extensive areas of material with grades between 5 and 15% total heavy mineral and the average is 10.8% heavy mineral.

Although the beach ridge forms a single recognizable body, the structure of the



mineralization through the eastern extension is not clear. This is due partly to a lack of information but also to there being no correspondence between topography and mineralization in that the higher grades are not located on or near dunes. There appears to be a low-grade north-south belt through the center. A higher-grade belt occurs near the eastern margin, through drill holes designated E in the north and H in the south. This higher-grade zone is shown on the eastern part of the cross section through drill line 63 and probably continues to the south into the adjacent I.R.E block. The grade contours on Fig. 4.3.3 suggest that there are mineralized zones extending in a south easterly direction from the beach ridge across the eastern extension; these leave the beach ridge at drill lines 65, 75 and 85. These zones are not simple retreat beach ridges but may be old dunes, the tops of which have been eroded, or may be surface redistributions due to wind and Man's activities.

The average composition for the whole of the block is approximately as follows:



MINERAL	WT % IN CONCENTRATE
ILMENITE	40.8
LEUCOXENE+ MONOZITE	3.1
RUTILE	4.8
ZIRCON	20.3
SILLIMANITE	29.1
KYANITE	1.9
TOTAL	100

Note: The mineralogical analysis is based on work done by Australian Mineral Development Laboratories (AMDEL) for KMML in 1977. AMDEL's computation is based on prospecting work done by Dr. Rao of AMD in 1972 and 1973-74. This was based on data for 245 beach bore holes and 236 bore holes in Eastern extension. This was grouped into 20 sets of five composite samples for Beach bore holes and 9 set of five composite samples for Eastern extension. From these data, the average composition for the white block was calculated as per the table above.

The economic heavy minerals fall mainly in the size range -60+120 Mesh with the dominant fraction being -60+80#. The proportion of heavy mineral decreases with depth but the size range is similar. Quartz however becomes more abundant and larger in grain size with depth and there is also some tendency for the proportion of slimes to increase with depth.

Slimes increase markedly inland. Near-surface samples of the beach ridge contain less than 1% slimes but similar samples across the eastern flats are commonly 2-3%. Near-surface samples in and around the paddy fields range between 5 and 10% with



some reaching 15%, however sampling was not possible in the middle of some wet paddy fields and no doubt the slime values are very high there.

The highest slime-values were obtained from the bottom of eastern extension samples where the proportion reaches 20-30%, presumably because the sands rest on a clay layer. High slime areas may contain heavy minerals coated with limonitic clays which, when they occur, typically require extra processing stages to achieve satisfactory separation of the various minerals.

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ANNEXURE II


ANNEXURE II

UNITED NATIONS FRAMEWORK CLASSIFICATION (UNFC) classification of reserves :-

The UNFC consists of a three dimensional system with the following three axes: Geological Assessment, Feasibility Assessment and Economic viability. The process of geological assessment is generally conducted in stages of increasing details. The typical successive stages of geological investigation i.e. reconnaissance, prospecting, general exploration and detailed exploration, generate resource data with a clearly defined degrees of geological assurance. These four stages are therefore used as geological assessment categories in the classification. Feasibility assessment studies form an essential part of the process of assessing a mining project. The typical successive stages of feasibility assessment i.e. geological study as initial stage followed by prefeasibility study and feasibility study/mining report are well defined. The degree of economic viability (economic or subeconomic) is assessed in the course of prefeasibility and feasibility studies. A prefeasibility study provides a preliminary assessment with a lower level of accuracy than that of a feasibility study, by which economic viability is assessed in detail.

It is a three digit code based system, the economic viability axis representing the first digit, the feasibility axis the second digit and the geological axis the third digit. The three categories of economic viability have codes 1,2 and 3 in decreasing order, similarly the three categories of feasibility study have also codes 1,2 and 3 while the four stages of geological assessment are represented by 4 codes i.e. 1 (detailed exploration), 2 (general exploration), 3 (prospecting) and 4 (reconnaissance). Thus the highest category of resources under UNFC system will have the code (111) and lowest category the code (334).

FIELD GUIDELINES FOR ADOPTION OF UNITED NATIONS FRAMEWORK CLASSIFICATION


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Placer and Residual Mineral Deposits of Hill and Valley Wash

Characteristics of Deposit

Eluvial, colluvial and alluvial **placer concentration of heavy metals and minerals**, pebble and cobble, boulder beds, gravel beds in alluvium and colluvium, conglomerates, foothills fan deposits, grain size from extremely fine striated material to rough to polished boulders.

Principal kinds of Minerals

Placer tin and gold deposits, monazite, garnet, ilmenite, rutile, diamonds in conglomerate, floats and gravel beds of corundum, kyanite, sillimanite, floats and talus deposits of magnetite.

Characteristics of each block is reviewed below:

Block -1

Geological axis :

Mapping of the area is 1:1000 scale is available with bench marks etc.

The deposit has been studied earlier. Favorable sediment Horizon is known and is seen to be available up to 8 M depth. Analysis of deposit and land use of the area is available.

Linking of maps with toposheet not possible because toposheets are "classified" as the area falls with 75 Kms from Maritime boundary. The entire area has been drilled and studied by Atomic Minerals Directorate for Exploration and Research.

Sampling and analysis: Sampling of sand for by trial mining of 52,500 tons. Plant scale trials on the mined material, testing and analysis of concentrates from these bulk samples.

In view of the above, Geological axis is "2".

Feasibility axis : General Geology of the area has been studied- in detail by Atomic Minerals Directorate for Exploration and Research.

Trial mining : 52,500 tons of sand was mined from the area in 2005-07. The sand that was mined was sampled and analysed.

The sand was processed in the mineral processing plant. It was found to be



suitable for processing.

Method of mining already finalized. Pontoon mining is practiced in Block 3 to the South of the plot. The dredge mining has been done in the immediately adjoining plot of IRE Ltd.

Detailed manpower requirement has been prepared. It requires only 6 persons. Sufficient manpower is now available. Environmental Impact Assessment and Environmental Management Plan including socio-economic impact is being prepared by NIIST, Trivandrum for submission to MOEF, Government of India.

Processing- proven by Industrial Scale trials conducted on material from trial mining of 52,500 tons. The sand was treated in existing plant where layout, material handling, product disposal, waste disposal efficient arrangements are available and details of the equipment are known.

Marketing: Titanium based minerals form the majority of the product. These are consumed in own plant for the production of Titanium dioxide (Rutile) pigment which is used in white paints. Other minerals like Zircon, finds a ready market in the country.

Economic viability : The company is a public sector unit and is the most profitable PSU in the State of Kerala. There is good demand for the TiO_2 product and the forecast is for good market for the paint industry and the TiO_2 market. Company is cash rich and there is a shortage of the pigment. The company has been receiving export enquiries also.

Other factors : The company has been complying with all the statutory provisions relating to the labour, land, mining, taxation etc. The company is a PSU and has employing competent professionals in the fields of labour welfare, mining, finance and Secretarial functions and they are discharging their functions satisfactory.

In view of the above, the feasibility axis is "1"

Economic Axis :

- 1) Exploration : The area has been explored in detail by Atomic Minerals



Directorate for Exploration and Research.

- 2) Mining Plan for the area is prepared. There has been trial mining in the area.
- 3) The material that was mined from the area has been analysed and later processed in the industrial plant to yield products suitable for end user industries. The trial mining has shown that the reserves are well above cut off grade.
- 4) The area has been surveyed. The land use in the plot is known in detail. There is not forest area in the plot or near it.

In view of the above, the Economic Axis is '1'.

To summarize the above, the characteristics of the deposit are as below :

Economic axis '1', Feasibility axis '1', Geologic Axis '2'.

Hence UNFC Classification is "112" for Block 1..

Block -3

Geological axis :

Mapping of the area is done in 1:1000 scale, maps are available with bench marks etc.

i) Preparation of geological base map including all geological features, extent of deposit, structure and Sampling by improvised version of drilling equipment completed by AMD Refining of sand mined from the area in industrial scale plant, study of grain size textures, associated gangues and concentrate recoveries from the mineral processing plant.

Linking of maps with toposheet not possible because toposheets are "classified" as the area falls with 75 Kms from Maritime boundary. The entire area has been drilled and studied by Atomic Minerals Directorate for Exploration and Research. Data on reserves is available.

Sampling and analysis: The area has been under mining for more than 70 years and under the present organisation for more than 40 years. The material from the area has been processed into suitable end product at the rate of more than 200,000 tons per year. Material that is mined is analysed in detail for the quality and content of valuable minerals. Records



of such analysis is maintained.

The minable reserves after considering the barriers are worked out in Table 21. The statutory barriers is only with the sea. There is no need of barrier with the Canal because the Inland Water ways Authority is already seeking the assistance of KMML to dredge the canal and to deepen the canal. It is estimated that clearances cannot be obtained for for barrier with the sea. Hence the reserves blocked in barrier with the sea is not estimated separately. KMML plans to obtain relaxation of the latest G.O. with the concurrence of Inland Water Authority.

In view of the above, Geological axis is "1".

Feasibility axis : General Geology of the area has been studied- in detail by Atomic Minerals Directorate for Exploration and Research.

The area has been under mining for more than 70 years and under the present organisation for more than 40 years. The material from the area has been processed into suitable end product at the rate of more than 200,000 tons per year. Material that is mined is analysed in detail for the quality and content of valuable minerals.

The raw sand is processed in the mineral processing plant.

Method of mining already finalized. Pontoon mining is practiced in the plot. The dredge mining has been done sucessfully in the immediately adjoining plot of IRE Ltd. For the last 15 years.

This is an operating mine and processing plant. Detailed manpower requirement has been prepared and implementd. Sufficient manpower is now available. Environmental Impact Assessment and Environmal Management Plan including socio-economic impact is being prepared by NIIST, Trivandrum for submission to MOEF, Government of India.

Processing- The sand is treated in existing plant where layout, material handling, product disposal, waste disposal efficient arrangements are available and details of the equipment are known.



Marketing: Titanium based minerals form the majority of the product. These are consumed in own plant for the production of Titanium dioxide (Rutile) pigment which is used in white paints. Other minerals like Zircon, finds a ready market in the country.

Economic viability : The company is a public sector unit and is the most profitable PSU in the State of Kerala. There is good demand for the TiO_2 product and the forecast is for good market for the paint industry and the TiO_2 market. Company is cash rich and there is a shortage of the pigment. The company has been receiving export enquiries also.

Other factors : The company has been complying with all the statutory provisions relating to the labour, land, mining, taxation etc. The company is a PSU and has employing competent professionals in the fields of labour welfare, mining, finance and Secretarial functions and they are discharging their functions satisfactory.

In view of the above, the feasibility axis is "1"

Economic Axis :

- 1) Exploration : The area has been explored in detail by Atomic Minerals Directorate for Exploration and Research.
- 2) Mining Plan for the area is prepared. The area has been under mining for last 70 years.
- 3) The material that was mined from the area has been analysed and processed in the industrial plant to yield products suitable for end user industries. This has shown that the reserves are well above cut off grade. The company is a very profitable unit.
- 4) The area has been surveyed. The land use in the plot is known in detail. There is no forest area in the plot or near it.

In view of the above, the Economic Axis is '1'.

To summarize the above, the characteristics of the deposit are as below :

Economic axis '1', Feasibility axis '1', Geologic Axis '1'.



Hence UNFC Classification is "111" for on shore deposit in Block 3.. UNFC Classification is "121" for on beach washing collection (probable reserves) of UNFC in Block 3

Block -5

Geological axis :

Mapping of the area is done on larger scale with bench marks etc.

The deposit has been studied earlier by AMD in 1976 through its Southern circle, Group B based in trivandrum. Geological survey conducted by AMD, with specially designed core drill, at a spacing of 61 meters X 31 meters, Sampling done at 5 feet intervals, samples were tested for bulk density, sieve analysis, mineral content of sieve fractions, by heavy mineral separation, microscopy, electro magnetic separation, Favorable sediment Horizon is known and is seen to be available up to 9.7 m depth. Analysis of deposit is available.

Linking of maps with toposheet not possible because toposheets are "classified" as the area falls within 75 Kms from Maritime boundary.

In view of the above, Geological axis is "1".

Feasibility axis : General Geology of the area has been studied- in detail by Atomic Minerals Directorate for Exploration and Research.

The deposit has been studied earlier by AMD in 1976 through its Southern circle, Group B based in trivandrum. Geological survey conducted by AMD, with specially designed core drill, at a spacing of 61 meters X 31 meters, Sampling done at 5 feet intervals, samples were tested for bulk density, sieve analysis, mineral content of sieve fractions, by heavy mineral separation, microscopy, electromagnetic separation, Favorable sediment Horizon is known and is seen to be available up to 9.7 m depth. Analysis of deposit is available.

(vi) Environmental : Meteorological and preliminary ecological data of the area, available.



Marketing: Titanium based minerals form the majority of the product. These are consumed in own plant for the production of Titanium dioxide (Rutile) pigment which is used in white paints. Other minerals like Zircon, finds a ready market in the country.

Economic viability : The company is a public sector unit and is the most profitable PSU in the State of Kerala. There is good demand for the TiO_2 product and the forecast is for good market for the paint industry and the TiO_2 market. Company is cash rich and there is a shortage of the pigment. The company has been receiving export enquiries also.

Other factors : The company has been complying with all the statutory provisions relating to the labour, land, mining, taxation etc. The company is a PSU and has employing competent professionals in the fields of labour welfare, mining, finance and Secretarial functions and they are discharging their functions satisfactory.

In view of the above, the feasibility axis is "1"

Economic Axis :

1. Detailed exploration of the area done by AMD.
2. Specific end-use grades of reserves are known by detailed analysis of the samples
3. General knowledge of forest/non-forest and other land use data available.

In view of the above, the Economic Axis is '1'.

To summarize the above, the characteristics of the deposit are as below :

Economic axis '1', Feasibility axis '1', Geologic Axis '1'.

Hence UNFC Classification is "111" for Block 5.

Block -7

Geological axis :

Mapping of the area is done on larger scale with bench marks etc.

The deposit has been studied earlier by AMD.



Linking of maps with toposheet not possible because toposheets are "classified" as the area falls within 75 Kms from Maritime boundary.

In view of the above, Geological axis is "1".

Feasibility axis : General Geology of the area has been studied- in detail by Atomic Minerals Directorate for Exploration and Research.

The deposit has been studied earlier by AMD.

(vi) Environmental : Meteorological and preliminary ecological data of the area, available.

Marketing: Titanium based minerals form the majority of the product. These are consumed in own plant for the production of Titanium dioxide (Rutile) pigment which is used in white paints. Other minerals like Zircon, finds a ready market in the country.

Economic viability : The company is a public sector unit and is the most profitable PSU in the State of Kerala. There is good demand for the TiO_2 product and the forecast is for good market for the paint industry and the TiO_2 market. Company is cash rich and there is a shortage of the pigment. The company has been receiving export enquiries also.

Other factors : The company has been complying with all the statutory provisions relating to the labour, land, mining, taxation etc. The company is a PSU and has employing competent professionals in the fields of labour welfare, mining, finance and Secretarial functions and they are discharging their functions satisfactorily.

In view of the above, the feasibility axis is "1"

Economic Axis :

1. Detailed exploration of the area done by AMD.
2. Specific end-use grades of reserves are known by detailed analysis of the samples
3. General knowledge of forest/non-forest and other land use data available.

In view of the above, the Economic Axis is " 1".



To summarize the above, the characteristics of the deposit are as below :

Economic axis '1', Feasibility axis '1', Geologic Axis '1'.

Hence UNFC Classification is "111 for Block 7..



Kerala Minerals and Metals Ltd

BLOCK 1 & BLOCK 3 (ONSHORE), BLOCK 5 & BLOCK 7

**CLASSIFICATION OF RESERVES OF LAND IN KERALA MINERALS AND METALS LTD.,
LEASEHOLD AS PER UNITED NATIONS FRAMEWORK CLASSIFICATION (UNFC) OF
MINERAL RESOURCES**

NATURE OF DEPOSIT *Placer Deposits of Regular Habit with man made modification*

Characteristics of deposit

Of regular habit with predictable change in trend with moderate physical contrast with overburden, flat to moderately dipping deposit with a minimum of geological disturbances. Man made modifications are visible.

AXIS	CLASSIFICATIO N	EXPLANATIO N	REMARKS
ECONOMIC AXIS	E1	Economic	Actually working mines in similar deposits near bye plots(for more than 10 years). Specific knowledge of end-use grades of reserves (above economic cut-off grade). And Specific knowledge that the area is non-forest and other land use data. A pre feasibility report of the plot is available which discusses the end use and markets of the mineral.
FEASIBILIT Y AXIS	F1	(Pre-Feasibility Study)	Actual physical possession of mining near bye land. Availability of information by actual mining of the adjacent areas for last many years. Availability of Mining plan, knowledge of actual mine recoveries and efficiencies, manpower requirement. Infrastructure and services, proven Marketing arrangements Availability of Economic viability information Statutory provisions relating to labour, land, mining, taxation being complied with in actual mining operation for more than 10 years in nearby areas. A pre feasibility report is available which discussing the feasibility of mining in the plot.
GEOLOGIC AL AXIS	G1	Detailed Exploration)	Availability of sufficient data by inspection of the area and visible outcrops. The sufficiency of geological information is discussed in a pre feasibility report.

Hence UNFC code for the reserves in this plot is 111



Kerala Minerals and Metals Ltd

BLOCK 3 (BEACH WASHING COLLECTION)

**CLASSIFICATION OF RESERVES OF LAND IN KERALA MINERALS AND METALS LTD.,
LEASEHOLD AS PER UNITED NATIONS FRAMEWORK CLASSIFICATION (UNFC) OF
MINERAL RESOURCES**

NATURE OF DEPOSIT Placer Deposits of Regular Habit with man made modification

Characteristics of deposit

Of regular habit with predictable change in trend with moderate physical contrast with overburden, flat to moderately dipping deposit with a minimum of geological disturbances. Man made modifications are visible.

<u>AXIS</u>	<u>CLASSIFICATION</u>	<u>EXPLANATION</u>	<u>REMARKS</u>
	<u>N</u>	<u>N</u>	
ECONOMIC AXIS	E1	Economic	Actually working mines in similar deposits near bye plots(for more than 10 years). Specific knowledge of end-use grades of reserves (above economic cut-off grade). And Specific knowledge that the area is non-forest and other land use data. A pre feasibility report of the plot is available which discusses the end use and markets of the mineral.
FEASIBILITY Y AXIS	F2	(Pre-Feasibility Study)	Actual physical possession of mining near bye land. Availability of information by actual mining of the adjacent areas for last many years. Availability of Mining plan, knowledge of actual mine recoveries and efficiencies, manpower requirement. Infrastructure and services, proven Marketing arrangements Availability of Economic viability information Statutory provisions relating to labour, land, mining, taxation being complied with in actual mining operation for more than 10 years in nearby areas. A pre feasibility report is available which discussing the feasibility of mining in the plot.
GEOLOGICAL AL AXIS	G1	Detailed Exploration)	Availability of sufficient data by inspection of the area and visible outcrops. The sufficiency of geological information is discussed in a pre feasibility report.

Hence UNFC code for the reserves in this plot is 121 (Probable Reserves)



GOVERNMENT OF KERALA

Abstract

Industries Department - Mines & Minerals - Mining Lease for mineral sands -
Renewal of Mining Lease to M/s. Kerala Minerals & Metals Limited, Chavara -
Granted - Orders Issued.

INDUSTRIES (A) DEPARTMENT

G.O.(Ms) No.175/2010/D

Dated, Thiruvananthapuram, 12.08.2010.

Road:- 1) G.O.(Ms) No.355/72/D dt.11.12.1972.

- 2) Letter No.4958/M1/2004 dt. 8.05.2008, 16.1.09, 30.7.09, 2.3.10 & 22.7.10 from the Director of Mining & Geology, Thiruvananthapuram.
- 3) Letter No.4/30/2009-MIV dated 11.5.2010 from the Ministry of Mines, Government of India.

ORDER

Government as per Order read as 1st paper above had sanctioned a Mining Lease to M/s. Kerala Minerals & Metals Limited, Chavara for a period of 20 years and the validity of the lease period expired on 8.7.2005. M/s. Kerala Minerals & Metals Limited have filed an application for renewal of Mining Lease in form-J over an area of 198,2020 hectares after leaving the area of 5.60 hectares where the mineral separation plant is located. The area applied in the application for renewal is comprised in Survey No.25 to 112 A in Neendakara Village, 1 to 121 of Chavara, 695 of Vadakumthala Village, 31 to 632 of Panmana Village, Block No.V, Sy. No.91 to 220 of Karunagappally Village, Block No.VII Sy.No.1 to 199 of Kulasekharapuram Village and 1 to 151 of Perinad Village, Karunagappally Taluk, Kollam District. M/s. Kerala Minerals & Metals Limited have later submitted a revised application in form-J effecting necessary changes for re-including 5.60 hectares of land comprised in Sy. Nos.1 to 14 of Chavara Village, which was already relinquished and deleted from the earlier application and has requested to renew the Mining Lease over an area of 203,802 hectares as detailed below:-

Sl.No.	District	Taluk	Village	Block	Survey Nos.	Area in Hectares.
1	Kollam	Karunagappally	Neendakara	I	25 to 112 A	34.285
2	Kollam	Karunagappally	Chavara Panmana Vadakumthala	II III	1 to 1212 31 to 632	88.119
3	Kollam	Karunagappally	Karunagappally	V	91 to 220 (less 218)	28.896
4	Kollam	Karunagappally	Puthuppally Kulasekharapuram	VII	1 to 199, 1 to 151	52.499
					Total	203,802

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RQP/BNG/028/88/A

The Government of India as per letter read as per paper above have conveyed prior approval under section 8(4) of the Mines & Minerals (Development & Regulation) Act, 1957 for the grant of Mining Lease for Ilmenite, Rutile, Leucosiderite, Zircon and Silimanite over an area of 203.802 hectares in village, Neendakara, Chavara, Vadakkumthala, Panmana, Kalamagappally, Kulasekharapuram in Kollam District in favour of M/s. Kerala Minerals & Metals Limited, Chavara.

Government are therefore pleased to sanction a Mining Lease for mineral sand, Ilmenite, Rutile, Leucosiderite, Zircon and Silimanite to M/s. Kerala Minerals & Metals Limited, Chavara over an area of 203.802 hectares comprised in the survey numbers noted in the above table for a period of 20 years under the Mineral Concession Rules, 1960, as recommended by the Director of Mining & Geology subject to the following conditions:-

- a. Royalty is payable as per sub-section (2) section 9 of Mines & Minerals (Development & Regulation) Act, 1957.
- b. Dead Rent is payable as per sub-section (1) of section 9-A of Mines & Minerals (Development & Regulation) Act, 1957.
- c. A Mining Lease deed in form 'K' shall be executed within 6 months of the order of the grant of Mining Lease.
- d. Mining plan and progressive mine closure plan duly approved by the AMD Government of India should be produced within a period of 6 months of the grant before execution of lease deed whichever is earlier.
- e. The mined out area should be reclaimed up to the level of the surrounding land.
- f. Water mining and groundwater pollution shall be kept to at the permissible statutory limit.
- g. Mining should be carried out without causing disturbance to the local residents.
- h. Financial Assistance should be given as per the provisions contained in the Financial Conservation & Development Rules, 1988 before execution of Mining Lease deed.
- i. A Mining Lease holder/lease holder should exhibit a notice board both in English and Malayalam for the information of the public at the entrance of the lease area containing the details viz, license No, validity period of the Mining Lease, name of the lease holder, quantity permitted to be extracted etc.
- j. Consent from the Inland Water Way Authority of India has to be obtained before entering into the Mining Lease area.
- k. The Director of Mining & Geology will ensure the compliance of the amended provisions of the Acts & Rules and other applicable Acts and Rules including of Forest (Conservation) Act, 1980.



- i. The lessee shall take steps for prevention of the present configuration of the land sea interface in the Mining Lease hold.
- ii. The mining activities in the area covered under this grant shall not extend below sea level.
- iii. The mining activities in the area covered under this grant shall be conducted without any obstruction to navigations or fishing activities.
- iv. The place of worship, burial ground, public works, canals or other public works should be excluded and also keep 50 meters clearance from the mining area as in the Rule 27 (f) of Mineral Conservation Rules, 1950.
- v. The applicant should procure consent from the land owners for starting mining operations in the area or part after execution of lease deed but before the entry into the area as per Rule 27 (b) of Mineral Conservation Rules, 1950.
- vi. Mining Lease for Beach sand minerals shall not be granted until a license is obtained from the Atomic Energy Regulatory Board, Mumbai under Rule 3 of Atomic Energy (Radiation Protection) Rules, 2004.
- vii. If any radioactive substances are recovered in the process of exploitation of beach sand minerals, the same shall be disposed of by entity concerned, at its cost, in accordance with the instructions/directions of the Atomic Energy Regulatory Board or of any person/body authorized by the Competent Authority in accordance with the provisions of the Atomic Energy Act, 1962 and the relevant rules and orders there under.
- viii. The company should have no objection to Atomic Minerals Directorate for its Exploration and Research (AMD) exploration activities and inspection by officials of AMD/ Government of India.
- ix. The applicant should obtain all necessary clearances from Revenue Department, Ministry of Environment & Forest and Coastal Regulation Zone (CRZ) authority and other relevant authorities as per other applicable provisions of the Act and Rules including Forest (Conservation) Act, 1980 and Governmental notification dated 27.1.94 as issued and amended by Ministry of Environment & Forest.
- x. The Mine Plan indicating the disposal of radioactive wastes shall be submitted and got approved from Director, Atomic Minerals Directorate for Exploration and Research, Hyderabad or Regional Office of the Indian Bureau of Mines, Nagpur.
- xi. Copy of the mine plan shall also be submitted to the Regional office to the Indian Bureau of Mines for mine plan approval for minerals other than atomic minerals.



w. The applicant company at the time of export of garnet of any prescribed substances shall contact Atomic Minerals Directorate for sampling their export consignments, and obtain the relevant Monazite Test Certificate (MTC).

The above terms and conditions shall be subject to such further modifications and alterations as may be made by Government from time to time. The Director, Survey & Land Records will survey and prepare a cadastral map of the area on suitable scale showing the area, Survey Numbers etc and furnish 3 copies in original under signature and seal to the Director of Mining & Geology.

(By Order of the Governor)

T. Dalakrishnan
Addl. Chief Secretary to Govt.

- ✓ The Managing Director, Kerala Minerals & Metals Limited, Chavara
- ✓ The Director of Mining and Geology, Thiruvananthapuram.
- ✓ The Controller, Indian Bureau of Mines, Nagpur (with C/L)
- ✓ The Secretary, Ministry of Mines, Government of India, New Delhi.
- ✓ The Director, Survey & Land Records, Thiruvananthapuram.
- ✓ The Accountant General (Audit), Kerala, Thiruvananthapuram.
- ✓ The District Collector, Kollam/Alappuzha
- ✓ Stock file/Office copy.

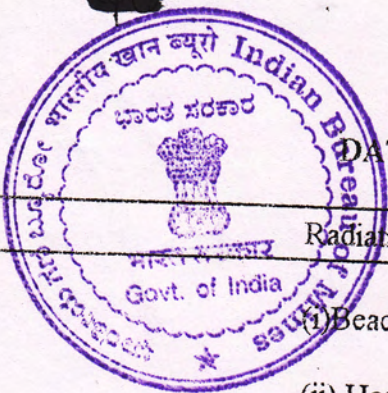
Forwarded/By Order,

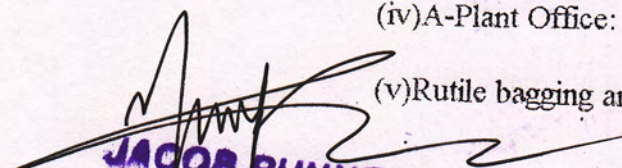
D. Dalakrishnan
Section Officer

RADIATION SURVEY

DATE: 26.06.2006

Location	Radiation Field, $\mu\text{Gy hr}^{-1}$
1. Mining Area:	(i) Beach: 1.5-2.0
	(ii) Heaps: 2.0
2. Beach north of Stock Yard:	(i) Beach: 10.0- 13.0
3. Mineral Sand Stock Yard:	(i) Northern Side: 1.8-2.0
	(ii) Southern Side: 2.0
4. Wet Concentration Plant:	(i) Ground: 2.0-3.0
	(ii) Spirals: 1.7-2.0
	(iii) Control Room: 1.5
	(iv) Concentrate stock: 6.0-8.0
	(v) Wet mill tailings dump: 0.6
5. Dry Mill:	(i) Dryer: 2.0
	(ii) Dry Mill Ground: 3.0
	(iii) H T Separators: 3.0
	(iv) Magnetic Separators: 1.5
6. A-Plant:	(i) Magnetic Separators: 1.7
	(ii) Furnace: 5.4
	(iii) H T Separators: 2.6
	(iv) A-Plant Office: 0.9
	(v) Rutile bagging area: 1.5




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 RQR/BNG/028/88/A

Contd...2



7.B-Plant:

- (i) Rutile bags (contact): 1.7
- (j) Vibrating Screen: 6.3
- (ii) Air Tables: 2.0
- (iii) Zircon bagging Area: 2.0-3.0
- (iv) Zircon bags: 3.0

8. Other Areas

- (i) Administrative office: 0.5
- (ii) Laboratory: 0.7
- (iii) Workers rest shelter-1: 1.3
- (iv) Workers rest shelter-11: 1.2
- (v) Canteen: 1.0
- (vi) Dispensary: 0.8
- (vii) Mechanical Workshop: 1.3
- (ix) Store : 1.7

9. Tailings Dumping Area:

- (i) Southern side(east) 0.6
- (ii) Southern side(west) 0.7
- (iii) West of canteen: 9.0
- (iv) West of Dry Mill: 2.0

Contd...3



10. Monazite godown:

(i) Inside

(ii) On Contact

12-18

Air Activity Results:

Location	Total Dust Concentration, mg/m ³	mWL
Zircon Plant (Bagging Area)	0.933	1.11

OBSERVATIONS:

Tailings from Zircon plant used to be Pumped back to Sea. Therefore increased background radiation field of 10-13 $\mu\text{Gy hr}^{-1}$ is observed in beaches immediately north of the plant. Tailings from the Zircon Plant containing about 15-30% monazite is being dumped in areas mined out by TOYO pumps and covered by wet mill tailings. Radiation Field in these areas, is not very high probably due to mixing with wet mill tailings, which is free of monazite. Radiation field in the actual mining areas at Ponmana is 2 $\mu\text{Gy hr}^{-1}$ to 3 $\mu\text{Gy hr}^{-1}$.

General background Radiation in the adjacent Areas not influenced by mining activity is 0.5 $\mu\text{Gy hr}^{-1}$. Radiation field of 2 to 3 $\mu\text{Gy hr}^{-1}$ near Mineral Sand heaps is observed.

Increased Radiation field of 3 $\mu\text{Gy hr}^{-1}$ to 6 $\mu\text{Gy hr}^{-1}$ is observed in the plant areas due to spillage of concentrates near machineries.

Higher radiation field of 6 $\mu\text{Gy hr}^{-1}$ is observed in B-Plant (Zircon plant) mainly due to spillages

Radiation field outside the Monazite godown is 2 $\mu\text{Gy hr}^{-1}$ and inside is 5 to 8 $\mu\text{Gy hr}^{-1}$. On contact with the Monazite bags the field is 12 to 15 $\mu\text{Gy hr}^{-1}$. Radiation caution board is essential.

RECOMMENDATIONS:

1. House keeping is to be improved in the plant to avoid accumulation spilled concentrates so that Radiation levels can be reduced.

Contd. 4



2. A Zircon Plant Tailings Disposal Plan is to be made and plan approved by AERB, since about 4000-5000 MT of tailings containing about 15-30% monazite is being generated. The radiation field observed in the adjacent beach at Chinnamanal is 10 to $15 \mu\text{Ry hr}^{-1}$ is due to pumping of Zircon plant tailings to sea
3. Personnel monitoring by TLD badges of a few workers may be done in Zircon Plant on a trial basis for a period of six months to study whether continuous monitoring is required
4. Air monitoring in Zircon Plant is to be carried out on trial basis to assess air borne radioactivity levels and resultant inhalation exposures.

S. SRIKUMAR
Dy. manager(mines)

ANNEXURE V

123
170 of 211



KERALA STATE POLLUTION CONTROL BOARD

CONSENT TO OPERATE / AUTHORISATION

UNDER

Water (Prevention & Control of Pollution) Act, 1974

Air (Prevention & Control of Pollution) Act, 1981

&

The Environment (Protection) Act, 1986

TO


Consent No. KP/BNG/RLM/028/88/A

✓ KERALA MINERALS AND METALS LTD.
SANKARAMANGALAM, CHAVARA
KOLLAM - 691 583

Date of issue: 20.09.2010

Valid upto: 30.6.2012

- Copy to: 1. The Chief Environmental Engineer, Regional Office,
Thiruvananthapuram
2. The Assistant Environmental Engineer, District Office, Kollam
3. The Secretary, Panmana Grama Panchayat, Kollam
4. Stock File


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KP/BNG/028/88/A

1. GENERAL



- 1 Validity
- 2 Name and address of establishment
Kerala Minerals and Metals Ltd.
Surthammangalam, Chavara
Govt. of Kerala - 691 583
Tel: 0476-2686722
Fax: 0476-2680101
- 3 Communication
e-mail : Kmmml@india3.vsnl.net.in
Website : www.kmmml.com
Chairman & Managing Director
Kerala Minerals and Metals Limited, Chavara
Kollam - 691 583
- 4 Occupier details
- 5 Survey Number 202
- 6 Village Panmana
- 7 Taluk Karunagappally
- 8 District Kollam
- 9 Local body Panmana Grama Panchayat, Ward no. 7
- 10 Category Red
- 11 Scale Large
- 12 Fee remitted Rs. 2.9 lakh (previous term fee) + Rs. 6 lakh (present term fee)
- 13 Annual Fee Rs. 2,000.00/-
- 14 Capital Investment Rs. 158.5 Crore
- 15 Water consumption & Source of water 11,728 m³/day, tube wells
TiO₂ Pigment - 3900 tonne/month
TiCl₄ - 9438 tonne/month
Synthetic Rutile
(Intermediate product) - 5500 tonne/y
- 16 Products / Activities
D. G. Set of capacity 500 KVA (2 No.)



2. GENERAL CONDITIONS

- 2.1 This integrated consent/authorisation is granted subject to the power of the Board to review and make variation in all or any of the conditions.
- 2.2 The consentee shall comply with the instructions that the Board may issue from time to time regarding prevention and control of air, water, land and sound pollution.
- 2.3 For renewal of the integrated consent / authorisation, application in the prescribed form shall be submitted to the Board in the third month before the date of expiry of the consent/ authorisation.
- 2.4 No change or alteration of the industrial plant (other than that specified herein) is to be made without the prior permission of the Board. Any change in the particulars furnished and/or in the identity of the occupier/authorised agent is to be intimated to the Board forthwith.
- 2.5 Suitable species of trees and certain plants shall be planted and maintained within and along the periphery of the premises, forming a green belt to improve the environment.
- 2.6 Periodical monitoring reports and returns to be submitted to the Head Office, District Office are as follows:

Sl No.	Reports to be submitted to the Board	Periodicity
1	Treated Effluent Quality and Quantity	Before the 10 th of every month
2	Emission Quality and Quantity	Before the 10 th of every month
3	Water Consumption Returns in Form 1	Before the 5 th of every month
4	Annual return on handling of Hazardous Waste in Form 4 and on auction and sale of hazardous waste in Form 13	Not later than the 31 st of January every year
5	Environmental Statement in Form V	Not later than the 30 th of September every year
6	Half yearly return on handling of lead acid battery in Form 8	By June and December every year

3. CONDITIONS AS PER

Water (Prevention & Control of Pollution) Act 1974

- 3.1 Quality of treated effluent shall be within the following tolerance limits:

Sl No.	Characteristics	Unit	Tolerance limit
1	pH	-	5.5 to 9.0
2	Suspended Solids	mg/l(max)	100
3	Oil & Grease	mg/l(max)	20
4	Total residual chlorine (as Cl)	mg/l(max)	1.0
5	Total Chromium (as Cr)	mg/l(max)	2.0
6	Zinc (as Zn)	mg/l(max)	15.0

7	Titanium (as Ti)	mg/l(max)	5.0
8	Lead (as Pb)	mg/l(max)	2.0
9	Vanadium (as V)	mg/l(max)	0.2
10	Manganese (as Mn)	mg/l(max)	2.0
11	Iron (as Fe)	mg/l(max)	3.0
12	Total Heavy Metals	mg/l(max)	7.0

- 3.2 Samples of trade effluent shall be collected from outlet and analysed at least once in a month in any laboratory approved by Board.
- 3.3 Online pH measurement facility shall be provided at the outlet and records in the above shall be made available for verification/inspection by the Board officers.
- 3.4 Maximum quantity of treated effluent discharged into the sea shall not exceed 7344 m³/day.
- 3.5 Existing trade Effluent Treatment Plant shall be functional at all times during operation of the facility and shall be maintained properly to achieve the standards stated in 3.1 above.
- 3.6 There shall be easy access to each and every effluent treatment unit and the final outlet for inspection and drawing of effluent samples.
- 3.7 Treated/untreated trade effluent shall be reused in process to the maximum extent.
- 3.8 Balance of treated effluent shall be discharged into Lakshadweep sea.
- 3.9 Water meter shall be fixed to record consumption of water. Separate meters shall be fixed if cess at different rates is payable for use of water for such purposes as cooling/boiler feed, domestic, process where the effluent is easily biodegradable process where the effluent is not easily biodegradable and/or toxic.
- 3.10 Rainwater harvesting and utilisation facility provided shall be maintained properly.
- 3.11 Sewage effluent shall be treated in septic tanks and treated effluent shall be dispensed through soak pits with sealed bottom, honeycomb or perforated ring wall and 75 cm thick 2 mm sand envelope around that.
- 3.12 Canteen effluent shall be treated and discharged into soak pit.
- 3.13 Biodegradable garbage shall be treated in anaerobic digester (biogas plant) and the biogas shall be utilized in the canteen. The slurry from biogas plant shall be treated in septic tank.

4. **CONDITIONS AS PER
Air (Prevention & Control of Pollution) Act 1981**

- 4.1. Emission shall be made only through the following chimneys and parameters thereof shall not exceed the standards indicated in column 7 below:

Sl. No.	Chimney Number	Source	Chimney above ground level	Rate [Nm ³ /Min]	Parameter	Limiting Standards [µg/Nm ³]
1.	ST 1A	Roaster	36.5	7590	Particulate matter SO ₂ CO	150 1200 50
2.	ST 2A	Calciner	33.5	12000	Particulate matter SO ₂ HCl	150 600 35
3.	ST 3A	Digester	19.1	6649	HCl	35
4.	ST 4A	Acid regeneration plant(Spray roaster)	70	46431	SO ₂ HCl	600 35
5.	ST 5A	Acid regeneration plant(Spray roaster)	70	46431	SO ₂ HCl	600 35
6.	ST 6A	Vent Gas Scrubber(Chlorinator)	45.7	29528	Particulate matter CO HCl Cl ₂	150 175 35 15
7.	ST 7A	Fume Scrubber	11	6122	Particulate matter HCl	175 35
8.	ST 8A	Tickle Preheater	30.5	277	-	-
9.	ST 9A	Tickle Preheater	30.5	277	-	-
10.	ST 10A	Oxygen Preheater	30.5	203	-	-
11.	ST 11A	Oxygen Preheater	30.5	203	-	-
12.	ST 12A	Lime Scrubber	36.6	49388	HCl Cl ₂	35 15



13	ST 13A	Tunnel Drier	19.1	13597	Particulate matter	150
14	ST 14A	Treatment tank	21	12	Particulate matter HCl	150 35
15	ST 15A	Main Boiler			-	-
16	ST 16A	Package Boiler	20	16745	-	-
17	ST 17A	Lime preparation tank	24.4	6580	Particulate matter	150
18	ST 18A	Spin flash drier U-400	22.5	24471	-	-
19	MS 1A	Fluid bed drier	20	13000	Particulate matter SO ₂	150 1200
20	1 AA	Roaster	36.5	-	Particulate matter SO ₂ CO	150 1200 50
21	2 AA	Calciner	33.5	-	Particulate matter SO ₂ HCl	150 600 35
22	3 AA	Digester	30	-	HCl	35
23		D.G set (2 nos.) of 500 KVA	Exhaust chimney height 4.5 m above roof level	-	"	-

- 4.2 Heights of stack nos. 3A, 7A, 14A & 17A shall be increased to 30 m within six months.
- 4.3 Continuous emission monitors with alarm system shall be provided in the stacks for the parameters specified.
- 4.4 The Company shall provide suction hood and scrubbing system for chlorine tonner unloading area for containing chlorine leak, if any, from the storage tank.
- 4.5 Emission standards are to be achieved by appropriate control measures and not by dilution.
- 4.6 The sound level (Leq) measured 1 m outside the boundary of the premises shall not exceed the standard applicable to the adjoining area.
- 4.7 The occupier shall install or modify equipments, as necessary, to make the emission/ sound quality conform to the standards specified in condition no. 4.1 and 4.6.

4.8 Record of type, quantity and purpose of consumption of fuel shall be maintained and abstract shall be submitted to the Board along with emission monitoring report.

4.9 The suspended particulate matter at the boundary of the premises shall not exceed 100 microgram per cubic meter.

4.10 All operations likely to produce dust or noise shall be carried out within sufficiently closed and insulated premises.

4.11 The occupier shall at own cost get the ambient sound level monitored at least once in a month. Records of sound level monitoring shall be maintained and shall be made available to the inspecting officers of the Board whenever called for.

5. Conditions As Per Hazardous Wastes (Management, Handling and Transboundary Movement) Rules

5.1 Activities for which Authorisation is granted:

Collection	√	Transportation	
Reception	√	Storage	√
Treatment	√	Disposal	√

5.2 Type, quantity and mode of storage/treatment/disposal of hazardous wastes shall be as follows:

Sl. No.	TYPE OF WASTE	CATEGORY	QUANTITY	MODE OF	
				STORAGE	TREATMENT/ DISPOSAL
1	Process sludge (Iron oxide sludge)	21.1	50 t/day	Stored in secured lined ponds	Dewatered and disposed to CSTDF at Kooli
2	Used spent oil	5.1	10000 litre/year	Stored in leak proof barrels in roofed building with concrete flooring	Through authorised agent having CPCB registration and SPCB approval

(i) The location of the hazardous waste storage site shall be made known by display board at the site. The premises of the disposal site shall be kept clean.

5.3 (i) Labelling and Transportation

(a) All hazardous waste containers shall be provided with a general label as given in Form 12.

- (b) Hazardous waste manifest in Form 13 shall be prepared in set of six (all six copies to be signed by the transporter) and retained, transported as indicated below.

Copy number with colour code	
Copy 1 (white)	To be forwarded by the transporter to the State Pollution Control Board
Copy 2 (yellow)	To be retained by the occupier after taking signature on it from the transporter and the remaining four copies to be carried by the transporter
Copy 3 (pink)	To be retained by the operator of the facility after signature
Copy 4 (orange)	To be returned to the transporter by the operator of facility after accepting waste
Copy 5 (green)	To be returned by the operator of the facility to State Pollution Control Board after treatment and disposal of wastes
Copy 6 (blue)	To be returned by the operator of the facility to the occupier after treatment and disposal of wastes

- (c) The occupier shall provide the transporter with relevant information in Form 11, regarding the hazardous nature of the wastes and measures to be taken in case of an emergency.
- (d) Details of disposal of hazardous wastes by sale/transfer (date, quantity, name and address of the buyer) shall be recorded in a log book and produced as and when called for.
- (e) Records of hazardous wastes at the facility shall be maintained in Form 3.

- 5.4 The guidelines and criteria for handling hazardous wastes laid down by the Central Pollution Control Board from time to time shall be followed.
- 5.5 All the facility personnel must be well informed about the hazardous waste management procedure relevant to the positions in which they are employed. All the facility personnel must be trained to ensure that they are able to respond effectively to emergencies by familiarizing them with the emergency procedures, emergency equipment operations and communication or alarm systems.
- 5.6 Facilities must be established, tested periodically and maintained to minimize the possibility of a fire, explosion or any unplanned sudden or non-sudden release of hazardous waste to air, soil or surface water which could threaten human health or environment.
- 5.7 The authorisee must develop, implement and maintain and keep up to date, a contingency plan designed to minimize hazard to human health or the environment.

from fires, explosions or any unexpected release of hazardous waste to air, soil or water.

F. OTHER CONDITIONS:

- 6.1 Used lead acid batteries, if any, shall be disposed as per the Batteries (Management and Handling) Rules 2002.
- 6.2 The consentee shall put up a signboard of size 60 x 4 ft. near the main entrance of the plant displaying consent conditions 1, 3.2 & 4.1.
- 6.3 If operations are done with backup power, the generator shall have adequate capacity to run all associated pollution control devices.
- 6.4 In case of process disturbance / failure of pollution control equipments, the respective units shall be shut down and shall not be restarted until the control measures are rectified to achieve the desired efficiency.
- 6.5 In case of discharge / apprehended discharge of any water / air pollutant or hazardous waste due to any accident or other unforeseen act or event, it shall be immediately intimated to the Board and the consentee / authorisee shall make all possible efforts to mitigate / prevent / remediate the discharge.
- 6.6 The ETP sludge shall be disposed safely. The mode of disposal shall be informed to the Board's District Office & Head Office.
- 6.7 The storage and handling area of furnace oil shall be protected safely from storm water.
- 6.8 The approved outlet location drawing shall be issued separately.

Date: 20.09.2010



CHAIRMAN

JEYAPRASAD L. J.
CHAIRMAN

ANNEXURE VI



Minutes of the meeting held on 21.09.2009 at Govt. Guest House, Asramam regarding issues connected with land acquisition at Ponnana

i. N.K.Premachandran, Minister for Water Resources while welcoming the gathering discussed the issues faced by the residents of Ponnana and problems of the Company. The need for a compassionate approach towards the residents was stressed. All the participants were requested to co-operate with the initiative taken by the Govt. to solve the outstanding issues.

ii. Ramaram Kareer, Hon'ble Minister for Industries addressed the gathering and explained the details of the package that was evolved in 2003. The various categories and their land values were explained. Minister also explained the present financial position of the Company. The working result of the Company during last year was not satisfactory and could attain only Rs. 2 crores profit from operations. The profit margin is on decreasing trend and if the import duty is further reduced, the margin will further come down. The inability of the Company to pay very high value for land was also highlighted. An offer of 2% increase on existing land value for Ponnana was offered as delayed compensation to settle once for all the issues of Ponnana.

Hon'ble Minister for Water Resources explained in detail the effect of the above increase and also stated that the minimum value for 5 cents and less having dwelling house could be realized from the existing minimum of one per cent allowing a proportionate increase.

Bri.Anilkumar, Grama Panchayat Member explained the deficiency in the Ponnana Package. The value of land the company was paying for land at Ponnana (Edupallycottai) was much higher and the persons displaced from Ponnana have to buy alternate land at that area. He also stressed on to do away with the various categories at Ponnana, as many areas would be categorized only as reclaimed land. He suggested a better take. The issue related to job for displaced persons to be favorably considered.

Hon'ble Minister for Industries stated that the issue of engagement with contractor could be considered in accordance with the need and preference would be given to persons belonging to displaced families. It was also stressed that land price could be fixed only if it is financially viable for the Company and this would reflect on the cost of production.

RAMARAM KAREER
Minister: Industries

Jacob Punnen
JACOB PUNNEN
ROP/BNG/028/09



...in 2003 cannot be reopened... brought of after deep mining... As regards to... 5 cents and below... As regard to employment...

Hon'ble Minister for Industries stated that all matters settled on... by earlier ministry will be full... As regards the lifting... (i) Notification it would be looked into...

Shri. Surenndran Pillai, CPI (M) stated that building valuation is... presently carried out using PWD schedule which is being... revised and hence future valuation to be made with revised... PWD schedule.

Shri. Anya Kumar requested upward revision of shifting charges.

Shri. N.R. Premachandran explained in detail the loss one has to... bear if the land is acquired in accordance with LA procedure... The loss of shifting charges, depreciation on houses only and... 12% enhancement on land value etc. Minister also offered that... when new mining site is operated, eligible persons from evicted... families would be provided employment with the contractor... based on requirement.

The Hon'ble Minister for Industries concluded the meeting and... reiterated the following decisions taken in the meeting.

- (1) The package arrived at in 2003 will not be modified. However, since land acquisition is based on the package formulated in 2003, in order to compensate the land owners, 3% increase over the market value plus the percentage increase (62, 72 & 82) envisaged in the package will be allowed as delay compensation.
- (2) Taking into account the increase in the cost of shifting etc, Rs. 5000/- increase will be allowed to the shifting charges.
- (3) The above modification in land value and shifting charge will be effective from 21.09.2006.
- (4) Acquisition will be carried out in a phased manner. As far as possible Company shall try to complete the acquisition by December 2006.
- (5) A committee consisting of one representative each from the political parties and the Ward Member shall decide

S. AMARAM KASHEEM
Minister (Industries)



the priority of properties to be acquired, after taking into consideration the requirements of the Company.

- (a) When hiring of land on a rateable site in Pimpri, persons required by the contractor and who are suitable for the work, including the evictees only will be engaged. This will be included in the tender condition.

The list of such eligible persons will be prepared by the committee consisting of representatives of political parties and ward member strictly in accordance with the following criteria and shall be required to be approved by the Company.

- (a) A member from those families who were residing in the area for the last 5 years with title and ownership of the land and building and existed from the area shall only be considered.
- (b) The family should not have received any employment in any form direct or indirect from KMMI, earlier.
- (c) No female member will be included in the list.
- (d) No substitute is permissible from any eligible family for such job.

It was explained that the modification proposed above shall be applicable to future cases only. Settled cases will not be re-opened. Regarding valuation of buildings the present system will have to continue without change. With regard to pending criminal cases in connection with land acquisition, the parties may submit request for withdrawal of the same to Dist Collector who will take appropriate further action. With regard to compensation to shops, it was informed that such cases will be dealt by Company as per existing practice.

17/10/08
ELAMARAM KAREEM
Minister (Industries)



MONTHLY MEAN MAXIMUM TEMPERATURE (°C)

STATION:

KOZHIKODE CITY

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2001	32.2	32.6	32.8	33.0	32.8	30.0	30.4	29.1	30.3	31.1	32.1	32.1
2002	32.1	32.7	33.8	34.1	32.9	30.7	30.8	29.4	31.4	31.3	32.5	32.6
2003	32.9	33.0	33.0	34.0	33.8	30.8	29.9	30.5	31.4	31.3	32.7	32.5
2004	32.6	33.2	34.0	34.0	31.1	30.6	29.7	29.5	30.7	31.4	32.6	32.8
2005	32.5	33.0	33.7	33.8	34.1	31.0	29.2	30.1	30.1	31.2	31.5	32.0

MONTHLY MEAN MINIMUM TEMPERATURE (°C)

STATION:

KOZHIKODE CITY

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2001	23.5	24.8	25.5	25.9	25.8	24.1	23.7	23.8	24.3	24.5	24.3	23.1
2002	23.5	24.2	25.9	26.7	26.0	24.0	24.2	23.5	24.5	24.3	24.6	22.1
2003	23.3	24.8	26.1	26.2	26.9	24.7	23.8	24.4	24.3	24.4	24.3	22.7
2004	23.0	24.1	26.2	26.4	24.7	24.2	24.0	23.6	24.2	24.4	24.1	22.3
2005	23.6	23.9	25.8	26.0	27.3	24.6	24.1	24.2	24.2	24.3	24.1	23.4

MEAN RELATIVE HUMIDITY (%) AT 0830 HOURS IST

STATION: Kozhikode city

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2001	78	82	74	80	81	91	83	83	83	85	84	75
2002	77	75	77	73	82	90	82	93	85	85	83	73
2003	78	81	75	78	79	89	82	89	83	85	78	75
2004	76	76	76	77	90	90	91	92	88	84	79	70
2005	78	74	74	82	73	88	92	88	89	86	85	80

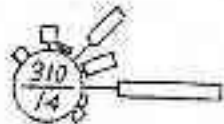
MEAN RELATIVE HUMIDITY (%) AT 1730 HOURS IST

STATION: Kozhikode city

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2001	64	69	68	71	77	86	86	86	81	78	75	65
2002	67	66	69	70	77	85	83	86	79	81	74	64
2003	66	70	70	71	75	81	85	85	78	80	69	65
2004	65	85	69	68	84	83	85	84	81	79	71	61
2005	67	65	65	70	70	82	89	83	83	78	74	65

JACOB PUNNEN
RQP/BNG/028/88/A

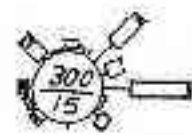
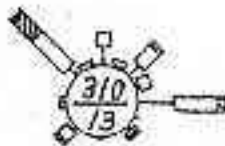
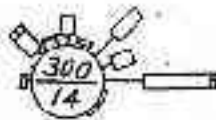




January

February

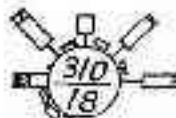
March



April

May

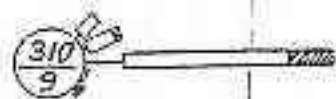
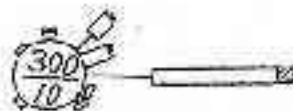
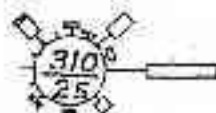
June



July

August

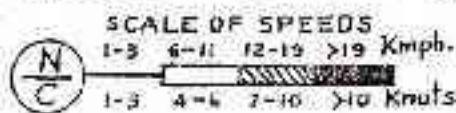
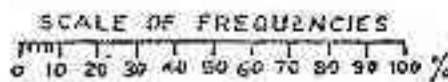
September



October

November

December

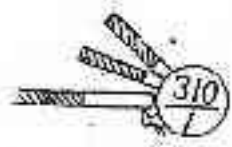


N :- Total number of observations.
C :- Total number of calms in percentage frequencies.

WIND ROSE

FOR... Kozhikode

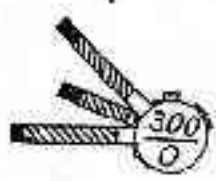
1730 HR. S. I. S. T.



January

February

March



April

May

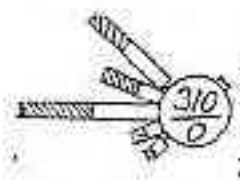
June



July

August

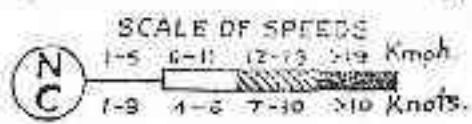
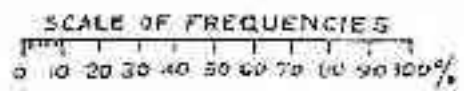
September



October

November

December



N :- Total number of observations.
 C :- Total number of calms in percentage Frequencies.

MONTHLY TOTAL RAINFALL (in mm)

YEAR STATIONS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1893 Kozhikode	0.0	0.0	54.7	42.2	29.1	790.5	872.8	324.8	372.0	393.0	26.0	0.0	2847.9
Quilandy	0.0	0.0	18.3	64.0	87.0	739.0	956.0	364.0	357.0	534.0	0.0	0.0	2934.0
1997 Kozhikode	1.8	0.0	16.7	0.0	68.5	996.1	1455.4	046.5	218.4	268.7	50.6	0.0	3934.1
Quilandy	3.0	0.0	1.0	3.0	66.0	1165.0	1421.0	671.0	119.0	182.0	56.0	0.0	3959.0
1998 Kozhikode	0.0	5.8	14.7	7.0	217.4	1062.8	779.4	32.9	520.2	429.7	41.5	76.9	3476.6
Quilandy	0.0	0.0	0.0	11.0	192.0	1060.0	798.0	309.0	490.0	377.0	35.0	40.0	3313.0
2000 Kozhikode	0.0	3.1	35.9	60.0	476.0	710.2	724.9	230.3	39.2	447.9	32.7	2.0	2762.8
Quilandy	0.0	0.0	19.0	77.0	550.0	704.2	672.0	344.6	53.0	259.0	20.0	8.0	2717.8
2001 Kozhikode	0.0	1.3	0.0	63.6	121.2	660.9	457.3	404.0	114.9	278.6	153.6	91.9	2347.3
Quilandy	16.0	0.0	0.0	118.0	129.0	834.0	457.0	474.2	135.9	768.4	57.0	112.0	2607.5
2002 Kozhikode	24.6	3.4	0.0	240.5	354.8	639.7	528.9	383.9	156.6	276.0	70.1	4.4	2651.1
Quilandy	2.0	0.0	0.0	245.0	356.0	757.3	487.8	381.0	96.0	239.7	125.0	0.0	2639.8
2003 Kozhikode	0.0	0.4	6.7	27.5	450.7	668.9	343.6	418.4	128.9	572.7	151.3	0.0	2786.5
Quilandy	0.0	10.0	30.0	71.0	325.0	511.0	336.0	419.8	66.0	540.0	78.0	0.0	2356.9
2004 Kozhikode	0.0	65.1	1.9	198.6	80.3	918.3	575.8	230.4	165.0	228.6	114.2	0.0	2568.2
Quilandy	15.0	14.0	13.2	111.0	100.0	920.0	701.0	215.0	90.0	287.0	22.0	0.0	2454.8
2005 Kozhikode	1.8	0.4	2.8	97.8	863.6	850.8	370.9	428.4	125.8	369.6	131.0	0.4	3183.4
Quilandy	0.0	0.0	0.0	72.0	772.2	1006.2	375.7	429.2	322.0	342.4	142.0	0.0	3467.7
2005 Kozhikode	18.3	0.0	0.0	56.3	56.1	590.6	610.9	208.2	394.9	190.7	180.0	17.7	2369.6
Quilandy	10.0	14.0	0.0	76.1	69.0	675.1	839.0	246.5	313.6	163.0	149.0	9.2	2537.1



Station: Kozhikode city

YEAR: 2006

Month: February

TEMPERATURE

DATE	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
1	32.4	22.6	33.7	25.3	33.7	26.8
2	32.6	22.6	34.0	25.2	34.0	26.5
3	34.0	22.7	34.6	25.9	34.6	26.8
4	34.4	23.4	34.0	24.6	33.6	27.6
5	33.0	24.0	34.8	25.6	33.8	27.5
6	32.0	24.0	34.6	27.0	34.0	27.6
7	32.0	22.4	34.3	25.4	34.4	27.8
8	31.6	21.0	33.7	25.4	34.2	27.4
9	32.2	21.0	35.2	26.5	34.0	28.1
10	31.6	22.0	34.1	23.1	34.0	28.1
11	32.4	22.5	35.0	24.5	34.0	27.6
12	33.2	22.6	35.2	23.5	34.1	27.5
13	32.9	22.4	35.1	22.7	34.5	28.0
14	32.1	21.0	32.9	23.1	34.7	26.6
15	32.7	20.5	35.4	23.6	34.4	25.9
16	32.0	21.9	33.6	24.6	34.8	26.6
17	32.8	23.9	32.8	23.6	34.4	26.0
18	33.0	24.0	34.0	23.4	34.6	26.0
19	33.1	24.2	34.4	25.3	33.6	25.2
20	33.1	24.7	34.0	25.3	34.0	27.7
21	33.7	24.8	33.6	26.2	34.4	25.4
22	33.8	24.5	33.6	26.8	33.0	26.1
23	33.9	23.1	33.8	27.0	33.5	27.1
24	34.1	22.2	33.4	24.4	33.8	26.7
25	34.0	22.7	33.7	27.3	34.3	28.4
26	33.2	23.6	34.0	27.3	34.6	27.5
27	33.8	23.6	34.3	27.4	34.7	27.8
28	33.5	24.9	32.9	26.3	34.5	27.4
29			33.6	25.9	34.4	26.6
30			33.5	26.0	34.1	26.4
31			33.6	25.8		





परमाणु
ऊर्जा
नियामक
परिषद

M. K. 1/1
Chavara



Atomic
Energy
Regulatory
Board

188 of 211



ANNEXURE VII

25 Years of
Safety Regulation
1983-2008

भारत सरकार
GOVERNMENT OF INDIA

अध्यक्ष
CHAIRMAN



Date: 002626
09.09.09

No.CH/AERB/IPSD/BSML/65A/2009/88/A

August 28, 2009

LICENSE

With reference to Application No. MS/ Mining/ AERB. License/147/2008/234 dated 20th December 2008.

Shri George kutty Thomas, Assistant General Manager (MS) of M/s The Kerala Minerals and Metals Ltd., Chavara, Kerala having undertaken to comply with the conditions prescribed in the:

- Atomic Energy Act, 1962 and the rules framed thereunder
- Applicable Codes and Guides, giving requirement for various operation stages and any orders issued thereunder

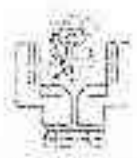
License to operate is hereby granted Under **Rule 3 of the Atomic Energy (Radiation Protection) Rules, 2004** to M/s The Kerala Minerals and Metals Ltd., Chavara, Kerala, subject to the conditions annexed to this license.

This license is valid until 31st August 2014.

Shri Georgekutty Thomas
Assistant General Manager (MS)
M/s The Kerala Minerals & Metals Ltd.
M.S. Unit, Kovilthottam
Chavara- 691583
Kollam, Kerala

(Signature)
(Competent Authority)
S. SHARMA
Chairman

(Signature)
JACOB PUNNEN
RQP/BNG/028/88/A



विद्युतमंत्रालय, अणुविद्युत विभाग, मुंबई - 400 004
KRAMAK BHAVAN, ANJES-HARTI NAGAR, MUMBAI - 400 004

एअर / टेलीफोन - 01-22-2506 2343, 2599 0604
फैक्स / फाक्स - 01-22-2556 2344, 2599 5717, 2599 3030
ईमेल: chairman@aerb.gov.in
वेबसाइट / वेबसाइट - www.aerb.gov.in

२००९-१०
०९/०९/०९

Annexure

Conditions of License:

1. The employer shall ensure that provisions of the Atomic Energy (Radiation Protection) Rules, 2004 are implemented.
2. Duty qualified Radiological Safety Officer (RSO) approved by Atomic Energy Regulatory Board (AERB) shall be available at the site and shall be provided with requisite facilities to discharge his duties and functions.
3. Records of quantity and monazite content of the raw material, products and monazite enriched tailings shall be maintained.
4. Monazite enriched tailings shall be disposed in trenches and topped with silica rich sand. The employer shall ensure that sufficient trenches are available for the disposal of tailings to be generated during the license period and there is no enhancement in the natural radiation background of the tailings disposal area.
5. Appropriate records of radiological monitoring of personnel, workplace, plant premises including tailings disposal area, mining area and iron oxide pipelines of chemical processing plant shall be maintained.
6. Transport of Monazite enriched tailings shall be in accordance with the guidelines prescribed by the AERB.
7. Annual Health Physics Report shall be sent to AERB in the prescribed format.
8. Full facilities shall be accorded to authorised representative(s) of AERB to inspect the installation at any time.
9. The employer shall comply with all the recommendations made by AERB with respect to radiological safety.
10. Any changes in the information listed in the application shall be intimated forthwith to AERB.
11. The license shall not be transferred without prior approval of AERB.
12. Application for renewal of license in the format prescribed vide No.CH/AERB/IPSD/65/2009/74/1 dated July 20 2009 shall reach AERB before 180 days of the date of expiry.
13. Any plan for decommissioning of the facility shall be intimated forthwith to AERB.

This license may be suspended/or cancelled, if any declaration made or information given in the application thereof is found to be false or if any undertaking given in such application is not carried out.

43

Renewed upto 25.05.96

25-05-98
Renewed upto 25.05.98

Regional Controller of Mines
Indian Bureau of Mines
Bangalore



Handwritten signature and date 2/2/86

CERTIFICATE OF RECOGNITION AS QUALIFIED PERSON TO PREPARE MINING PLANS
(Under Rule 22 (e) of Mineral Concession Rules 1960)

Shri JACOB PUNNEN resident
of TRIVANDRUM / KERALA son
of P. C. PUNNOOSE, having given satisfactory
evidence of his qualifications and experience is hereby granted recognition
under Rule 22 (c) of the Mineral Concession Rules, 1960 as a Qualified
Person to prepare Mining Plans.

His registration number is ROP / BNG / 028 / 88 / A

This recognition is valid for a period of two years
ending 25/5/1990

Place: Bangalore

JACOB PUNNEN
ROP/BNG/028/88/A

(M. S. SOWAR)
Regional Controller of Mines
Indian Bureau of Mines
Regional Controller of Mines
Indian Bureau of Mines
Bangalore-Bangalore.

Date: 26th May / 1988

Renewed upto 25.5.92

Renewed upto 25.5.94

Regional Controller of Mines
Indian Bureau of Mines
Bangalore

Regional Controller of Mines
Indian Bureau of Mines
Bangalore

संख्या 25-5-2010 तक
Renewed upto 25-5-2010

U.K. Kheer
Regional Controller of Mines
भारतीय खनन बोर्ड
Indian Bureau of Mines
बंगलूर, Bangalore.



25-5-2010 तक
Renewed upto 25-5-2010

U.K. Kheer
Regional Controller of Mines
भारतीय खनन बोर्ड
भारतीय खनन बोर्ड
भारतीय खनन बोर्ड

K.S.

- 2 -

The certificate of Recognition as Qualified Person granted to Sri Jacob Purnan to prepare Mining Plans under Rule 22 C of Mineral Concession Rules 1960 granted vide Regn. No. RQP/BNG/28/88/A valid up to 25.02.2010 is renewed for further period of 10 years valid up to 25.02.2020.

Bangalore
Date: 28/09/2010



Ivan Kheer
(IVAN KHESS)
REGL. CONTROLLER OF MINES
INDIAN BUREAU OF MINES
BANGALORE

JACOB PURNAN
RQP/BNG/28/88/A



परमाणु खनिजों के लिए माइनिंग प्लानों की तैयारी हेतु योग्य व्यक्ति के रूप में पंजीकरण
का नवीनीकरण प्रमाण-पत्र
CERTIFICATE OF RENEWAL OF REGISTRATION AS QUALIFIED PERSON TO
PREPARE MINING PLANS FOR ATOMIC MINERALS

{दिनांक 2 जनवरी, 1990 के राजपत्र अधिसूचना सं. 1(8)/89/एम. VI की शर्तों के अनुसार भारत के राजपत्र,
असाधारण, भाग - II, खंड 3 - उप खंड (II) में प्रकाशित}

(In terms of Gazette Notification no. 1(8)/89-M.VI dated 2nd January, 1990,
Published in Gazette of India, extraordinary, part III section 3-sub section(i)
Under rule 22L of Mineral Commission Rule, 1965)

श्री जेकब पुन्नन सुपूत्र श्री पी. सी. पुन्नोस निवासो ए-24, कनकनगर
तिरुवनन्तपुरम, केरल - 695003 को एतद् द्वारा परमाणु खनिजों/विहित पदार्थों के संबंध में
माइनिंग प्लान तैयार करने के लिए योग्य व्यक्ति के रूप में पंजीकृत किया जाता है।

*Shri Jacob Punnen S/o Shri P. C. Punnose resident of A-24,
KanakNagar, Thiruvananthapuram, Kerala, Pin- 695003 is hereby
registered as a qualified person to prepare mining plans in respect of Atomic
Minerals / Prescribed Substances.*

इसकी पंजीकरण संख्या AMD/MPA/RQP/5/2010 है।

His registration number AMD/MPA/RQP/5/2010

यह मान्यता 11.11.2012 तक वैध है।

This recognition is valid upto 11.11.2012.

स्थान Place: हैदराबाद Hyderabad

दिनांक Date: 11.11.2010

निदेशक Director

DETAILS OF MODERNIZATION OF MINERAL SEPARATION PLANT OF M/S KMML


A project for production of Sillimanite, debottlenecking of the existing plant for improving the production of Ilmenite, Rutile and Zircon as approved by Government of Kerala as per G.O No: 156/2008/ID dated: 04.10.2008 is under implementation.

The brief summary of the project are as follows:

1. Adding 2 Nos small pre-concentration plants to be installed in the mining area itself to pre-concentrate the "Beach Washings" collected from the beach. The "beach washing" is getting depleted every year in grade and these plants will ensure quality feed to the wet mill and also reduce the transportation cost as the tailings are rejected near the mining site itself. By addition of 2 dredge pumps the same plant can mine and concentrate from in-land deposits.
2. Adding 2 sets of spiral concentrators (12 start each) in the "Primary" and "Scavenging" circuits of the wet mill to marginally increase the capacity and keep the grade of output steady for down stream processing.
3. Adding 2 new generation High Tension Separators in the Dry Mill and modify some of the existing machine with "retrofit" electrodes pole pieces etc for improving the performance. Addition of a Rare Earth Drum Magnetic Separator and an Induced Roll Magnetic Separator in the Ilmenite / Rutile circuit for better extraction of Ilmenite is also suggested.
4. It is suggested to construct a new Zircon / Sillimanite recovery plant in place of the present zircon plant which uses "Manual air tables" which are outdated and inefficient.

The Zircon circuit consists of concentrating the zircon fraction (the non-conducting stream of the Dry Mill) in a 5 stage gravity concentration circuit using "Up-Current Classifiers" "Spiral Concentrators", "Wet Shaking Tables" etc and filtering, drying and cleaning it further in Electro Static and Magnetic Separator equipments.

5. The Sillimanite is separated by treating the "Middlings" of the above "Zircon Circuit" in a Froth Flotation circuit and floating out Sillimanite using small quantities of chemicals like Sodium Silicate and Oleic acid. The float thus separated will be cleaned further after filtering and drying in Magnetic and Electrostatic machines.


JACOB PUNNEN
 ROP/BNG/028/88/A

It is estimated that the output of the plant will increase to such levels:

#	Mineral	Output / Year in MT
1	Ilmenite	18,890
2	Rutile	1060
3	Zircon	4780
4	Sillimanite	360



The rich Monazite fraction will be collected from Zircon cleaning circuit as "Magnetics" and will be pumped to demarcated pits and will be buried under a one metre bed of Sand.

- The flow sheet of the Zircon / Sillimanite circuit with details of machinery is attached for your reference.
- The cost of the project will be around 21 crores and will be paid back in less than 2 years.
- The old Mineral Separation Plant and Zircon Plant will be scrapped after commissioning of the modernization units.
- As most of the operations are in wet stage the plant will be safer and emission of dust will be little.
- The Dryer plants will have both cyclone and bag filter for collecting the dust particles.

FORM 20B

[Refer section 159 of the Companies Act, 1956]

Form for filing annual return by a company having a share capital with the Registrar

Note - All fields marked in * are to be mandatorily filled.



Authorised capital of the company as on the date of filing

(Rs.) 350000000.00

1(a) * Corporate identity number (CIN) of company U14109KL197200002399 Pre-Fill

(b) Global location number (GLN) of company

2(a) Name of the company THE KERALA MINERALS AND METALS LIMITED *

(b) * Address of the registered office of the company Line I SANKARAMANGALAM

Line II CHAYARA P.O.

* City KOLLAM

* State Kerala-KL

Country INDIA

* Pin code 691583

(c) Telephone number with STD code 0475-2686722 (d) Fax 0476-2680101

(e) * e-mail ID of the company kmmk@md3.vsnl.net.in

(f) Website www.knmi.com

3. * Whether shares listed on recognised stock exchange Yes No
If yes, stock exchange code: A [] B []

4. * Financial year end date to which the annual general meeting (AGM) relates 31/03/2010 (DD/MM/YYYY)

5. * Whether annual general meeting (AGM) held? Yes No

(a) If yes, date of AGM 28/09/2010 (DD/MM/YYYY)

(b) * Due date of AGM 30/09/2010 (DD/MM/YYYY)

(c) * Whether any extension for financial year or AGM granted? Yes No

(d) If yes, due date of AGM after grant of extension [] (DD/MM/YYYY)

I. Capital Structure of the company as on the date of AGM or latest due date thereof

6. * Authorised capital of the company (in Rs.) 350,000,000.00

Break up of Authorised capital

* Number of equity shares 3,500,000 Total amount of equity shares (in Rs.) 350,000,000.00

Nominal amount per equity share 100

* Number of preference shares 0 Total amount of preference shares (in Rs.) []

Nominal amount per preference share []

Number of unclassified shares 0 Total amount of unclassified shares (in Rs.) []

JACOB PUNNEN
RQP/BNG/028/88/A

JACOB PUNNEN
028/88/A

7. Issued capital of the company	(in Rs.)	309,327,200.00
Break up of Issued capital		
Number of equity shares	3,093,272	Total amount of equity shares (in Rs.) 309,327,200.00
Nominal amount per equity share	100	
Number of preference shares	0	Total amount of preference shares (in Rs.)
Nominal amount per preference share		
8. Subscribed capital of the company	(in Rs.)	309,327,200.00
Break up of Subscribed capital		
Number of equity shares	3,093,272	Total amount of equity shares (in Rs.) 309,327,200.00
Nominal amount per equity share	100	
Number of preference shares	0	Total amount of preference shares (in Rs.)
Nominal amount per preference share		
9. Paid up capital of the company	(in Rs.)	309,327,200.00
Break up of Paid up capital		
Number of equity shares	3,093,272	Total amount of equity shares (in Rs.) 309,327,200.00
Nominal amount per equity share	100	
Number of preference shares	0	Total amount of preference shares (in Rs.)
Nominal amount per preference share		
10. Total debentures of the company	(in Rs.)	0.00
Break up of Debenture		
Number of non convertible debentures	0	Total amount of non convertible debentures (in Rs.)
Nominal amount per non convertible debenture		
Number of partly convertible debentures	0	Total amount of partly convertible debentures (in Rs.)
Nominal amount per partly convertible debenture		
Number of fully convertible debentures	0	Total amount of fully convertible debentures (in Rs.)
Nominal amount per fully convertible debenture		

II. Indebtness of the company as on the date of AGM or latest due date thereof (secured loans including interest outstanding and accrued but not due for payment)

11. Amount (in Rs.) 0.00

III. Equity share breakup (percentage of total equity) as on the date of AGM or latest due date thereof

S.No.	Category	Percentage
1.	Government (Central and State)	100.00
2.	Government companies	0.00
3.	Public financial companies	0.00
4.	Nationalised or other banks	0.00
5.	Mutual funds	0.00
6.	Venture capital	0.00
7.	Foreign holdings (Foreign institutional investor(s), Foreign company(ies), Foreign financial institution(s), Non-resident Indian(s) or Overseas corporate bodies or Others)	0.00
8.	Bodies corporate (not mentioned above)	0.00
9.	Directors or relatives of directors	0.00
10.	Other top fifty (50) shareholders (other than listed above)	0.00
11.	Others	0.00
12.	Total	100.00

Total number of shareholders

IV. Details of directors(s), Managing Director, manager and secretary as on the date of AGM

12. Number of director(s), Managing Director, manager and secretary

Following details are to be entered only in case date of AGM is on or after 1st July'2007

Provide Director Identification number (DIN) in case of director, Managing Director and Income-tax permanent account number (Income-tax PAN) in case of manager, secretary

DIN or Income-tax PAN	<input type="text" value="C0052922"/>	<input type="button" value="Pre-Fill"/>
Name	<input type="text" value="THOTANCHATH BALAKRISHNAN"/>	
Designation	<input type="text" value="Nominee director"/>	Date of appointment <input type="text" value="11/06/2009"/>
Number of equity share(s) held	<input type="text" value="0"/>	<input type="text" value="0.00"/> per cent
Whether he/she has signed the annual return	<input type="radio"/> Yes <input checked="" type="radio"/> No	
If yes, date of signing	<input type="text"/> (DD/MM/YYYY)	

DIN or Income-tax PAN	<input type="text" value="R2724743"/>	<input type="button" value="Pre-Fill"/>
Name	<input type="text" value="ALKESH KUMAR SHARMA"/>	
Designation	<input type="text" value="Nominee director"/>	Date of appointment <input type="text" value="20/02/2010"/>
Number of equity share(s) held	<input type="text" value="0"/>	<input type="text" value="0.00"/> per cent
Whether he/she has signed the annual return	<input type="radio"/> Yes <input checked="" type="radio"/> No	
If yes, date of signing	<input type="text"/> (DD/MM/YYYY)	

III. Equity share breakup (percentage of total equity) as on the date of AGM or latest due date thereof

S No.	Category	Percentage
1.	Government [Central and State]	100.00
2.	Government companies	0.00
3.	Public financial companies	0.00
4.	Nationalised or other banks	0.00
5.	Mutual funds	0.00
6.	Venture capital	0.00
7.	Foreign holdings (Foreign institutional investor(s), Foreign company(ies), Foreign financial institution(s), Non-resident indian(s) or Overseas corporate bodies or Others)	0.00
8.	Bodies corporate (not mentioned above)	0.00
9.	Directors or relatives of directors	0.00
10.	Other top fifty (50) shareholders (other than listed above)	0.00
11.	Others	0.00
12.	Total	100.00

Total number of shareholders

2

IV. Details of directors(s), Managing Director, manager and secretary as on the date of AGM

12. Number of director(s), Managing Director, manager and secretary

10

Following details are to be entered only in case date of AGM is on or after 1st July 2007

Provide Director identification number (DIN) in case of director, Managing Director and Income-tax permanent account number (Income-tax PAN) in case of manager, secretary

DIN or Income-tax PAN	000E2922	Pre-Fill
Name HOTANCHATH BALAKRISHNAN		
Designation	Nominee director	Date of appointment
		11/05/2009
Number of equity share(s) held	0	0.00 per cent
Whether he/she has signed the annual return	<input type="radio"/> Yes	<input checked="" type="radio"/> No
If yes, date of signing		(DD/MM/YYYY)

DIN or Income-tax PAN	02724743	Pre-Fill
Name ALKESH KUMAR SHARMA		
Designation	Nominee director	Date of appointment
		20/02/2010
Number of equity share(s) held	0	0.00 per cent
Whether he/she has signed the annual return	<input type="radio"/> Yes	<input checked="" type="radio"/> No
If yes, date of signing		(DD/MM/YYYY)

VII	DIN or Income-tax PAN	01736495	Pre-Fill
Name CHITTI APILLY KUNNATH JOSEPH GEORGE			
Designation		Whole-time director	Date of appointment
Number of equity share(s) held		0	15/06/2009
Whether he/she has signed the annual return		<input type="radio"/> Yes	<input checked="" type="radio"/> No
If yes, date of signing			(DD/MM/YYYY)



VIII	DIN or Income-tax PAN	03100318	Pre-Fill
Name MADHUSOODANAN NAIR RAMANPILLAI			
Designation		Nominee director	Date of appointment
Number of equity share(s) held		0	0.00 per cent
Whether he/she has signed the annual return		<input type="radio"/> Yes	<input checked="" type="radio"/> No
If yes, date of signing			(DD/MM/YYYY)

IX	DIN or Income-tax PAN	00211026	Pre-Fill
Name NEMMARA RANGANATHAN SUBRAMANIAM			
Designation		Managing director	Date of appointment
Number of equity share(s) held		10	0.00 per cent
Whether he/she has signed the annual return		<input checked="" type="radio"/> Yes	<input type="radio"/> No
If yes, date of signing		15/11/2010	(DD/MM/YYYY)

X	DIN or Income-tax PAN	AENPN1175N	Pre-Fill
Name RAKHESH R			
Designation		Secretary	Date of appointment
Number of equity share(s) held		0	0.00 per cent
Whether he/she has signed the annual return		<input checked="" type="radio"/> Yes	<input type="radio"/> No
If yes, date of signing		15/11/2010	(DD/MM/YYYY)

V. Details of director(s), Managing Director, manager and secretary who ceased to be associated with the company since the date of last AGM

13. Number of director(s), Managing Director, manager and secretary

5

Following details are to be entered only in case date of AGM is on or after 1st July 2007

Provide DIN in case of director, Managing Director and income-tax PAN in case of manager, secretary



I

DIN or Income-tax PAN: 00222708 Pre-Fill

Name: AMITABH KANT

Designation: Director

Date of appointment: 28/03/2008 Date of cessation: 20/02/2010

II

DIN or Income-tax PAN: 00027595 Pre-Fill

Name: PULLUKOTTAYIL HABEL KURIAN

Designation: Director

Date of appointment: 06/07/2006 Date of cessation: 20/02/2010

III

DIN or Income-tax PAN: 01588780 Pre-Fill

Name: PULLOTTUPADATH RADHAKRISHNAN

Designation: Director

Date of appointment: 19/06/2007 Date of cessation: 20/02/2010

IV

DIN or Income-tax PAN: 02477880 Pre-Fill

Name: THOMAS MATHEW

Designation: Director

Date of appointment: 17/12/2005 Date of cessation: 21/05/2010

DIN or Income-tax PAN	C1844154	
Name	SRINIVAS SHASHIDHAR KUKATLAPALLI	
Designation	Managing Director	
Date of appointment	11/06/2009	Date of cessation 31/12/2009



14. In case of a listed company, details of secretary in whole time practice certifying the annual return

Name

Whether associate or fellow Associate Fellow

Certificate of practice number

15. Whether complete list of share holders, debenture holders has been enclosed as attachment Yes No
in case No, then submit the details of all the share holders, debenture holders in a CD
separately with the office of Registrar of Companies.

Attachments

- Annual return as per schedule V of the Companies Act, 1956
- Approval letter for extension of financial year or annual general meeting
- Optional attachments) - if any

Attach

Attach

Attach

List of attachments

Schedule-V.pdf

Remove attachment

Verification

I confirm that all the particulars mentioned above are true as per the attached annual return which is duly prepared as required under section 159 and Schedule V and which is duly signed as required under section 151 of the Act. To the best of my knowledge and belief, the information given in this form and its attachments is correct and complete.

I have been authorised by the Board of directors' resolution number - TP/CS/CR dated 26/03/2016 (DD/MM/YYYY) to sign and submit this form.

To be digitally signed by

Managing Director or director or manager or secretary of the company

RAXH
ESH R



* Designation

* DIN of the director or Managing Director; or Income-tax PAN of the manager; or Membership number, if applicable or income-tax PAN of the secretary (secretary of a company who is not a member of ICSI, may quote his/ her income-tax PAN)

Certificate

It is hereby certified that I have verified the above particulars (including attachment(s)) from the records of THE KERALA MINERALS AND METALS LIMITED

and found them to be true and correct. I further certify that all required attachment(s) have been completely attached to this form.

- Chartered accountant (in whole-time practice) or Cost accountant (in whole-time practice) or
- Company secretary (in whole-time practice)

REMEMBER
SHB

* Whether associate or fellow Associate Fellow

* Membership number or certificate of practice number

This eForm has been taken on file maintained by the registrar of companies through electronic mode and on the basis of statement of correctness given by the filing company



FORM OF ANNUAL RETURN OF A COMPANY HAVING A SHARE CAPITAL
ANNUAL RETURN

THE COMPANIES ACT, 1956 (1 OF 1956)

SCHEDULE V
[See section 15B]
PART II

I. Registration Details

Registration No. State Code (Refer Code List)
 Registration Date Whether shares listed on recognised
 Date Month Year Stock Exchange(s)
 Y=yes N=No

If Yes, Stock Exchange Code (Total)
 (Refer Code List 2)

AGM Held Y-Yes N-No Date of AGM
 Due Date Date Month Year

II. Name and Registered Office Address of Company:

Company Name
 Address
 Town/City
 State Pin Code
 Telephone with STD
 Area Code Number

Fax Number

E-mail Address

III. Capital Structure of the Company (Amount in Rs.Thousands)

Authorised Share Capital Breakup

Type of Shares	No. of Shares	Nominal value (in Rs.)
(i) Equity	<input type="text" value="3500000"/>	<input type="text" value="100"/>
(ii) Preference	<input type="text" value="NIL"/>	<input type="text" value="NIL"/>
Total Authorised Capital	<input type="text" value="3500000"/>	

Issued Share Capital Breakup

Type of Shares	No. of Shares	Nominal Value (in Rs.)
(i) Equity	<input type="text" value="3093272"/>	<input type="text" value="100"/>
(ii) Preference	<input type="text" value="NIL"/>	<input type="text" value="NIL"/>
Total Issued Capital	<input type="text" value="3093272"/>	



Subscribed Share Capital Breakup

Type of Shares	No. of Shares	Nominal Value (in Rs.)
(i) Equity	3 0 9 3 2 7 2	1 0 0
(ii) Preference	N I L	N I L
Total Subscribed Capital	3 0 9 3 2 7	1 0 0

Paid-up Share Capital Breakup

Type of Shares	No. of Shares	Amount paid-up (in Rs.)
(i) Equity	3 0 9 3 2 7 2	1 0 0
(ii) Preference	N I L	N I L
Total Paid up Capital	3 0 9 3 2 7	1 0 0

Debentures Breakup

Type of Debenture	No. of Debentures	Nominal value (in Rs.)
(i) Non-Convertible	N I L	N I L
(ii) Partly Convertible	N I L	N I L
(iii) Fully Convertible	N I L	N I L
Total Amount	N I L	N I L

IV. Directors/Manager/Secretary Information (Past and Present) (Refer clause 6 of Part I of Schedule V)

Name **B A L A K R I S H N A N T H O T T I A M C H A T H I**

Surname: B A L A K R I S H N A N T
 Middle Name: H O T T I A M
 First Name: C H A T H I
 Nationality: Indian, Foreign
 Date of birth: 0 3 / 1 0 / 9 1
 Date Month Year

Designation: C-Chairman, W-Whole time Director, S-Secretary, R-Manager, D-Director, M-Managing Director

Date of Appointment: 1 1 / 0 6 / 0 9
 Date of Ceasing: / /

Election Commission Identity Card No. (If issued):

Residential Address: **9 C S F S K I N G S W O O D**
J A W A H A R N A G A R
 Town/City: **K O W D I A R**
 District: **T H I R U V A N A N T H A P U R A M**
 State: **K E R A L A**
 Pin code: **6 9 5 0 0 3**



Name **A L K E S H K U M A R S H A R M A**

Surname: **A L K E S H** Middle Name: **K U M A R** First Name: **S H A R M A**
 Nationality: Indian Foreign Date of birth: **1 2 0 8 6 3**

Designation: C-Chairman W-Whole time Director, S-Secretary, R-Manager
 D-Director, M-Managing Director

Date of Appointment: **2 0 0 2 1 0** Date of Cessing:

Election Commission Identity Card No. (if issued):

Residential Address: **B 4 / 2 3 0 S A F D A R J U N G**
E N G L A V E
 Town/City: **N E A R D P P B S C H O O L**
 District: **N E W D E L H I**
 State: **D E L H I**
 Pin code: **1 1 0 0 2 9**

Name **C H E M B I L K A K K I T A M P A H A**
K A P U N A K A R A N

Surname: **C H E M B I L** Middle Name: **K A K K I** First Name: **T A M P A H A**
 Nationality: Indian Foreign Date of birth: **3 1 0 5 5 5**

Designation: C-Chairman cum Managing Director W-Whole time Director, S-Secretary, R-Manager
 D-Director, M-Managing Director

Date of Appointment: **1 4 0 5 0 7** Date of Cessing:

Election Commission Identity Card No. (if issued):

Residential Address: **5 0 / 1 7 0 2**
V I D H Y A N A G A R
 Town/City: **K A D A V A N T H R A P O**
 District: **K O C H I**
 State: **E R N A K U L A M**
 Pin code: **6 8 2 0 2 0**



Name: RAJA GOPAL KUNJUPIL JAI
 Surname Middle Name First Name
 Nationality: I-Indian F-Foreign Date of birth: 21 01 82
 Date Month Year
 Designation: C-Chairman cum Managing Director
 D-W-Whole time Director, S-Secretary, R-Manager
 D-Director, M-Managing Director

Date of Appointment: 14 09 07 Date of Ceasing:
 Date Month Year Date Month Year

Election Commission Identity Card No. (if issued):

Residential Address: 7 539 69
 THEKKUMKARA VEEDU
 KALLUMKADAVU
 Town/City: PATTANAPURAM
 District: KOLLAM
 State: KERALA
 Pin code: 699695

Name: CHITTI LAPILLY KUNNATH
 JOSEPH GEORGE
 Surname Middle Name First Name

Nationality: I-Indian F-Foreign Date of birth: 09 12 51
 Date Month Year

Designation: C-Chairman cum Managing Director
 W-W-Whole time Director, S-Secretary, R-Manager
 D-Director, M-Managing Director

Date of Appointment: 19 08 09 Date of Ceasing:
 Date Month Year Date Month Year

Election Commission Identity Card No. (if issued):

Residential Address: CHITTI LAPILLY
 KUNNATH HOUSE
 NARAYANAN ASAN ROAD
 Town/City: VYTTILA PO
 District: ERNAKULAM
 State: KERALA
 Pin code: 682019



Name **MACHUSOODANAN NAIR**
RAMANPILAI
 Surname Middle Name First Name
 Nationality I-Indian
 F-Foreign Date of birth **25** **11** **76**
 Date Month Year
 Designation C-Chairman cum Managing Director
 W-Who's time Director, S-Secretary, R-Manager
 D-Director, M-Managing Director

Date of Appointment **21** **05** **10** Date of Ceasing
 Date Month Year Date Month Year

Election Commission Identity Card No. (if issued)

Residential Address **MUZHA KANCHERI**
EDACODE
 Town/City **NE MOM**
 District **THIRUVANANTHAPURAM**
 State **KERALA**
 Pin code **695020**

Name **NEEMARA RANGANATHAN**
SIRRAMANI AM
 Surname Middle Name First Name

Nationality I-Indian
 F-Foreign Date of birth **25** **11** **61**
 Date Month Year

Designation C-Chairman cum Managing Director
 W-Who's time Director, S-Secretary, R-Manager
 D-Director, M-Managing Director

Date of Appointment **31** **12** **09** Date of Ceasing
 Date Month Year Date Month Year

Election Commission Identity Card No. (if issued)

Residential Address **NO 35, 3RD STREET**
 Town/City **TATARA D**
 District **COIMBATORE**
 State **TAMILNADU**
 Pin code **641012**



Name **A M I T A B H K A N T**
 Surname Middle Name First Name
 Nationality I-Indian F-Foreign Date of birth **0 1 0 3**
 Date Month Year
 Designation C-Chairman cum Managing Director
 W-Whole time Director, S-Secretary, R-Manager
 D-Director, M-Managing Director

Date of Appointment **2 8 0 3 0 8** Date of Ceasing **2 0 0 2 1 1**
 Date Month Year Date Month Year

Election Commission Identity Card No. (if issued)

Residential Address **D 1 3 1**
B H A R T I N A G A R
 Town/City **D E L H I**
 District **D E L H I**
 State **D E L H I**
 Pin code **1 1 0 0 3**

Name **P U L L U K O T T A Y I L H A B E L K U R I A N**
 Surname Middle Name First Name
 Nationality I-Indian F-Foreign Date of birth **2 0 0 1 5 9**
 Date Month Year
 Designation C-Chairman cum Managing Director
 W-Whole time Director, S-Secretary, R-Manager
 D-Director, M-Managing Director

Date of Appointment **0 6 0 7 0 8** Date of Ceasing **2 0 0 2 1 0**
 Date Month Year Date Month Year

Election Commission Identity Card No. (if issued)

Residential Address **P J L L U K O T T A Y I L**
T C 1 8 5 2 5 T K D I W A K A R A J N R I J A D
 Town/City **M U T T A D A P O**
 District **T H I R U V A N A N T H A P U R A M**
 State **K E R A L A**
 Pin code **6 9 5 0 2 5**



Name **P U L L O T T U P A D A T H**
R A D H A K R I S H N A Y A N

Surname Middle Name First Name

Nationality I-Indian
 F-Foreign Date of birth **1 7** **1 2** **3 1**
 Date Month Year

Designation C-Chairman cum Managing Director
 W-Whole time Director, S-Secretary, R-Manager
 D-Director, M-Managing Director

Date of Appointment **1 9** **0 6** **0 7** Date of Ceasing **2 0** **0 2** **1 0**
 Date Month Year Date Month Year

Election Commission Identity Card No. (if issued):

Residential Address **2 9 3 P A N A M P I L L Y A V E N U E**
P A N A M P I L L Y N A G A R
 Town/City **K O C H I**
 District **E R N A K U L A M**
 State **K E R A L A**
 Pin code **6 8 2 0 1 5**

Name **T H O M A S M A T H E W**

Surname Middle Name First Name

Nationality I-Indian
 F-Foreign Date of birth **3 2** **0 4** **5 4**
 Date Month Year

Designation C-Chairman cum Managing Director
 W-Whole time Director, S-Secretary, R-Manager
 D-Director, M-Managing Director

Date of Appointment **1 7** **1 2** **0 8** Date of Ceasing **2 1** **0 5** **1 0**
 Date Month Year Date Month Year

Election Commission Identity Card No. (if issued):

Residential Address **1 2 5 G R E E N G A R D E N**
7 F A N G O O F
 Town/City **T H I R U V A N A N T H A P U R A M**
 District **T H I R U V A N A N T H A P U R A M**
 State **K E R A L A**
 Pin code **8 9 5 6 0 9**



Name **S R I N I V A S S H A S H I D H A R**
K U K A T L A P A L L I

Surname Middle Name First Name

Nationality Indian
F-Foreign Date of birth **2 9** **0 1** **6 5**
Date Month Year

Designation C-Chairman cum Managing Director
 W-Whole time Director, S-Secretary, R-Manager
D-Director, M-Managing Director

Date of Appointment **1 1** **0 6** **0 9** Date of Ceasing **3 1** **1 2** **0 9**
Date Month Year Date Month Year

Election Commission Identity Card No.(if issued)

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Residential Address **D A R S A N N A G A R D O O R N o . 5 3 2**
K U D A P P A N A K K U N N J
Town/City **T H I R U V A N A N T H A P U R A M**
District **T H I R U V A N A N T H A P U R A M**
State **K E R A L A**
Pin code

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Name **R A K H E S H R A J A S E K H A H A N**

Surname Middle Name First Name

Nationality Indian
F-Foreign Date of birth **0 8** **1 2** **7 3**
Date Month Year

Designation C-Chairman cum Managing Director
 W-Whole time Director, S-Secretary, R-Manager
D-Director, M-Managing Director

Date of Appointment **0 4** **0 6** **0 9** Date of Ceasing

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Date Month Year Date Month Year

Election Commission Identity Card No.(if issued)

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Residential Address **S H E E B H A V A N**
A R U V I P P U R A M R O A D
P E Y A D P O
Town/City **T H I R U V A N A N T H A P U R A M**
District **T H I R U V A N A N T H A P U R A M**
State **K E R A L A**
Pin code **5 9 5 6 7 3**



V. Details of Shares/Debentures held at date of AGM

Ledger Folio of Share/Debenture Holder 11
 Share/Debenture Holder's Name
 GOVERNOR OF KERALA
 Surname Middle Name First Name

Father's/Husband's Name

Type of Share/ Debenture 1
 1- Equity, 2- Preference Shares
 3- Debentures 4- Stock

Number of Shares/ Debentures held/ Stock, if any. 3193262 Amount per Share (in Rs.) 100

Address RAJ BHAVAN
 Town/City THIRUVANANTHAPURAM
 District THIRUVANANTHAPURAM
 State KERALA
 Pin Code 695003

Ledger Folio of Share/Debenture Holder 19
 Share/Debenture Holder's Name
 NEMMARA RANGANATHAN
 Surname Middle Name First Name
 SUBRAMANIAM

Father's/Husband's Name NEMMARA SUBRAMANIAM
 RANGANATHAN

Type of Share/Debenture 1
 1- Equity, 2- Preference Shares
 3- Debentures 4- Stock

Number of Shares/ Debentures Held/ Stock, if any. 10 Amount per Share (in Rs.) 100

Address NO 35 3RD STREET
 Town/City TATABAD
 District COIMBATORE
 State TAMILNADU
 Pin Code 641012