

**BEFORE THE HONOURABLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI**

Original Application no. 76/2019

State of Kerala & Others : Respondent(s)

**Report filed by the Joint Committee constituted
in Original Application No. 76/2019.**

Adv. Jogy Scaria,

ADDITIONAL STANDING COUNSEL

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VOLUME 1

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Dated this the 2nd day of November 2019.

Jogy Scaria, Advocate
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SINDHU RADHAKRISHNAN
Chief Environmental Engineer

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SINDHU RADHAKRISHNAN
Chief Environmental Engineer

BEFORE THE HONOURABLE NATIONAL GREEN TRIBUNAL

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State of Kerala & Others:

Respondent(s)

Report filed by the Joint Committee Members, Smt. Sindhu Radhakrishnan, Chief Environmental Engineer, Kerala State Pollution Control Board (KSPCB) and Dr. Deepesh V, Scientist B, Central Pollution Control Board (CPCB), Regional Directorate, Bengaluru in the matter of Original Application No. 76/2019.

This report is submitted in continuation to the report submitted on 18/09/2019 by the Chief Environmental Engineer on behalf of the Joint Committee requesting one month additional time to collect relevant data and information to prepare the environmental damage assessment report. Due to paucity of data, report preparation was delayed and delay in submitting the report may be kindly be accepted.

1.0 Background

The issue for consideration in the O.A No.76/2019 is the illegal mining carried out by M/s. Indian Rare Earths Limited (IREL) and M/s. Kerala Minerals & Metals Limited (KMML) along the coastal area of Alappad and Chavara, in Kollam District, Kerala. As per the direction of the Honorable National Green Tribunal, a study report, on the beach erosions along the Kayamkulam - Neendakara coastal stretch and the contribution of beach sand extraction on the extent of vulnerability, prepared by National Centre for Earth Science Studies (NCESS) has been submitted. The NCESS has conducted the study along 22 Km long coastal stretch extending from Kayamkulam inlet at north to Neendakara inlet at south during February - March, 2019.

The main finding in the report submitted by NCESS that "the severe erosion is attributed to the unsustainable mining practices that have been going on along the coast had been noted by the Honorable Tribunal in the Order dated 19-07-2019 (Annexure I) and pronounced that M/s IREL and M/s KMML had mined excess quantity during the period 2001-2010 and 2010-2019.

As per the direction of the Honorable National Green Tribunal in the above order a Joint Committee has been constituted with Dr. Deepesh V., Scientist B of Central Pollution Control Board, Regional Directorate, Bengaluru and Smt. Sindhu



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Radhakrishnan, Chief Environmental Engineer, Regional Office, Kerala State Pollution Control Board, Thiruvananthapuram as members.

Beach sand along the eastern and western coast of India is found to be rich in heavy minerals such as ilmenite, rutile, zircon, monazite, sillimanite etc. These minerals have considerable use in the production of various industrial products like titanium dioxide, ceramic, welding electrode, pigments, paint additives, etc. The major deposit along the west coast is the *Quilon* deposit known as "*Chavara deposits*" along 22.5 Km length of Neendakara – Kayamkulam (NK) belt in Kerala. Chavara deposit, 'Q' grade ilmenite has high titanium oxide content. It is preferred worldwide due to its high titanium oxide content and less iron.

Neendakara – Kayamkulam (NK) belt has been under mining since 1909 by various companies. Since 1965, M/s. Indian Rare Earth Limited (IREL), a Government of India undertaking under the department of Atomic Energy, succeeded in taking over the assets of 2 companies. Initially, their activities confined to mining and separation of heavy minerals from beach washings deposited by wave action. Later on the Atomic Mineral Division, (Atomic Minerals Directorate for Exploration and Research) under the Department of Atomic Energy carried out geological exploration of the area, and company started inland dredging operations since 1990.

The Neendakara Kayamkulam stretch was divided into 8 blocks (NK Blocks). Mining leases for NK Blocks I, III, V and VII was granted originally to KSIDC (Kerala State Industries Development Corporation) and were subsequently given to M/s. KMML a public sector unit under the Government of Kerala. Mining lease has been renewed vide GO (MS) No. 214/2011/ID dated 24-10-2011 for 20 years. Mining lease for NK Blocks II, IV, VI and VIII were granted to M/s. IREL vide G.O. No. 195/70/ID of 30/05/1970. After the expiry of mining leases in 1990, the mining leases of IREL were extended periodically for short periods. In 2005, vide G.O.(MS)No22/2005/ID dated 22/2/2005 the mining lease was renewed to IREL with retrospective effect from 1990 for 20 years for NK Block II. Subsequently, vide G.O. (MS)No.32/2006/ID dated 15/3/2006, the period of the lease was extended till 2020. The mining plan was approved by Atomic Minerals Directorate (AMD) vide AMD Approval No. AMD-20 /90 – PMSG /34 dated 12/01/1991.

Mineral sand mining in Chavara belt is done by the industries in two ways:

Beach mining: Where the mineral sand deposited on the beaches is scraped off based on accretion rate. The waves will be depositing the mineral sand continuously on the beach




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according to various factors mentioned in the NCESS report such as wind velocity, wave action, season, etc.

Inland mining: The coastal inland up to 100 m is permitted to be mined for the heavy minerals. The mining is done in the approved blocks by excavating the sand up to 3 to 7 m using earth excavators or by Dredge Wet Concentrator (DWC) method.

The mined sand from both cases is then transported to the mineral extraction plant where the heavy minerals are separated by gravity separation using hydro cyclones. For this process the sand is passed through a series of gravity separators along with water. The heavier particles are collected as raw material for further purification & separation. The lighter particles are collected at the plant itself which are to be utilized for refilling excavated area.

Subsequent to the Honorable NGT order dated 19-07-2019, the Chairman of Kerala State Pollution Control Board (KSPCB) had convened a meeting on 13/08/2019 with various stake holders concerned with the mining of heavy minerals from the Chavara coastal area and with technical experts in this field. The discussions were intended to sort out the problems in recovering mineral resource without causing further environmental damage.

It was explained by the Assistant Manager from Atomic Minerals Division (AMD), Department of Atomic Energy that Chavara region in Kollam District is having a major mineral deposit extending 22.5 Km length from Neendakara to Kayamkulam. Titanium content of more than 62% and low iron content minerals naturally occurs from High Tide Level (HTL) to 200 m towards east up to the inland navigation channel/ estuary called T S (Thiruvananthapuram – Shoranur) Canal which is separating the present mining area from main land. From T S Canal to 1 Km east, heavy mineral potential is 10 % and up to 6 Km it is 6 - 7.5 %. M/s. KMMML and M/s. IREL together is carrying out mining in 8 blocks for which they are holding lease. The mineral deposit in the offshore is 7.5 – 9 m depth in Chavara area.

Representative from NCESS reported that sea wall construction will protect the land and accretion of sand and natural beach building will not happen where sea wall is constructed. The mineral deposition will take place elsewhere where the sea wall ends. It was also reported that according to their study during 2009 - 12 the accretion rate in this beach was found to be 60 m³/ m/ year and the length of available beach at present is only 700 m.



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According to the Senior Geologist from Mining & Geology Department, Atomic Mineral Division (AMD) has explored 34750 Ha of land for mining and mineral extraction. Out of which, 550 Ha has been given on lease to M/s. KMML (1 lease) and M/s. IREL (4 leases). M/s. IREL has Environmental Clearance (EC) for 2 blocks, whereas, M/s. KMML has not yet obtained EC. If the mining is conducted as per the approved Mining Plan, Environmental Impact Assessment, Environmental Clearance and according to the relevant statutes, the environmental damages could have been averted or minimized. As per the Mining Plan, provision is given only for manual mining using shovels and in practice the companies are using heavy earth movers for beach mining.

In the meeting, representatives of M/s. IREL reported that the percentage of heavy minerals received from beach washing has come down to 10 – 12 % after the devastating tsunami in 2004. Representatives of M/s. KMML explained that they had applied for Environmental Clearance and public hearing has been conducted. They also reported that it is practically and technically not feasible to put back the tailing sand after mineral separation. As per EIA report, it is committed that the tailing sand will be returned to beach as per the mining plan and none of the regulatory/ technical authorities had advised them not to return the sand to the beach.

The Director, Geological Survey of India (GSI) informed that a mobile gravity separator is being used in East African Countries, for beach mining. The unit travels in one direction for about 500 m separating the minerals and depositing the rejects on the beach itself. The deposition of heavy mineral containing sand happens on the beach by wave action by the time one transit is over. Thus mining can be done without disturbing the beach. However, it was opined that this will be feasible for long beach stretches and the available beach length in the present case is only 700 m.

As per the request of the Chairman, KSPCB, possibilities of offshore mining were also discussed in the meeting. It was informed that the GSI has identified 21 blocks of sea bed in different sectors like Chavara, Varkala, etc. in Kerala. It was informed that the sea bed is having 125 million Tonnes/ metre of heavy minerals at 1m depth. The sea depth is 10 to 60 m extending up to 1 Km away from seashore with an average heavy mineral concentration of 18 %. As per a notification published by Government of India, the operating rights with respect to sea minerals, in offshore area can be granted only to Government or Government owned public limited companies. The Senior Geologist informed that offshore mining shall be carried out as per 'Offshore Mineral Development and Regulation Act' 2002. The license is being issued by Government of




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India by auctions. Amendment in the act is required for this and there are some litigations pending.

It was decided in the meeting to make plans and proposals to mine offshore minerals and rebuild the beach using the reject sand and also to place the matter before Honorable NGT for consideration. Copy of minutes of this meeting is produced herewith as Annexure II.

1.1 Prospect of mineral sand mining

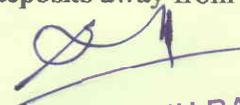
According to the Indian Minerals Yearbook prepared by Indian Bureau of Mines (IBM), Ministry of Mines, India is endowed with large resources of heavy metal minerals which occur along the coastal stretches and also as inland placers. The heavy minerals sand comprises a group of seven minerals: ilmenite, leucoxene (brown ilmenite), rutile, zircon, sillimanite, garnet and monazite. In India there are five well defined zones rich in heavy metal rich sand deposits and one of the zone is in Kerala: 22 km stretch between Neendakara – Kayamkulam (NK) block, Kollam district, Kerala (known as ‘Chavara’ deposit after the main mining centre). The average grade of total heavy minerals in these deposits is 10 – 25 % of which 30 - 40 % is ilmenite. Ilmenite reserve/ deposit in Kerala is in the following stretches.

<i>Ilmenite resources/ deposits in Kerala</i>	<i>Million Tonnes</i>
Chavara Barrier beach	13.17
Chavara Eastern Extension (Phase-I)	17.02
Chavara Eastern Extension (Phase-II)	49.26
Trikkunnappuzha-Thotapally beach & Eastern extension	9.50
Alappuzha-Kochi	5.88
<i>Brahmagiri (Phase I-V & NW extension), Odisha (For reference)</i>	86.04

Mining and processing of beach sand are carried out by the IREL, a Government of India Undertaking; KMML, a Kerala State Government Undertaking and two Private Sector Producers M/s V V Mineral, Thoothukudi, Tamil Nadu and M/s Beach Minerals Co. Pvt. Ltd, Kuttam, Tamil Nadu.

It was reported that, IREL, Chavara, collected beach sand over a stretch of 22 km between Neendakara and Kayamkulam in Kerala (Indian Minerals Yearbook, 2018). The unit has adopted wet mining operations using two Dredge and Wet Concentrator (DWC) of 100 TPH capacity each to exploit the inland deposits away from the beaches.




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However, during site visit, IREL is employing mining with earth movers instead of DWC. Chavara ilmenite is the richest in TiO_2 content (75.8 % TiO_2) and has great demand in India and abroad for manufacturing pigments. The sand deposits of OSCOM (Orissa Sands Complex) at Chatrapur in district Ganjam extend along the coast of Bay of Bengal with an average width of 1.4 Km and average depth of 7.5 m. Mining operations involve suction dredging to 6 m depth below water level on a much larger scale (500 TPH) augmented by a smaller sized (100 TPH) supplementary.

As per the IBM's annual mineral yearbook, it is explained that, dry mining of beach washings laden with 40 – 70 % Heavy Minerals (HM) are collected through front-end loaders and bulldozers for further concentration to 90 % HM at land based concentrators. Though dry mining is very simple and economic, there is considerable opposition by local people for this form of mining for reasons that removal of sand would expose the land area to sea erosion.

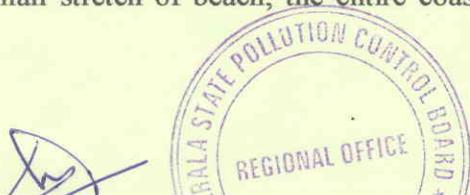
As an alternate approach, IREL has adopted wet mining involving dredging and wet concentration (DWC) from inland areas away from the beach lines. In this mode, an artificial pond is created, the sand bed is cut and the slurry is pumped to spiral concentrator for removal of quartz/ silica.

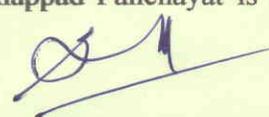
As per the IBM yearbook, KMML collects seasonal accretions of heavy mineral sand from the beach front. The pit so formed gets filled by fresh accretions of heavy mineral sand. The mineral sand is collected using bulldozers and wheel loaders and transported in trucks to Mineral Separation Plant (MSP).

2.0 Site visit & ground reality

In order to ascertain the ground realities, the joint committee supported by a team of Environmental Engineer, Assistant Environmental Engineer from KSPCB, Kollam district office and field staff from CPCB, Bengaluru conducted site visit & field survey along the coast of Alappad and Panmana Panchayat on 22/08/2019. The team visited the beach mining sites of M/s IREL and M/s KMML. The Alappad Panchayat office was also visited to gather information about the environmental issues caused due to beach sand mining.

At Vellanathuruth in Alappad Panchayat, about 1 Km length has been allotted to M/s. IREL for beach mining. It is located in 16th ward of Alappad Panchayat. Except for this small stretch of beach, the entire coastal stretch of Alappad Panchayat is having sea




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wall protection. The sea wall is reported to have constructed as early as in the year 1977. During the visit, beach mining operations were not observed. Two officers from M/s. IREL were present at the site. It was informed that beach mining operations were temporarily halted for past 6 months on the direction of Chief Minister of Kerala on account of public complaints. However inland mining was going on using excavators, front wheel loaders, other earth movers and was told that DWC is under repair.

It was reported that M/s. IREL separates minerals such as Ilmenite, Rutile, Zircon, Monazite, Sillimanite and Garnet after washing and gravity separation of the dredged sand using hydro-cyclones. Approximately, 1000 Tonnes of sand is dredged from the area per day. IREL has an on-site primary mineral separation plant at Vellanathuruth beach. Heavy minerals fractions are separated and transported to the mineral separation plant. The tailings are seen heaped in the beach itself. Some part of the excavated (inland) area was seen refilled with tailing sand and planted with coconut saplings. The company has provided temporary/ contract/ permanent jobs for the people who have leased their land to them for a period of 3 years as per the lease agreement. It was reported that M/s IREL has the Government permit to dredge coastal shore line to a maximum width of 100 m.

The ground water in the wells of this area has salt content due to the proximity of the sea and the water for drinking purpose is provided by Kerala Water Authority and if any shortage occurs, the water is supplied in tankers by M/s. IREL. The seashore and sea wall in the area is also maintained by M/s. IREL.

During the visit it was noticed that beach mining was being done in the site of M/s. KMML in Ponmana area in Panmana village. The site is adjacent to IREL site, in the northern part of Panmana Village. About 50 temporary mining staff were employed in transferring the heaped sand into trucks. Two front loading earth movers were seen at the site. The contractual mining staffs are reported to be from the displaced families, who have sold their land to the KMML. Large heaps of left over sand could be seen near this beach which was not utilized for refilling the mined areas.

T S canal is east of the mining area and is separated from the sea by the beach and inland mining areas at Vellanathuruth & Ponmana. In the beach mining area, the land had dwindled to a meager 50 m at Vellanathuruth. Mining activities at beach front and inland in proximity to T S Canal have devoured the land over a period of time.



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Chief Environmental Engineer

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Beach mining activities at Ponmana (KMML mining site)



Inland mining by IREL at Vellanathuruth (Alappad village)



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Chief Environmental Engineer



Ponmana (KMML beach mining site)



Primary sand processing facility of IREL at Vellanathuruth (Alappad village)



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Sand tailing heap at IREL primary processing site, Vellanathuruth



Beach mining site of IREL, Vellanathuruth

As per NCESS reports, approval letter of mine plan, Govt. lease orders and EIA reports by the project proponent, only sustainable volume of sand shall be mined from the beach and proper reclamation / mine closure measures are to be followed for continuing the mining without causing harm to the environment. The tailing, which is more than 70 % of the collected sand, shall be returned to the beach itself. The indiscriminate removal of sand from the beach is the major reason for the beach erosion and in the NCESS report it is also advised not to beach mine during monsoon season when the beach erosion is aggravated.



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M/s. IREL obtained EC vide F.No. 11-36/2008-IA-III, dated 01-03-2011 for mining in 180 Ha area in Alappad, Panmana and Ayanivelikulangara villages in Kollam District. They have obtained Integrated Consent to Operate under Water, Air & Environment Protection Act for beach washing, for a quantity of 800 Tonnes/ day and having mineral separation of 160 Tonnes/ day. M/s. IREL also has applied for Environmental Clearance for 8 Ha of land in Block II on mining lease valid till 28/2/2020. In the case of KMML, has applied for EC for block III and public hearing was conducted. They have not applied for consent to operate under Water, Air & Environment Protection Act for beach washing and mineral separation operations.

2.1 Specific observations based on the site visit:

- During the site visit it was noticed that both companies are not returning the tailing sand to the beach.
- Heaps of tailing sand could be observed at Vellanathuruth near primary sand processing facility of IREL and at KMML mining site, Ponmana, northern side of Panmana village.
- A part of the tailing sand was found to be reused for refilling the leased inland mine area at Vellanathurth. This reclaimed area was leased private property.
- DWC for inland mining was found to be not in operation and mechanical excavation using earth movers was observed. In the case of DWC, the separation of the minerals happen on-site and tailings will be deposited to the mined area simultaneously.
- Abandoned school and other structures were observed in Ponmana area near to present KMML mining site.
- Mangroves were observed along the T S canal side of Ponmana area.
- A locally famous temple Kattil Mekathil Durga temple is located in the KMML mining site at Ponmana, Panmana village.
- Constructed groins for promoting beach accretion were observed in the Vellanathuruth and Ponmana beaches.
- As per the local people surveyed at Vellanathuruth, they are willing to lease out their property to IREL because of the fair lease package offered by the company. This fact was further confirmed by the Alappad Panchayath authorities.
- As per the IREL lease, reclaimed site is returned to the owner within three years and valuation of structures, trees, etc. are as per Govt. rates. Apart from this relocation charges are borne by the company.




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- Temporary/ permanent employment is offered by the company to one member of each displaced family.
- As per the local people, KMML is purchasing private lands in the lease area and temporary job as mining staff is offered to one member of each displaced family.
- Due to the unsustainable mining practices, there are environmental damages/ degradation to the area with respect to the following:
 - *Loss of beach land and natural plantation*
 - *Loss of natural beach and recreational value*
 - *Loss of traditional fishing*
 - *Loss of natural coastal protection*
 - *Loss of habitat, properties & cultural value*
 - *Loss of ecological services offered by coastal region*

3.0 Environmental damage

The term environmental damage is linked with serious cases of pollution, contamination and loss to biodiversity and is often dealt with environmental liability regulations and through ecological/ environmental compensation under the ambit of 'polluter pays principle'. The concept of ecological compensation is the charges to be paid for polluting environment and the charges are arrived on the basis of the ecologic-economic assessment of that particular environment.

On assessing the environmental damages, adequate ecological compensation is levied upon the defaulters to implement measures intended to restore, rehabilitate, decontaminate and enhance the concerned environment. Hence, the environmental compensation imposed for environmental damages essentially includes restoration/ rehabilitation expenses, fine/ penalty/ financial deterrent for the activities which caused the environmental damages and the expenses incurred for identifying the extent of environmental degradation.

Environmental damages due specific anthropogenic activities have far reaching effects on various habitats and ecosystems and also impair human's consumer & non-consumer values. Environmental damages significantly vary in terms of the damage's space, scope, level and magnitude. Due to this, significant indices or markers of environmental damage differ considerably and one of the initial steps of environmental damage assessment is to determine the unique indices or markers which help assess the actual damage. However, due to the complicated conception of ecosystems, it would be a



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daunting task to understand and assess the extent of environmental damages. This also holds good on the fact that; it is quite a complicated task to correctly assess the benefits to emerge from the restoration measures as a result of implementation of compensatory activities.

3.1 Environmental Damage Assessment

Environmental damage assessment and compensation involves three modules. The first and foremost step is to assess the interim compensation for interim/ temporary restoration process. This is assessed by quantifying the interim damages with the help of equivalency analysis. In the present case (unsustainable mining of black sand at beach front), reserve equivalency method can be used where potential interim environmental damages can be assessed in each compartment of habitat like air, water, land, flora, fauna, etc. Potential damages calculated for each compartment sums up as the interim compensation for immediate restoration measures.

The equivalency analysis, selection of environmental indices/ markers and appropriate restorations always represent a repeated process. Thus, the initial decisions on the choice of equivalency approaches and restoration measures can be changed after gaining more knowledge about the nature of the relevant damage and the effective restoration. It is also highlighted that there is no established standard for any of the components of environmental equivalency analysis and so, it would be fully reasonable to consider any approach which promises to reach the appropriate restoration of type and amount through the most efficient way as the 'most correct' approach.

After the interim assessment, environmental restoration plan has to be made by a detailed investigation and appropriate restoration measures has to be zeroed on by a panel of environmental experts. The actual cost of such a restoration plan/ project has to be imposed on the defaulter. The third component of the environmental damage is the actual cost of studies/ surveys/ investigations/ discussions/ monitoring/ reviews/ field visits/ laboratory assessments, etc. carried out by the regulatory authorities and expert team assigned with the implementation/ monitoring/ review of the restoration project. Therefore, environmental damage essentially includes following three components:

- a) *Interim damage assessment and compensation for temporary restoration activities.*
- b) *Expenses with respect to long term restoration/ rehabilitation plan.*
- c) *Cost associated with all studies, investigations and reviews associated with damage assessment and restoration activities.*



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3.2 Interim damage assessment

The first step of damage assessment is to impose compensation on interim damages emerged in each compartment of the habitat/ ecosystems. This include the cost of resources, which has been impaired of its intended uses after the emergence of damage.

The matter in question is the unsustainable beach mining of black sand by M/s. Indian Rare Earth Ltd (IREL) and M/s. Kerala Metals & Minerals Ltd (KMML) in Vellanathuruthu (Alappad Panchayat), Ponmana (Panmana Panchayat) and Kovilthottam (Chavara Panchayat) in Kollam district, Kerala. The potential damage assessment is limited to land and water funds. Due to unsustainable mining activities, damages are manifested on coastal land and the subsequent effects are, lossofland resources, deprived natural coastal protection, altered coastal micro climate, aggravated beach erosion, effect on recreational/ cultural aspects, etc.

Damages are believed to be negligible on surface waters and ground water. The environmental damages associated with coastal productivity, fauna and fish stock are to be investigated thoroughly to delineate any effects if exist in the restoration phase. Similarly, health effect of such unsustainable mining requires a very detailed study as black sand deposits are associated with natural background radiation as traces of radioactive minerals occur along with other heavy metal minerals. The effect of mining on the background radiation needs a thorough investigation and implication on human health has to be elucidated.

In this report the interim damages are assessed with respect to land resources and unsustainable extraction of mineral reserves. Any other damages on account of other environmental components can be integrated with this assessment if required.

The damage assessment is confined only to 2001 – 2019 as there is great limitation in obtaining relevant data for the period prior to 2000. The committee has referred World Bank document, “Methodology for calculating environmental damage assessment and relevant compensation” (World Bank, 2011) developed for mining sector.

Potential environmental damages can be listed as following:

- Land destruction due to tailings
- Land lost due to unsustainable mining
 - Value of land



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Chief Environmental Engineer

- Land plot damage - Lost opportunities on account of:
 - Agriculture revenue lost
 - Recreational
 - Cultural
 - Traditional fishing
- Damage due to unsustainable extraction of minerals
- Restoration expenses
- Ecological services lost
 - Natural coastal protection
 - Coastal micro climate control

3.2.1 Land deterioration/ destruction due to tailing

The following formula is applied for calculating damage to be caused to the surrounding environment because of the deterioration/ degradation/ pollution of the ground surface with solid wastes:

$$D (GS) = Q \times M \times CF (SW)$$

D (GS)	Damage to be caused by land reserve destruction or land surface deterioration.
Q	Index of land reserve's relative value (0.3 for barren lands to 3.0 for land falling under ecologically sensitive zones).
M	Weight/ quantity of solid waste released (Tons/ year)
CF(SW)	Damage to be caused by 1.0 ton of solid waste (Rs.)

The land reserve's relative value can be taken as 0.5 for barren lands, 1.0 for grass lands/ recreational plots, 1.5 for agricultural lands, 2.0 for plantations, wetlands& coastal area, 2.5 for forest lands and 3.0 for ecologically sensitive zones.

The amount of unit damage to be caused to the surrounding environment in the result of releasing of 1.0 ton of solid waste into the environment can be expressed by the sum of the expenses on removal, detoxification, disposal charges, cost of land polluted, expenses on hygiene and environmental restoration measures.

In this specific scenario, the solid waste generated is the mine tailing resulted from the beach mining/ washings. The black sand rich in ilmenite and other heavy metal minerals are processed on or off site to separate heavy metal rich fractions and tailing consisting



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of silica sand are deposited in surrounding areas as mounds or in trenches in the industry premises.

As per the recommendations of NCESS for sustainable mining, these mine tailing have to be deposited back to the beach to prevent further erosion of beach and to reclaim the lost beach due to mining activities. This is one of the requirement as per the approved mining plan and Government mining lease, where it is imposed that the reclamation of mined area and progressive closure of mine shall be done as per the plan. However, the industry representatives were of the opinion that depositing sand tailing back to beach front was not viable for two main reasons: a) loose sand depositions at beach front will be carried off by wave action and b) tailing deposition at beach front will reduce further deposition of the heavy metal rich black sand and its heavy mineral content.

Hence, excessive extraction of beach sand using heavy earth moving equipment and non-deposition of sand tailings back to the extracted areas in beach front resulted in the loss of beach area. Or in other words the intensive beach mining operations and associated anthropogenic perturbations disturbed the natural beach formation, increased beach erosion and ultimately resulted in the destruction of beach front. The extent of land loss is evident from the Google Earth imagery.



Vellanathuruth (IREL beach mining site) 08-04-2019

Yellow reference line is 300 m long



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Vellanathuruth (IREL beach mining site) 29-01-2003



Panmana (KMML beach mining site) 13-04-2019
Yellow reference line is 440 m long



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Chief Environmental Engineer



Panmana (KMML beach mining site) 29-01-2003

To calculate the extent of damage, total mine tailings generated during the beach mining operation is required. Reports regarding quantity of beach washing, heavy mineral content, tailing generated etc have been called for from the concerned industries and it is attached as Annexure III & IV. The complete detail of mine tailings generated by the beach washing by M/s. IREL and M/s KMML is not provided by the industries and is not available in the NCESS report of April, 2019. Hence, the quantity of mine tailings is calculated from the total sand excavated from beach washing / mining and the average heavy mineral (%) in the excavated sand. The remaining sand after the extraction of minerals is taken as the tailing which has to be disposed of scientifically for reclaiming mined areas. Details of mine tailings generated by the industries are given bellow.

<i>Particulars</i>	<i>IREL</i>		<i>KMML</i>	
	2001-10	2011-19	2001-10	2011-19
Period of mining activity	2001-10	2011-19	2001-10	2011-19
Mined volume (MT)	1643976	1175784	1573070	1778921
Average heavy mineral (HM) (%)	54.47	30.52	23	24.91
Approx. mineral sand in the mined volume (MT)	895473.73	358849.28	361806.10	443129.22
Tailings generated based on the HM % (MT)	748502.27	816934.72	1211263.90	1335791.78



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 ...ADHAKRISHNAN

There is a huge data gaps in % heavy metal contents in the mined sand with respect to KMML, the heavy metal content (%) was calculated with limited data made available to the committee. Data from 2008-09 onwards was provided by KMML and based on this % HM content was calculated. For the decade 2001-2010, only two data sets were available for the years 2008-09 and 2009-10 and from this heavy metal percentage calculated (18.4 & 14.2 % respectively). However, considering the huge gap in data for the period 2001-2010, approximate HM content of 23% was taken into consideration for calculating the mine tailings generated by KMML.

For calculating the environmental damages to land deterioration/ destruction/ pollution due to improper mine tailing disposal, following aspects have to be accounted/ considered.

<i>No.</i>	<i>Requirements</i>	<i>Particulars</i>	<i>Remarks</i>
1	Index of land reserve's relative value.	2.0	The land reserve's relative value can be taken as 0.5 for barren lands, 1.0 for grass lands/ recreational plots, 1.5 for agricultural lands, 2.0 for plantations, marine & coastal area, 2.5 for forest lands and 3.0 for ecologically sensitive zones.
2	Quantity of mine tailings improperly disposed (Tonnes)	1565436.99	Calculated quantity of tailings generated by M/s. IREL for the period from 2001-19.
		2547055.68	Calculated quantity of tailings generated by M/s. KMML for the period from 2001-19.
3	Damage to be caused by 1.0 tonne mine tailings disposed unscientifically.	Rs. 99/ tonne	The mine tailings generated in this process is washed beach/ sea sand. In this context detoxification and waste disposal/ treatment cost are not applicable. The damage factors to be considered in this scenario are the removal, reuse of mine tailing and the restoration/ reclamation of the beach area where the tailings were disposed. In this context it is estimated that Rs.99/ tonne is required for the removal and disposal of mine tailings using earth moving machineries. Since, this coastal stretches of southern Kerala were once sand dunes, the best restoration effort is to stop beach mining and allow sand dunes to develop along with the



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			natural vegetation. In this context, a separate re-plantation is not considered. The total damage per unit tailing is Rs 99/ Tonne.
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Calculation for damage to be caused to the land environment because of the deterioration/ degradation of the ground surface with mine tailing:

Industry >	IREL		KMML	
Period of mining activity	2001-10	2011-19	2001-10	2011-19
M=Quantity of mine tailing generated (Tonnes)	748502.27	816934.72	1211263.90	1335791.78
Q=Index of land reserve's relative value	2.0	2.0	2.0	2.0
CF (SW)= Damage to be caused by a tonne of mine tailing (Rs.)	99	99	99	99
Damage to be caused by land reserve destruction/ pollution D (GS) = Q x M x CF (SW) for the period from 2001-2019	148203449.46 (14.82 Cr)	161753074.56 (16.18 Cr)	239830252.2 (23.98 Cr)	264486772.44 (26.45 Cr)

Damage to be caused to the surrounding environment because of the deterioration of the land surface with mine tailing and associated activities of M/s. IREL during the period 2001-2019 = 148203449.46 + 161753074.56 = Rs. 309956524.02 (30.995 Cr)

Damage to be caused to the surrounding environment because of the deterioration of the land surface with mine tailing and associated activities of M/s. KMML during the period 2001-2019 = 239830252.2 + 264486772.44 = Rs. 504317024.64 (50.43 Cr)

Other subsequent ecological cost arising from the land destroyed by the specific activity can be assessed separately and added to the value obtained from the above equation for land deterioration/ destruction.



SINDHU RADHAKRISHNAN
Chief Environmental Engineer

3.2.2 Cost of land/ beach lost due to beach mining

M/s IREL was engaged in beach mining activities in two locations, NK block IV (Vellanathurth) and NK block II (Near Kovilthottam). M/s KMML was carrying out beach mining in beach sections in the NK block III (North & South of Kattil Mekkathil Temple).



Photograph: KattilMekkathil Temple, Panmana.

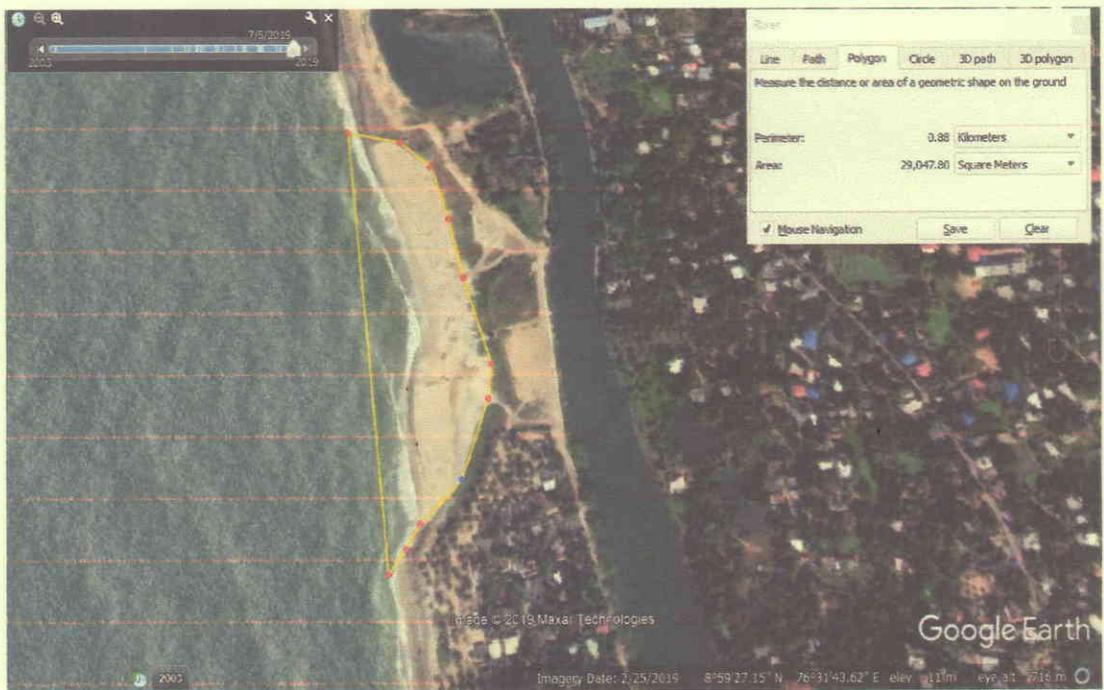
The extent of beach area lost/ affected by unsustainable beach mining by IREL and KMML is taken from Google earth satellite historic data with respect to the 2000 shoreline determined by NCESS in their April, 2019 report. The extent of beach mining was determined by the geomorphologic changes observed in the Google earth historic satellite imagery over a period from 2003 to 2019. Accordingly, areas of 29047.8 and 105924.66 m² were affected due to beach mining activities of IREL near Kovilthottam (NK block II) and Vellanathuruth (NK block IV) respectively. The areas affected by beach mining by KMML were 180481.87 and 58304.31 m² at north and south of KattilMekkathil temple, Panmana village (NK block III) respectively.



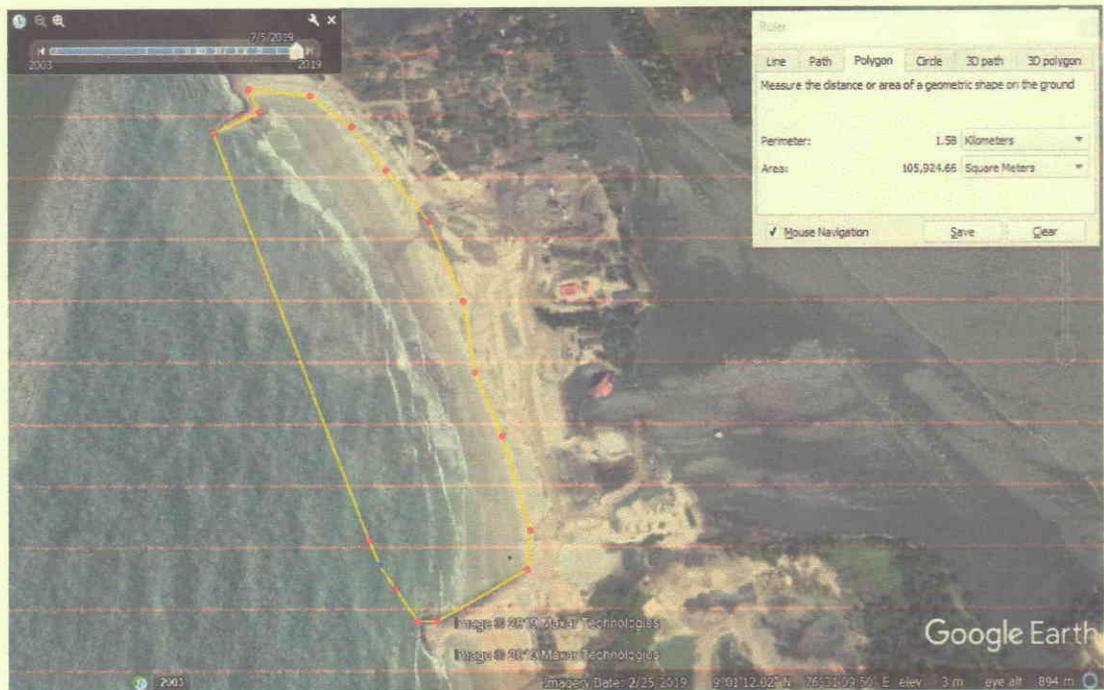
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SINDHU RADHAKRISHNAN
Chief Environmental Engineer

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Beach area affected due to mining activities by IREL (NK Block II)



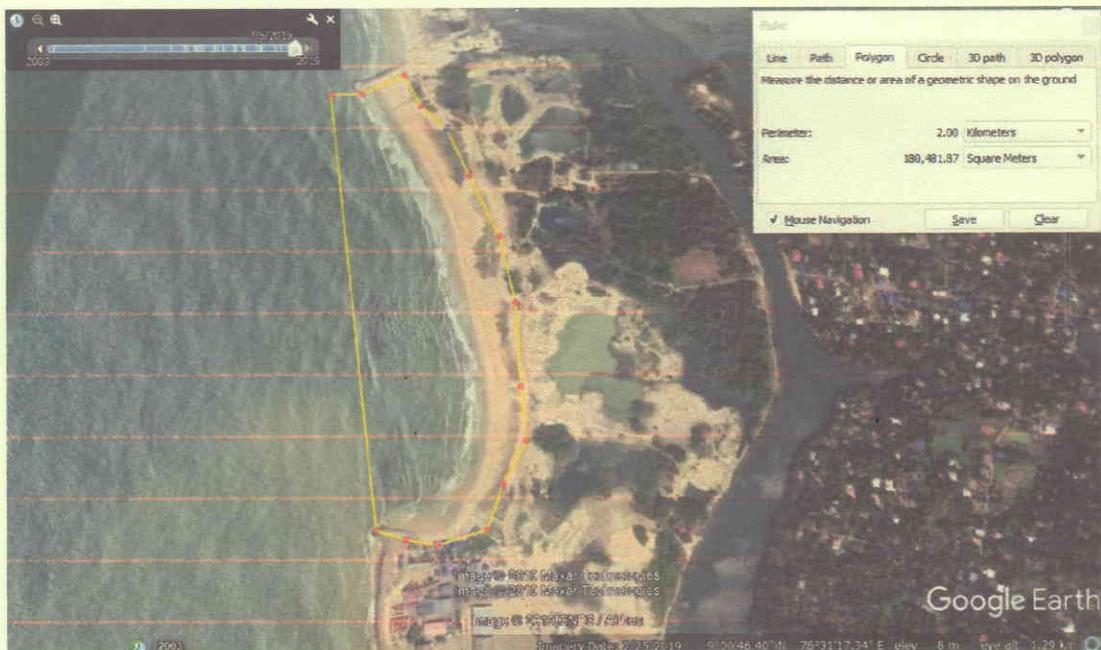
Beach area affected due to mining activities by IREL (NK Block IV)

No.	Industry	Land lost/ affected	Total area	Cost of lost land [#]
1	IREL	29047.8 m ² (NK block II) 105924.66 m ² (NK block IV)	134972.5 m ²	Rs. 66633204.05 (6.66 Cr)
2	KMML	180481.87 m ² (NK block III) 58304.31 m ²	238786.18 m ²	Rs. 117883961.34 (11.79 Cr)

Fair price of land Rs. 49368/ Ares (100 m²)



SINDHU RADHAKRISHNAN
Chief Environmental Engineer



***Beach area affected due to mining activities by KMML
(NK Block III –Ponmana, North of Kattil temple)***



***Beach area affected due to mining activities by KMML
(NK Block III – Ponmana, South of Kattil temple)***

3.2.3 Land plot damage

Land plot damage is calculated on account of deprived or lost opportunities to utilize the land for other purposes, if it was not damaged by the unsustainable mining activities. The narrow coastal strip of land in question can be utilized for recreational purposes, fishing activities, cultivation of coconut trees and other purposes had it been not used for mining activities. These various other land use options are referred as “lost opportunities” and all these deprived uses of land come with their respective value/ cost.



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SINDHU RADHAKRISHNAN
Engineer



Area affected due to mining activities by IREL with respect to lost coconut cultivation



Area affected due to mining activities by KMML with respect to lost coconut cultivation

The Alappad and adjoining Panmana is a narrow strip of land sandwiched between Arabian sea and inland estuary (T S canal) which is rich with black sand deposits. This unique 22 Km long coastal land mass is one of the kinds in Kerala with coastal waters, backwaters and sandy beaches with characteristic sand dunes. Alappad is a unique coastal ecosystem on a sand bar rich in heavy mineral deposits (approx. 50 - 200 m width) and just 0.5 to 1.5m above mean sea level. This make the village vulnerable to slightest of perturbations caused either by natural or anthropogenic factors. Heavy



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SINDHU RADHAKRISHNAN

minerals, coconut palms and fisheries are the major natural resources of the area. The area was bordered by sandy beaches with sand dunes in the past and at present most of the shoreline is bordered with seawall along the entire stretch, except in the beach mining sites. Scattered mangrove patches are there at the eastern side of the land mass along the backwater. The entire coastline of Alappad falls in a well-defined sediment cell extending from the Kayamkulam breakwater in the north to Neendakkare inlet in the south. The area is dotted with several temples and many are in the leased mining sites. The area was severely affected by the infamous tsunami of 2004 and extensive damages were reported in the area.

The lost opportunities or the deprived uses of this coastal strip of land due to unsustainable beach mining are the following:

3.2.3.1 Agriculture: gain from coconut cultivation

The sandy coastal area supports luxurious growth of coconut palms and is evident from the Google earth satellite imagery of 2003. Due to intensive mining activities, the coconut palms were destroyed over a period of time. The economic loss from the vanished coconut tree cover in this coastal area has to be assessed. However, there are no baseline data on the extent of coconut cultivation and the yield in this locality. Therefore, the economic gain from these coastal coconut grooves has to be calculated by the theoretical yield per unit land. Normally, 175 to 400 trees are grown in a hectare of land and around 75 nuts per tree is the average yield from a single tree. In this scenario, it is assumed to be a non-intensive cultivation of coconut palms in the area with 110 trees per hectare with annual yield of 50 nuts. Thus the average gain from coconut palms in one hectare (10000 m²) of coastal land is Rs.44000/ year if the fair price of coconut is Rs 8/-. The other resources derived from the coconut tree like biomass, coir and timber is assumed to be around 5 % of the annual gain and hence, the total unit gain per hectare is Rs. 46200/- per year.

Damages caused to the land that had been previously utilized for recreational/ agricultural/ or any other 'lost opportunities' is:

$$D(LP) = A (LT + G)$$

D(LP)	Damage caused to the land that had been previously utilized for recreational/ agricultural/ or any other 'lost opportunities' (Rs). *
A	Area affected by direct impact (m ²)
LT	Average tax on land paid to the Govt. per unit land (Rs./ 100 m ²)
G	Cost of the lost opportunities (to be gained from recreational/ agricultural/ or any other activities) from unit land (Rs./ year)



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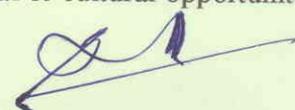
<i>Particulars</i>	<i>IREL</i>		<i>KMML</i>	
	2001-10	2011-19	2001-10	2011-19
A = Area affected by direct impact (m ²)	97747.33		288357.4	
LT = Average tax on land paid to the Govt. per unit land (Rs./ 100 m ²)	Rs.1/ Are (1 Are = 100 m ²)/ year Rs. 100/ 10000 m ² / year			
G = Cost of the lost opportunities (to be gained from coconut plantation) from unit land	Rs. 46200/ 10000 m ² / year			
D(LP) = A (LT + G) Damage caused to the land that had been previously utilized for agricultural (<i>Cocunut palms</i>) (Rs/ year).	452570.1		1335094.76	
Total damages (Rs) for the period 2001-19 (19 years)	8598831.9 (0.86 Cr)		25366800.48 (2.54 Cr)	

3.2.3.2 Recreational/ cultural cost:

The unique coastal morphology of a narrow strip of land sandwiched between sea and estuary is an important factor which enhances the tourism potential and associated recreational activities. Industrial activities like mining and associated operations in contrary will affect the recreational value of such places. Therefore, the area affected by the mining attracts environmental cost with respect to the lost recreational potential. Bequest and existence values have to be taken into account while calculating the cost of lost recreational opportunities. However, in practice, it is very difficult to assign monetary values for such concepts and usually travel cost method (TCM) or willingness to pay (WTP) approaches are used to determine the value lost recreational opportunities. Similar is the case of cultural/ spiritual values as the areas have more temples and cultural centers. Due to intensive mining activities, the aesthetic attributes are compromised and recreational potential has been destroyed over a period of time. Due to the mining activities, temples were isolated and cultural centers were abandoned, resulting in the deprivation of cultural values.

However, the approaches like TCM and WTP requires comprehensive studies and scientific surveys over a period of time covering various sections of the society across all income groups. Such studies are exhaustive, requires time and resources to get utilizable data for such monetary valuations. In this scenario, on interacting with a small section of local communities, the value of lost recreational & cultural opportunities has





SINDHU RADHAKRISHNAN
Chief Environmental Engineer

to be assumed with the extent of willingness to pay expressed by the local people to enjoy the natural and cultural landscape of the locality, had it been preserved properly.

Recreational value assigned by local population

Recreation value is a bequest/ existence value and it is hard to fetch price for such entities. It is assumed that, 10% of the local people population is willing to pay Rs. 20/ person to enjoy the aesthetic value of coastal region with beaches and lush green cover of coconut trees for 120 days in a year. Therefore 10% of population (5066 people) visiting the beaches for 120 days in year spending Rs.20/person: Rs. 12158400/- (1.21 Cr) per year.

Recreational value assigned by outstation people

If same number of people (5066) comes from outstation localities for 30 days in a year spending on an average of Rs. 100/- per person, then the approximate recreational value placed on the area by outstation people is Rs. 15198000/- (1.52 Cr) per year.

Cultural value assigned by the local population

10% of population (5066 people) visiting the temple and cultural centers for 96 days in a year spending Rs. 10/ person: Rs. 4863360/- (0.48 Cr) per year.

Total cost of lost opportunities on account of recreational and cultural purposes is:
12158400+15198000+ 4863360 = **Rs. 32219760/- per year.**

Therefore the above cost projected for 2001-19 (19 years) = 612175440 (61.22 Cr)

The above cost may be divided equally among IREL and KMML, which is **Rs. 306087720.00 (30.61 Cr).**

3.2.4 Damage due to unsustainable extraction of minerals

In case of illegal/ unsustainable extraction operations, the total amount of damage shall be calculated by below formula:

$$D(IE) = Q \times P + RE$$

D(IE)	Extent of damage to be caused by illegal/ unsustainable extraction of mineral resources (Rs).
Q	Volume of illegally extracted mineral resources (MT)
P	Market rate or price of mineral resources (Rs.)
RE	Expenses on restoration measures (Rs.)



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In the April, 2019 report submitted by NCESS, it is clearly pointed out that both IREL and KMML have not adhered to the sustainable mining quantities already recommended by NCESS in previous study reports of 2012 & 2013. It is also maintained that the unsustainable mining extraction beyond the recommended quantity resulted in severe erosion of beach and coastal stretches. Had the industries, exercised caution while mining, the present situation of loss of beach could be prevented.

In the report, NCESS has calculated the excess quantity mined by both industries which is 50 % more than the recommended limits during 2010-19. The value of minerals extracted over the recommended quantity has to be recovered from the defaulting industries.

The base price of minerals extracted shall be used to calculate the damage. Though, black sand is rich in seven heavy minerals (ilmenite, leucoxene, rutile, zircon, sillimanite, garnet and monazite), lion share of production is through ilmenite. Hence, base price of ilmenite is used to calculate the damages due to illegal/ unsustainable extraction of minerals. For the purpose of calculation, the heavy metal content (%) of the mined beach sand is taken as 54.47 & 30.52 for IREL for 2001-10 & 2011-19 periods respectively. For KMML the heavy metal content taken are 23 & 24.91 % for 2001-10 and 2011-19 respectively.

As per the Indian Minerals Yearbooks 2011, 2017& 2018 (Part III: Minerals review), prepared by Indian Bureau of Mines, Ministry of Mines, Govt. of India; IREL produced Quilon (Q) grade Ilmenite prices from the period 2008-17, varies from 3775 to 6000/T (2008-11) and 1700 to 22250/T (2013-14). The price range was Rs. 5850 to 15120/ T during 2015-17. Therefor the ilmenite price of IREL varied from Rs. 1700 to 22250 during the period 2013-17.

The average price calculated for ilmenite produced by IREL during 2008-17 is Rs 10390.56/ T. KMML produced ilmenite price for the above period is limited for 2008-09, 2011-12 and 2012-13 as per the Indian Minerals Yearbook 2017 & 2018. The average price based on the prices during the above period is Rs.15275/ tonne.



SINDHU RADHAKRISHNAN
Chief Environmental Engineer

Period of mining activity	2001-2010		2011-2019	
	IREL	KMML	IREL	KMML
Mined quantity (m ³)	913326	873997*	653219	988297
Sustainable mining limit recommended by NCESS (m ³ / year)	75000	75000	48600	74500
Excess quantity mined/ extracted (m ³)	238326 (428939.13 MT)	273997 (493139.8 MT)	215819 (388471 MT)	317797 (572030 MT)
Heavy metal %	54.47	23.0	30.52	24.91
Q = Mineral content in the excess quantity mined MT	233643.13	113422.15	118561.3	142492.6
P = Avg. price of mineral resources (Rs./ MT)	4306.75	4306.75	10390.56	15275
Extent of damage to be caused by unsustainable extraction of mineral resources (Value of excess mining) (Rs) D(IE) = Q x P	1006242550.13 (100.60 Cr)	488480629.18 (48.85 Cr)	1231918301.33 (123.19 Cr)	2176574465 (217.66 Cr)
RE = Expenses on restoration measures (Rs.)	To be assessed separately			

* KMML has not given mining quantity for 2001-02

Value of excess extraction of minerals for IREL:

Rs 1006242550.13 + 1231918301.33 = **2238160851.46 (223.82 Cr)**

Value of excess extraction of minerals for KMML:

Rs 488480629.18 + 2176574465.00 = **2665055094.18 (266.51 Cr)**




 SINDHURAJ BAHADUR MISHRA
 Chief Environmental Engineer
 Environmental Engineer

4.0 Total interim environmental damages

No.	Damage components	IREL	KMML
1	Damages caused by land reserve destruction (Tailing)	309956524.02 (30.995 Cr)	504317024.64 (50.43 Cr)
2	Cost of land affected by unsustainable beach mining.	66633204.10 (6.66 Cr)	117883961.30 (11.79 Cr)
3	Damage caused to the land that had been previously utilized for <i>Coconut cultivation</i>	8598831.90 (0.86 Cr)	25335360.60 (2.54 Cr)
4	Total cost of lost opportunities on account of recreational and cultural purposes (2001-19)	306087720.00 (30.61 Cr)	306087720.00 (30.61 Cr)
	Total Environmental damage (1+2+3+4)	69,12,76,280 (69.12 Cr)	95,36,24,067 (95.36Cr)
5	Value of excess extraction of mineral resources (2001-2010)	1006242550.13 (100.62 Cr)	488480629.18 (48.85 Cr)
6	Value of excess extraction of mineral resources (2011-2019)	1231918301.33 (123.19 Cr)	2176574465.00 (217.66 Cr)
	Total value of excess mining (5+6)	223,81,60,851 (223.81 Cr)	266,50,55,094 (266.51 Cr)

Summary of damage assessment

- a) *Interim damage assessment and compensation for temporary restoration activities calculated for IREL for the period 2001-19 is Rs.69,12,76,280 (69.12 Cr and the total value of excess mining 223,81,60,851 (223.81Cr)*
- b) *Interim damage assessment and compensation for temporary restoration activities calculated for KMML for the period 2001-19 is Rs. 95,36,24,067 (95.36 Cr) and the total value of excess mining is 266,50,55,094 (266.51 Cr)*

4.1 Long term restoration plan and assessment of ecological services

Damages with respect to lost beach front have to be levied from the defaulters in the form of actual restoration expenses. The restoration plan has to be made after consulting with environmental & domain experts. Since, this process is an in-depth study demanding resources and time; this has to be taken up separately. Along with this the damage on account of deprived ecological services offered by beach if it had not been



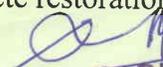

SINDHU RADHAKRISHNAN
Chief Environmental Engineer

disturbed by mining activities (services like natural coastal protection, primary productivity, services of coastal wetland, etc.) has to be taken up and assessed.

5.0 Finding and Suggestions

- A. Environmental damages assessed by the joint committee may be recovered from the defaulting industries with suitable modification in assessment if required and may be utilized for making a restoration plan and its implementation.
- B. The State Board opines that the value of excess minerals extracted even though comes under environmental damage has already been accrued to the public as both companies are fully owned by Government. Hence the committee leaves open the question of whether the amount is to be recovered as damages.
- C. The above assessment is not including the deprived ecological services of the land / beach existed previously in the mining areas. The biggest hurdle in such damage assessment studies is the lack of proper baseline data to compare with the present scenario. In this scenario also, the baseline conditions/ data collection was the most difficult part. Hence, it is suggested that, provisions may be made to compile all relevant baseline data/ conditions at the proposal stage of all projects. This aspect should be included in the EIA/ EMP report, EC, etc., so that it can be readily referred in case of future environmental damages due to that project.
- D. The quantity of tailing sand available in stockpiles need to be surveyed and estimated. The tailing sand must be used immediately for restoration of eroded beaches. It is expected that the available sand is not sufficient for restoring the entire area lost. The companies must submit mine closure plans specifying the method of restoration of sandy beaches.
- E. It is unlikely that beach mining can be conducted without erosion. The beaches in this area are subject to seasonal erosion and accretion. Assuming the mean shoreline position is steady in the absence of mining, it is clear that the net removal of heavy minerals would cause erosion. Therefore it is necessary to find alternatives for recovery of valuable minerals without damaging the beaches. The companies must submit mining plans for offshore dredge mining and use of silica sand tailings therefrom for complete restoration of beaches.




SINDHU RADHAKRISHNAN

- F. Mining using mobile gravity separator in the shoreline also may be explored. The present mining practices are totally unsustainable and should be discontinued till other sustainable and viable options are made to tap the mineral resources.
- G. Offshore mining by suction dredging already being done by IREL at OSCOM, Odisha shall be implemented in the mining fields of IREL & KMML in Kerala. The mineral budgeting studies done by AMD, points out good deposits of minerals extending up to 1 Km in the sea. Possibility of offshore mining shall be explored and beach mining may be stopped till the restoration projects are completed.
- H. Inland mining may be allowed only with dredge wet concentration (DWC) method, where the tailing will be deposited in the pit simultaneously with mining. This will reduce the unscientific disposal of tailing and will have some accountability on the sand tailing.
- I. Since, it was opined by many experts that offshore mining by suction dredging and mobile gravity separator will not be viable for short stretches of beaches; the industries may be allowed to explore engaging a common facility for offshore mining. In order to facilitate offshore mining, a window of two years may be given to stop all existing mining practices and completely shift to offshore mining.
- J. Comparing to other beach mining sites in Tamil Nadu, the beach erosion is at a higher magnitude at Alappad & Panmana due to its unique geographical location. If the mining continues unabated, the inland waterways bordering the mining sites will merge with the sea and subsequent after effects may have far reaching effects on the ecology of the area.



Dr Deepesh V
Scientist B
Central Pollution Control Board,
Regional Directorate, Bengaluru



Smt. Sindhu Radhakrishnan
Chief Environmental Engineer
Kerala State Pollution Control Board,

SINDHU RADHAKRISHNAN
Chief Environmental Engineer



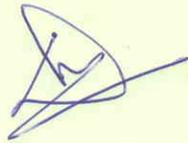
**BEFORE THE HONOURABLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI**

Original Application no. 76/2019

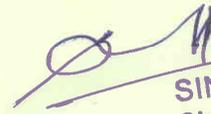
State of Kerala & Others : Respondent(s)

VERIFICATION

We, Sindhu Radhakrishnan, aged 50 years, D/o Sri. R. Radhakrishnan Nair, Chief Environmental Engineer, Kerala State Pollution Control Board, Regional Office, Thiruvananthapuram, and Dr. Deepesh V, aged 42 years, S/o Valsan Velachery, Scientist B, Central Pollution Control Board, Regional Directorate, Bengaluru, do hereby verify on this the 2nd day of November 2019, that all what is stated above are true and correct to the best of our knowledge, information and belief.



Dr. Deepesh V.,
Scientist B
Central Pollution Control Board.



Smt. Sindhu Radhakrishnan
Chief Environmental Engineer
Kerala State Pollution Control Board,

SINDHU RADHAKRISHNAN
Chief Environmental Engineer



Item No. 06

Court No. 1

**BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI**

Original Application No.76/2019

News item published in "Indian Express" Authored by Vishnu Varma

Titled

"17-year-old's video gets Kerala talking of impact of sand mining"

Date of hearing: 19.07.2019

**CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE MR. JUSTICE S.P. WANGDI, JUDICIAL MEMBER
HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER**

For Applicant(s): NONE

For Respondent (s): Mr. Nishe Rajen Shonker, Advocate for Kerala
Mr. Jogy Scaria, Advocate for KSPCB

ORDER

1. The issue for consideration is the alleged unscientific mining by Centre Rare Earths Limited and Kerala Minerals and Metal Limited along the coastal area of Kollam in Kerala. Vide order dated 29.03.2019, a report was directed to be furnished on the factual aspects by the District Magistrate, Kollam and the State Pollution Control Board (SPCB).
2. Accordingly, such a report has been furnished vide e-mail dated 17.07.2019, though the report is of April 2019. Findings in the report are as follows:




MOHAN RADHAKRISHNAN
Chief Environmental Engineer

"7. Conclusions and Recommendations:

A preliminary study on the erosion along the Neendakara-Kayamkulam coastal stretch and the contribution of beach sand extraction on the extent of vulnerability was carried out during February-March 2019. The present study, even though carried out within a short period has utilised all the relevant data needed for assessing the present status / stability of the coast. The field data collected as part of this study along with the archived data with CESSAICCESS and other secondary data collected from various sources have been synthesized and integrated to have a comprehensive understanding of the present state. The salient conclusions are as below:

The long-term shoreline changes computed from the aerial photograph/satellite imageries for the period 1968-2019 shows severe erosion of the mining sites of IREL and KMML. The shoreline retreats are to the extent of 425 m, 382 m and 142 m respectively at Vellanathuruthu (IREL mining site), Ponmana (KMML mining site) and Kovilthottam (IREL mining site). During the period of 2000-2019 the shoreline has receded by 243 m, 227 m and 57 m respectively at Vellanathuruthu, Ponmana and Kovilthottam mining sites.

Critical examination of the shift in nearshore depth contours during the 19 year period of 2000 to 2019 utilising bathymetric charts prepared by CESSAICCESS in 2000, 2010 and 2019 has revealed that there has been a shoreward shift in isobaths particularly the shallow water isobaths of 2-10 m. The extent of deepening of the nearshore areas is more pronounced off Ponmana and Vellanathuruthu indicating severe erosion in the nearshore areas.

perusal of the mining data provided by the two public sector companies M/s. IREL and KMML conclusively show that the mining volumes during the last two decades viz-2000 -2010 and 2010 -2019 have been considerably higher than the sustainable mining quantity recommended by CESS/NCESS. The severe erosion is attributed to the unsustainable mining practices that have been going on along this coast."

(emphasis added)

3. Thus, the report shows that mining volumes have far exceeded the sustainable mining quantity proposed. The excess quantity is noted as follows:

"Table 11 Excess quantity mined by IREL and KMML during the period of 2001-2010 and 2010-2019

PSUs	Mining quantities for 9 years (m ³)	Average mining quantity (m ³ /year)	Permissible quantity (m ³ /year)	Excess quantity mined for 9 years (m ³)
2001-2010				
KMML	*8,73,997	*1,09,250	1,50,000 m ³ (2,69,998 MT)	5,46,573 m ³ (9,83,824 MT)
IREL	9,13,326	1,01,481		
Total	17,87,323	1,98,591		
2010-2019				
KMML	9,98,297	1,09,811	#74,500 m ³ (1,34,099 MT)	3,17,797 m ³ (5,72,030 MT)
IREL	6,53,219	7,25,80	##48,600 m ³ (87,479 MT)	2,15,819 m ³ (3,88,471 MT)
Total	16,41,516	1,82,391	1,23,100 m ³ (2,21,578 MT)	5,33,616 m ³ (9,60,501 MT)
Note:				
1. Lengths of mining sites of KMML and IREL are 1060 m and 1500 m respectively with a total mining length of 2560 m				
2. *KMML has not given the mining quantity for 2001-2002				
3. #Recommended volume as per NCESS report submitted to KMML (Hameed et al., 2013)				
4. ## Recommended volume as per NCESS report submitted to IREL (Kurian et al., 2012)				

4. In view of above, we constitute a joint Committee with representatives from the Central Pollution Control Board (CPCB) and the State Pollution Control Board, (SPCB) to determine the amount of compensation to be recovered for damage to the environment by unsustainable illegal mining. Such a report may be furnished within two months by e-mail at judicial-ngt@gov.in. It is open to the concerned regulatory authorities to recover the compensation by following due procedure of law.



SINDHU RADHAKRISHNAN
Chief Environmental Engineer

A copy of this order be sent to the CPCB and the SPCB by e-mail for compliance.

List for further consideration on 16.12.2019.

Adarsh Kumar Goel, CP

S.P. Wangdi, JM

K. Ramakrishnan, JM

Dr. Nagin Nanda, EM

July 19, 2019
Original Application No.76/2019
DV

SINDHU RAMAKRISHNAN
Chief Environmental Engineer

**MINUTES OF THE MEETING CONDUCTED ON 13/08/2019 IN
CONNECTION WITH THE ISSUES RELATED TO BEACH MINING, IN
THE CHAMBER OF THE CHAIRMAN OF THE BOARD**

Meeting started at 2.10 pm. Chairman presided over the meeting. Member Secretary was also present. The following officers attended the meeting.

- 1) Dr. L. Sheela Nair - Sc. F& Group Head, NCESS Co & Group
- 2) R. V. Viswanath - General Manager (TS), IREL, Chavara
- 3) Sri. S. Surya Kumar - General Manager & Head, Chavara, IREL
- 4) Sri. T. S. Shaji - Assistant Managing director
- 5) Dr. Mathew Joseph - Director, Geological Survey of India
- 6) Sri. Baiju Sebastian - Senior Geologist, Mining & Geology Department
- 7) Dr. J. Ansari - CSIR – NIIST, Thiruvananthapuram
- 8) Sri. S. Anil Kumar - Superintending Engineer, Harbour Engineering Department, Thiruvananthapuram
- 9) Sri. V. Ajaykrishnan - General Manager, KMML
- 10) Sri. S. Karthikeyan - Assistant General Manager, Mines
- 11) P. K. Baburajan - Chief Environmental Engineer, Head Office, Thiruvananthapuram.
- 12) Sri. M. P. Thrideep Kumar - Environmental Engineer, Head Office, Thiruvananthapuram.
- 13) Smt. Simi. P - Environmental Engineer, District Office, Kollam.
- 14) Smt. Saritha. R - Assistant Environmental Engineer, Head Office, Thiruvananthapuram.




SINDHU RADHAKRISHNAN
Chief Environmental Engineer

Chairman welcomed all the officers and requested everyone to introduce themselves. Chairman informed that the meeting was convened for discussing the issues related to beach mining and to find a solution for the issues. He said that the mineral resources have to be recovered without causing environmental damage. Offshore mining has to be promoted. How to carry out the above in a practical way is the intention of this meeting.

Sri. T. S. Shaji, Atomic Minerals Division, Department of Atomic Energy explained the details of mineral deposits in that area. Chavara region is having a major mineral deposit for a 22.5 km stretch from Neendakara to Kayamkulam. Titanium content is more than 62% and low iron content from HTL to 200 m upto T. S Canal. From T. S. Canal to 1 km east, heavy mineral potential is 10 % and upto 6 km, it is 6 - 7.5%. Sedimentation deposit is there upto 12 km. Kerala Minerals & Metals Ltd & Indian Rare Earth Ltd. together carrying out mining in 8 blocks, for that they are holding lease. The mineral deposit in the offshore is 7.5 - 9m depth in that area.

Chairman asked whether any one conducted study on accretion rate of minerals at the beach. Dr. L. Sheela Nair, Group head, Cop group, NCESS replied that recently they have not conducted any study regarding this. But during the period 2009 - 2012, they had conducted a study and as per the study the accretion rate is 60 m³/m. Beach washing is being carried out around 700 m. The data was collected based on beach profile and model study conducted. Chairman opined that the data collected based on model study is not so reliable.

Chairman then asked what happened to the accretion rate when sea wall is constructed. She replied that sea wall will not help the beach building. Sea wall is for protecting the land. Due to sea wall mineral deposition will not take place in that area and the deposition will be taken elsewhere where the sea wall ends. Chairman informed the Member Secretary that the same has to be submitted before the Hon'ble NGT.

Shri. Biju Sebastain, Sr.Geologist, Mining & Geology Dept. explained the following; Atomic Mineral Division has explored 34750 hectares of land for sand



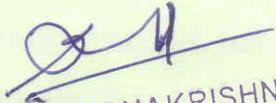
mining for mineral extraction. Out of which 550 hectares has given for lease. KMML has one lease and IREL has 4 lease. KMML does not hold EC for mining. IREL is having EC for one or two blocks. For conducting sand mining, a Mining Plan has to be submitted by the project proponent and approved by Indian Bureau of Mines (IBM). In that Mining Plan all do's and don'ts are clearly mentioned. If the project proponent conduct mining as per the Act, Rules, Mining Plan, EC, there will not arise any problem related to the same. For example, in Mining Plan, provision is given for using shovel and carrying out hand mining. But these companies are using machineries for mining. Beach washing should be restricted. Inland mining shall be promoted. For the same they have to purchase land and after recovering the minerals, reject sand can be put back.

IREL explained that the mineral part separated during beach washing only 10-12%. May be 20 or 30 years back the concentration was higher. But after Tsunami taken place, the percentage getting from beach washing is only 10-12%. IREL has conducted a study on this through NCESS. And at present beach is not there, 500 m already gone as per study report.

KMML officials explained that their intention is to recover the natural resources for the sake of nation's wealth. They will not ever go against the law. For getting EC, KMML has done everything. Submitted application for the same before the MoEF, State PCB has conducted public hearing in 2017 and all the people supported the project. CSIR - NIIST is our consultant. Chairman pointed out that KMML has already conducted beach mining to a large extent. Erosion took place due to that mining. It is a fact. Then KMML said that mining alone is not the reason for erosion of beach of that area. On the southern side of Kollam also beach eroded.

Dr. Sheela Nair explained that one reason for that is the construction of 700 m long break water at Muthalappozhi, that affected the lateral transport of minerals towards Kollam.




SINDHU RADHAKRISHNAN
Chief Environmental Engineer

Chairman asked KMMML officials that whether they are putting back sand after separation of minerals. They replied that practically and technically it is not feasible to put back the sand after mineral separation. Chairman questioned whether any technical authority advised on the matter and asked the same to all the officers present. All replied that they have not given any advise on the same.

Dr. Mathew Joseph, Director, Geological Survey of India informed that in East African countries, they are using a mobile gravity separation unit for beach sand mining depositing reject sand back for renourishing the beach. The unit travels from south to north for a 500 m in one direction. The redeposition of heavy minerals taken place before to next transit. Mining can be carried out without disturbing the environment of the beach. Chairman requested the Director to provide the details to the Board for issuing necessary directions.

Sr. Geologist opined that in India it is not easy to allow mining everywhere as in that country because we are following some Rules and Acts and issued lease for mining. Chairman explained that that issues have to be sorted out as it is ultimately for the land welfare and for decreasing the environmental damage.

All opined that long stretches could not be mined as there is only 700 m available for mining.

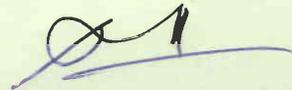
Dr. J. Ansari, Senior Scientist, NIIST informed that in the EIA report submitted for EC, it is agreed that the remaining sand shall be put back. But there is no condition being insisted in the EC regarding this.

Sr. Geologist informed that for carrying out mining, first prepare a mining plan, after that EIA report is submitted, then based on EIA report EC is being given. In that EC there is condition that mining has to be carried out as per the Mining Plan. Mining Plan is not a static one and it can be changed as per EIA and got re approved from the concerned authorities.

Chairman asked Dr. Ansari whether the Mining plan has been amended based on the EIA report, and whether issues noticed during EIA are reflected in the



-4-


SINDHU RADHAKRISHNAN

Mining plan, i.e., whether modified Mining plan has submitted for EC. Dr. Ansari replied that it has not come to his notice till date.

Chairman informed this matter will be taken up by the Board and will inform the concerned authorities.

Chairman questioned whether instead of beach mining, the units can explore the possibilities of offshore mining. Sr. geologist explained that offshore mining has to be carried out as per the Offshore Mineral Development and Regulation Act, 2002. The license is being issued by the Government of India. Earlier licenses were issued to explore 65 blocks. Later Government of India cancelled the licenses and ordered henceforth, it should be done as per auction. Amendment on the same also not yet come. Cases related to this are pending before the Hon'ble Court. So at present exploring offshore mining is not possible.

Chairman said that for the time being legal aspects of the same it may be brought to the notice of the Hon'ble NGT and will be sorted out. But the technical aspects and other related issues have to be taken up.

GSI official replied that they have conducted a feasibility study of seabed and identified 21 blocks in different sectors like Chavara sector, Varkala sector etc and that is having 125 million tonnes/ meter of heavy minerals. At present study conducted at 1 m depth seabed. The sea depth (bathymetry) is 10 m but can go upto 60 m depth and can go up to 1 km away from seashore. Started working near the seashore also. 18 % heavy minerals is present in these deposits. Dredging cost will be economical. But Government of India has to give permission. Chairman asked the quantity of heavy mineral deposit available in Chavara area. GSI official replied that in whole Kerala it is 9.5 million tons and in Varkala and Chavara region it is 3 million tons.

IREL official informed that on the 7th of July 2019, Government of India has published a notification that the Central Government hereby prohibits grant of operating rights with respect of the atomic minerals near the offshore area in the country including 62 blocks to any person except Govt or Govt Public limited



Annexure I

companies. Offshore deposits will be considered as the extension of the land deposit. Leases for offshore mining can be issued by Kerala Govt. Sr. Geologist informed that the lease is being given by IBM. Chairman asked IREL to provide the details.

Chairman sought one more clarification from the officials. Provided permission is granted for offshore mining, why not use reject sand after separating the 18 % heavy minerals, to rebuild the beaches destroyed by mining? He pointed out that all official have to explore the possibility of the same.

Chairman then asked Dr. Ansari what is the reason for the delay in issue of EC to KMML. Dr. Ansari replied that a violation was noticed and so the application has to be considered by the violation committee.

Chairman informed that in several cases, the Hon'ble NGT has ordered levying Environmental compensation for violations. It is calculated to be higher than profits made by causing environmental damage.

Smt. Simi, EE, DO, Kollam informed that the public protest is mainly due to the reason that the companies are not returning the land to the public that was taken from them for lease. Chairman replied that the returning of land etc is not relevant. The matter before the Hon'ble NGT is whether environmental damage occurred and that will be Board's concern.

Chairman concluded with advice on making suitable plans for sea bed area mining, and re-building beaches eroded. Both companies should take the said matters very seriously to avoid penalties.

The meeting comes to an end at 3.00 pm.

Ajit Haridas

CHAIRMAN



Sindhu Radhakrishnan
SINDHU RADHAKRISHNAN
Chief Environmental Engineer



I Annexure IV
आईआरईएल (इंडिया) लिमिटेड

IREL (INDIA) LIMITED

(Formerly Indian Rare Earths Limited)

(भारत सरकार का उपक्रम / A Govt. of India Undertaking)

चवरा, कोल्लम - 691 583, केरल राज्य, भारत

Chavara, Kollam - 691 583, Kerala State, INDIA

CIN : U15100MH1950GOI008187

फोन } 0476-2680701-5
Phone }
फैक्स } 0476-2680141
Fax }
ईमेल } cgm-ch@irel.co.in
Email }
वेबसाइट } www.irel.co.in
website }

ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 Company

1142 (RO)
31/10/2019
3241

CH/MNG/PCB/2019
26.09.2019

The Chief Environmental Engineer,
Kerala State Pollution Control Board,
Regional Office,
Thiruvananthapuram

Sub: Submission of data regarding the beach mining

Ref: email OA No 76/2019 dated 16.09.19.

Sir / Madam,

We hereby enclose our reply for the details sought regarding the beach mining, vide your e-mail referred above, for your kind perusal.

Thanking you,

Yours faithfully

For IREL (India) Limited, Chavara Unit

[Signature]
26/9/2019
Chief General Manager & Head

पंजीकृत कार्यालय: प्लॉट नं 1207, वीर सावरकर मार्ग, सिद्धिविनायक मंदिर के पास, प्रभादेवी, मुंबई - 400 028
Regd. Office: Plot No.1207, Veer Savarkar Marg, Near Siddhivinayak Temple, Prabhadevi, Mumbai - 400 028.



1. Beach mining data for the past 20 years, quantity mined, heavy mineral content, disposal of left over sand:

The quantity of raw sand collected from the beach mining for the past 20 years from Vellanathuruthu – Ponmana area and the heavy mineral content in the sand are as follows:

Year	Quantity mined	HM %
1999-00	91443	80.2
2000-01	141444	78.5
2001-02	125502	79.6
2002-03	145928	74.0
2003-04	154491	65.4
2004-05	95611	57.1
2005-06	157494	54.3
2006-07	8034	43.9
2007-08	67676	54.4
2008-09	250021	34.4
2009-10	206395	27.1
2010-11	221024	30.7
2011-12	108205	33.0
2012-13	117349	26.6
2013-14	90026	26.0
2014-15	47120	33.8
2015-16	0	
2016-17	13938	33.0
2017-18	0	
2018-19	0	

The beach washings collected from the Vellanathuruthu area is transported and fed to the Mineral Separation plant at IREL, Chavara (which is located at a distance of 18 km) along with the raw sand collected from other lease hold areas for recovery of heavy minerals, hence no separate data available for the quantity of heavy minerals recovered from the beach washings.

The waste sand from the Mineral Separation plant which contains tailing sand from all the areas has been used, as per the Mining plan approved by AMD, Hyderabad & IBM, Bengaluru, for the reclamation of the mined out pits. In 2014 a mini separation plant to



2)

A handwritten signature in blue ink, consisting of a stylized cursive script.

upgrade the mineral sand collected from the Vellanathuruthu area was set up and after that the tailing sand generated from the mini separation plant has been using for refilling the mined out pits at Vellanathuruthu itself.

Approximate quantity of tailing sand generated from beach washing since 2014 and utilized for refilling in mined out pit in Vellanathuruthu is tabulated below:

Year	Tailing sand generated from the beach washing (approx) in tones
2013-14	45000
2014-15	23000
2015-16	No collection of beach washings
2016-17	6000
2017-18	No collection of beach washings
2018-19	No collection of beach washings

2. A map showing beach length where lease obtained for mining, area mined, proposed to be mined. :

Map attached

3. A copy of the agreement with public for acquiring/leasing land for inland mining

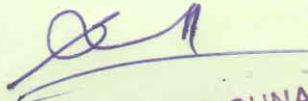
Copy of the agreement attached

4. Reports of any health studies conducted in the area

IREL has not conducted any health studies



3)


SINDHUJ RADHAKRISHNAN
Chief Environmental Engineer

5. Reports of any study conducted on background radiation

Pre-Operational Radiological Monitoring at the proposed Mineral Separation Plant site of IREL, Chavara at Vellanathuruthu coastal region of Kollam District, Kerala

The pre operational radiological monitoring of the proposed mining area at Vellanathuruthu region was carried out by Health Physics unit (HPU) of IREL Udyogamandal along with HPU of IREL Manavalakurichi.. The site is located in the Alappad village of Karunagappally block and lies between the latitude of N 9° 02' 44 to 9° 03' 74 and longitude 76° 50'61 to 76° 56'77.

External Gamma radiation monitoring

An extensive radiation survey of the mining area was carried out using a sensitive Geiger Muller tube detector integrated with Global Position System (GPS) and a pocket size radiation survey meter (RadEye PRD) which incorporates a high sensitivity NaI(Tl) detector with an integrated photo multiplier tube. Measurements were recorded at 1 m above the ground level. Gamma ray exposure rate at eighteen locations along with latitude and longitude values is given in Table 10.

Table : External Gamma radiation monitoring

SL No	Location	Radiation (µGy/h)	Field	Latitude	Longitude
1	Pushpamangalam House	0.4		9.0244	76.5139
2	Kunnumpurath House	1.7		9.0244	76.5129
3	Thuppassery House	1.7		9.0267	76.5112
4	Thekke thuppassery	2.0		9.0271	76.5115
5	New mining area	1.2		9.0285	76.5108
6	Pandarathuruth	1.7		9.0300	76.5096
7	Mukkumpuzha junction	0.5		9.0308	76.5122
8	Panamoottil	1.2		9.0305	76.5095
9	Haribhavanam	1.1		9.0310	76.5093



4)


SINDHU RANHAKRISHNAN
Chief Environmental Engineer

10	Alappad Govt L.P School	1.7	9.0328	76.5085
11	Alappad Church	1.7	9.0357	76.5073
12	Panikkar Kadav	0.7	9.0374	76.5061
13	Kurusum Moottil	2.7	9.0362	76.5069
14	Nishayalam	1.4	9.0348	76.5677
15	Kollampurath	1.3	9.0314	76.5095
16	Edayil House	1.3	9.0314	76.5095
17	Padattedath	1.35	9.0318	76.5080
18	Ramanamadam	1.4	9.0320	76.5084



5)


SINDHU RADHA KRISHNAN
 Chief Environmental Engineer



KMML/MS/Mines/PCB/01
28.09.2019

The Chief Environmental Engineer,
Regional Office, KSPCB,
Pattom, Thiruvananthapuram.

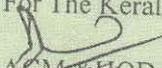
Dear Sir /Madam,

Ref: - Your office communication (e-mail) dtd 23.09.2019

Sub: Details called for regarding beach washings collection (e-mail) dtd 15.09.2019 --reg

This has reference to your communication mentioned above. The details requested by you are furnished below,

- 1) Data regarding beach washings collection and heavy mineral recovered is enclosed. (Annexure I)
- 2) Map showing beach washings collection areas is enclosed.(Annexure II)
- 3) Presently the mining activities are being carried out at the Block III, comprising of 88.119 ha out of the total lease area of 203.802 ha. In this block KMML owned around 15ha of land and the rest of land has been taken possession through acquisition of land based on LA Act and negotiated purchase. The process was carried out in four main phases under the supervision of committees headed by the District Collector with necessary Government approvals. The documentation for the purchase of land is very exhaustive. However we may produce the documentation at a later stage if necessary.
- 4) It is understood that the studies have been carried out by BARC of DAE.However the reports are not available to us.
- 5) Back ground radiation is being monitored as directed by AERB in the license in our mining area. A copy of the last quarter report is enclosed herewith.-Annexure III

Thanking you,
For The Kerala Minerals & Metals Ltd.,

AGM & HOD (MS)

Regd. Office : Sankaramangalam, Chavara-691583, Kollam District
Phone : 0476-2686722 to 2686733




SINDHU RADHAKRISHNAN
Chief Environmental Engineer

ANNEXURE I

1) Beach Washings Collection details from 2008

KMML engaged NCESS for carrying out sand budgeting studies for its sea washings collection areas in 2013 for sustainable development. The study was conducted over two seasons. The report was implemented from September 2014 onwards. As per the report the quantity of seawashings permitted per year is, 1, 34,100 MT and the same is being followed

Year	Beach Collection (MT)
2008 - 09	258,904
2009 - 10	352,602
2010 - 11	417,544
2011 - 12	374,144
2012 - 13	401,557
2013-2014	212,229
2014-2015	218,106
2015-2016	45,194
2016-2017	113,147
2017-2018	47,375
2018-2019*	219,698 <i>* Backlog quantity for the</i>

year 2017-2018 also included.




SINDHU RADHAKRISHNAN
Chief Environmental Engineer

2) Mineral Production Details

MINERAL PRODUCTION FROM 2008				
Year	Production			
	Ilmenite	Rutile	Zircon	Sillimanite
2008-2009	42,510	2,690	2,445	0
2009-2010	44,300	3,335	2,592	0
2010-2011	38,920	2,413	2,838	0
2011-2012	43,403	2,600	5,213	339
2012-2013	45,240	1,850	3,960	1,265
2013-2014	62,850	2,330	3,635	1,270
2014-2015	65,050	2,638	4,768	1,012
2015-2016	65,630	2,775	5,346	472
2016-2017	55,404	2,405	4,784	600
2017-2018	56,757	2,454	4,844	701
2018-2019	26,140	1,548	4,762	271



[Handwritten signature]

SINDHU RADHAKRISHNAN
Engineer

DESPATCHED



Asst. *Futan*
Date *18/09/19*

The Kerala Minerals and Metals Ltd.

(A Govt. of Kerala Undertaking)

Mineral Separation Unit
Kovilthottam, Chavara
Kollam-691 583, Kerala, S. India
Ph:0476-2680047, 2680048, 2682727
Fax:0476-2686442
E-mail : dgms@kmml.com
CIN : U14109KL1972SGC002399

MS/AERB/OPSD/153/2019 / 367
03/09/2019

By Regd / AD

To

THE HEAD,
Operating Plants Safety Division,
Atomic Energy Regulatory Board,
Niyamak Bhavan-A, Anushakthinagar,
Mumbai- 400 094,
Maharashtra.

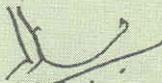
Sir,

Sub: Health Physics Report for the IInd QTR -2019.

Please find enclosed the IInd quarter Health Physics Report during April 2019 to June 2019 for the Mineral Separation Unit of The Kerala Minerals and Metals Ltd, Chavara, Kollam, Kerala.

Thanking you,

Yours faithfully,
For The Kerala Minerals and Metals Ltd.


S Srikuimar,

Assistant General Manager & HOD (MS)



Regd. Office : Sankaramangalam, Chavara-691583, Kollam District
Phone : 0476-2686722 to 2686733





S. S. SANKARANARAYANAN

**QUARTERLY HEALTH PHYSICS REPORT FOR
NON DAE BEACH SAND MINERALS (BSM) FACILITY**

Name of the facility: M/s The Kerala Minerals and Metals Ltd, M.S. Unit.
 Location of the facility: Chavara, Kollam, Kerala.
 Period of reporting: April 2019 to June 2019 (2nd Quarter)

1.0 DOSE STATISTICS.

		No. of persons monitored	Collective dose (person-mSv)	Average individual dose(mSv)	Maximum Individual Dose(mSv)
QUARTER II	Regular	17	3.5	0.205	0.35
	Temporary	Nil	Nil	Nil	8Nil
Cumulative in the Year	Regular	17	4.8	0.14	0.4
	Temporary	Nil	Nil	Nil	Nil

1.1 INDIVIDUAL DOSE STATISTICS.

Dose Range (mSv)	Number of persons in a year-2019					
	Regular		Temporary		Total	
	Less than 2	More than 2	Less than 2	More than 2	Less than 2	More than 2
	2	2	2	2	2	2
	17	0	Nil	Nil	17	0
TOTAL	17	0	Nil	Nil	17	0

Cont....2




SINDHU RADHAKRISHNAN
 Chief Environmental Engineer

2.0 MONAZITE ENRICHED TAILINGS DETAILS.

1. PCP

	Feed	Concentrate Produced	Tailings
QTY(T)	4858	967.515	3890.49
Monazite %	0.1	0.4	Traces

2. Wet Mill

	Feed	Concentrate Produced	Tailings
QTY(T)	88924	20519	586.9
Monazite %	0.66	2.80	Traces

3. Dry Mill.

Material	Quantity(MT)	Monazite %
Feed	20519	2.8
Non Mag **	7341	0.2
Non: Conductings	8181	4.7
Sieve Waste	650	8.10
Ilmenite Product	7341	0.2
Rutile Product	322.65	Nil

4. Zircon-Sillimanite Plant.

Material	Quantity(MT)	Monazite %
Feed Non : conducting **	8181	4.70
Zircon Product	848.5	0.2
Sillimanite	0.	Nil
Wet table Tailings	6530	Traces
Monazite Tailings	800	44

** Recycled in RRP & ZRP for further recovery of minerals.

Cont.....3

-3-



(Signature)
SINDHU RADHAKRISHNAN
 Chief Environmental Engineer

2.1 METHOD OF DISPOSAL OF MONAZITE ENRICHED TAILINGS

- ✓ Disposed in trenches within the plant boundary.

3.0 RADIATION MONITORING RESULTS (* whichever is applicable)

Location	Radiation level (micro Gray/hour)
Mining area.	3-4
Backfilled area (with Silica rich sand).	0.15

Pre Concentration Plant

➤ General background.	2.1
➤ Raw material Storage area.	3.6
➤ PCP Concentrate	2.00-2.50
➤ PCP tailings area	0.15

Mineral Processing Plant

(Physical Mineral Separation and/or chemical processing)

➤ General background of plant premises.	3.5
➤ Raw material storage area.	3
➤ Inside Mineral Separation Plant (e.g. magnetic separators, high tension separators etc.)	1-2.5
➤ Rutile Recovery Plant. (Dry Mill).	1.50-2.25
➤ Tailings from IRMS-Zircon Plant.	15-23
➤ Wet table-Zircon Plant.	2
➤ Monazite enriched tailings storage area.	30-37
➤ On top of trenches filled with monazite enriched tailings and topped with silica rich sand.	0.15

Cont.....4



Sindhu Radhakrishnan
SINDHU RADHAKRISHNAN
Chief Environmental Engineer

Location – Titanium Pigment Unit	Radiation level (micro Gray/hour)
➤ Iron oxide slurry tank & connecting flanges in Acid regeneration plant – on contact	18-25
➤ The return water pipeline in the overhead iron oxide storage tank – on contact	30-58
➤ The iron oxide slurry pipeline in the overhead iron oxide storage tank – on contact	2.5-3

(Signature of the R.S.O)



(Signature of the Employer with Official Seal & Date)

HEAD, Operating Plants Safety Division,
Atomic Energy Regulatory Board,
Niyamak Bhavan-A, Anushakthinagar,
Mumbai- 400 094,
Maharashtra.



SINDHU RADHAKRISHNAN
Chief Environmental Engineer



भारत सरकार Government of India
 परमाणु ऊर्जा विभाग Department of Atomic Energy
 परमाणु खनिज अन्वेषण और अनुसंधान निदेशालय Atomic Minerals Directorate for Exploration and Research

No. MR. 4228

14/12/2015

10229

1-10-153-156, बेगमपेट Begumpet
 हैदराबाद Hyderabad - 500 016

26 नवंबर Nov, 2015

ED	TA to MD	GM (P&T)	JGM (P&T Mts)	HOD (F&A)	HOD (Mts)
HOD (Mts)	AGM (Mts)	AGM (Mts)	AGM (Mts)	AGM (Mts)	AGM (Mts)

सं. No. AMD/MRG/KMML/MS/203.802 Ha

विषय : मेसर्स केरल मिनेरल्स एंड मेटल्स लि., चवरा के पक्ष में नीण्डाकरा, चवरा, पन्मना, वडक्कुमतला, कुलशेखरापुरम और पुतुपल्ली गांव, करुनागापल्ली तालुक, जिला : कोल्लम, केरल में 203.802 हेक्टेयर क्षेत्र की सीमा में खनन आयोजना और प्रगामी खान को बंद करने की आयोजना के अनुमोदन के संबंध में।

Sub: Approval of Mining Plan and Progressive Mine Closure Plan, over an extent 203.802 Ha area in Neendakara, Chavara, Panmana, Vadakkumthala, Kulasekharapuram and Puthupally villages, Karunagapally Taluk, Kollam district of Kerala in favour of M/s Kerala Minerals and Metals Limited, Chavara-reg.

सं. : दिनांक 07/09/2015 का पत्रांक केएमएमएल/एमएस/माइन्स/एएमडी
 Ref : Letter No. KMML/MS/MINES/AMD dated 07-09-2015

खान और खनिज(विकास एवं विनियमन) अधिनियम, 1957 की धारा 5 की उपधारा(2) के खण्ड(ख) के साथ भारत सरकार के दिनांक 02/01/1990 के आदेश सं. एस.ओ.4(ई) को पढ़ें, उक्त के द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए नीण्डाकरा, चवरा, पन्मना, वडक्कुमतला, कुलशेखरापुरम और पुतुपल्ली गांव, करुनागापल्ली तालुक, जिला : कोल्लम में 203.802 हेक्टेयर क्षेत्र की सीमा में चावरा इल्मेनाइट खान की खनन आयोजना और प्रगामी खान के समापन के लिए निम्नलिखित शर्तों के तहत मेसर्स केरल मिनेरल्स एंड मेटल्स लि., चवरा के पक्ष में अनुमोदन किया जाता है:

In exercise of power conferred by the clause (b) of sub-section (2) of Section 5 of Mines and Minerals (Development & Regulation) Act, 1957 read with Government of India Order No. S. O. 4(E) dated 02-01-1990, the Mining Plan and Progressive Mine Closure Plan of Chavara Ilmenite Mine over an extent 203.802 Ha in Neendakara, Chavara, Panmana, Vadakkumthala, Kulasekharapuram and Puthupally villages, Karunagapally Taluk, Kollam district of Kerala is approved in favour of M/s Kerala Minerals and Metals Limited, Chavara subject to the following conditions:

अनुमोदन की शर्तें Conditions of approval:

1. खान आयोजना और प्रगामी समापन की आयोजना एमएम(डीएंडआर) अधिनियम, 1957 की प्रथम अनुसूची के खण्ड ख के अधीन "परमाणु खनिज" के रूप में अधिसूचित इल्मेनाइट, रुटाइल, ल्यूकोसीन और जिर्कॉन खनिजों के संबंध में अनुमोदित है।
 The Mining Plan and Progressive Mine Closure Plan is approved in respect of minerals Ilmenite, Rutile, Leucoxene and Zircon which are notified as "Atomic Minerals" under Part B of First Schedule of MM (D&R) Act, 1957.



[Signature]
 RADHAKRISHNAN
 Engineer

2. मेसर्स केरल मिनेरल्स एंड मेटल्स लि.(केएमएमएल)चावरा राज्य सरकार द्वारा पट्टा देने का विवरण अथवा खनन पट्टे में संशोधन की जानकारी रिकार्ड हेतु निदेशक, एएमडी को देगा।

M/s. Kerala Minerals and Metals Limited (KMML) Chavara shall furnish the details of grant of lease or modifications in mining lease by State Government to Director, AMD for record.

3. पट्टेदार, पट्टा विलेख की प्रति जिसे वर्तमान नियमों के अंतर्गत कार्यान्वित किया गया है को रिकार्ड के लिए इस निदेशात्मक में प्रस्तुत करेगा।

The lessee shall submit a copy of lease deed, executed as per the extant rules to this Directorate for record.

4. राज्य सरकार द्वारा खनन का पट्टा देते समय निर्धारित की गई शर्तों और उसके बाद के आदेशों यदि कोई हों तो खनन आयोजना(प्रगामी खान समापन की आयोजना सहित) को कार्यान्वित करते समय उसका ध्यान रखा जाए।

The conditions stipulated by the State Government while granting the mining lease and subsequent orders, if any shall be taken care of while implementing the Mining Plan (including Progressive Mine Closure Plan).

5. मेसर्स केएमएमएल, चवरा परमाणु ऊर्जा (विकिरण संरक्षण) नियम, 2004(दिनांक 9/5/2009 के स्था.आदेश सं. 1210) के उपबंधों के अनुसार एईआरबी से लाइसेंस प्राप्त करेगा। इसकी एक प्रति रिकार्ड के लिए एएमडी और आईबीएम को भेजी जाए।

M/s KMML, Chavara shall obtain License from AERB as per the provisions of Atomic Energy (Radiation Protection) Rules, 2004 (vide S. O. No. 1210 dated 09-05-2009). A copy of the same may be sent to AMD and IBM for records.

6. परमाणु ऊर्जा नियमांक परिषद के निदेशानुसार खनिज पृथक्करण संयंत्र से उत्पादित मोनाज़ाइट समृद्ध सांद्रण का भण्डारण अलग से किया जाए।

The monazite rich concentrates produced from the mineral separation plant shall be stored separately as per the directions from AERB.

7. मोनाज़ाइट सांद्रण का निपटान एईआरबी द्वारा लाइसेंस की शर्तों और एएमएमडीआर अधिनियम, 1957 के अंतर्गत उपबंधों के भी अधीन है।

The disposal of monazite concentrate is subject to the conditions of licences by AERB and also the provisions under MMDR Act, 1957.

8. चाहे भारत सरकार, राज्य सरकार अथवा किसी अन्य प्राधिकारी द्वारा खनन/क्षेत्र के लिए समय-समय पर लागू कोई अन्य कानून से बिना किसी पूर्वाग्रह के खनन आयोजना और प्रगामी खान बंद करने की आयोजना के लिए अनुमोदित है।

That the Mining Plan and Progressive Mine Closure Plan is approved without any prejudice to any other laws applicable to the mine/area from time to time whether made by the Government of India, State Government, or any other authority.

9. खनन आयोजना(प्रगामी खान बंद करने की आयोजना) के लिए अनुमोदित है।



SINDHU RADHAKRISHNAN
Chief Environmental Engineer

1960 अथवा किसी दूसरे कानून सहित वन (संरक्षण) अधिनियम, 1960, पर्यावरण संरक्षण अधिनियम, 1986 और उसके अधीन बनाए गए नियमों अथवा सीआरज़ेड अधिसूचना आदि के किसी अन्य उपबंधों की शर्तों में सरकार का किसी भी तरह से अनुमोदन को समाविष्ट नहीं करता है।

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 provisions of the Mines & Mineral (Development and Regulation) Act, 1957 or the Mineral Concession Rules, 1960 or any other law including Forest (Conservation) Act 1960, Environment Protection Act, 1986 and the rules made thereunder, or CRZ notification etc.

10. कि खान अधिनियम, 1952 के उपबंध और उसके अधीन बनाए गए नियम और विनियम के साथ-साथ खान खोलने की सूचना को प्रस्तुत करने, प्रबंधक की नियुक्ति और खान अधिनियम, 1952 के द्वारा यथापेक्षित अन्य सांविधिक कर्मचारी का अनुपालन किया जाए।

That the provisions of the Mines Act, 1952 and Rules and Regulations made thereunder including submission of notice of opening, appointment of manager and other statutory officials as required by the Mines Act, 1952 shall be complied with.

11. कि खनन आयोजना (प्रगामी खान समापन की आयोजना सहित) किसी अन्य आदेश अथवा किसी क्षेत्रीय सक्षम न्यायालय के निदेश के किसी पूर्वाग्रह के बिना अनुमोदित है।

That the Mining Plan (including Progressive Mine Closure Plan) is approved without prejudice to any other order or direction from any court of competent jurisdiction.

12. खनन आयोजना (प्रगामी खान समापन की आयोजना सहित) का क्रियान्वयन यदि कोई निषेधाज्ञा/सूचना के रद्द होने के अधीन होगी।

The execution of Mining Plan (including Progressive Mine Closure Plan) shall be subjected to vacation of prohibitory orders/notices, if any.

13. खनन आयोजना (प्रगामी खान समापन की आयोजना सहित) के कथन में खान अधिनियम, 1952 के अधीन यथापेक्षित किसी सूचना का छिपाया जाना ज्ञात होता है और उसमें सुधार का प्रस्ताव नहीं किया गया तो अनुमोदन को तत्काल प्रभाव से वापस लिया माना जाएगा।

If any information as required under Mines Act, 1952 in the contents of the Mining Plan (including Progressive Mine Closure Plan) is found to be concealed and the proposals for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.

14. यदि किसी भी चरण में यह पाया गया कि खनन आयोजना कागज़ात में दी गई सूचना असत्य अथवा तथ्यों को त्रुटिपूर्वक प्रस्तुत करती है तो कागज़ात का अनुमोदन तत्काल प्रभाव से रद्द हो जाएगा।

If at any stage, it is observed that the information furnished in the Mining Plan document are incorrect or mis-

15. यह अनुमोदन खनन कार्य और संबंध गतिविधियों को खनन हेतु पट्टे क्षेत्र तक सीमित करता है। खनन पट्टा क्षेत्र को खनिज संरक्षण और विकास नियम, 1988 के नियम 28 के अंतर्गत सांविधिक आयोजना पर पट्टेदार/आरक्यूपी/आवेदक द्वारा दिखाया गया है। आवेदक/पट्टेदार द्वारा दिया गया पट्टे का नक्शा और अन्य आयोजना के संबंध में भूमि पर दिखाई गई पट्टे की सीमा की सत्यता के संबंध में एएमडी की कोई जिम्मेदारी नहीं होती है।

This approval of mining operations and associated activities is restricted to the mining lease area only. The mining lease area is as shown on the statutory plans under rule 28 of Mineral Conservation and Development Rules, 1988 by the lessee/RQP/applicant. AMD does not take any responsibility regarding correctness of the boundaries of the lease shown on the ground with reference to the lease map and other plans furnished by the applicant/lessee.

16. मुख्य नियंत्रक, खनन आईबीएम नागपुर द्वारा उनके दिनांक 06/4/2010 के पत्रांक 11013/3/एमपी/90-सीसीओएम वाल्यूम VII द्वारा जारी किये गये परिपत्रांक 2/2010 की अंतर्वस्तु का अनुपालन किया जाए और खनन पट्टा मिलने/क्रियान्वयन की तारीख से छह माह की अवधि के भीतर एएमडी को एक प्रति पृष्ठांकित की जाए, ऐसा न करने पर अनुमोदन को वापस लिया हुआ माना जाएगा।

The contents of circular No. 2/2010 issued by the Chief Controller of Mines, IBM, Nagpur vide his letter No. 11013/3/MP/90-CCOM Vol VII dated 06-04-2010 shall be complied with and a copy endorsed to AMD within a period of six months from the date of grant/execution of mining lease, failing which the approval shall be deemed to have been withdrawn.

17. कि किसी समय खनन कार्य के दौरान यह पाया गया कि वर्तमान कानूनों का पालन नहीं किया जा रहा है तो निदेशक, एएमडी लिखित रूप में संबंधित कारणों को देते हुए प्रदत्त अनुमोदन को स्थगित कर सकते हैं।

That if anytime, during the operation of mines, it is found that the existing laws are not being followed, Director, AMD may suspend the approval accorded, by giving the relevant reasons in writing.

18. कि यदि खनन/मिलिंग पद्धति में कोई सहसा परिवर्तन होता है तो इस संबंध में सूचना निदेशक, एएमडी, हैदराबाद को दें।

That if there is any drastic change in the method of mining/milling, the information in this regard shall be sent to the Director, AMD, Hyderabad.

19. निदेशक, एएमडी, हैदराबाद के किसी भी प्राधिकृत प्रतिनिधि को खनन और संसाधन संयंत्र, संबंधित रिकार्ड और रजिस्टर को किसी भी समय निरीक्षण करने की पूर्ण सुविधा दी जाए।

Full facilities shall be accorded to any authorized representative of the Director, AMD to inspect the mine and the processing plant, concerned records and registers at any time.

20. एमसीडीआर. 1988 के नियम 22C के अंतर्गत खनन क्षेत्र में खनन कार्य के दौरान खनन क्षेत्र के अंतर्गत खनिज संरक्षण और विकास नियम, 1988 के नियम 28 के अंतर्गत सांविधिक आयोजना पर पट्टेदार/आरक्यूपी/आवेदक द्वारा दिखाया गया है। आवेदक/पट्टेदार द्वारा दिया गया पट्टे का नक्शा और अन्य आयोजना के संबंध में भूमि पर दिखाई गई पट्टे की सीमा की सत्यता के संबंध में एएमडी की कोई जिम्मेदारी नहीं होती है।



SINDHU RADHAKRISHNAN
Chief Environmental Engineer

ANNEXURE -15

किया है तो इस खनन आयोजना(प्रगामी खान बंद करने की आयोजना सहित) के अनुमोदन से छह माह के भीतर इसकी एक प्रति निदेशक, एएमडी को रिकार्ड के लिए पृष्ठांकित करते हुए प्रस्तुत की जाए।

The Financial Assurance as required under rule 23F of MCDR, 1988 should be submitted to the Regional Controller of Mines, Indian Bureau of Mines, Bangalore, if already not done, within six months from the approval of this Mining Plan (including Progressive Mine Closure Plan) endorsing a copy of the same to Director, AMD for record.

21. सांविधिक सूचना की एक प्रति जिसे केएमएमएल-चवरा द्वारा भारतीय खान ब्यूरो और खान संरक्षा महानिदेशक को भेजा जाना है की प्रति निदेशक, एएमडी, हैदराबाद को भी पृष्ठांकित की जाए।

Copy of statutory notices, which will be sent by the KMML-Chavara to Indian Bureau of Mines and Director General of Mines Safety, will also be endorsed to Director, AMD, Hyderabad.

22. परमाणु खनिजों के संबंध में जिसके लिए एएमडी द्वारा खनन आयोजना का अनुमोदन दिया गया है इसको विहित प्रोफार्मा में सांविधिक विवरणी फार्म F-8 और H-8 में भेजा जाए।

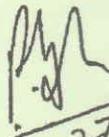
The statutory returns in the prescribed format, in respect of atomic minerals for which the mining plan is approved by AMD shall be sent in Form F-8 and H-8.

23. पट्टेदार शेष पट्टा अवधि के लिए खनन स्कीम प्रस्तुत करे और वर्तमान नियमों के अनुसार मौजूदा खनन पट्टे के नवीनीकरण के संबंध में एएमडी से अनुमोदन के लिए नई खनन आयोजना को प्रस्तुत करे।

The lessee should submit scheme of mining for the remaining lease period and a fresh mining plan for approval of AMD in respect of renewal (s) of existing mining lease as per the extant rules.

24. एएमडी आर संशोधन अधिनियम, 2015 की धारा-11(बी) के अंतर्गत नियमों के उपबंधों को तैयार किया जा रहा है वह भी लागू होंगे और यह अनुमोदन एक बार नियमों के क्रियान्वित हो जाने के बाद संशोधनाधीन होंगे।

The provisions of the Rules being formulated under Section-11(B) of MMDR Amendment Act, 2015 shall also be applicable and this approval is subject to revision once the rules are implemented.


(प्रताप सिंह परिहार)

(P.S. Parihar)
प्रताप सिंह परिहार / P.S. PARIHAR
निदेशक / DIRECTOR

परमाणु खनिज अन्वेषण एवं अनुसंधान निदेशालय
Atomic Minerals Directorate for Exploration & Research
परमाणु ऊर्जा विभाग / Department of Atomic Energy
भारत सरकार / Government of India

The Managing Director,
Kerala Minerals and Metals Ltd.,
Sankaramangalam, Chavara, Kollam,
Kerala-691 583.




SINDHU RADHAKRISHNAN
Environmental Engineer

प्रतिलिपि Copy to:

1. The Director, Department of Mining and Geology, Keasavadasapuram, Pattom Palace P.O., Thiruvananthapuram, Kerala- 695 004
2. The Regional Controller of Mines, Indian Bureau of Mines, Industrial Suburb, II Stage, Tumkur Road, Yeshwantpur, Bangalore -560 022
3. The Director, Bangalore Region, Director General of Mines Safety, No.5, 14th Main (100ft) Road, 4th B Block, Koramangla, Bengaluru - 560034
4. Shri Jacob Punnen, RQP, A-24, Kanaka Nagar, Thiruvananthapuram, Kerala-695 003.

(प्रताप सिंह परिहार)
(P.S. Parihar)
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Chief Environmental Engineer

TABLE 15

RAW SAND MINING DETAILS FROM 2008-09 to 2018- 19

Year	Beach Collection (MT)	Beach Collection Transported (MT)	Inland Collection (MT)	Total(MT)	Deviation In Returns
Opening stock	110,000				
2008 - 09	220,000	258,904	22,636	281,540	
2009 - 10	208,000	204,204	63,213	267,417	
2010 - 11	175,000	250,762	19,531	270,293	
2011 - 12	195,000	152,201	76,784	228,985	
2012 - 13	194,000	139,928	133,663	273,591	
2013 - 14	200,000	212,229	282,413	494,642	33,156* (527,798)
2014 - 15	134,000	218,106	489,128	707,234	185,361** (521,873)
2015 - 16	134,000	45,194	546,948	592,142	220,179*** (812,321)
2016 - 17	134,000	113,147	92,806	205,953	
2017 - 18	134,000	47,375	17,822	65,197	
2018 - 19	134,000	219,698	212,979	432,677	
Total	1,973,000	1,861,748	1,957,923	3,819,671	
Opening stock 2019-20	111,252		27701		

*The quantity is the pre-concentrates from PCPs which has to be deducted from the raw sand collection, since it is the out-put of the PCP

**The additional quantity (185361MT) is taken from handling of old dump workings for better recovery of minerals. The later stock in the dump yard at PCP I will be apx. 220179 MT

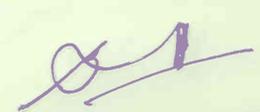
***The above additional quantity taken from handling of dumps for better recovery of minerals & stock is nil at PCP I stock yard

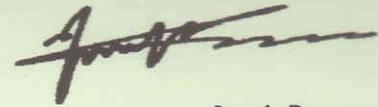
2008-09 to 2017-18 data from state DMG's audit certificate attached as Annexure 21.

Inland collection of 92,806 MT in 2016-17 includes 23,288 MT from Inland Waterways Authorities canal dredging.

T. KARTHIKEYAN




SINDHU RADHAKRISHNAN
Chief Environmental Engineer



Jacob Punnen,
AMD/MPA/RQP/5/2010

watered using a Hydro-cyclone and the sand will be loaded by wheel loaders for transport to Pre-Concentrator plant.

The flow diagram for pre concentration unit is shown in Plate No.22.

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

No development work is required because there is no overburden

TABLE NO 21

PROPOSED OF RAW SAND .PRODUCTION PROGRAM FOR BLOCK 3

Year	Pit No.(s)	Overburden	ROM Ore Tons	Sale-able Ore	Sub-grade Ore	Mineral Rejects
First 2011-12	YEAR OVER					
Second 2012-13	YEAR OVER					
Third 2013-14	YEAR OVER					
Forth 2014-15	BEACH WASHING	NIL	1,34,580	NIL	NIL	NIL
Forth 2014-15	PANMANA & KOVILTHOT TAM	NIL	5,50,000	NIL	NIL	NIL
Forth 2014-15	TOTAL	NIL	6,84,580	NIL	NIL	NIL
Fifth 2015-16	BEACH WASHING	NIL	1,34,580	NIL	NIL	NIL
Fifth 2015-16	PANMANA & KOVILTHOTT AM	NIL	6,50,000	NIL	NIL	NIL
Fifth 2015-16	TOTAL	NIL	7,84,580	NIL	NIL	NIL



Capacity of dredge is 50 TPH or 300,000 Tons/year.

The proposed layout of dredge is given in the following drawings on Plate No. 19.
c) Attach - Individual year wise plans and sections. In case of 'A' class mines




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