



आईआरईएल (इंडिया) लिमिटेड  
**IREL (India) Limited**  
(Formerly Indian Rare Earths Limited)  
(भारत सरकार का उपक्रम)  
(A Govt. of India Undertaking)

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मणवालकुरिच्चि, कन्याकुमारी जिला, तमिलनाडु - 629 252

**Manavalakurichi, Kanyakumari Dist. Tamil Nadu - 629 252**

CIN : U15100MH1950GOI008187 Website : www.irel.co.in

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

IRELMK/ENV-15/2019/

20.05.2019

✓ The Additional Principal Chief Conservator of Forests  
Ministry of Environment, Forest and Climate Change  
Regional Office (South-Eastern Zone)  
1<sup>st</sup> and 2<sup>nd</sup> Floor, Handloom Export Promotion Council  
34, Cathedral Garden Road  
Nungambakkam, CHENNAI - 600034

**Sub:** Half yearly progress report for the period from October-2018 to March-2019 for ML area of 7.06 hectares of M/s Indian Rare Earths Limited located at Manavalakurichi village, Kalkulam taluk, Kanyakumari District, Tamilnadu

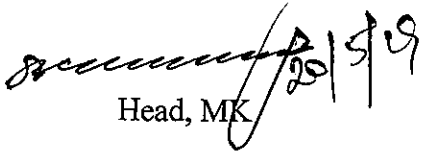
**Ref.:** MoEFCC letter No. J-11015/61/2011-IA.II (M) dt. 06.04.2018

Sir,

With reference to above, point wise compliance report for the period from October-2018 to March-2019 is enclosed as Annexure-I. Relevant monitoring reports are enclosed as Annexure-II.

This is for your kind information please.

Yours truly,  
For IREL (India) Limited

  
Head, MK

- Encl: i. Compliance report (Annexure – I)  
ii. Monitoring reports (Annexure – II)

Copy to ;

The Adviser  
Environmental Impact Assessment Division(IA)  
Government of India  
Ministry of Environment, Forests & Climate Change  
Indira Paryavaran Bhawan  
Aliganj, Jorbagh Road  
New Delhi-110003

The Member Secretary  
Tamil Nadu Pollution Control Board  
76, Mount Salai, Guindy, Chennai-600032

Annexure-IHALF YEARLY COMPLIANCE REPORT(OCTOBER 2018 TO MARCH 2019)MINING LEASE: G.O.3(D) No.6 DATE: 28.01.2000; AREA:7.06 HECTSENVIRONMENTAL CLEARANCE ORDER: J-11015/61/2011-IA.II DATED:, 06.04.2018

Sl.	Conditions	Compliance
<b>A</b>	<b>Specific Conditions</b>	
1	This Environmental clearance is granted subject to outcome of Hon'ble Supreme Court of India, Hon'ble High Court of Tamilnadu, Hon'ble NGT or any other Court of Law, if any, as may be applicable to this project.	Directions of Hon'ble Supreme Court of India, Hon'ble High Court of Tamilnadu, Hon'ble NGT or any other Court of Law if applicable to this project, will be implemented.
2	In Inter-tidal zone, only manual mining operations shall be carried out deploying persons using baskets and hand spades for collection of ore or minerals as per the approved mining plan.	Only manual mining is being carried out in the inter-tidal zone as per approved mining plan by deploying persons using baskets and hand spades.
3	No mining activities will be allowed in forest area, if any, for which the Forest Clearance is not available.	Forest lands are not available within mining lease hold area.
4	The Environmental Clearance is subject to obtaining requisite NBWL Clearance, if any, from the Standing Committee of National Board for Wildlife for Mining project.	Not applicable
5	The project Proponent shall obtain Consent to Operate from the State Pollution Control Board, Tamilnadu and effectively implement all the conditions stipulated therein.	Consent to operate for the production of beach sand minerals viz. Ilmenite, Rutile, Zircon, Monazite and Garnet has been obtained from TNPCCB and the stipulated conditions are implemented.
6	The recommendations of the Tamilnadu State Coastal Zone Management Authority (TNSCZMA) forwarded vide their letter dated 08.01.2018 shall be implemented. The recommendations, inter-alia, are (i) The Project Proponent shall not use any explosives for the mining. No blasting or drilling for mining shall be carried out. (ii) PP shall ensure that the mining activity does not lead to beach erosion. Adequate measures shall be	The Recommendations of TNSCZMA vide letter dated: 8.1.2018 are being implemented. (i) The method of mining adopted by IREL, Manavalakurichi does not require any blasting or drilling activities. Hence, no explosives are used in the mining operations. (ii) Only Manual mining in the inter-tidal zone is undertaken in a sustainable manner where replenishment of beach sand minerals has been occurring due to littoral action. Mining operations are carried out in a systematic

Sl.	Conditions	Compliance
	<p>undertaken to avoid least disturbance in the inter-tidal zone. (iii) The unit shall ensure that the mined area is refilled with the tailings. The aesthetic appeal of the beaches should be retained by avoiding artificial sand dunes of greater heights. (iv) The beach profile shall be monitored periodically with the maintenance of relevant records / measurements / details so as to take appropriate remedial action on the event of any adverse impacts. (v) There should not be any sea water intrusion due to the project activities and periodical water quality monitoring shall be conducted and (vi) The unit shall not establish new mineral separation plant/processing unit within CRZ areas and also there should not be any expansion of existing mineral separation plant / processing unit.</p>	<p>manner to avoid disturbance in the intertidal zone. All the mining operations are undertaken as per approved mining plan.            (lii) The inland mined out area is refilled with tailings generated out of the ROM collected from this ML area.            (lv) The beach profile monitoring is carried out and the relevant records are maintained.            (v) There is no chance of any sea water intrusion due to IREL mining activities, however periodical water quality monitoring is conducted.            (vi) IREL, Manvalakurichi will not establish any new mineral separation plant/processing unit within CRZ areas. There will not be any expansion of the existing mineral separation plant/processing unit.</p>
7	<p>The private patta lands which are not owned by M/s. IREL, mining will be carried out only after obtaining the consents from the concerned land owners as per the provisions of the Atomic Mineral Concession Rules 2016 and MMDR Act, 1957.</p>	<p>The entire 7.06 hectares ML area is an un-surveyed sea-beach poromboke Government land. Hence not applicable.</p>
8	<p>During mining operations, the village built up areas, roads, human settlement areas shall not be disturbed.</p>	<p>No built up areas, roads and human settlements are available within the ML area.</p>
9	<p>The tailing will be backfilled only in the Mined out area.</p>	<p>Mining operations are carried out over 7.06 hectares ML area, which is a replenishable area. The replenishable areas are not backfilled.</p>
10	<p>Necessary AERB clearance shall be obtained under the Atomic Energy (Radiation Protection) Rules, 2004 for operation of BSM (Beach Sand Minerals) facility</p>	<p>AERB clearance has been obtained under Atomic Energy (Radiation Protection) Rules, 2004 for operation of Beach Sand Minerals facility. Present AERB clearance is valid upto 19.08.2019.</p>
11	<p>Occupational health and safety measures, especially concerning radiation to be enhanced for workers who are having some ailments like hypertension, diabetes etc. They should have health check up once in six months.</p>	<p>Medical check up is carried out for radiation workers once in six months.</p>
12	<p>Project Proponent shall run an awareness campaign on sanitation for</p>	<p>Awareness campaign on sanitation for women and utilization of Sanitary Napkins has been</p>

*[Handwritten Signature]*



Sl.	Conditions	Compliance
	women and utilization of Sanitary napkin and also to distribute the Sanitary Napkin/pads to the women and provide the training for proper disposal.	carried out during November 2018 and December 2018 at Periavilai, Chinavilai & Manavalakurichi villages. We have distributed sanitary napkin/pads to 200 women during awareness campaign. Training for proper disposal of used napkins/pads was imparted. An amount of Rs.43,000/- was incurred towards conducting the above programme.
13	Identification of sand dunes shall be done prior to undertaking mining activities and their conservation shall as per MoEF guidelines from time to time. No flattening of sand dunes shall be carried out. Dressing or altering the sand dunes, hills, natural features including landscape changes shall not be carried out for beautification /recreational purposes. Precautions shall be taken to prevent intrusion of sea water into hinterland to avoid problem of submersion/flooding.	The entire ML area is located within the intertidal zone. No sand dunes/ hills/ natural features, etc. are available within the ML Area. Hence, not applicable.
14	Tailings and rejects shall be filled back systematically after separating the heavy/rare minerals. Sand tailing shall be put back at the mined area on completion of extraction of rare minerals. Afforestation shall be taken up with suitable species on mined out areas to prevent erosion of shoreline. Under no circumstance, the tailings will be dumped in agricultural lands, wet lands, paddy field, canals and the backfilling will be carried out only in the inland mined out areas.	Mining operations are carried out systematically in a sustainable manner as per the approved mining plans. The replenishable areas are not backfilled. No Afforestation is carried out over 7.06 hectares ML area as it is a replenishable zone. The tailing generated after separation of atomic minerals (beach sand minerals) are used for backfilling the mined out areas and under no circumstance, these tailing will be dumped in agricultural lands, wet lands, paddy field and canals.
15	The mining activities shall be regulated in such a way that there will be minimum disturbance to the fauna during spawning and breeding period i.e. from November to March.	Mining operations do not affect any fauna during spawning & breeding period.
16	Mining shall be carried out in phases only. Simultaneous opening of entire beach front is not permissible. There shall be uninterrupted access to the seafront. Minimum 20m width of approach roads shall be provided where necessary.	Mining operations are carried out in phases only. A number of Permanent approach roads to seafront are already available. Also, temporary approach roads with adequate width are provided wherever necessary.
17	Mining shall be carried out by permitted methods without the use of	Mining is carried out by permitted methods as per approved mining plan. No explosives are

Sl.	Conditions	Compliance
	any forms of blasting. Use of explosives for blasting is prohibited. The mining should be stated near sea side and mining should be progressed parallel to sea coast so that inland water table is not disturbed.	used. The mining operations are progressed in parallel to sea coast and manual mining operations are carried out as per the approved mining plan in the intertidal zones. The inland water table is not disturbed due to IREL manual mining operations.
18	Radiation survey shall be carried out as stipulated by the Atomic Minerals Directorate for Exploration and Research, Department of Atomic Energy, Government of India to ascertain the effects of radioactive minerals.	In order to ascertain the effects of radioactive minerals, radiation survey is carried out at regular intervals by Health Physics Unit (HPU), an independent organisation under Department of Atomic Energy. <b>(Annexure-II, Sl. No.1)</b>
19	Regular monitoring of water quality upstream and downstream of adjoining water bodies shall be carried out and record of monitoring data should be maintained and submitted to Ministry of Environment, Forest & Climate Change, its Regional Office, Chennai, Central Groundwater Authority, Regional Director, Central Groundwater Board, State Pollution Control Board and Central Pollution Control Board.	Regular monitoring of water quality is being carried out. The record of the monitoring data are being submitted to MoEF&CC, its Regional Office, Chennai, Central Groundwater Authority, Regional Director, Central Groundwater Board, State Pollution Control Board and Central Pollution Control Board at regular intervals. <b>( Annexure-II, Sl No.1)</b>
20	A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment, Forest and Climate Change 5 years in advance of final mine closure for approval.	Final Mine Closure Plan along with details of Corpus Fund will be submitted to MoEF&CC 5 years in advance, while seeking approval for final mine closure.
B	<b>Standard Conditions</b>	
1	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment, Forest and Climate Change.	Mining technology and scope of working will be not changed without prior approval of MoEF&CC
2	No change in the calendar plan including excavation, quantum of beach sand mineral i.e. Ilmenite, Rutile, Zircon, Monazite, Sillimanite and Garnet and waste should be made	Will be adhered to.
3	The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of water (surface water and ground water) for the project.	There is no requirement of water for mining operations over 7.06 hectares ML area. Hence, not applicable.
4	Mining shall be carried out as per the	Mining operations are carried out as per mining



Sl.	Conditions	Compliance
	provisions outlined in mining plan approved by AMD as well as by abiding to the guidelines of Directorate General Mines Safety (DGMS).	plan approved by AMD and the guidelines of DGMS.
5	The lands which are not owned by Proponent, mining will be carried out only after obtaining the consents from all the concerned land owners as per the provisions of the Atomic Mineral Concession Rules, 1960 and MMDR Act, 1957.	The entire 706 hectares ML area is an un-surveyed sea-beach poromboke Government land. Hence, not applicable
6	Digital processing of the entire lease area using remote sensing technique shall be carried out regularly once in three years for monitoring land use pattern and report submitted to Ministry of Environment, Forest and Climate Change its Regional Office.	Digital processing of the entire lease area using remote sensing technique will be carried out regularly once in three years and will be submitted to MoEF&CC and its Regional Office.
7	The critical parameters as per the Notification 2009 such as PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>x</sub> , and SO <sub>x</sub> , etc. in the ambient air within impact zone, peak particle velocity at 300 m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharged water shall be monitored [(TDS, DO, PH and Total Suspended solids (TSS)]. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the Company in public domain. The circular No. J-20012/1/2006-IA.II (M) dated 27.05.2009 issued by Ministry of Environment, Forest and Climate Change shall also be referred in this regard for its compliance.	The ambient air qualities, Stack emission & Sewage water are monitored periodically by TNPCB approved Agency. However, there is no discharge of water due to mining operations. The ROM collected from 7.06 Hectares ML area is transported to the MSP located adjacent to ML boundary towards mineral beneficiation plant. The process water in the Mineral Beneficiation activities is recycled and there is no direct discharge of water into the environment at IREL, Manavalakurichi. The monitored data is displayed on a display board at the plant site near the main gate of IREL, Manavalakurichi company in public domain. The monitored data will be uploaded on IREL website along with half yearly EC compliance report. Provisions under the circular No. J-20012/1/2006-IA.II (M) dated 27.05.2009 issued by Ministry of Environment, Forest and Climate Change will be complied. (Annexure-II, sl. nos. 2, 3 & 4)
8	Effective safeguard measures such as regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of PM <sub>10</sub> and PM <sub>2.5</sub> such as haul road, loading point and transfer points. Fugitive dust emissions from all the sources shall be controlled regularly. It shall be ensured that the Ambient Air	Regular water sprinkling and cleaning of the haul roads is carried out to control air pollution and dust suppression. Fugitive dust emissions from all the sources are controlled. Monitoring of ambient air qualities are carried out as per the norms. The parameters of Ambient Air Quality are well within in the limit prescribed by the Central Pollution Control Board.

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Sl.	Conditions	Compliance
	Quality parameters conform to the norms prescribed by the Central Pollution Board in this regard. Monitoring of Ambient Air Quality to be carried out based on the notification 2009, as amended from time to time by the Central Pollution Control Board.	
9	Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and constructing new piezometers during the mining operation. The project proponent shall ensure that no natural water course and / or water resources shall be obstructed due to any mining operations. The monitoring shall be carried out four times in a year pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) and the data thus collected may be sent regularly to Ministry of Environment, Forest and Climate change and its Regional Office, Central Ground Water Authority and Regional Director, Central Ground Water Board.	Regular monitoring of ground water level and quality in four seasons is carried out in and around the mining lease area. Natural water courses or water resources are not obstructed due to IREL Mining operations. The monitoring data will be sent regularly to MoEF&CC, its Regional Office, Central Ground Water Authority and Regional Director, Central Ground Water Board.
10	Regular monitoring of the flow rate of the springs and perennial nallahs flowing in and around the mine lease shall be carried out and records maintain. The natural water bodies and or streams which are flowing in an around the village, should not be disturbed. The Water Table should be nurtured so as not to go down below the pre-mining period. In case of any water scarcity in the area, the project proponent has to provide water to the villagers for their use. A provision for regular monitoring of water table in open dug wall located in village should be incorporated to ascertain the impact of mining over ground water table.	No springs and nallahs are flowing in and around the ML area. Natural water bodies or streams which are flowing in and around the village are not disturbed due to mining operations. There is no obstruction of ground water due to IREL mining operations. However, as desired, regular monitoring of water table in open dug wells located in the villages is carried out.
11	Regular monitoring of water quality upstream and downstream of water bodies shall be carried out and record of monitoring data should be	Regular monitoring of water quality is carried out and the record of monitoring data will be submitted to the Ministry of Environment, Forest and Climate Change and its Regional

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Sl.	Conditions	Compliance
	maintained and submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office, Central Ground Water Authority, Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Board.	Office, Central Ground Water Authority, Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Board.
12	The Illumination and sound at night at project sites disturb the villages in respect of both human and animal population. Consequent sleeping disorders and stress may affect the health in the villages located close to mining operations. Habitations have a right for darkness and minimal noise levels at night. PPs must ensure that the biological clock of the villages is not disturbed; by orienting the floodlights/masks away from the villagers and keeping the noise levels well within the prescribed limits for day light/night hours.	The Biological clock of the villagers will not be disturbed due to the Mining operations of IREL. Illumination is provided only in the work site. Noise levels are regularly monitored & maintained well within the prescribed limits. (Annexure-II, sl. no.5)
13	Main haulage road in the mine should be provided with permanent water sprinklers and other roads should be regularly wetted with water tankers fitted with sprinklers. The material transfer points should invariably be provided with Bag filters and or dry fogging system. In case of Belt-conveyors facilities the system should be fully covered to avoid air borne dust; Use of effective sprinkler system to suppress fugitive dust on haul roads and other transport roads shall be ensured.	Haul roads are regularly wetted with water sprinklers. The ROM collected from 7.06 hecta ML area is transported to Mineral Beneficiation Plant located adjacent to ML Boundary for separation of individual minerals. The material transfer points in Mineral Beneficiation operations are provided with Bag filters to control dust generation.
14	Sufficient number of Gullies to be provided for better management of water. Regular Monitoring of PH shall be included in the monitoring plan and report shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.	Regular monitoring of water quality including pH is carried out. The reports will be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis. ( Annexure-II, sl. no.6)
15	There shall be planning, developing and implementing facility of rainwater harvesting measures on long term basis and implementation of conservation	The mining and mineral separation plant operations are carried out very near to shore. Rain water harvesting system is implemented at IREL, Manavalakurichi where all the rooftop rain

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Sl.	Conditions	Compliance
	measures to augment ground water resources in the area in consultation with Central Ground Water Board.	water collected from plant area is stored in a harvesting pond.
16	The reclamation at waste dump sites shall be ecologically sustainable. Scientific reclamation shall be followed. The local species may be encouraged and species are so chosen that the slope, bottom of the dumps and top of the dumps are able to sustain these species. The aspect of the dump is also a factor which regulates some climate parameters and allows only species adapted to that micro climate.	Scientific reclamation & systematic afforestation are practised in order to generate greenery. The tailings dumps are made to restore the natural topography over the mined out areas. Native species, viz Casuarina, Coconut, etc. are planted over the backfilled areas.
17	The top soil, if any, shall temporarily be stored at earmarked site(s) only and it should not be kept unutilized for long. The top soil shall be used for land reclamation and plantation. The over burden (OB) generated during the mining operations shall be stacked at earmarked dump site(s) only and it should not be kept active for a long period of time. The OB dumps should be scientifically vegetated with suitable native species to prevent erosion and surface run off. In critical areas, use of geo textiles shall be undertaken for stabilization of the dump. The entire excavated area shall be backfilled and afforested. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environmet, Forest and Climate Change and its Regional Office on six monthly basis.	There is no top soil. No overburden is generated during mining operations at IREL, Manavalakurichi. Mineralisation occurs right from surface of the deposit. Mined out areas are backfilled with tailings generated from Mineral beneficiation operations followed by systematic plantation to restore the natural topography. The compliance status will be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.
18	Plantation shall be raised in a 7.5 m wide green belt in the safety zone around the mining lease, backfilled and reclaimed area, around water body, along the roads etc. by planting the native species in consultation with the local DFO/Agriculture Department and as per CPCB Guidelines. The density of the trees should be around 2500 plants per ha. Greenbelt shall be developed all	The entire 7.06 hectares ML area is located within the Inter-tidal zone. The replenishment occurs within the ML area due to littoral action. Hence, no plantation/ green belt are raised over the mining lease area. ( Annexure-II, sl. no.7)

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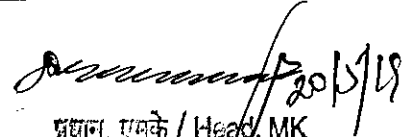
Sl.	Conditions	Compliance
	along the mine lease area in a phased manner and shall be completed within first five years.	
19	Project proponent shall follow the mitigation measures provided in Office Memorandum No. Z-11013/57/2014-IA.II (M), dated 29th October, 2014 titled "Impact of mining activities on Habitations-Issues related to the mining Projects wherein Habitations and villages are the part of mine lease or Habitations and villages are surrounded by the mine lease area", if any, applicable to the project.	IREL, Manavalakurichi will follow the guidelines issued by MoEF&CC vide OM No. Z-11013/57/2014-IA.II (M), dated 29th October, 2014. As such, there is no village, habituated zones, etc. located within the ML area.
20	The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna, if any, spotted in the study area. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Department. A copy of action plan shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office.	No endangered fauna is available in the study area.
21	At least 2.5% of the total cost of the project shall be earmarked towards the Enterprise Social Commitment (ESC) based on local needs and action plan with financial and physical breakup/details shall be prepared and submitted to the Ministry's Regional Office located at Chennai. Implementation of such program shall be ensured accordingly in a time bound manner.	Mining operations at IREL, Manavalakurichi are continuing since 1970. Corporate Social Responsibility activities are carried out as per the provisions under Companies Act, 2013 and CSR rules, 2014. CSR fund is always allocated more than 2 % of the net profit of the company. Although IREL, Manavalakurichi incurred loss in the 2017-18, Rs.25.70 lakh is allocated towards implementation of CSR schemes. The CSR is a regular activity and the action plan towards meeting the local needs will be implemented in time bound manner.
22	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	7.06 hectares Mining Lease area of IREL is existing at Manavalakurichi since 1970 and it is not a new project. Hence, not applicable

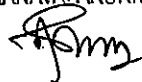
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Sl.	Conditions	Compliance
23	Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs.	Mining operations are carried out manually as per the approved mining plan. The manually collected ROM from 7.06 hectares ML area is heaped and then the collected ROM from the heap is transported by trucks to the adjacent Mineral Beneficiation Plant for individual mineral separation. Workers engaged in operations of HEMM are provided with ear plugs/ muffs and the noise levels are maintained below 85 dBA in work environment. (Annexure-II, sl. no. 8)
24	Industrial waste water (workshop and waste water from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19 <sup>th</sup> May, 1993 and 31 <sup>st</sup> December, 1993 or as amended from time to time. Oil and grease traps should be installed before discharge of workshop effluents.	No industrial waste water is generated during Beach Mineral Sand mining operations.
25	Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects.	All persons employed in mines are imparted with trained as per Mines Vocational Training Rules, 1966. Personnel working in dusty area are provided with protective respiratory masks.
26	A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization	Environment Management cell is constituted at IREL, Manvalakurichi and effectively functioning. Unit head is the Chairmen of the Cell. Once in every three months, the environmental parameters of the mines and mineral beneficiation areas are reviewed by the Environment Management Cell.
27	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office.	The funds earmarked for environmental protection measures will not be diverted to other purpose. Year wise expenditure towards environmental protection measures (expenditure towards Air sampling, Water sampling, Water sprinkling, Afforestation, PPEs, Bag filters etc.) is enclosed. ( Annexure-II, sl. no. 9)
28	The project authorities should inform to the Regional Office regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.	This 7.06 hectares ML area has been existing since 1970. Hence, not applicable.
29	The project proponent shall submit six	Six monthly reports on the status of

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Sl.	Conditions	Compliance
	monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment, Forest and Climate Change, its Regional Office, Central Pollution Control Board and State Pollution Control Board.	implementation of the stipulated environmental safeguards in hard copy is submitted to Ministry of Environment, Forest and Climate Change, its Regional Office, Central Pollution Control Board and State Pollution Control Board.
30	The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information / monitoring reports.	IREL, Manavalakurichi will extend full cooperation to the Officers of MoEF & CC in the event of monitoring the compliances of the stipulated conditions.
31	A copy of clearance letter will be marked to concerned Panchayat / local NGO, if any, from whom suggestion / representation has been received while processing the proposal.	A copy of Clearance letter has been sent to Panchayat.
32	State Pollution Control Board should display a copy of the clearance letter at the Regional Office, District Industry Centre and Collector's office/ Tehsildar's office for 30 days.	Complied.
33	The project authorities should advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment, Forest and Climate Change at <a href="http://www.environmentclearance.nic.in">www.environmentclearance.nic.in</a> and a copy of the same should be forwarded to the Regional Office.	Information on Environment Clearance for 7.06 hecta ML area of IREL was published in two local newspapers Dinamani and The New Indian Express on 11.04.2018 and the same was forwarded to the Regional office.

  
 प्रधान, एमके / Head, MK  
 आई.एल. (इंडिया) लिमिटेड / IREL (India) Limited  
 (Formerly Indian Kero Earths Limited)  
 भारत सरकार का उपक्रम / (A Govt. of India Undertaking)  
 मण्णालकुरिची - 629 252 कन्याकुमारी जिला  
 MANAVALAKURICHI - 629 252, Kanyakumari District



IREL (India) Limited  
Formerly Indian Rare Earths Limited  
Manavalakurichi

Monitoring Report  
(From October 2018 to March 2019)

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9	Fund allocation for environmental protection/ CSR activities	9	81





भारतसरकार / Government of India  
भाभापरमाणुअनुसंधानकेंद्र / BHABHA ATOMIC RESEARCH CENTRE  
स्वास्थ्यभौतिकीप्रभाग / Health Physics Division  
विकिरणसुरक्षाअनुभाग (परमाणुईंधन) / Radiation Protection Section (Nuclear Fuels)  
स्वास्थ्यभौतिकीइकाई / Health Physics Unit

फैक्स / Fax : 04651-237220 आईआरईएल(इंडिया)लिमिटेड / IREL(India)Limited

फ़ोन / Tel : 04651-237255-58 मणवालकुरिच्ची /Manavalakurichi- 629252

ईमेल/ [e.mail : oic.hpu-mk@irel.co.in](mailto:oic.hpu-mk@irel.co.in) तमिलनाडु , इंडिया /Tamil Nadu,India

दिनांक Date: 24-04-2019

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Dear Sir/Madam,

Enclosed please find the monthly report on the activities of Health Physics Unit for the month of March-2019 for your kind information and necessary action.

Regards

Yours Sincerely



K.Sreekumar

Officer in Charge, HPU, IREL, MK

Dr.SujataRadhakrishnan  
Officer in Charge, Health Physics Unit  
IREL, Udyogamandal

Cc: The Head,  
IREL, MK

## RADIOLOGICAL MONITORING AT IREL, MANAVALAKURICHI PLANT (MARCH-2019)

### 1. Radiation Fields:

Radiation field at different locations in the mining areas and plant measured during the month of MARCH, 2019 are presented in Table 1. Background radiation field at Guest House ranged from 0.15 to 2.75  $\mu\text{Gyh}^{-1}$ . Radiation field at the MK beach area is in the range 0.15 – 1.00  $\mu\text{Gyh}^{-1}$ . The background radiation field inside the Minerals Separation Plant varied from 1.20 to 65.0  $\mu\text{Gyh}^{-1}$ . The maximum fields were at the Monazite section, Rutile section, Zircon section, Garnet section and Monazite Exolon section. Dry mill tailings area showed radiation field ranging from 30.0 to 37.0  $\mu\text{Gyh}^{-1}$ . Table 2 gives the radiation field in the plant premises.

### 2 Air monitoring:

The results of analysis of airborne dust,  $^{232}\text{Th}$  and thoron daughters are provided in Table 3. The gross dust concentration inside the plant varied from 0.13 to 3.60  $\text{mgm}^{-3}$  (mean 1.61 $\pm$ 0.99) (respirable = 25%; TLV= 4  $\text{mg.m}^{-3}$ ). The higher dust levels were observed at GarnetSection, Zircon(Old) Ground floor, Zircon(New)platform and Monazite Section. The air activity due to  $^{232}\text{Th}$  varied from 0.001 to 0.137  $\text{Bq.m}^{-3}$  (mean= 0.031 $\pm$ 0.042  $\text{Bq.m}^{-3}$ ). The average dust levels and air activities are higher than that of previous month. Higher concentrations of airborne thorium were observed at Monazite section, Zircon (old) ground floor, Zircon [new] platform and Garnet ground floor (average 39.09 % DAC). The average thoron daughter concentrations were higher than that of the previous month and varied from 0.37 to 11.26 (mean = 2.70 $\pm$ 2.96 mWL).

### 3. Environmental Air Samples:

Data of environmental (plant premises) air samples collected from six locations is given in Table 4.  $^{232}\text{Th}$  activity in the samples ranged from 1 to 10  $\text{mBqm}^{-3}$ . These values are comparable with the ambient activity levels in natural high background radiation areas. Quarterly analysis of environmental air samples collected from a radial distance of 1 Km around the plant is provided in Table 5.

### 4. Analysis of liquid Effluents:

The radioactivity levels in the Valliyar River water and Well water collected from a radial distance of one kilometer are given in Table 6. The levels are comparable with the natural concentration encountered at the high background radiation areas.

### 5. Analysis of Solid Wastes:

Results of the analysis of tailings from HUP and ETP (ZOP) solid waste are presented in Table 7. The levels are comparable with natural concentration prevailing in this area.

### Recommendation:

- (1) Continuous operation of MUP exhaust fans to be ensured to reduce air activity.
- (2) Spillage and accumulation of Monazite rich fraction in MSP is high. It may be controlled.

Table: 1 Results of the radiation survey of the plant area (March -2019) Radiation field ( $\mu\text{Gy/ h}$ )

S.No	LOCATION	MIN	MAX	REMARKS
1.	DWCP, Kottumangalam	3.00	50.0	Temporary dry mill storage
2.	HUP ground floor	0.50	2.60	
3.	HUP first floor	0.50	0.90	
4.	HUP concentrate	8.00	17.0	
5.	HUP tailings Area	0.10	0.20	
6.	Conc. sand godown	6.00	30.0	

7.	F.B.drier area	2.00	8.00	Sand Accumulation
8.	Weighing room	0.90	1.30	
9.	Vibrating screen Section	1.80	7.50	Sand Accumulation
10.	Rutile section	2.00	22.0	Sand Accumulation
11.	H.T.Plant Section	1.20	17.0	Sand Accumulation
12.	Ilmenite / Rutile readings	2.00	7.00	
13.	Zircon section	4.00	35.0	Sand Accumulation
14.	Monazite exolons Section	8.00	20.0	Sand Accumulation
15.	Monazite Section	5.00	65.0	Sand Accumulation
16.	Garnet section	4.00	22.0	Sand Accumulation
17.	Ilmenite section	2.50	15.0	Sand Accumulation
18.	Monazite silos (ground floor)	6.00	10.0	
19.	Road in front of godown	2.00	2.50	
20.	Monazite stores near ETP outside	80.0	85.0	
21.	New monazite store(outside walls)	20.0	25.0	
22.	Road out side	2.00	6.00	
23.	Monazite pumping area	7.00	10.0	

Table: 2 Radiation Survey results of the plant premises (March -2019) Radiation field - ( $\mu\text{Gy/hr}$ )

S.No	Location	Min	Max	Remarks
1	In front of Precon&HUP Road	1.20	1.70	
2	Dry Mill waste area	30.0	37.0	
3	Con A yard	8.00	17.0	
4	Guest House area	0.15	2.75	
5	MK Beach	0.15	1.00	
6	Main Gate	0.40	1.40	
7	In front of Lab	0.70	1.30	
8	In front of Dry mill	1.50	4.00	
9	In front ZOP	2.00	5.50	
10	In front stores	1.20	1.50	
11	In front m/w/shop	1.50	1.80	
12	In front of Electrical w/s	1.50	1.80	
13	In front of civil section	1.80	3.00	
14	In front of canteen	1.40	3.20	
15	ETP area	10.0	35.0	Semi processed minerals stored
16	Raw sand dump (HUP)	0.60	32.0	Drymill waste for processing

Table: 3 Air monitoring, Manavalakurichi Plant (March-2019)

S. No	Location	Dust conc (mgm <sup>-3</sup> )	Thorn daughters (mWL)	<sup>232</sup> Th (Bq m <sup>-3</sup> )
1	Vibratory screens platform	0.13	0.37	0.001
2	Vibratory screens Ground floor	0.67	0.61	0.001
3	Weighing room	1.07	2.60	0.008
4	H.T.Platform East	1.33	0.75	0.004
5	H T Ground floor East	1.33	1.04	0.008
6	H.T.Platform West	2.00	0.59	0.004
7	H.T Ground floor West	0.13	0.43	0.001
8	Rutile Platform	1.87	1.30	0.011
9	Rutile Ground floor	0.40	2.56	0.021
10	Garnet Platform	2.13	1.10	0.018
11	Garnet ground floor	3.60	1.99	0.048
12	Zircon section (old) Platform	1.07	2.21	0.001
13	Zircon Section (Old) ground floor	2.40	2.93	0.041
14	Zircon section (New) Platform	3.20	4.35	0.087
15	Zircon Section (New) ground floor	0.53	3.01	0.006
16	Zircon air tables	1.20	0.43	0.006
17	Monazite ground floor	2.80	8.03	0.089
18	Monazite IRMS	2.20	7.44	0.114
19	Monazite RCBMS	2.40	11.26	0.137
20	Ilmenite Section	1.73	1.00	0.013
	Limits	<b>TLV: 4.00</b>	<b>DAC: 1WL</b>	<b>DAC: 0.22</b>

No of Samples = 29  
 Average dust conc. = 1.61± 0.99mg m<sup>-3</sup>  
 Average air activity (<sup>232</sup>Th) = 0.031± 0.042Bq m<sup>-3</sup>  
 Average air activity (Thoron daughters) = 2.70±2.96mWL

Table 4: Air monitoring, plant premises - (March-2019)

S. No	LOCATION	Dust mg/m <sup>3</sup>	Th(B)Mwl	<sup>232</sup> ThBqm <sup>-3</sup>
1	In front of Lab	0.53	0.16	0.002
2	In front of ZOP	0.13	0.14	0.002
3	In front of Dry mill	1.07	0.61	0.007
4	In front of Stores	0.53	0.41	0.001
5	In front of E/W shop	1.87	0.55	0.010
6	In front of canteen	0.27	0.33	0.001

Table 5: Quarterly air activity-Environmental samples (January-March, 2019)

S.No	Location	Dust.con (mg m <sup>-3</sup> )	Th (B) ( mWL )	<sup>232</sup> Th ( Bq m <sup>-3</sup> )
1	Guest House Area	0.27	0.22	0.002
2	Pillayar coil junction	0.80	0.35	0.001
3	Periavilai	0.13	0.14	0.001
4	HUP Tails Area	0.67	0.33	0.002

Table 6: Quarterly Analysis of Water samples (January-March, 2019)

S. No	Location	Gross $\alpha$ Bq $l^{-1}$	Gross $\beta$ Bq $l^{-1}$
1.	Pillayarcoil junction well	0.011	0.068
2.	Valliyar river water	0.010	0.046
3.	Guest House new well	0.016	0.060
4.	HUP Tails water	0.009	0.026

Table7: Analyses of Solid Tailings (February-2019)

S.No	Location	$^{232}\text{Th}$ (Bqg $^{-1}$ )	MDL(Bqg $^{-1}$ )	Regulatory limit (Bqg $^{-1}$ )
1	HUP Tailings	0.043	0.022	1.0



Government of India  
BHABHA ATOMIC RESEARCH CENTRE  
Health Physics Division  
Radiation Protection Section (Nuclear Fuel)  
Health Physics Unit

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Indian Rare Earths Ltd  
Manavalakurichy- 629252  
Tamil Nadu, India

Date: 18-03-2019

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Dear Sir/Madam,

Enclosed please find the monthly report on the activities of Health Physics Unit for the month of February-2019 for your kind information and necessary action.

The non-radiological measurement of Respirable dust (PM<sub>10</sub>) and TDS/Chloride are now done by different agencies of IREL and same are not included in this report.

Regards

Yours Sincerely



K.Sreekumar

Officer in Charge, HPU, IREL, MK

Dr. Sujata Radhakrishnan  
Officer in Charge, Health Physics Unit  
IREL, Udyogamandal

Cc: The Head,  
IREL, MK

## RADIOLOGICAL MONITORING AT IREL, MANAVALAKURICHI PLANT (FEBRUARY-2019)

### 1. Radiation Fields:

Radiation field at different locations in the mining areas and plant measured during the month of February, 2019 are presented in Table 1. Background radiation field at Guest House ranged from 0.20 to 2.75  $\mu\text{Gyh}^{-1}$ . Radiation field at the MK beach area is in the range 0.20 – 0.80  $\mu\text{Gyh}^{-1}$ . The background radiation field inside the Minerals Separation Plant varied from 1.00 to 80.0  $\mu\text{Gyh}^{-1}$ . The maximum fields were at the Monazite section, Ilmenite section, Rutile section, Zircon section and Monazite Exolon section. Dry mill tailings area showed radiation field ranging from 28.0 to 40.0  $\mu\text{Gyh}^{-1}$ . Table 2 gives the radiation field in the plant premises.

### 2 Air monitoring:

The results of analysis of airborne dust,  $^{232}\text{Th}$  and thoron daughters are provided in Table 3. The gross dust concentration inside the plant varied from 0.13 to 3.73  $\text{mgm}^{-3}$  (mean  $0.92 \pm 0.80$ ) (respirable = 25%; TLV = 4  $\text{mg.m}^{-3}$ ). The higher dust levels were observed at HT platform East and Monazite IRMS. The air activity due to  $^{232}\text{Th}$  varied from 0.001 to 0.122  $\text{Bq.m}^{-3}$  (mean =  $0.025 \pm 0.032 \text{Bq.m}^{-3}$ ). The average dust levels and air activities are lower than that of previous month. Higher concentrations of airborne thorium were observed at Monazite section, Zircon (old) ground floor, Zircon [new] platform, H.T Section East and Rutile Platform (average 22.67 % DAC). The average thoron daughter concentrations were lower than that of the previous month and varied from 0.22 to 8.08 (mean =  $1.99 \pm 2.02 \text{mWL}$ ).

### 3. Environmental Air Samples:

Data of environmental (plant premises) air samples collected from six locations is given in Table 4.  $^{232}\text{Th}$  activity in the samples ranged from 1 to 6  $\text{mBq.m}^{-3}$ . These values are comparable with the ambient activity levels in natural high background radiation areas.

### 4. Analysis of Solid Wastes:

Results of the analysis of tailings from HUP and ETP (ZOP) solid waste are presented in Table 5. The levels are comparable with natural concentration prevailing in this area.

### Recommendation:

- (1) Continuous operation of MUP exhaust fans to be ensured to reduce air activity.
- (2) Spillage and accumulation of Monazite rich fraction in MSP is high. It may be controlled.

Table: 1 Results of the radiation survey of the plant area (February 2019) Radiation field ( $\mu\text{Gy/h}$ )

S.No	LOCATION	MIN	MAX	REMARKS
1.	DWCP, Kottumangalam	1.00	50.0	Temporary drymill storage
2.	HUP ground floor	0.50	6.00	
3.	HUP first floor	0.50	0.70	
4.	HUP concentrate	15.0	20.0	
5.	HUP tailings Area	0.10	0.20	
6.	Conc. sand godown	6.00	32.0	
7.	F.B. drier area	1.50	9.00	Sand Accumulation

8.	Weighing room	0.80	1.30	
9.	Vibrating screen Section	1.50	4.00	
10.	Rutile section	2.00	26.0	Sand Accumulation
11.	H.T.Plant Section	1.20	16.0	Sand Accumulation
12.	Ilmenite / Rutile readings	2.00	9.00	
13.	Zircon section	1.00	38.0	Sand Accumulation
14.	Monazite exolons Section	8.00	20.0	Sand Accumulation
15.	Monazite Section	8.00	80.0	Sand Accumulation
16.	Garnet section	6.00	12.0	Sand Accumulation
17.	Ilmenite section	2.50	20.0	Sand Accumulation
18.	Monazite silos (ground floor)	6.00	10.0	
19.	Road in front of godown	1.90	2.50	
20.	Monazite stores near ETP outside	90.0	100.0	
21.	New monazite store(outside walls)	20.0	25.0	
22.	Road out side	3.00	5.00	
23.	Monazite pumping area	9.00	10.0	

Table: 2 Radiation Survey results of the plant premises (February 2019) Radiation field - ( $\mu\text{Gy/hr}$ )

S.No	Location	Min	Max	Remarks
1	In front of Precon&HUP Road	1.00	1.20	
2	Dry Mill waste area	28.0	40.0	
3	Con A yard	15.0	20.0	
4	Guest House area	0.20	2.75	
5	MK Beach	0.20	0.80	
6	Main Gate	0.50	1.40	
7	In front of Lab	0.80	0.90	
8	In front of Dry mill	1.00	4.00	
9	In front ZOP	2.00	5.50	
10	In front stores	1.30	1.50	
11	In front m/w/shop	1.50	1.60	
12	In front of Electrical w/s	1.50	1.60	
13	In front of civil section	2.00	3.00	
14	In front of canteen	2.00	3.00	
15	ETP area	15.0	30.0	Semi processed minerals stored
16	Raw sand dump (HUP)	0.80	44.0	Drymill waste

Table: 3 Air monitoring, Manavalakurichi Plant (February-2019)

S. No	Location	Dust conc (mgm <sup>-3</sup> )	Thorn daughters (mWL)	<sup>232</sup> Th (Bq m <sup>-3</sup> )
1	Vibratory screens platform	0.40	0.43	0.001
2	Vibratory screens Ground floor	0.13	0.28	0.001
3	Weighing room	1.33	2.60	0.013
4	H.T.Platform East	3.73	1.79	0.032
5	H T Ground floor East	1.20	1.20	0.029
6	H.T.Platform West	0.67	0.85	0.018
7	H.T Ground floor West	0.13	0.28	0.001
8	Rutile Platform	1.07	1.28	0.025
9	Rutile Ground floor	0.80	1.77	0.016
10	Garnet Platform	0.67	1.44	0.002
11	Garnet ground floor	0.80	0.75	0.005
12	Zircon section (old) Platform	1.07	1.34	0.016
13	Zircon Section (Old) ground floor	0.67	1.46	0.023
14	Zircon section (New) Platform	0.40	1.87	0.022
15	Zircon Section (New) ground floor	0.80	3.19	0.013
16	Zircon air tables	0.40	0.22	0.001
17	Monazite ground floor	0.87	4.37	0.045
18	Monazite IRMS	1.94	8.08	0.122
19	Monazite RCBMS	1.27	5.83	0.101
20	Ilmenite Section	0.13	0.73	0.004
	Limits	<b>TLV: 4.00</b>	<b>DAC: 1WL</b>	<b>DAC: 0.22</b>

No of Samples = 29  
 Average dust conc. = 0.92± 0.80mg m<sup>-3</sup>  
 Average air activity (<sup>232</sup>Th) = 0.025± 0.032Bq m<sup>-3</sup>  
 Average air activity (Thoron daughters) = 1.99 ±2.02mWL

Table 4: Air monitoring, plant premises - (February-2019)

S. No	LOCATION	Dust mg/m <sup>3</sup>	Th(B)Mwl	<sup>232</sup> ThBqm <sup>-3</sup>
1	In front of Lab	0.27	0.12	0.001
2	In front of ZOP	0.27	0.28	0.003
3	In front of Dry mill	0.27	0.85	0.006
4	In front of Stores	0.13	0.10	0.001
5	In front of E/W shop	0.27	0.43	0.003
6	In front of canteen	0.40	0.20	0.001

Table5: Analyses of Solid Tailings (January-2019)

S.No	Location	<sup>232</sup> Th (Bqg <sup>-1</sup> )	MDL(Bqg <sup>-1</sup> )	Regulatory limit (Bqg <sup>-1</sup> )
1	HUP Tailings	0.34	0.022	1.0
2	ZOP solid waste (Plant S.D)	Nil	Nil	Nil

Government of India  
BHABHA ATOMIC RESEARCH CENTRE  
Health Physics Division  
Radiation Protection Section (Nuclear Fuel)  
Health Physics Unit

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Indian Rare Earths Ltd  
Manavalakurichy- 629252  
Tamil Nadu, India

Date: 20-02-2019

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Dear Sir/Madam,

Enclosed please find the monthly report on the activities of Health Physics Unit for the month of January-2019 for your kind information and necessary action.

Regards

Yours Sincerely



K.Sreekumar

Officer in Charge, HPU, IREL, MK

Dr.SujataRadhakrishnan  
Officer in Charge, Health Physics Unit  
IREL, Udyogamandal

Cc: The Head,  
IREL, MK



## RADIOLOGICAL MONITORING AT IREL, MANAVALAKURICHI PLANT (JANUARY-2019)

### 1. Radiation Fields:

Radiation field at different locations in the mining areas and plant measured during the month of January, 2019 are presented in Table 1. Background radiation field at Guest House ranged from 0.10 to 2.20  $\mu\text{Gy}\cdot\text{h}^{-1}$ . Radiation field at the MK beach area is in the range 0.20 –0.80  $\mu\text{Gy}\cdot\text{h}^{-1}$ . The background radiation field inside the Minerals Separation Plant varied from 1.00 to 60.0  $\mu\text{Gy}\cdot\text{h}^{-1}$ . The maximum fields were at the Monazite section, Garnet section, Rutile section, Zircon section and Monazite Exolon section. Dry mill tailings area showed radiation field ranging from 30.0 to 47.0  $\mu\text{Gy}\cdot\text{h}^{-1}$ . Table 2 gives the radiation field in the plant premises.

### 2 Air monitoring:

The results of analysis of airborne dust,  $^{232}\text{Th}$  and thoron daughters are provided in Table 3. The gross dust concentration inside the plant varied from 0.13 to 3.94  $\text{mg}\cdot\text{m}^{-3}$  (mean 1.26  $\pm$ 0.86) (respirable = 25%; TLV= 4  $\text{mg}\cdot\text{m}^{-3}$ ). The higher dust levels were observed at Monazite ground floor Monazite IRMS and Zircon [New] ground floor. The air activity due to  $^{232}\text{Th}$  varied from 0.002 to 0.166  $\text{Bq}\cdot\text{m}^{-3}$  (mean= 0.036 $\pm$ 0.043 $\text{Bq}\cdot\text{m}^{-3}$ ). The average dust levels and air activities are higher than that of previous month. Higher concentrations of airborne thorium were observed at Monazite section, Zircon (New) ground floor, Zircon [old] section, H.T Platform west and Zircon Airtables (average 33 % DAC). The average thoron daughter concentrations were equal to that of the previous month and varied from 0.37 to 8.68 (mean = 2.78 $\pm$ 2.49 mWL).

### 3. Environmental Air Samples:

Data of environmental (plant premises) air samples collected from six locations is given in Table 4.  $^{232}\text{Th}$  activity in the samples ranged from 1 to 11  $\text{mBq}\cdot\text{m}^{-3}$ . These values are comparable with the ambient activity levels in natural high background radiation areas.

The result of the air samples collected using High volume air sampler (Environ Tech) from various representative locations in the plant premises are provided in Table 5. The sampling duration was 5 hours, continuous. The SPM & RPM varied from 105.29 to 176.21 and 39.95 to 93.62  $\mu\text{g}\cdot\text{m}^{-3}$ , respectively.  $^{232}\text{Th}$  activities are varied from 0.1 to 0.3  $\text{mBq}\cdot\text{m}^{-3}$ .

### 4. Analysis of Solid Wastes:

Results of the analysis of tailings from HUP and ETP (ZOP) solid waste are presented in Table 6. The levels are comparable with natural concentration prevailing in this area.

### 5. Water quality Analysis:

Water samples were collected from within and outside the plant premises. The details are provided in Table 7.

### Recommendation:

- (1) Continuous operation of MUP exhaust fans to be ensured to reduce air activity.
- (2) Spillage and accumulation of Monazite rich fraction in MSP is high. It may be controlled.

Table: 1 Results of the radiation survey of the plant area (January 2019) Radiation field ( $\mu\text{Gy}/\text{h}$ )

S.No	LOCATION	MIN	MAX	REMARKS
1.	DWCP, Kottumangalam	1.00	70.0	Temporary drymill storage
2.	HUP ground floor	1.00	2.00	
3.	HUP first floor	0.50	0.75	
4.	HUP concentrate	10.0	14.0	
5.	HUP tailings Area	0.10	0.30	
6.	Conc. sand godown	6.00	30.0	

7.	F.B.drier area	3.00	8.00	Sand Accumulation
8.	Weighing room	1.30	1.50	
9.	Vibrating screen Section	2.00	8.00	Sand Accumulation
10.	Rutile section	3.00	22.0	Sand Accumulation
11.	H.T.Plant Section	1.50	18.0	Sand Accumulation
12.	Ilmenite / Rutile readings	4.00	16.0	Sand Accumulation
13.	Zircon section	1.00	45.0	Sand Accumulation
14.	Monazite exolons Section	10.0	20.0	Sand Accumulation
15.	Monazite Section	6.00	60.0	Sand Accumulation
16.	Garnet section	5.00	24.0	Sand Accumulation
17.	Ilmenite section	3.00	18.0	Sand Accumulation
18.	Monazite silos (ground floor)	8.00	10.0	
19.	Road in front of godown	1.50	2.00	
20.	Monazite stores near ETP outside	100.0	110.0	
21.	New monazite store(outside walls)	20.0	25.0	
22.	Road out side	3.00	5.00	
23.	Monazite pumping area	9.00	11.0	

Table: 2 Radiation Survey results of the plant premises (January 2019) Radiation field - ( $\mu\text{Gy/hr}$ )

S.No	Location	Min	Max	Remarks
1	In front of Precon&HUP Road	0.80	1.20	
2	Dry Mill waste area	30.0	47.0	
3	Con A yard	10.0	14.0	
4	Guest House area	0.10	2.20	
5	MK Beach	0.20	0.80	
6	Main Gate	1.00	1.30	
7	In front of Lab	1.20	1.50	
8	In front of Dry mill	2.00	3.00	
9	In front ZOP	2.00	5.00	
10	In front stores	1.60	1.80	
11	In front m/w/shop	1.50	1.80	
12	In front of Electrical w/s	1.50	1.80	
13	In front of civil section	1.80	2.50	
14	In front of canteen	2.00	2.50	
15	ETP area	6.00	35.0	Semi processed minerals stored
16	Raw sand dump (HUP)	1.00	21.0	

Table: 3 Air monitoring, Manavalakurichi Plant (January-2019)

S. No	Location	Dust conc (mgm <sup>-3</sup> )	Thorn daughters (mWL)	<sup>232</sup> Th (Bq m <sup>-3</sup> )
1	Vibratory screens platform	0.80	0.57	0.004
2	Vibratory screens Ground floor	0.13	0.53	0.002
3	Weighing room	0.67	1.99	0.013
4	H.T.Platform East	1.33	2.50	0.016
5	H T Ground floor East	1.47	1.04	0.005
6	H.T.Platform West	1.33	4.19	0.036
7	H.T Ground floor West	0.13	0.37	0.004
8	Rutile Platform	1.60	2.99	0.015
9	Rutile Ground floor	0.40	0.93	0.012
10	Garnet Platform	1.73	0.96	0.016
11	Garnet ground floor	1.20	0.93	0.018
12	Zircon section (old) Platform	0.67	2.80	0.052
13	Zircon Section (Old) ground floor	0.53	2.47	0.041
14	Zircon section (New) Platform	1.47	1.56	0.024
15	Zircon Section (New) ground floor	2.00	4.23	0.035
16	Zircon air tables	1.47	1.79	0.038
17	Monazite ground floor	3.94	8.68	0.129
18	Monazite IRMS	2.27	8.55	0.166
19	Monazite RCBMS	1.34	6.33	0.076
20	Ilmenite Section	0.80	2.24	0.015
	Limits	<b>TLV: 4.00</b>	<b>DAC: 1WL</b>	<b>DAC: 0.22</b>

No of Samples = 29  
 Average dust conc. = 1.26± 0.86 mg m<sup>-3</sup>  
 Average air activity (<sup>232</sup>Th) = 0.036± 0.043Bq m<sup>-3</sup>  
 Average air activity (Thoron daughters) = 2.78±2.49mWL

Table 4: Air monitoring, plant premises - (January-2019)

S. No	LOCATION	Dust mg/m <sup>3</sup>	Th(B)Mwl	<sup>232</sup> ThBqm <sup>-3</sup>
1	In front of Lab	0.13	0.47	0.001
2	In front of ZOP	0.27	0.35	0.004
3	In front of Dry mill	1.07	1.18	0.011
4	In front of Stores	0.40	0.41	0.004
5	In front of E/W shop	0.13	0.41	0.005
6	In front of canteen	0.27	0.35	0.003

Table 5: Air monitoring, Plant premises, using high volume air sample (5hr duration)(December-2018)

S.No	Date	Location	SPM µgm m <sup>-3</sup>	RPM µgm m <sup>-3</sup>	<sup>232</sup> Th Bq m <sup>-3</sup>
1	29-01-2019	Top of Canteen	121.02	39.95	0.0001
2	25-01-2019	Top of R&D	173.19	93.62	0.0001
3	11-01-2019	Top of Rest shed	130.69	89.95	0.0002
4	31-01-2019	Top of Civil	105.29	62.96	0.0003
5	02-01-2019	Top of Dispensary	176.21	51.21	0.0002

Table 6: Analyses of Solid Tailings (December-2018)

S.No	Location	<sup>232</sup> Th (Bqg <sup>-1</sup> )	MDL(Bqg <sup>-1</sup> )	Regulatory limit (Bqg <sup>-1</sup> )
1	HUP Tailings	0.41	0.022	1.0
2	ZOP solid waste (Plant S.D)	Nil	Nil	Nil

Table: 7 Water Quality parameters of Environmental Water Samples (January-2018)

Sl. No	Location	PH	TDS	T.Chlorides	T.Hardness
			Ppm	Ppm	Ppm
1	Office new well ,IREL, MK	7.60	334	91.12	251
2	Office old well, IREL, MK	7.30	316	99.56	290
3	Canteen well, IREL, MK	7.90	358	95.34	241
4	Zirconium Oxide Plant, IREL, MK	7.70	220	120	220
5	Valliyar river,N8°08'40.0"E77°18'31.0"	6.90	90	88.44	120
6	Muttom,N8°07'38.6"E77°19'03.7"	6.90	342	155	210
7	Tank Near Laboratory, IREL, MK	7.70	420	156	240
8	Guest house out west well, IREL, MK	7.60	140	150	261
9	Guest house new well, IREL, MK	7.80	400	168	340
10	Pillaiyarcoil JunctionN8°09'12.8"E77°18'02.5"	7.20	223	99.34	180
11	Kootumangalam,N8°09'24.0"E77°17'25.6"	7.00	297	142	161
12	Sea water, IREL, MK	7.80	22650	25150	10997
13	Colachel,N8°10'02.9"E77°16'07.0"	6.80	88	90.54	80.28
14	IRE Drinking Water, IREL, MK	7.20	276	121	162
15	Esanthangu N 8°13'24.93" E 77°32'90.87"	6.90	590	398	211
16	Kadiapattinam N8°08'11.3"E77°18'19.0"	8.00	332	312	322
17	Ammandivilai	7.20	53	68.54	80.54

Government of India  
BHABHA ATOMIC RESEARCH CENTRE  
Health Physics Division  
Radiation Protection Section (Nuclear Fuel)  
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Indian Rare Earths Ltd  
Manavalakurichy- 629252  
Tamil Nadu, India

Date: 16-01-2019

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Dear Sir/Madam,

Enclosed please find the monthly report on the activities of Health Physics Unit for the month of December-2018 for your kind information and necessary action.

Regards

Yours Sincerely



K.Sreekumar

Officer in Charge, HPU, IREL, MK

Dr.SujataRadhakrishnan  
Officer in Charge, Health Physics Unit  
IREL, Udyogamandal

Cc: The Head,  
IREL, MK

## RADIOLOGICAL MONITORING AT IREL, MANAVALAKURICHI PLANT (DECEMBER-2018)

### 1. Radiation Fields:

Radiation field at different locations in the mining areas and plant measured during the month of December, 2018, are presented in Table 1. Background radiation field at Guest House ranged from 0.50 to 2.50  $\mu\text{Gyh}^{-1}$ . Radiation field at the MK beach area is in the range 0.60 – 1.00  $\mu\text{Gyh}^{-1}$ . The background radiation field inside the Minerals Separation Plant varied from 1.00 to 100.0  $\mu\text{Gyh}^{-1}$ . The maximum fields were at the Monazite section. Dry mill tailings area showed radiation field ranging from 28.0 to 35.0  $\mu\text{Gyh}^{-1}$ . Table 2 gives the radiation field in the plant premises.

### 2 Air monitoring:

The results of analysis of airborne dust,  $^{232}\text{Th}$  and thoron daughters are provided in Table 3. The gross dust concentration inside the plant varied from 0.13 to 2.13  $\text{mgm}^{-3}$  (mean  $0.96 \pm 0.55$ ) (respirable = 25%; TLV = 4  $\text{mg.m}^{-3}$ ). The higher dust levels were observed at Zircon Airtables. The air activity due to  $^{232}\text{Th}$  varied from 0.001 to 0.136  $\text{Bq.m}^{-3}$  (mean =  $0.025 \pm 0.038 \text{ Bq.m}^{-3}$ ). The average dust levels and air activities are higher than that of previous month. Higher concentrations of airborne thorium were observed at Monazite section, Zircon (New) ground floor and Zircon Airtables (average 34 % DAC). The average thoron daughter concentrations were higher than that of the previous month and varied from 0.28 to 7.20 (mean =  $2.81 \pm 1.88 \text{ mWL}$ ).

### 3. Environmental Air Samples:

Data of environmental (plant premises) air samples collected from six locations is given in Table 4.  $^{232}\text{Th}$  activity in the samples ranged from 3 to 7  $\text{mBq.m}^{-3}$ . These values are comparable with the ambient activity levels in natural high background radiation areas.

The result of the air samples collected using High volume air sampler (Environ Tech) from various representative locations in the plant premises are provided in Table 5. The sampling duration was 5 hours, continuous. The SPM & RPM varied from 127.76 to 194.92 and 46.82 to 95.87  $\mu\text{gm}^{-3}$ , respectively.  $^{232}\text{Th}$  activities are varied from 0.1 to 0.3  $\text{mBq m}^{-3}$ .

Quarterly analysis of environmental air samples collected from a radial distance of 1 Km around the plant is provided in Table 6.

### 4. Analysis of liquid Effluents:

The radioactivity levels in the Valliyar River water and Well water collected from a radial distance of one kilometer are given in Table 7. The levels are comparable with the natural concentration encountered at the high background radiation areas.

### 5. Analysis of Solid Wastes:

Results of the analysis of tailings from HUP and ETP (ZOP) solid waste are presented in Table 8. The levels are comparable with natural concentration prevailing in this area.

### 6. Water quality Analysis:

Water samples were collected from within and outside the plant premises. The details are provided in Table 9.

### Recommendation:

- (1) Continuous operation of MUP exhaust fans to be ensured to reduce air activity.
- (2) Spillage and accumulation of Monazite rich fraction in MSP is high. It may be controlled.

Table: 1 Results of the radiation survey of the plant area (December-2018) Radiation field ( $\mu\text{Gy}/\text{h}$ )

S.No	LOCATION	MIN	MAX	REMARKS
1.	DWCP,Kottumangalam	1.00	70.0	Temporarily Drymill stored
2.	HUP ground floor	1.00	2.30	
3.	HUP first floor	0.40	0.60	
4.	HUP concentrate	6.00	20.0	
5.	HUP tailings Area	0.10	0.20	
6.	Conc.sandgodown	7.00	12.0	
7.	F.B.drier area	3.00	10.0	Sand Accumulation
8.	Weighing room	1.50	1.80	
9.	Vibrating screen Section	3.00	9.00	Sand Accumulation
10.	Rutile section	3.00	23.0	Sand Accumulation
11.	H.T.Plant Section	1.50	16.0	Sand Accumulation
12.	Ilmenite / Rutile readings	2.80	10.0	Sand Accumulation
13.	Zircon section	1.00	45.0	Sand Accumulation
14.	Monazite exolons Section	10.0	30.0	Sand Accumulation
15.	Monazite Section	8.00	100.0	Sand Accumulation
16.	Garnet section	5.00	16.0	
17.	Ilmenite section	3.00	25.0	Sand Accumulation
18.	Monazite silos (ground floor)	8.00	10.0	
19.	Road in front of godown	2.50	3.00	
20.	Monazite stores near ETP outside	90.0	100.0	
21.	New monazite store(outside walls)	20.0	25.0	
22.	Road out side	2.00	7.00	
23.	Monazite pumping area	9.00	11.0	

Table: 2 Radiation Survey results of the plant premises (December-2018) Radiation field - ( $\mu\text{Gy}/\text{hr}$ )

S.No	Location	Min	Max	Remarks
1	In front of Precon&HUP Road	1.00	1.60	
2	Dry Mill waste area	28.0	35.0	
3	Con A yard	6.00	20.0	
4	Guest House area	0.50	2.50	
5	MK Beach	0.60	1.00	
6	Main Gate	1.00	1.20	
7	In front of Lab	1.00	1.40	
8	In front of Dry mill	2.00	3.00	
9	In front ZOP	2.20	5.00	
10	In front stores	1.50	1.80	
11	In front m/w/shop	1.80	2.00	
12	In front of Electrical w/s	1.80	2.20	
13	In front of civil section	2.00	2.50	
14	In front of canteen	2.00	3.00	
15	ETP area	10.0	25.0	Semi processed mineral stored
16	Raw sand dump (HUP)	0.60	18.0	

Table: 3 Air monitoring, Manavalakurichi Plant (December-2018)

S. No	Location	Dust conc (mgm <sup>-3</sup> )	Thorn daughters (mWL)	<sup>232</sup> Th (Bq m <sup>-3</sup> )
1	Vibratory screens platform	0.27	0.28	0.001
2	Vibratory screens Ground floor	0.13	0.28	0.002
3	Weighing room	0.67	2.95	0.004
4	H.T.Platform East	0.67	1.99	0.003
5	H T Ground floor East	0.53	2.24	0.001
6	H.T.Platform West	0.93	3.78	0.010
7	H.T Ground floor West	1.60	1.48	0.013
8	Rutile Platform	1.07	3.68	0.007
9	Rutile Ground floor	1.07	2.70	0.007
10	Garnet Platform	1.20	2.66	0.016
11	Garnet ground floor	1.47	1.32	0.008
12	Zircon section (old) Platform	0.27	1.24	0.004
13	Zircon Section (Old) ground floor	1.07	2.74	0.023
14	Zircon section (New) Platform	0.40	2.84	0.013
15	Zircon Section (New) ground floor	0.93	5.06	0.030
16	Zircon air tables	2.13	2.72	0.038
17	Monazite ground floor	1.00	2.85	0.048
18	Monazite IRMS	1.40	7.05	0.120
19	Monazite RCBMS	1.87	7.20	0.136
20	Ilmenite Section	0.53	1.12	0.013
	Limits	<b>TLV: 4.00</b>	<b>DAC: 1WL</b>	<b>DAC: 0.22</b>

No of Samples = 29  
 Average dust conc. = 0.96 ± 0.55mg m<sup>-3</sup>  
 Average air activity (<sup>232</sup>Th) = 0.025 ± 0.038 Bq m<sup>-3</sup>  
 Average air activity (Thoron daughters) = 2.81 ± 1.88mWL

Table 4: Air monitoring, plant premises - (December- 2018)

S. No	LOCATION	Dust mg/m <sup>3</sup>	Th(B)Mwl	<sup>232</sup> ThBqm <sup>-3</sup>
1	In front of Lab	0.53	0.43	0.004
2	In front of ZOP	0.93	0.41	0.003
3	In front of Dry mill	1.20	1.04	0.004
4	In front of Stores	0.13	0.45	0.004
5	In front of E/W shop	0.27	0.45	0.007
6	In front of canteen	0.13	0.20	0.004

Table 5: Air monitoring, Plant premises, using high volume air sample (5hr duration)(December-2018)

S.No	Date	Location	SPM µgm m <sup>-3</sup>	RPM µgm m <sup>-3</sup>	<sup>232</sup> Th Bq m <sup>-3</sup>
1	22-12-2018	Top of Canteen	180.63	88.25	0.0001
2	26-12-2018	Top of R&D	127.76	46.82	0.0002
3	27-12-2018	Top of Rest shed	147.62	59.37	0.0001
4	24-12-2018	Top of Civil	177.46	85.08	0.0002
5	28-12-2018	Top of Dispensary	194.92	95.87	0.0003



Table 6: Quarterly air activity-Environmental samples (October-December, 2018)

S.No	Location	Dust.con	Th (B)	<sup>232</sup> Th
1	Guest House Area	0.40	0.79	0.002
2	Pillayar coil junction	0.27	0.51	0.002
3	Periavilai	0.13	0.46	0.002
4	HUP Tails Area	0.13	0.65	0.004

Table 7: Quarterly Analysis of Water samples (October-December, 2018)

S. No	Location	Gross $\alpha$ Bq $l^{-1}$	Gross $\beta$ Bq $l^{-1}$
1.	Pillayarcoil junction well	0.003	0.009
2.	Valliyar river water	0.001	0.004
3.	Guest House new well	0.006	0.011
4.	HUP Tails water	0.009	0.016

Table8: Analyses of Solid Tailings (November-2018)

S.No	Location	<sup>232</sup> Th (Bqg $^{-1}$ )	MDL(Bqg $^{-1}$ )	Regulatory limit (Bqg $^{-1}$ )
1	HUP Tailings	0.45	0.022	1.0
2	ZOP solid waste (Plant S.D)	Nil	Nil	Nil

Table: 9 Water Quality parameters of Environmental Water Samples (December-2018)

Sl. No	Location	PH	TDS	T.Chlorides	T.Hardness
			Ppm	Ppm	Ppm
1	Office new well ,IREL, MK	7.2	310	85.34	241
2	Office old well, IREL, MK	7.3	282	71.12	241
3	Canteen well, IREL, MK	7.6	340	88	263
4	Zirconium Oxide Plant, IREL, MK	7.7	199	113	201
5	Valliyar river,N8°08'40.0"E77°18'31.0"	6.7	86	80.54	120
6	Muttom,N8°07'38.6"E77°19'03.7"	7.1	340	142	201
7	Tank Near Laboratory, IREL, MK	7.5	420	156	220
8	Guest house out west well, IREL, MK	7.3	130	142	241
9	Guest house new well, IREL, MK	7.6	360	128	322
10	Pillaiyarcoil JunctionN8°09'12.8"E77°18'02.5"	7.0	215	99.56	161
11	Kootumangalam,N8°09'24.0"E77°17'25.6"	7.0	272	113	161
12	Sea water, IREL, MK	7.8	22500	25803	11096
13	Colachel,N8°10'02.9"E77°16'07.0"	6.7	86	99.6	80
14	IRE Drinking Water, IREL, MK	7.1	252	113	140
15	Esanthangu	6.7	155	298	241
16	Kadiapattinam N8°08'11.3"E77°18'19.0"	7.6	318	312	362
17	Ammandivilai	7.5	57	80.54	80

Government of India  
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Indian Rare Earths Ltd  
Manavalakurichy- 629252  
Tamil Nadu, India

Date: 17-12-2018

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Dear Sir/Madam,

Enclosed please find the monthly report on the activities of Health Physics Unit for the month of November-2018 for your kind information and necessary action.

Regards

Yours Sincerely



K.Sreekumar

Officer in Charge, HPU, IREL, MK

Dr. Sujata Radhakrishnan  
Officer in Charge, Health Physics Unit  
IREL, Udyogamandal

Cc: The Head,  
IREL, MK

## RADIOLOGICAL MONITORING AT IREL, MANAVALAKURICHI PLANT (NOVEMBER-2018)

### 1. Radiation Fields:

Radiation field at different locations in the mining areas and plant measured during the month of November, 2018, are presented in Table 1. Background radiation field at Guest House ranged from 1.00 to 3.00  $\mu\text{Gyh}^{-1}$ . Radiation field at the MK beach area is in the range 0.60 – 1.40  $\mu\text{Gyh}^{-1}$ . The background radiation field inside the Minerals Separation Plant varied from 1.00 to 100.0  $\mu\text{Gyh}^{-1}$ . The maximum fields were at the Monazite section and Zircon section. Dry mill tailings area showed radiation field ranging from 30.0 to 35.0  $\mu\text{Gyh}^{-1}$ . Table 2 gives the radiation field in the plant premises.

### 2 Air monitoring:

The results of analysis of airborne dust,  $^{232}\text{Th}$  and thoron daughters are provided in Table 3. The gross dust concentration inside the plant varied from 0.13 to 2.40  $\text{mgm}^{-3}$  (mean  $0.74 \pm 0.63$ ) (respirable = 25%; TLV = 4  $\text{mg.m}^{-3}$ ). The higher dust levels were observed at Monazite ground floor and Rutile ground floor. The air activity due to  $^{232}\text{Th}$  varied from 0.001 to 0.119  $\text{Bq.m}^{-3}$  (mean =  $0.020 \pm 0.034 \text{Bq.m}^{-3}$ ). The average dust levels are lower than that of previous month and air activities are higher than that of previous month. Higher concentrations of airborne thorium were observed at Monazite Section and Rutile Platform (average 35 % DAC). The average thoron daughter concentrations were lower than that of the previous month and varied from 0.22 to 4.72 (mean =  $1.50 \pm 1.26 \text{mWL}$ ).

### 3. Environmental Air Samples:

Data of environmental (plant premises) air samples collected from six locations is given in Table 4.  $^{232}\text{Th}$  activity in the samples ranged from 1 to 4  $\text{mBq.m}^{-3}$ . These values are comparable with the ambient activity levels in natural high background radiation areas.

The result of the air samples collected using High volume air sampler (Environ Tech) from various representative locations in the plant premises are provided in Table 5. The sampling duration was 8 hours, continuous. The SPM & RPM varied from 52.12 to 198.81 and 27.51 to 94.05  $\mu\text{gm}^{-3}$ , respectively.  $^{232}\text{Th}$  activity is 0.1  $\text{mBq m}^{-3}$ .

### 4. Analysis of Solid Wastes:

Results of the analysis of tailings from HUP and ETP (ZOP) solid waste are presented in Table 6. The levels are comparable with natural concentration prevailing in this area.

### 5. Water quality Analysis:

Water samples were collected from within and outside the plant premises. The details are provided in Table 7.

### Recommendation:

- (1) Spillage and accumulation of Monazite rich fraction in MSP is high and contributed higher radiation exposure. It may be controlled immediately.

Table: 1 Results of the radiation survey of the plant area (November-2018) Radiation field ( $\mu\text{Gy/ h}$ )

S.No	LOCATION	MIN	MAX	REMARKS
1.	DWCP, Kottumangalam	1.00	70.0	Dry mill temporary storage
2.	HUP ground floor	0.60	1.00	
3.	HUP first floor	0.60	0.80	
4.	HUP concentrate	6.00	10.0	
5.	HUP tailings Area	0.10	0.20	
6.	Conc. sand godown	4.00	20.0	

7.	F.B.drier area	3.00	9.00	
8.	Weighing room	0.90	1.30	
9.	Vibrating screen Section	2.00	7.00	Sand Accumulation
10.	Rutile section	3.00	20.0	Sand Accumulation
11.	H.T.Plant Section	1.20	15.0	Sand Accumulation
12.	Ilmenite / Rutile readings	3.00	16.0	Sand Accumulation
13.	Zircon section	1.00	35.0	Sand Accumulation
14.	Monazite exolons Section	10.0	22.0	Sand Accumulation
15.	Monazite Section	9.00	100.0	Sand Accumulation
16.	Garnet section	8.00	16.0	Sand Accumulation
17.	Ilmenite section	4.00	20.0	Sand Accumulation
18.	Monazite silos (ground floor)	8.00	11.0	
19.	Road in front of godown	2.00	2.50	
20.	Monazite stores near ETP outside	100.0	120.0	
21.	New monazite store(outside walls)	20.0	25.0	
22.	Road out side	2.00	7.00	
23.	Monazite pumping area	9.00	12.0	

Table: 2 Radiation Survey results of the plant premises (November-2018) Radiation field - ( $\mu\text{Gy/hr}$ )

S.No	Location	Min	Max	Remarks
1	In front of Precon&HUP Road	0.80	1.00	
2	Dry Mill waste area	30.0	35.0	
3	Con A yard	6.00	10.0	
4	Guest House area	1.00	3.00	
5	MK Beach	0.60	1.40	
6	Main Gate	1.00	1.30	
7	In front of Lab	0.80	1.20	
8	In front of Dry mill	2.00	3.00	
9	In front ZOP	3.00	4.00	
10	In front stores	1.50	1.80	
11	In front m/w/shop	1.70	2.00	
12	In front of Electrical w/s	1.70	2.00	
13	In front of civil section	2.00	2.50	
14	In front of canteen	2.00	2.50	
15	ETP area	10.0	25.0	
16	Raw sand dump (HUP)	1.40	15.0	Drymill tailings

Table: 3 Air monitoring, Manavalakurichi Plant (November-2018)

S. No	Location	Dust conc (mgm <sup>-3</sup> )	Thorn daughters (mWL)	<sup>232</sup> Th (Bq m <sup>-3</sup> )
1	Vibratory screens platform	0.13	0.26	0.001
2	Vibratory screens Ground floor	0.53	0.47	0.001
3	Weighing room	0.27	1.85	0.004
4	H.T.Platform East	0.80	1.34	0.008
5	H T Ground floor East	1.07	1.67	0.016
6	H.T.Platform West	0.53	0.98	0.003
7	H.T Ground floor West	0.40	0.22	0.001
8	Rutile Platform	2.40	1.36	0.029
9	Rutile Ground floor	0.27	1.97	0.002
10	Garnet Platform	0.13	0.39	0.010
11	Garnet ground floor	1.07	1.40	0.013
12	Zircon section (old) Platform	0.67	0.85	0.007
13	Zircon Section (Old) ground floor	0.53	2.07	0.022
14	Zircon section (New) Platform	0.40	0.69	0.001
15	Zircon Section (New) ground floor	0.13	0.77	0.001
16	Zircon air tables	0.13	0.55	0.002
17	Monazite ground floor	1.94	3.53	0.061
18	Monazite IRMS	1.07	3.96	0.103
19	Monazite RCBMS	1.60	4.72	0.119
20	Ilmenite Section	0.67	0.87	0.004
	Limits	<b>TLV: 4.00</b>	<b>DAC: 1WL</b>	<b>DAC: 0.22</b>

No of Samples = 29  
Average dust conc. = 0.74±0.63 mg m<sup>-3</sup>  
Average air activity (<sup>232</sup>Th) = 0.020±0.034Bq m<sup>-3</sup>  
Average air activity (Thoron daughters) = 1.50 ±1.26 mWL

Table 4: Air monitoring, plant premises - (November- 2018)

S. No	LOCATION	Dust mg/m <sup>3</sup>	Th(B)Mwl	<sup>232</sup> ThBqm <sup>-3</sup>
1	In front of Lab	0.13	0.08	0.002
2	In front of ZOP	0.27	0.22	0.003
3	In front of Dry mill	0.67	0.53	0.004
4	In front of Stores	0.80	0.16	0.001
5	In front of E/W shop	0.53	0.12	0.002
6	In front of canteen	0.27	0.08	0.001

Table 5: Air monitoring, Plant premises, using high volume air sample (8 hr duration)(November-2018)

S.No	Date	Location	SPM µgm m <sup>-3</sup>	RPM µgm m <sup>-3</sup>	<sup>232</sup> Th Bq m <sup>-3</sup>
1	28-11-2018	Top of Canteen	198.81	94.05	0.0001
2	20-11-2018	Top of R&D	135.18	73.58	0.0001
3	23-11-2018	Top of Rest shed	129.50	30.65	0.0001
4	27-11-2018	Top of civil	134.59	90.82	0.0001
5	22-11-2018	Top of Dispensary	52.12	27.51	0.0001

Table6: Analyses of Solid Tailings (October-2018)

S.No	Location	$^{232}\text{Th}$ (Bqg <sup>-1</sup> )	MDL(Bqg <sup>-1</sup> )	Regulatory limit (Bqg <sup>-1</sup> )
1	HUP Tailings	0.048	0.022	1.0
2	ZOP solid waste (Plant S.D)	Nil	Nil	Nil

Table: 7 Water Quality parameters of Environmental Water Samples (November-2018)

Sl. No	Location	PH	TDS	T.Chlorides	T.Hardness
			Ppm	Ppm	Ppm
1	Office new well ,IREL, MK	7.2	300	71.1	281
2	Office old well, IREL, MK	7.1	341	99.6	241
3	Canteen well, IREL, MK	7.4	370	128	241
4	Zirconium Oxide Plant, IREL, MK	7.6	370	142	161
5	Valliyar river,N8°08'40.0"E77°18'31.0"	6.0	105	42.6	80
6	Muttom,N8°07'38.6"E77°19'03.7"	6.3	370	128	201
7	Tank Near Laboratory, IREL, MK	7.0	90	71.1	161
8	Guest house out west well, IREL, MK	7.3	250	156	241
9	Guest house new well, IREL, MK	7.5	340	142	222
10	Pillaiyarcoil JunctionN8°09'12.8"E77°18'02.5"	6.9	295	85.3	120
11	Kootumangalam,N8°09'24.0"E77°17'25.6"	6.7	276	99.6	161
12	Sea Water	7.5	28400	23144	10068
13	Colachel,N8°10'02.9"E77°16'07.0"	6.0	210	99.6	201
14	IRE Drinking Water, IREL, MK	7.0	200	113	120
15	Esanthangu,N8°07'54.9"E77°19'43.8"	6.7	350	298	201
16	Kadiapattinam N8°08'11.3"E77°18'19.0"	7.4	320	298	322
17	Ammandivilai	6.9	86	42.7	161

**Government of India**  
**BHABHA ATOMIC RESEARCH CENTRE**  
**Health Physics Division**  
**Radiation Protection Section (Nuclear Fuel)**  
**Health Physics Unit**

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Indian Rare Earths Ltd  
Manavalakurichy- 629252  
Tamil Nadu, India

Date: 19-11-2018

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Dear Sir/Madam,

Enclosed please find the monthly report on the activities of Health Physics Unit for the month of October-2018 for your kind information and necessary action.

Regards

Yours Sincerely



K.Sreekumar

Officer in Charge, HPU, IREL, MK

Dr. SujataRadhakrishnan  
Officer in Charge, Health Physics Unit  
IREL, Udyogamandal

Cc: The Head,  
IREL, MK

## RADIOLOGICAL MONITORING AT IREL, MANAVALAKURICHI PLANT (OCTOBER-2018)

### 1. Radiation Fields:

Radiation field at different locations in the mining areas and plant measured during the month of October, 2018, are presented in Table 1. Background radiation field at Guest House ranged from 1.00 to 3.00  $\mu\text{Gyh}^{-1}$ . Radiation field at the MK beach area is in the range 0.50 – 1.20  $\mu\text{Gyh}^{-1}$ . The background radiation field inside the Minerals Separation Plant varied from 1.00 to 120.0  $\mu\text{Gyh}^{-1}$ . The maximum fields were at the Monazite section, Monazite Exolon section and Zircon section. Dry mill tailings area showed radiation field ranging from 30.0 to 35.0  $\mu\text{Gyh}^{-1}$ . Table 2 gives the radiation field in the plant premises.

### 2 Air monitoring:

The results of analysis of airborne dust,  $^{232}\text{Th}$  and thoron daughters are provided in Table 3. The gross dust concentration inside the plant varied from 0.27 to 3.54  $\text{mgm}^{-3}$  (mean  $1.05 \pm 0.81$ ) (respirable = 25%; TLV = 4  $\text{mg.m}^{-3}$ ). The higher dust levels were observed at Monazite RCBMS, Monazite IRMS and Rutile Platform. The air activity due to  $^{232}\text{Th}$  varied from 0.001 to 0.081  $\text{Bq.m}^{-3}$  (mean =  $0.012 \pm 0.018 \text{ Bq.m}^{-3}$ ). The average dust levels are higher than that of previous month and air activities are slightly higher than that of previous month. Higher concentrations of airborne thorium were observed at Monazite RCBMS, Zircon [Old] Platform and Garnet Platform (average 20 % DAC). The average thoron daughter concentrations were higher than that of the previous month and varied from 0.28 to 8.33 (mean =  $2.30 \pm 2.27 \text{ mWL}$ ).

### 3. Environmental Air Samples:

Data of environmental (plant premises) air samples collected from six locations is given in Table 4.  $^{232}\text{Th}$  activity in the samples ranged from 1 to 4  $\text{mBq.m}^{-3}$ . These values are comparable with the ambient activity levels in natural high background radiation areas.

The result of the air samples collected using High volume air sampler (Environ Tech) from various representative locations in the plant premises are provided in Table 5. The sampling duration was 8 hours, continuous. The SPM & RPM varied from 87.55 to 187.72 and 16.67 to 97.24  $\mu\text{gm}^{-3}$ , respectively.  $^{232}\text{Th}$  activities are varied from 0.1 to 0.4  $\text{mBq m}^{-3}$ .

### 4. Analysis of Solid Wastes:

Results of the analysis of tailings from HUP and ETP (ZOP) solid waste are presented in Table 6. The levels are comparable with natural concentration prevailing in this area.

### 5. Water quality Analysis:

Water samples were collected from within and outside the plant premises. The details are provided in Table 7.

### Recommendation:

- (1) Continuous operation of MUP exhaust fans to be ensured to reduce air activity.
- (2) Spillage and accumulation of Monazite rich fraction in MSP is high. It may be controlled.

Table: 1 Results of the radiation survey of the plant area (October-2018) Radiation field ( $\mu\text{Gy/ h}$ )

S.No	LOCATION	MIN	MAX	REMARKS
1.	DWCP, Kottumangalam	3.00	40.0	Dry mill waste storage
2.	HUP ground floor	1.00	2.00	
3.	HUP first floor	0.50	0.70	
4.	HUP concentrate	5.00	8.00	
5.	HUP tailings Area	0.20	0.30	



6.	Conc.sandgodown	6.00	30.0	
7.	F.B.drier area	3.00	9.00	Sand Accumulation
8.	Weighing room	0.90	1.30	
9.	Vibrating screen Section	1.60	8.00	Sand Accumulation
10.	Rutile section	2.00	20.0	Sand Accumulation
11.	H.T.Plant Section	1.20	15.0	Sand Accumulation
12.	Ilmenite / Rutile readings	3.00	16.0	Sand Accumulation
13.	Zircon section	2.00	50.0	Sand Accumulation
14.	Monazite exolons Section	9.00	40.0	Sand Accumulation
15.	Monazite Section	6.00	120.0	Sand Accumulation
16.	Garnet section	4.00	12.0	Sand Accumulation
17.	Ilmenite section	3.00	13.0	Sand Accumulation
18.	Monazite silos (ground floor)	8.00	10.0	
19.	Road in front of godown	2.00	2.50	
20.	Monazite stores near ETP outside	80.0	120.0	
21.	New monazite store (outside walls)	20.0	25.0	
22.	Road out side	2.00	6.00	
23.	Monazite pumping area	8.00	10.0	

Table: 2 Radiation Survey results of the plant premises (October-2018) Radiation field - ( $\mu\text{Gy/hr}$ )

S.No	Location	Min	Max	Remarks
1	In front of Precon&HUP Road	1.20	1.50	
2	Dry Mill waste area	30.0	35.0	
3	Con A yard	5.00	8.00	
4	Guest House area	1.00	3.00	
5	MK Beach	0.50	1.20	
6	Main Gate	0.80	1.60	
7	In front of Lab	0.60	0.80	
8	In front of Dry mill	1.00	3.00	
9	In front ZOP	2.00	5.00	
10	In front stores	1.40	1.60	
11	In front m/w/shop	1.50	1.70	
12	In front of Electrical w/s	1.40	1.60	
13	In front of civil section	2.00	3.00	
14	In front of canteen	2.00	2.50	
15	ETP area	15.0	30.0	Semi processed mineral stored
16	Raw sand dump (HUP)	0.50	2.50	

Table: 3 Air monitoring, Manavalakurichi Plant (October-2018)

S. No	Location	Dust conc (mgm <sup>-3</sup> )	Thorn daughters (mWL)	<sup>232</sup> Th (Bq m <sup>-3</sup> )
1	Vibratory screens platform	0.40	0.49	0.001
2	Vibratory screens Ground floor	0.53	0.28	0.003
3	Weighing room	0.27	2.32	0.001
4	H.T.Platform East	1.07	0.89	0.003
5	H T Ground floor East	1.33	1.06	0.004
6	H.T.Platform West	0.80	1.65	0.006
7	H.T Ground floor West	0.27	0.69	0.003
8	Rutile Platform	2.00	0.85	0.004
9	Rutile Ground floor	0.67	0.98	0.003
10	Garnet Platform	0.53	4.19	0.024
11	Garnet ground floor	0.93	3.62	0.010
12	Zircon section (old) Platform	1.60	1.46	0.024
13	Zircon Section (Old) ground floor	0.80	1.87	0.012
14	Zircon section (New) Platform	0.80	3.09	0.009
15	Zircon Section (New) ground floor	0.80	2.28	0.009
16	Zircon air tables	1.07	0.53	0.013
17	Monazite ground floor	0.87	2.97	0.019
18	Monazite IRMS	2.40	7.80	0.010
19	Monazite RCBMS	3.54	8.33	0.081
20	Ilmenite Section	0.40	0.55	0.003
	Limits	<b>TLV: 4.00</b>	<b>DAC: 1WL</b>	<b>DAC: 0.22</b>

No of Samples = 29  
 Average dust conc. = 1.05± 0.81 mg m<sup>-3</sup>  
 Average air activity (<sup>232</sup>Th) = 0.012± 0.018 Bq m<sup>-3</sup>  
 Average air activity (Thoron daughters) = 2.30±2.27 mWL

Table 4: Air monitoring, plant premises - (October- 2018)

S. No	LOCATION	Dust mg/m <sup>3</sup>	Th(B)Mwl	<sup>232</sup> ThBqm <sup>-3</sup>
1	In front of Lab	0.13	0.28	0.001
2	In front of ZOP	0.13	0.33	0.001
3	In front of Dry mill	0.13	0.98	0.001
4	In front of Stores	1.47	0.33	0.001
5	In front of E/W shop	0.27	0.20	0.004
6	In front of canteen	0.27	0.16	0.001

Table 5: Air monitoring, Plant premises, using high volume air sample (8 hr duration) (October-2018)

S.No	Date	Location	SPM µgm m <sup>-3</sup>	RPM µgm m <sup>-3</sup>	<sup>232</sup> Th Bq m <sup>-3</sup>
1	25-10-2018	Top of Canteen	133.11	60.09	0.0003
2	27-10-2018	Top of R&D	124.56	63.45	0.0001
3	23-10-2018	Top of Rest shed	187.72	16.67	0.0001
4	26-10-2018	Top of civil	183.21	97.24	0.0004
5	24-10-2018	Top of Dispensary	87.55	49.81	0.0001

Table6: Analyses of Solid Tailings (September-2018)

S.No	Location	<sup>232</sup> Th (Bqg <sup>-1</sup> )	MDL(Bqg <sup>-1</sup> )	Regulatory limit (Bqg <sup>-1</sup> )
1	HUP Tailings	0.036	0.022	1.0
2	ZOP solid waste (Plant S.D)	Nil	Nil	Nil

Table: 7 Water Quality parameters of Environmental Water Samples (October-2018)

Sl. No	Location	PH	TDS	T.Chlorides	T.Hardness
			Ppm	Ppm	Ppm
1	Office new well ,IREL, MK	7.3	290	85	201
2	Office old well, IREL, MK	7.7	350	114	201
3	Canteen well, IREL, MK	7.4	300	142	281
4	Zirconium Oxide Plant, IREL, MK	7.6	210	100	161
5	Valliyar river,N8°08'40.0"E77°18'31.0"	6.5	110	43	120
6	Muttom,N8°07'38.6"E77°19'03.7"	6.8	280	113	280
7	Tank Near Laboratory, IREL, MK	6.5	157	81	160
8	Guest house out west well, IREL, MK	7.0	390	170	161
9	Guest house new well, IREL, MK	7.4	406	156	201
10	Pillaiyarcoil JunctionN8°09'12.8"E77°18'02.5"	7.2	195	113	241
11	Kootumangalam,N8°09'24.0"E77°17'25.6"	6.8	263	85	120
12	Sea water, IREL, MK	7.5	22500	21336	9061
13	Colachel,N8°10'02.9"E77°16'07.0"	6.8	106	57	80
14	IRE Drinking Water, IREL, MK	7.4	365	100	211
15	Esanthangu,N8°07'54.9"E77°19'43.8"	6.3	486	298	281
16	Kadiapattinam N8°08'11.3"E77°18'19.0"	7.8	710	284	241
17	Ammandivilai	6.9	65	28	120

## TEST REPORT

### AMBIENT AIR QUALITY SURVEY

Report No.:	ECI-NN-AAQ-143/03/2019	Report Date:	20.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference:	MW-26/1819 Dt: 10/11/2018	Sample Reference No.:	ECI-NN-AAQ-143/03/2019
Sample Drawn By:	ECI	Sample Received On:	16.03.2019
Sample Collected Date:	15.03.2019	Test Commenced On:	16.03.2019
Qty of Sample Received:	Filter Paper & 25ml Solution	Test Completed On:	19.03.2019
Sample Description:	Ambient Air	Sampling Method:	IS 5182:P14
Sample Mark:	Top of Laboratory		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQS (Industrial, Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrene (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	14.8	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	25.1	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	49.7	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	7.1	IS 5182:Part 02	80

<--- End of Report --->

Certified By: *B. Vijay*

Remarks: --

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

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## TEST REPORT

### AMBIENT AIR QUALITY SURVEY

Report No :	ECI-NN-AAQ-142/03/2019	Report Date :	20.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-AAQ-142/03/2019
Sample Drawn By :	ECI	Sample Received On :	16.03.2019
Sample Collected Date :	15.03.2019	Test Commenced On :	16.03.2019
Qty of Sample Received :	Filter Paper & 25ml Solution	Test Completed On :	19.03.2019
Sample Description :	Ambient Air	Sampling Method :	IS 5182:P14
Sample Mark:	Top of Administrative Building		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrene (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	13.2	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	22.7	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	45.3	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	6.5	IS 5182:Part 02	80

<--- End of Report --->

Verified By : *B. Vignesh*

Remarks : --

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

*[Signature]*  
**Authorized Signatory**



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## TEST REPORT

### AMBIENT AIR QUALITY SURVEY

Report No :	ECI-NN-AAQ-144/03/2019	Report Date :	20.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-AAQ-144/03/2019
Sample Drawn By :	ECI	Sample Received On :	16.03.2019
Sample Collected Date :	15.03.2019	Test Commenced On :	16.03.2019
Qty of Sample Received :	Filter Paper & 25ml Solution	Test Completed On :	19.03.2019
Sample Description :	Ambient Air	Sampling Method :	IS 5182:P14
Sample Mark:	Top of Civil Workshop Building		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrine (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	14.5	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	25.5	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	49.1	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	6.7	IS 5182:Part 02	80

<--- End of Report --->

Certified By : *B. V. V.*

Remarks : --

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

*[Signature]*  
Authorized Signatory



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## TEST REPORT

### AMBIENT AIR QUALITY SURVEY

Report No :	ECI-NN-AAQ-145/03/2019	Report Date :	20.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No.:	ECI-NN-AAQ-145/03/2019
Sample Drawn By :	ECI	Sample Received On :	16.03.2019
Sample Collected Date :	15.03.2019	Test Commenced On :	16.03.2019
Qty of Sample Received :	Filter Paper & 25ml Solution	Test Completed On :	19.03.2019
Sample Description :	Ambient Air	Sampling Method :	IS 5182:P14
Sample Mark:	Top of Canteen Building		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 08	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrene (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	16.3	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	28.1	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	55.6	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	8.1	IS 5182:Part 02	80

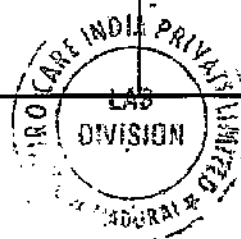
<--- End of Report --->

Verified By : *B. Vignesh*

Remarks : --

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

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**Authorized Signatory**



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## TEST REPORT

### AMBIENT AIR QUALITY SURVEY

Report No.:	ECI-NN-AAQ-44/03/2019	Report Date:	05.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference:	MW-26/1819 Dt: 10/11/2018	Sample Reference No.	ECI-NN-AAQ-44/03/2019
Sample Drawn By:	ECI	Sample Received On:	28.02.2019
Sample Collected Date:	27.02.2019	Test Commenced On:	28.02.2019
Qty of Sample Received:	Filter Paper & 25ml Solution	Test Completed On:	04.03.2019
Sample Description:	Ambient Air	Sampling Method:	IS 5182:P14
Sample Mark:	Top of Administrative Building		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrene (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	12.8	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	21.4	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	39.5	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	6.2	IS 5182:Part 02	80

<--- End of Report --->

Certified By: *B. Vijay*

Remarks: -

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

*[Signature]*  
Authorized Signatory



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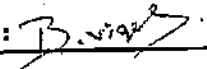
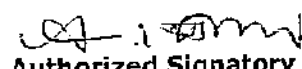
## TEST REPORT

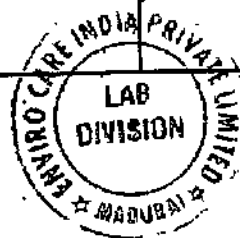
### AMBIENT AIR QUALITY SURVEY

Report No :	ECI-NN-AAQ-45/03/2019	Report Date :	05.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-28/18'19 Dt: 10/11/2018	Sample Reference No :	ECI-NN-AAQ-45/03/2019
Sample Drawn By :	ECI	Sample Received On :	28.02.2019
Sample Collected Date :	27.02.2019	Test Commenced On :	28.02.2019
Qty of Sample Received :	Filter Paper & 25ml Solution	Test Completed On :	04.03.2019
Sample Description :	Ambient Air	Sampling Method :	IS 5182:P14
Sample Mark:	Top of Laboratory		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrine (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	14.3	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	24.8	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	46.2	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	6.9	IS 5182:Part 02	80

<--- End of Report --->

Certified By :  Remarks :	<b>For ENVIRO CARE INDIA PRIVATE LIMITED</b> (Laboratory Division)   <b>Authorized Signatory</b>
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**TEST REPORT**

**AMBIENT AIR QUALITY SURVEY**

Report No :	ECI-NN-AAQ-46/03/2019	Report Date :	05.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-AAQ-46/03/2019
Sample Drawn By :	ECI	Sample Received On :	28.02.2019
Sample Collected Date :	27.02.2019	Test Commenced On :	28.02.2019
Qty of Sample Received :	Filter Paper & 25ml Solution	Test Completed On :	04.03.2019
Sample Description :	Ambient Air	Sampling Method :	IS 5182:P14
Sample Mark:	Top of Civil Work Shop Building		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrine (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	13.1	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	23.2	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	41.7	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	6.5	IS 5182:Part 02	80

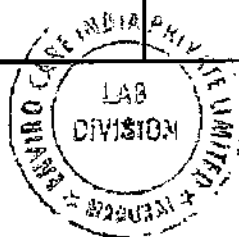
----- End of Report -----

Verified By : *[Signature]*

Remarks : ---

For **ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

*[Signature]*  
**Authorized Signatory**



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1. This report is the property of Enviro Care India Private Limited and should be kept confidential.  
2. This report is valid only for the purpose mentioned in the report and should not be used for any other purpose.  
3. The validity of this report is 30 days from the date of issue of this report.  
4. Any dispute shall be referred to the Managing Director of Enviro Care India Private Limited.



## TEST REPORT

### AMBIENT AIR QUALITY SURVEY

Report No.:	ECI-NN-AAQ-47/03/2019	Report Date:	05.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference:	MW-26/1819 Dt: 10/11/2018	Sample Reference No.:	ECI-NN-AAQ-47/03/2019
Sample Drawn By:	ECI	Sample Received On:	28.02.2019
Sample Collected Date:	27.02.2019	Test Commenced On:	28.2.2019
Qty of Sample Received:	Filter Paper & 25ml Solution	Test Completed On:	04.03.2019
Sample Description:	Ambient Air	Sampling Method:	IS 5182:P14
Sample Mark:	Top of Canteen Building		

S.No.	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial-Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrene (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	15.6	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	27.3	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	56.2	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	7.9	IS 5182:Part 02	80

<--- End of Report --->

Verified By: *[Signature]*

Remarks: --

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

*[Signature]*  
**Authorized Signatory**



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**TEST REPORT**
**AMBIENT AIR QUALITY SURVEY**

Report No :	ECI-NN-AAQ-218/01/2019	Report Date :	12.01.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-AAQ-218/01/2019
Sample Drawn By :	ECI	Sample Received On :	09.01.2019
Sample Collected Date :	08.01.2019	Test Commenced On :	09.01.2019
Qty of Sample Received :	Filter Paper & 25ml Solution	Test Completed On :	12.01.2019
Sample Description :	Ambient Air	Sampling Method :	IS 5182:P14
Sample Mark :	Top of the Administrative Building		

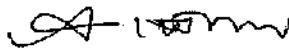
S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrene (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	13.1	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	22.1	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	45.6	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	6.5	IS 5182:Part 02	80

&lt;--- End of Report ---&gt;

 Certified By : *N. Suresh*

Remarks : --

 For ENVIRO CARE INDIA PRIVATE LIMITED  
 (Laboratory Division)

  
 Authorized Signatory

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1. This report is valid only for the purpose mentioned in the report.  
 2. The responsibility for the accuracy of the results lies with the client.  
 3. The report shall not be used for any other purpose without the permission of the laboratory.  
 4. The report shall not be used for any other purpose without the permission of the laboratory.  
 5. The validity of the report is limited to the invoice amount.  
 6. Any dispute arising out of this report is subjected to Madurai jurisdiction only.



## TEST REPORT

### AMBIENT AIR QUALITY SURVEY

Report No:	ECI-NN-AAQ-219/01/2019	Report Date:	12.01.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference:	MW-26/1819 Dt: 10/11/2018	Sample Reference No:	ECI-NN-AAQ-219/01/2019
Sample Drawn By:	ECI	Sample Received On:	09.01.2019
Sample Collected Date:	08.01.2019	Test Commenced On:	09.01.2019
Qty of Sample Received:	Filter Paper & 25ml Solution	Test Completed On:	12.01.2019
Sample Description:	Ambient Air	Sampling Method:	IS 5182:P14
Sample Mark:	Top of the Laboratory Building		

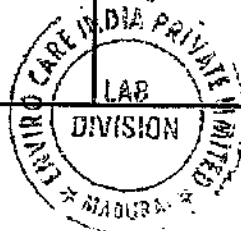
S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrene (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	12.7	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	21.5	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	40.6	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	6.9	IS 5182:Part 02	80

<--- End of Report --->

Verified By: *N. Sathish*

Remarks: ---

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)



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1. This report is valid only for the purpose stated.  
2. Any other use of this report is at the client's risk.  
3. In case of any dispute, the client shall be responsible for the same.  
4. This report is the property of Enviro Care India Private Limited and shall not be used for any other purpose without the written permission of the Laboratory.  
5. The client shall be responsible for the accuracy of the data provided in the report.  
6. The client shall be responsible for the accuracy of the data provided in the report.  
7. The client shall be responsible for the accuracy of the data provided in the report.  
8. The client shall be responsible for the accuracy of the data provided in the report.



## TEST REPORT

### AMBIENT AIR QUALITY SURVEY

Report No	ECI-NN-AAQ-220/01/2019	Report Date	12.01.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference	MW-26/1819 Dt: 10/11/2018	Sample Reference No	ECI-NN-AAQ-220/01/2019
Sample Drawn By	ECI	Sample Received On	09.01.2019
Sample Collected Date	08.01.2019	Test Commenced On	09.01.2019
Qty of Sample Received	Filter Paper & 25ml Solution	Test Completed On	12.01.2019
Sample Description	Ambient Air	Sampling Method	IS 5182:P14
Sample Mark	Top of the Civil Work Shop Building		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrine (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	15.5	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	28.6	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	54.3	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	7.8	IS 5182:Part 02	80

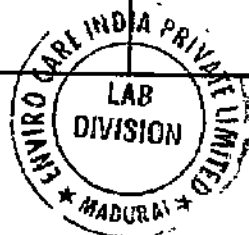
<--- End of Report --->

Verified By : *N. Sarvesh*

Remarks : ---

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

*[Signature]*  
**Authorized Signatory**



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1. This report is valid only for the purpose mentioned.  
2. The results are based on the data received from the client.  
3. The results are based on the data received from the client.  
4. The results are based on the data received from the client.  
5. The results are based on the data received from the client.  
6. The results are based on the data received from the client.





## TEST REPORT

Chennai Office : 117, (GRT) Main Road, (Bharathi)  
 Bangalore Office : 117, (GRT) Main Road, (Bharathi)

### AMBIENT AIR QUALITY SURVEY

Report No :	ECI-NN-AAQ-221/01/2019	Report Date :	12.01.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference	MW-26/1819 Dt: 10/11/2018	Sample Reference No. :	ECI-NN-AAQ-221/01/2019
Sample Drawn By :	ECI	Sample Received On :	09.01.2019
Sample Collected Date :	08.01.2019	Test Commenced On :	09.01.2019
Qty of Sample Received :	Filter Paper & 25ml Solution	Test Completed On :	12.01.2019
Sample Description :	Ambient Air	Sampling Method :	IS 5182:P14
Sample Mark :	Top of the Canteen Building		

S.No.	PARAMETERS	UNITS	RESULTS	TEST METHOD	Permissible limits of NAAQs (Industrial, Residential)
1.	Ammonia (as NH <sub>3</sub> )	µg/m <sup>3</sup>	< 1.0	IS 11255:Part 06	400
2.	Arsenic (as As)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	6.0
3.	Benzene (C <sub>6</sub> H <sub>6</sub> )	µg/m <sup>3</sup>	< 1.0	IS 5182:Part 11	5.0
4.	Benzo-a-Pyrine (BaP)	ng/m <sup>3</sup>	< 1.0	IS 5182:Part 12	1.0
5.	Carbon Monoxide (as CO)	mg/m <sup>3</sup>	< 1.2	ECI-SOP-SAM-08	2.0
6.	Lead (as Pb)	µg/m <sup>3</sup>	< 0.1	IS 5182:Part 22	1.0
7.	Nickel (as Ni)	ng/m <sup>3</sup>	< 0.1	IS 5182:Part 22	20
8.	Nitrogen dioxide (as NO <sub>2</sub> )	µg/m <sup>3</sup>	13.6	IS 5182:Part 06	80
9.	Ozone (as O <sub>3</sub> )	µg/m <sup>3</sup>	< 9.8	IS 5182:Part 09	180
10.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	25.1	EPA 40 CFR Part 50 Appendix L	60
11.	Respirable Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	48.6	IS 5182:Part 23	100
12.	Sulphur Dioxide (as SO <sub>2</sub> )	µg/m <sup>3</sup>	7.1	IS 5182:Part 02	80

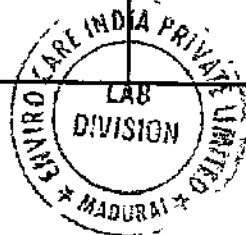
<--- End of Report --->

Verified By : *N. Suresh*

Remarks : --

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

*[Signature]*  
**Authorized Signatory**



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e-mail : ecicbe@envirocareindia.com

1. This report is valid only for the purpose stated.
2. Any alteration or modification to the report is not allowed.
3. If you do not receive the report within the stipulated time, the report is not valid and it is the sole responsibility of the client.
4. While a report is in progress, the test items will not be returned for more than 15 days from the date of the report.
5. Total liability of our company is limited to the invoice amount.
6. Any dispute or complaint shall be referred to Madurai jurisdiction only.





**TAMILNADU POLLUTION CONTROL BOARD**  
Advanced Environmental Laboratory, Tirunelveli - 10.

**AMBIENT AIR QUALITY SURVEY - REPORT OF ANALYSIS**

**Report No. 19/AEL-TNV/AAOS/2018 - 2019 Dated: 05.12.2018**

1. Name of the Industry : M/s.Indian Rare Earths Limited
2. Address of the Industry : Manavalakurichi Post,  
Kanyakumari District.
3. Date of Survey : 27.11.2018 & 28.11.2018
4. Duration of survey : 8 hours
5. Category/Classification : Red Large
6. Land use classification : -

**Meteorological Conditions**

Ambient Temperature (°C)	Min	Max	Relative Humidity (%)	Min	Max
	26	31		60	78
Weather condition	Partially Cloudy		Rain Fall (mm)	Nil	
Predominant Wind Direction	South West to North East		Mean Wind Speed (Km/hr.)		

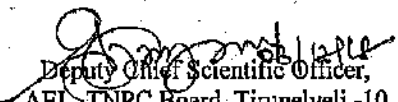
**AMBIENT AIR QUALITY SURVEY RESULTS**

St. No	Location of the sampling station	Direction *	Approximate Distance in meter *	Approximate Height from GL (m)	Pollutants (µg/m <sup>3</sup> )		
					PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>
1.	On top of Laboratory Building	North	100	4	160.03	10.03	10.1
2.	On top Administrative block	North East	150	4	91.5	24.08	10.1
3.	On top of civil department building	East	150	4	91.10	13.04	9.6
4.	On top of guest house building	South East	1000	4	73.30	5.0	9.14
5.	On top of building at canteen	South West	100	4	97.9	47.5	16.6

Note: \* With respect to major emission sources.

The analytical results are restricted to the sampling period of 8 hrs

Test Performed	Test Method
PM <sub>10</sub>	IS 5182: (Part 23) - 2006
SO <sub>2</sub>	Modified west - Graeke / IS 5182 : (Part 2) - 2001 RA: 2012
NO <sub>2</sub>	Jacobs - Hochheiser / IS 5182: (Part 6) - 2006 RA : 2012

  
 Deputy Chief Scientific Officer,  
 AEL, TNPC Board, Tirunelveli -10





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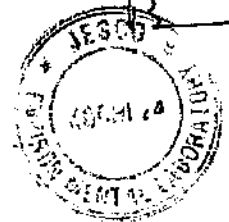
P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	Ambient Air Quality Monitoring
Date of Sampling	24-10-2018 & 25-10-2018 (24hrs)
Report date	30-10-2018
Report No	AAQM/2018/10/07/1
Location	Top of Guest House Building

SL No	Particulars	Unit	Value	Limit
1	Particulate Matter (PM <sub>10</sub> )	microgm/m <sup>3</sup>	57.1	100
2	Particulate Matter (PM <sub>2.5</sub> )	microgm/m <sup>3</sup>	17.4	60
3	Sulphur Dioxide (SO <sub>2</sub> )	microgm/m <sup>3</sup>	5.0	80
4	Nitrogen Dioxide (NO <sub>2</sub> )	microgm/m <sup>3</sup>	10.8	80

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P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	Ambient Air Quality Monitoring
Date of Sampling	24-10-2018 & 25-10-2018 (24hrs)
Report date	30-10-2018
Report No	AAQM/2018/10/07/2
Location	Near Workers Rest Room

SL No	Particulars	Unit	Value	Limit
1	Particulate Matter (PM <sub>10</sub> )	microgm/m <sup>3</sup>	59.2	100
2	Particulate Matter (PM <sub>2.5</sub> )	microgm/m <sup>3</sup>	18.9	60
3	Sulphur Dioxide (SO <sub>2</sub> )	microgm/m <sup>3</sup>	4.5	80
4	Nitrogen Dioxide (NO <sub>2</sub> )	microgm/m <sup>3</sup>	11.6	80

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 P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	Ambient Air Quality Monitoring
Date of Sampling	24-10-2018 & 25-10-2018 (24hrs)
Report date	30-10-2018
Report No	AAQM/2018/10/07/3
Location	Top of Laboratory Building

SL No	Particulars	Unit	Value	Limit
1	Particulate Matter (PM <sub>10</sub> )	microgm/m <sup>3</sup>	71.5	100
2	Particulate Matter (PM <sub>2.5</sub> )	microgm/m <sup>3</sup>	21.4	60
3	Sulphur Dioxide (SO <sub>2</sub> )	microgm/m <sup>3</sup>	5.6	80
4	Nitrogen Dioxide (NO <sub>2</sub> )	microgm/m <sup>3</sup>	12.2	80

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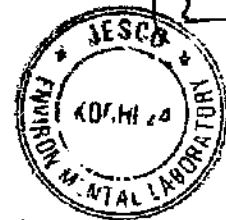
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Vellackal Building, Club Junction, Pookattupadi Road, Edappally P. O.  
P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	Ambient Air Quality Monitoring
Date of Sampling	24-10-2018 & 25-10-2018 (24hrs)
Report date	30-10-2018
Report No	AAQM/2018/10/07/4
Location	Top of Canteen Building

SL No	Particulars	Unit	Value	Limit
1	Particulate Matter (PM <sub>10</sub> )	microgm/m <sup>3</sup>	77.2	100
2	Particulate Matter (PM <sub>2.5</sub> )	microgm/m <sup>3</sup>	23.8	60
3	Sulphur Dioxide (SO <sub>2</sub> )	microgm/m <sup>3</sup>	6.0	80
4	Nitrogen Dioxide (NO <sub>2</sub> )	microgm/m <sup>3</sup>	12.8	80

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P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	Ambient Air Quality Monitoring
Date of Sampling	24-10-2018 & 25-10-2018 (24hrs)
Report date	30-10-2018
Report No	AAQM/2018/10/07/1
Location	Top of Guest House Building

SL No	Particulars	Unit	Value	Limit
1	Particulate Matter (PM <sub>10</sub> )	microgm/m <sup>3</sup>	57.1	100
2	Particulate Matter (PM <sub>2.5</sub> )	microgm/m <sup>3</sup>	17.4	60
3	Sulphur Dioxide (SO <sub>2</sub> )	microgm/m <sup>3</sup>	5.0	80
4	Nitrogen Dioxide (NO <sub>2</sub> )	microgm/m <sup>3</sup>	10.8	80

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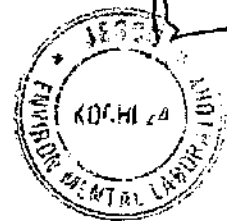
(Environmental Laboratory approved by K.S.P.C.B.)  
Vellackal Building, Club Junction, Pookattupadi Road, Edappally P. O.  
P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	Ambient Air Quality Monitoring
Date of Sampling	24-10-2018 & 25-10-2018 (24hrs)
Report date	30-10-2018
Report No	AAQM/2018/10/07/2
Location	Near Workers Rest Room

SL No	Particulars	Unit	Value	Limit
1	Particulate Matter (PM <sub>10</sub> )	microgm/m <sup>3</sup>	59.2	100
2	Particulate Matter (PM <sub>2.5</sub> )	microgm/m <sup>3</sup>	18.9	60
3	Sulphur Dioxide (SO <sub>2</sub> )	microgm/m <sup>3</sup>	4.5	80
4	Nitrogen Dioxide (NO <sub>2</sub> )	microgm/m <sup>3</sup>	11.6	80

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P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	Ambient Air Quality Monitoring
Date of Sampling	24-10-2018 & 25-10-2018 (24hrs)
Report date	30-10-2018
Report No	AAQM/2018/10/07/3
Location	Top of Laboratory Building

SL No	Particulars	Unit	Value	Limit
1	Particulate Matter (PM <sub>10</sub> )	microgm/m <sup>3</sup>	71.5	100
2	Particulate Matter (PM <sub>2.5</sub> )	microgm/m <sup>3</sup>	21.4	60
3	Sulphur Dioxide (SO <sub>2</sub> )	microgm/m <sup>3</sup>	5.6	80
4	Nitrogen Dioxide (NO <sub>2</sub> )	microgm/m <sup>3</sup>	12.2	80

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## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	Ambient Air Quality Monitoring
Date of Sampling	24-10-2018 & 25-10-2018 (24hrs)
Report date	30-10-2018
Report No	AAQM/2018/10/07/4
Location	Top of Canteen Building

SL No	Particulars	Unit	Value	Limit
1	Particulate Matter (PM <sub>10</sub> )	microgm/m <sup>3</sup>	77.2	100
2	Particulate Matter (PM <sub>2.5</sub> )	microgm/m <sup>3</sup>	23.8	60
3	Sulphur Dioxide (SO <sub>2</sub> )	microgm/m <sup>3</sup>	6.0	80
4	Nitrogen Dioxide (NO <sub>2</sub> )	microgm/m <sup>3</sup>	12.8	80

ANALYST





## TEST REPORT

### STACK MONITORING

Report No :	ECI-NN-SM-199/03/2019	Report Date :	20.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Underlaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-SM-199/03/2019
Sample Drawn By :	ECI	Sample Received On :	18.03.2019
Sample Collected Date :	16.03.2019	Test Commenced On :	18.03.2019
Qty of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	20.03.2019
Sample Description :	Stack	Sampling Method :	IS :11255:P1
Sample Mark :	2 TON FBD - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max. Permissible TNPCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	5089	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.0	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	17.2	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	112.2	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	10.0	----	NA
8.	Stack Diameter at port hole	m	0.50	---	NA
9.	Stack Height from G Level	m	16.0	----	NA
10.	Stack Temperature	°C	101	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	8.6	IS 11255:Part 02	NA

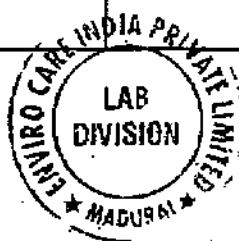
<--- End of Report --->

Verified By : *B. V. V.*

Remarks : NA - Not Applicable

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

*[Signature]*  
Authorized Signatory



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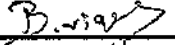


**TEST REPORT****STACK MONITORING**

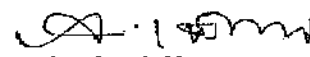
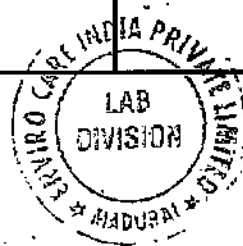
Report No.:	ECI-NN-SM-200/03/2019	Report Date:	20.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference:	MW-26/1819 Dt: 10/11/2018	Sample Reference No.:	ECI-NN-SM-200/03/2019
Sample Drawn By:	ECI	Sample Received On:	18.03.2019
Sample Collected Date:	16.03.2019	Test Commenced On:	18.03.2019
Qty of Sample Received:	Thimble & 50 ml Soln.	Test Completed On:	20.03.2019
Sample Description:	Stack	Sampling Method:	IS :11255:P1
Sample Mark:	Illuminate SD No-351 - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max. Permissible TNPCE norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	1842	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.3	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	15.5	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	97.3	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	13.0	---	NA
8.	Stack Diameter at port hole	m	0.30	---	NA
9.	Stack Height from G Level	m	19.3	---	NA
10.	Stack Temperature	°C	110	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	7.6	IS 11255:Part 02	NA

&lt;--- End of Report ---&gt;

Certified By: 

Remarks : NA - Not Applicable

For ENVIRO CARE INDIA PRIVATE LIMITED  
(Laboratory Division)
  
 Authorized Signatory

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## TEST REPORT

### STACK MONITORING

Report No :	ECI-NN-SM-201/03/2019	Report Date :	20.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-SM-201/03/2019
Sample Drawn By :	ECI	Sample Received On :	18.03.2019
Sample Collected Date :	16.03.2019	Test Commenced On :	18.03.2019
Qty of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	20.03.2019
Sample Description :	Stack	Sampling Method :	IS :11255:P1
Sample Mark:	Zircon SD No-851 - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max. Permissible TNPCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	1876	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.6	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	14.6	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	109.1	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	10.0	---	NA
8.	Stack Diameter at port hole	m	0.30	---	NA
9.	Stack Height from G Level	m	17.06	---	NA
10.	Stack Temperature	°C	115	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	7.0	IS 11255:Part 02	NA

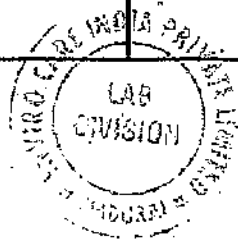
<--- End of Report --->

Verified By : *B. V. V.*

Remarks : NA - Not Applicable

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
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## TEST REPORT

### STACK MONITORING

Report No.:	ECI-NN-SM-202/03/2019	Report Date:	20.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference:	MW-26/1819 Dt: 10/11/2018	Sample Reference No.:	ECI-NN-SM-202/03/2019
Sample Drawn By:	ECI	Sample Received On:	18.03.2019
Sample Collected Date:	16.03.2019	Test Commenced On:	18.03.2019
Qty of Sample Received:	Thimble & 50 ml Soln	Test Completed On:	20.03.2019
Sample Description	Stack	Sampling Method:	IS :11255:P1
Sample Mark:	Rutile SD No-401 - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max Permissible TNPCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	1841	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.5	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	17.3	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	96.4	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	15.0	---	NA
8.	Stack Diameter at port hole	m	0.30	---	NA
9.	Stack Height from G Level	m	17.8	---	NA
10.	Stack Temperature	°C	117	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	8.1	IS 11255:Part 02	NA

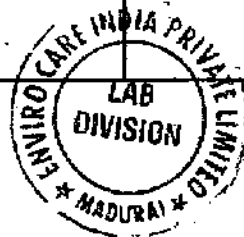
<--- End of Report --->

Verified By: *B. Srinivas*

Remarks : NA - Not Applicable

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## TEST REPORT

### STACK MONITORING

Report No :	ECI-NN-SM-203/03/2019	Report Date :	20.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-SM-203/03/2019
Sample Drawn By :	ECI	Sample Received On :	18.03.2019
Sample Collected Date :	16.03.2019	Test Commenced On :	18.03.2019
Qty. of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	20.03.2019
Sample Description :	Stack	Sampling Method :	IS :11255:P1
Sample Mark:	22 TON FBD - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max. Permissible TNPCC norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	20862	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.4	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	17.6	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	120.5	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	14.5	---	NA
8.	Stack Diameter at port hole	m	1.0	---	NA
9.	Stack Height from G Level	m	32.0	---	NA
10.	Stack Temperature	°C	108	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	8.8	IS 11255:Part 02	NA

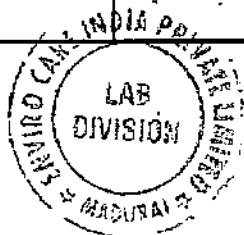
<--- End of Report --->

Verified By : *B. Nial*

Remarks : NA - Not Applicable

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## TEST REPORT

### STACK MONITORING

Report No :	ECI-NN-SM-33/03/2019	Report Date :	05.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-SM-33/03/2019
Sample Drawn By :	ECI	Sample Received On :	01.03.2019
Sample Collected Date :	28.02.2019	Test Commenced On :	01.03.2019
Qty of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	04.03.2019
Sample Description :	Stack	Sampling Method :	IS :11255:P1
Sample Mark:	Illuminate SD -No - 351 - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max. Permissible TNPCE norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	1894	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.8	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	14.4	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	95.8	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	13.0	---	NA
8.	Stack Diameter at port hole	m	0.30	---	NA
9.	Stack Height from G Level	m	19.3	---	NA
10.	Stack Temperature	°C	118	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	7.3	IS 11255:Part 02	NA

<--- End of Report --->

Verified By : *[Signature]*

Remarks : NA - Not Applicable

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## TEST REPORT

### STACK MONITORING

Report No :	ECI-NN-SM-34/03/2019	Report Date :	05.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-SM-34/03/2019
Sample Drawn By :	ECI	Sample Received On :	01.03.2019
Sample Collected Date :	28.02.2019	Test Commenced On :	01.03.2019
Qty of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	04.03.2019
Sample Description :	Stack	Sampling Method :	IS :11255:P1
Sample Mark:	Zircon SD -No - 851 - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max. Permissible TNPCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	1866	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.6	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	13.9	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	100.6	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	10.0	---	NA
8.	Stack Diameter at port hole	m	0.30	---	NA
9.	Stack Height from G Level	m	17.05	---	NA
10.	Stack Temperature	°C	119	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	6.9	IS 11255:Part 02	NA

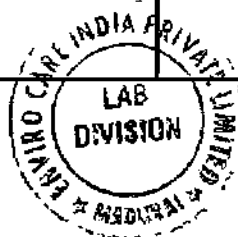
<--- End of Report --->

Verified By : *B. Srinivas*

Remarks : NA - Not Applicable

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1. This report is valid only for the test performed and the conditions specified in the report.  
2. The report is valid only for the test performed and the conditions specified in the report.  
3. The report is valid only for the test performed and the conditions specified in the report.  
4. The report is valid only for the test performed and the conditions specified in the report.





## TEST REPORT

### STACK MONITORING

Report No. :	ECI-NN-SM-35/03/2019	Report Date :	05.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No. :	ECI-NN-SM-35/03/2019
Sample Drawn By :	ECI	Sample Received On :	01.03.2019
Sample Collected Date :	28.02.2019	Test Commenced On :	01.03.2019
Qty of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	04.03.2019
Sample Description :	Stack.	Sampling Method :	IS :11255:P1
Sample Mark :	Rutile - SD. No-401 - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max. Permissible TNPCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	1876	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.8	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	15.5	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	94.6	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	15.0	---	NA
8.	Stack Diameter at port hole	m	0.30	---	NA
9.	Stack Height from G Level	m	17.8	---	NA
10.	Stack Temperature	°C	121	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	7.9	IS 11255:Part 02	NA

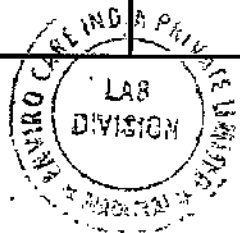
<--- End of Report --->

Verified By : *[Signature]*

Remarks : NA - Not Applicable

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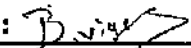
## TEST REPORT

### STACK MONITORING

Report No :	ECI-NN-SM-36/03/2019	Report Date :	05.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-SM-36/03/2019
Sample Drawn By :	ECI	Sample Received On :	01.03.2019
Sample Collected Date :	28.02.2019	Test Commenced On :	01.03.2019
Qty of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	04.03.2019
Sample Description :	Stack	Sampling Method :	IS :11255:P1
Sample Mark :	2 TON FBD - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max.Permisssible TNPCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	5212	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.1	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	17.9	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	109.6	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	10.0	---	NA
8.	Stack Diameter at port hole	m	0.50	---	NA
9.	Stack Height from G Level	m	16.0	---	NA
10.	Stack Temperature	°C	96	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	8.3	IS 11255:Part 02	NA

<--- End of Report --->

Verified By :   
 Remarks : NA - Not Applicable

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
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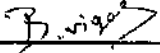
## TEST REPORT

### STACK MONITORING

Report No :	ECI-NN-SM-37/03/2019	Report Date :	05.03.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-SM-37/03/2019
Sample Drawn By :	ECI	Sample Received On :	01.03.2019
Sample Collected Date :	28.02.2019	Test Commenced On :	01.03.2019
Qty of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	04.03.2019
Sample Description :	Stack	Sampling Method :	IS :11255:P1
Sample Mark:	22 TON FBD - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max. Permissible TNPCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	20609	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.4	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	15.9	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	118.6	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	14.5	----	NA
8.	Stack Diameter at port hole	m	1.0	---	NA
9.	Stack Height from G Level	m	32.0	----	NA
10.	Stack Temperature	°C	111	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	8.8	IS 11255:Part 02	NA

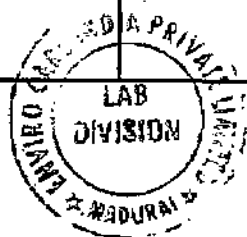
<--- End of Report --->

Verified By : 

Remarks : NA - Not Applicable

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
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Authorized Signatory



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## TEST REPORT

### STACK MONITORING

Report No :	ECI-NN-SM-206/01/2019	Report Date :	12.01.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-SM-206/01/2019
Sample Drawn By :	ECI	Sample Received On :	09.01.2019
Sample Collected Date :	08.01.2019	Test Commenced On :	09.01.2019
Qty of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	12.01.2019
Sample Description :	Stack	Sampling Method :	IS :11255:P1
Sample Mark	22 Ton FBD - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max Permissible INPCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	20354	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.0	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	15.4	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	120.5	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	14.5	---	NA
8.	Stack Diameter at port hole	m	1.0	---	NA
9.	Stack Height from G Level	m	32.0	---	NA
10.	Stack Temperature	°C	101	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	8.3	IS 11255:Part 02	NA

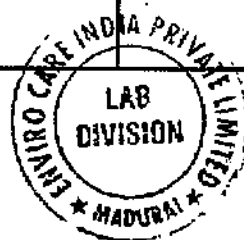
<--- End of Report --->

Verified By : *N. Sarav*

Remarks : NA - Not Applicable

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
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2. Any test conducted after 30 days shall have been this report.  
3. Report generated for reference purposes, except in laboratory, cannot without the permission of the laboratory.  
4. Charges referred by the customer for test items will be for the report for more than 15 days from date of issuance of report.  
5. Total liability of our laboratory is limited to the invoice amount.  
6. Any dispute arising out of this report is subjected to Madurai Jurisdiction only.



## TEST REPORT

### STACK MONITORING

Report No.:	ECI-NN-SM-205/01/2019	Report Date:	12.01.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference:	MW-26/1819 Dt: 10/11/2018	Sample Reference No.:	ECI-NN-SM-205/01/2019
Sample Drawn By:	ECI	Sample Received On:	09.01.2019
Sample Collected Date:	08.01.2019	Test Commenced On:	09.01.2019
Qty of Sample Received:	Thimble & 50 ml Soln	Test Completed On:	12.01.2019
Sample Description:	Stack	Sampling Method:	IS :11255:P1
Sample Mark:	2 Ton FBD - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max. Permissible (N)PCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	5191	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.2	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	17.3	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	112.5	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	10.0	---	NA
8.	Stack Diameter at port hole	m	0.50	---	NA
9.	Stack Height from G Level	m	16.0	---	NA
10.	Stack Temperature	°C	99	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	8.1	IS 11255:Part 02	NA

<--- End of Report --->

Verified By : *N. Sarath*

Remarks : NA - Not Applicable

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

*[Signature]*  
**Authorized Signatory**



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e-mail : ecicba@envirocareindia.com



**TEST REPORT**

 Accredited by NABL (Chennai) - No. 10015  
 Registered by Section 8 (FCS-2007)

**STACK MONITORING**

Report No	ECI-NN-SM-203/01/2019	Report Date	12.01.2019
Customer Name & Address	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference	MW-26/1819 Dt: 10/11/2018	Sample Reference No	ECI-NN-SM-203/01/2019
Sample Drawn By	ECI	Sample Received On	09.01.2019
Sample Collected Date	08.01.2019	Test Commenced On	09.01.2019
Qty of Sample Received	Thimble & 50 ml Soln	Test Completed On	12.01.2019
Sample Description	Stack	Sampling Method	IS :11255:P1
Sample Mark:	Zircon - SD. No-851 - Chimney		


S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max. Permissible TNPCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	1858	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.8	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	14.5	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	102.3	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	10.0	---	NA
8.	Stack Diameter at port hole	m	0.30	---	NA
9.	Stack Height from G Level	m	17.05	---	NA
10.	Stack Temperature	°C	129	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	7.1	IS 11255:Part 02	NA

&lt;--- End of Report ---&gt;

 Verified By : *N. Sathish*

Remarks : NA - Not Applicable

 For ENVIRO CARE INDIA PRIVATE LIMITED  
 (Laboratory Division)

  
 Authorized Signatory

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1. This report is valid only for the purpose mentioned.  
 2. The responsibility of the sample is on the client.  
 3. Report shall be valid only for the purpose mentioned and in the same format without the permission of the laboratory.  
 4. If the client is not satisfied with the results, the lab shall not be liable for more than 15 days from date of issue of report.  
 5. Report quality of our laboratory is under the laboratory control.  
 6. Report shall be valid only for the purpose mentioned and in the same format without the permission of the laboratory.



## TEST REPORT

### STACK MONITORING

Report No :	ECI-NN-SM-204/01/2019	Report Date :	12.01.2019
Customer Name & Address :	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MVV-26/1819 Dt: 10/11/2018	Sample Reference No :	ECI-NN-SM-204/01/2019
Sample Drawn By :	ECI	Sample Received On :	09.01.2019
Sample Collected Date :	08.01.2019	Test Commenced On :	09.01.2019
Qty of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	12.01.2019
Sample Description :	Stack	Sampling Method :	IS :11255:P1
Sample Mark :	Rutile - SD. No-401 - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max Permissible (NPCB norms for General Emission Standards)
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	1835	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.7	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	15.2	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	93.5	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	15.0	---	NA
8.	Stack Diameter at port hole	m	0.30	---	NA
9.	Stack Height from G Level	m	17.8	---	NA
10.	Stack Temperature	°C	126	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	7.5	IS 11255:Part 02	NA

<--- End of Report --->

Verified By : *N. Sarath*

Remarks : NA - Not Applicable

For ENVIRO CARE INDIA PRIVATE LIMITED  
(Laboratory Division)

*[Signature]*  
Authorized Signatory



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## TEST REPORT

### STACK MONITORING

Report No. :	ECI-NN-SM-202/01/2019	Report Date :	12.01.2019
Customer Name & Address :	M/s. Indian Rare Earths Limited (A Government Of India Undertaking) Manavalakurichi-629252 Kanyakumari District, Tamil Nadu		
Customer Reference :	MW-26/1819 Dt: 10/11/2018	Sample Reference No. :	ECI-NN-SM-202/01/2019
Sample Drawn By :	ECI	Sample Received On :	09.01.2019
Sample Collected Date :	08.01.2019	Test Commenced On :	09.01.2019
Qty of Sample Received :	Thimble & 50 ml Soln	Test Completed On :	12.01.2019
Sample Description :	Stack	Sampling Method :	IS :11255:P1
Sample Mark :	Illuminate - SD. No-351 - Chimney		

S.No	PARAMETERS	UNITS	RESULTS	TEST METHOD	Max Permissible INPCB norms for General Emission Standards
1.	Ambient Temperature	°C	32	IS 11255:Part 03	NA
2.	Carbon Monoxide (as CO)	% (v/v)	< 0.2	IS 13270	1.0
3.	Flow rate	Nm <sup>3</sup> /hr	1814	IS 11255:Part 03	NA
4.	Flue Gas velocity	m/sec	9.4	IS 11255:Part 03	NA
5.	Oxides of Nitrogen (as NO <sub>x</sub> )	mg/Nm <sup>3</sup>	13.6	IS 11255:Part 07 & IS 5182 :Part 06	NA
6.	Particulate Matter (PM)	mg/Nm <sup>3</sup>	96.5	IS 11255:Part 01	150
7.	Port hole Height from G Level	m	13.0	---	NA
8.	Stack Diameter at port hole	m	0.30	---	NA
9.	Stack Height from G Level	m	19.3	---	NA
10.	Stack Temperature	°C	122	IS 11255:Part 03	NA
11.	Sulphur Dioxide (as SO <sub>2</sub> )	mg/Nm <sup>3</sup>	7.6	IS 11255:Part 02	NA

<--- End of Report --->

Verified By : *N. Suresh*

Remarks : NA - Not Applicable

**For ENVIRO CARE INDIA PRIVATE LIMITED**  
(Laboratory Division)

*[Signature]*  
**Authorized Signatory**



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1. The results shall be valid for 30 days.
2. Any objection to the report shall be raised within 7 days of the report.
3. Report shall not be reproduced or reprinted without the permission of the Laboratory.
4. Unless provided by customer, the test items will not be retained for more than 15 days from date of issue of test report.
5. Total liability of our Laboratory is limited to the invoice amount.
6. Any dispute arising out of this report is subjected to Madurai Jurisdiction Only.





**TAMILNADU POLLUTION CONTROL BOARD**  
Advanced Environmental Laboratory, Tirunelveli - 10.

**STACK MONITORING SURVEY - REPORT OF ANALYSIS**

**Report .F.No. 19/AEL- TNV/ SM/ 2018 - 2019, Dated: 05.12.2018**

1. Name of the Industry : M/s.Indian Rare Barths Limited
2. Address of the Industry : Manavalakurichi Post,  
Kanyakumari District.
3. Date of Survey : 27.11.2018 & 28.11.2018
4. Type of Industry : Mineral Separation

**STACK MONITORING SURVEY RESULTS**

Sl. No.	Stack attached to	Stack Temp °k	Flue Gas Velocity (m/sec)	Gas Discharge rate (NM <sup>3</sup> /day)	Pollutants (ng/m <sup>3</sup> )		
					PM	SO <sub>2</sub>	NO <sub>x</sub>
1.	22 TPH FBD (Fluidized bed dryer)	333	3.84	233070	94.7	102.56	30.26
2.	Ilmanite Shaft dryer SD 351	401	3.86	17348	82.7	4.27	12.16
3.	Zircon wet Section dryer-851	332	10.93	33058	73.0	4.27	9.2
4.	2TPH FBD	337	9.18	137467	43.3	34.19	30.26

Test Performed	Test Method
PM <sub>10</sub>	IS 5182: (Part23) - 2006
SO <sub>2</sub>	Modified west - Graeke / IS 5182 : (Part 2) - 2001 RA: 2012
NO <sub>2</sub>	Jacobs - Hochheiser / IS 5182: (Part 6) - 2006 RA : 2012

*[Signature]*  
Deputy Chief Scientific Officer,  
AEL, TNPC Board, Tirunelveli -10





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# JESCO

(Environmental Laboratory approved by K.S.P.C.B.)

Vellackal Building, Club Junction, Pookattupadi Road, Edappally P. O.

P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	22TPH FDB (Stack Emission )
Date of Sampling	24-10-2018
Report date	30-10-2018
Report No	SEM/2018/10/07/1

SL No	Particulars	Unit	Value
1	Velocity of gas emission	m/sec	6.65
2	Temperature of stack gas	°C	70
3	Volume of stack emission	Nm <sup>3</sup> /hr	16327
4	<b>Concentration of Pollutants</b>		
4.1	Particulate matter	mg/Nm <sup>3</sup>	144.8
4.2	Sulphur Dioxide	"	385.5
4.3	Carbon Monoxide	"	Nil
4.4	Nitrogen Oxides	"	8.8

ANALYST





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P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	2TPH FDB (Stack Emission )
Date of Sampling	24-10-2018
Report date	30-10-2018
Report No	SEM/2018/10/07/2

SL No	Particulars	Unit	Value
1	Velocity of gas emission	m/sec	6.44
2	Temperature of stack gas	<sup>o</sup> C	110
3	Volume of stack emission	Nm <sup>3</sup> /hr	3535
4	<b>Concentration of Pollutants</b>		
4.1	Particulate matter	mg/Nm <sup>3</sup>	118.2
4.2	Sulphur Dioxide	"	240.9
4.3	Carbon Monoxide	"	Nil
4.4	Nitrogen Oxides	"	7.8

ANALYST





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Vellackal Building, Club Junction, Pookattupadi Road, Edappally P. O.

P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	RUTILE SD 401 (Stack Emission )
Date of Sampling	24-10-2018
Report date	30-10-2018
Report No	SEM/2018/10/07/3

SL No	Particulars	Unit	Value
1	Velocity of gas emission	m/sec	3.27
2	Temperature of stack gas	<sup>o</sup> C	55
3	Volume of stack emission	Nm <sup>3</sup> /hr	759
4	<b>Concentration of Pollutants</b>		
4.1	Particulate matter	mg/Nm <sup>3</sup>	69.1
4.2	Sulphur Dioxide	"	Nil
4.3	Carbon Monoxide	"	Nil
4.4	Nitrogen Oxides	"	6.0

ANALYST





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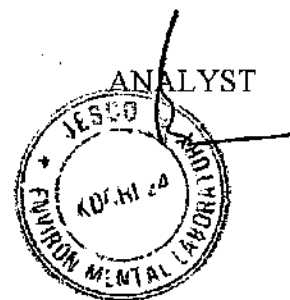
Vellackal Building, Club Junction, Pookattupadi Road, Edappally P. O.

P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt.,
Source of Emission	ILMENITE SD 351 (Stack Emission )
Date of Sampling	24-10-2018
Report date	30-10-2018
Report No	SEM/2018/10/07/4

SL No	Particulars	Unit	Value
1	Velocity of gas emission	m/sec	5.18
2	Temperature of stack gas	<sup>o</sup> C	125
3	Volume of stack emission	Nm <sup>3</sup> /hr	795
4	<b>Concentration of Pollutants</b>		
4.1	Particulate matter	mg/Nm <sup>3</sup>	119.7
4.2	Sulphur Dioxide	"	Nil
4.3	Carbon Monoxide	"	Nil
4.4	Nitrogen Oxides	"	6.4





# JESCO

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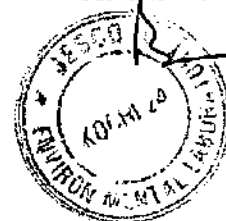
(Environmental Laboratory approved by K.S.P.C.B.)  
 Vellackal Building, Club Junction, Pookattupadi Road, Edappally P. O.  
 P. B. No. 2204, Cochin - 682 024

## ANALYSIS REPORT

Client	M/s. Indian Rare Earths Ltd, Manavalakurichi, Kanyakumari Dt ,
Source of Emission	ZIRCON SD 851 (Stack Emission )
Date of Sampling	24-10-2018
Report date	30-10-2018
Report No	SEM/2018/10/07/5

SL No	Particulars	Unit	Value
1	Velocity of gas emission	m/sec	4.05
2	Temperature of stack gas	<sup>o</sup> C	95
3	Volume of stack emission	Nm <sup>3</sup> /hr	838
4	<b>Concentration of Pollutants</b>		
4.1	Particulate matter	mg/Nm <sup>3</sup>	56.3
4.2	Sulphur Dioxide	”	Nil
4.3	Carbon Monoxide	”	Nil
4.4	Nitrogen Oxides	”	5.0

ANALYST





15/3/19

**TEST REPORT**

**WATER ANALYSIS**

ULR No :	TC6932-19-0-00001149-F	Report Date	09.03.2019
Customer Name & Address  M/s. Indian Rare Earths Limited (A Government of India Undertaking) Manavalakurichi - 629 252. Kanyakumari District, Tamil Nadu.	Sample Reference No.	EL-NL-WR-11-03-2019	
	Sample Description	Water	
	Sample Drawn By	Customer	
	Sample Collected On	04.03.2019	
	Qty of Sample Received	2 Liter (Approximately)	
	Sample Received On	04.03.2019	
	Test Commenced On	05.03.2019	
	Test Completed On	09.03.2019	
	Sampling Method		
Sample Mark		IREL STP Treated Water	

S.No	Name of the Test	Test Method	Units	Result	Max Permissible Limit for TNPDS (as per IS: 10500)
1.	Biochemical Oxygen Demand (BOD) at 27°C for 3 days.	IS 3025 (Part 44) : 1993 (Reaffirmed 2014)	mg/L	3.8	20
2.	pH Value @ 25°C	IS 3025 (Part 11) : 1983 (Reaffirmed 2017) clause No.2	No	8.0	6.5
3.	Total Dissolved Solids @ 105°C.	IS 3025 (Part 16) - 1984 (Reaffirmed 2017)	mg/L	1480	NA
	Total Suspended Solids @ 105°C	IS 3025 (Part 7) : 1983 (Reaffirmed 2017)	mg/L	<10	300

<--- End of Report --->

**Notes:**

The concentration of the parameters tested in the above sample is within the prescribed limits of TNPDS tolerance limits of 2017.

Report Confirmed By :

*R. Revathi*

R.REVATHI  
Sr. Lab Chemist

For EXCELLENCE LABORATORY

*T. Karthikeyan*  
Authorized Signatory



T. KARTHIKEYAN  
Head - Laboratory

**TEST REPORT**

**WATER ANALYSIS**

ULR No :	TC6932-19-0-00000026-F	Report Date	09.01.2019
Customer Name & Address  M/s. Indian Rare Earths Limited (A Government of India Undertaking) Manavalakurichi – 629 252. Kanyakumari District, Tamil Nadu.	Sample Reference No.	EL-NL-WR-14-01-2019	
	Sample Description	Water	
	Sample Origin	Customer	
	Sample Collected Date	04.01.2019	
	Qty of Sample Received	2 Liter (Approximately)	
	Sample Received On	04.01.2019	
	Test Commenced On	05.01.2019	
	Test Completed On	09.01.2019	
	Sampling Method		
	Sample ID	IREL-STP Treated Water	

S.No	Name of the Test	Test Method	Units	Results	Limit/Permissible Limit/Tolerance Limit
1.	Biochemical Oxygen Demand (BOD) at 27°C for 3 days.	IS 3025 (Part 44) : 1993 (Reaffirmed 2014)	mg/L	5.0	20
2.	pH value @ 25°C	IS 3025 (Part 16) - 1984 (Reaffirmed 2017)	°	7.9	5.5 - 9.0
3.	Total Dissolved Solids @ 105°C.	IS 3025 (Part 16) - 1984 (Reaffirmed 2017)	mg/L	1350	NA
4.	Total Suspended Solids @ 105°C	IS 3025 (Part 16) - 1984 (Reaffirmed 2017)	mg/L	150	500

<--- End of Report --->

**Notes:**

The concentration of the parameters tested in the above sample is within the prescribed limits of TNPCB tolerance limits of 2017.

Report Confirmed By :

*R.Revathi*

**R.REVATHI**  
Sr.Lab Chemist

For EXCELLENCE LABORATORY

*R.S.Dinakaran*  
Authorized Signatory

**R.S.DINAKARAN**  
Quality Manager



ENV-01

Mr. Ravi



ISO 9001 : 2015 & IS/ISO/IEC 17025  
 Quality Management System Implemented &  
 NABL Accredited Laboratory  
 info@excellencelaboratory.com  
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**TEST REPORT**

**WATER ANALYSIS**

ULR No :	TC6932-19-0-0000665-F	Report Date :	09.02.2019
Customer Name & Address  M/s. Indian Rare Earths Limited (A Government of India Undertaking) Menavalakurichi - 629 252. Kanyakumari District, Tamil Nadu.	Sample Reference No.:	EL-NL-WR-17-02-2019	
	Sample Description:	Water	
	Sample Drawn By:	Customer	
	Sample Recd. On:	05.02.2019	
	Qty of Sample received:	2 Liter (Approximately)	
	Sample received On:	05.02.2019	
	Test commenced On:	06.02.2019	
	Test completed On:	09.02.2019	
	Sample Method:	IREL STP Treated Water	

S.No.	Name of the Test	Test Method	Units	Results	Max. Permissible Limits of TNPCB std. for Treated Sewage
1.	Biochemical Oxygen Demand (BOD) at 27°C for 3 days	IS 3025 (Part 44) - 1993 (Reaffirmed 2014)	mg/L	8.3	20
2.	pH value @ 25°C	IS 3025 (Part 11) - 1983 (Reaffirmed 2017) Clause No. 11.1	No.	8.2	5.5-9.0
3.	Total Dissolved Solids @ 105°C	IS 3025 (Part 16) - 1984 (Reaffirmed 2017)	mg/l.	1400	NA
4.	Total Suspended Solids @ 105°C	IS 3025 (Part 17) - 1984 (Reaffirmed 2017)	mg/l.	250	30

← End of Report →

**Notes:**  
 The concentration of the parameters tested in the above sample is within the prescribed limits of TNPCB tolerance limits of 2017.

Report Confirmed By :

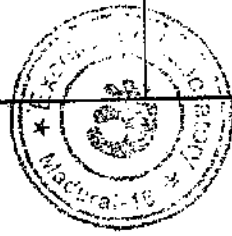
*R. Revathi*

**R. REVATHI**  
 Sr. Lab Chemist

For EXCELLENCE LABORATORY

*T. Karthikeyan*  
 Authorized Signatory

**T. KARTHIKEYAN**  
 Head - Laboratory







(SHOW THE HIDDEN)

75.

# ACCURACY ANALABS

(NABL Accreditation Laboratory)

(ISO 9001 : 2008 Certified Laboratory)

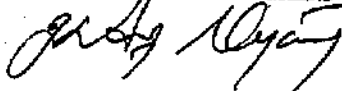

Env. - 12



Ca. 13/11/18

CERT No. TC-6429

## TEST REPORT 1

WASTE WATER ANALYSIS						
Report No :		AAL/WR/274/2018- 19		Report Date		09.11.2018
Customer Name & Address :  M/s Indian Rare Earths Limited, (A Government of India undertaking) Manavalakurichi, Kanyakumari- 629252			Sample Ref. No		AAL/WR/274/2018- 19	
			Sample Description		STP Outlet Water	
			Sample Drawn By		Customer	
			Sample Collected Date		05.11.2018	
			Quantity of Sample		4 Lit	
			Sample Received On		05.11.2018	
			Test Commenced On		05.11.2018	
		Test Completed On		09.11.2018		
SNo	Name of the Test	Test Method	Units	TNPCB Standards	Results	
1	PH @25°	IS 3025 : P11:1983(RA.2002)	Value	5.5 to 9.0	7.8	
2	Total Suspended Solids @105°C	IS 3025 : P17:1984(RA.2003)	mg/l	30	18	
3	Biological Oxygen Demand (BOD)@27°C for 3 days	IS 3025 : P44:1993(RA.2003)	mg/l	20	12	
End of Report						
For ACCURACY ANALABS						
 AUTHORIZED SIGNATORY (K.Arun Nagaraj) Quality Manager						
<b>Note:</b> 1. The test results relate only to the item tested. Samples are not drawn by us unless otherwise stated. 2. The test item will not be retained for more than 10 days from date of issue of test reports, unless otherwise specified by customer. 3. The test report shall not be reproduced in full or part without the written approval of Fresh Aqua Makers. 4. The report cannot be used as evidence in the court of law and should not be used in any advertising media without our special permission in writing. 5. Total liability of our laboratory is limited to the invoice amount and any dispute arising out of this report is subject to Dindigul Jurisdiction only.						

Head Office : No. 7A, 17 Sri Sakthi Vinayagar Complex, Ramalakshmi Nagar Extn, Dindigul - 624 004  
 Mobile : 76392 03132, 99448 09484, 84383 85571 E-mail : accuracyanalabs@gmail.com  
 Branches : Chennai, Madurai, Nagercoil, Karur & Thanjavur



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आईआरईएल (इंडिया) लिमिटेड  
**IREL (India) Limited**  
(Formerly Indian Rare Earths Limited)  
(भारत सरकार का उपक्रम)  
(A Govt. of India Undertaking)

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CIN : U15100MH1950GOI008187 Website : www.irel.co.in

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

IRELMK/ENV-15/2019

02.05.2019

### AMBIENT NOISE LEVEL MONITORING

Monitoring period from October 2018 to March 2019

Location	Noise Level in dB(A) Day time		Average Noise Level in dB(A) Day time	Noise Level in dB(A) Night time		Average Noise Level in dB(A) Night time
	Max.	Min.		Max.	Min.	
Sea Side (North)	74.0	73.0	73.5	68.5	67.0	67.75
Front entrance ( North)	74.0	72.2	73.1	67.0	66.0	66.5
East side of IREL	70.5	69.0	69.75	69.0	67.5	68.25
South side of IREL	73.5	70.0	71.75	68.0	66.5	67.25
West side of IREL	73.0	71.0	72.0	67.5	68.5	68.0

Deputy Officer (S&T)

Chief Manager (S&T)



**TEST WATER BEFORE TASTE**  
**TAMIL NADU WATER SUPPLY & DRAINAGE BOARD**  
 District Level Water Testing Laboratory,  
 TWAD Board, 46/50 Vellalar Colony, Ramavarmapuram, Nagercoil 629001.

LAC

Ph.04652-238315

**TEST REPORT**

From  
 J.Jayanthi Jayala, B.Sc.  
 Junior Water Analyst,  
 D.W.T.Lab, TWAD Board,  
 Nagercoil.

To  
 The Dy. General Manager,  
 Indian Rare Earths Ltd.,  
 Manavalakurichi.

Lr.No.Lab No.38734-38739/TWA/Lab-NGL/18-19 Dated 25.02.2019

Sir,

Sub : Examination of water sample - Report furnished - Reg.  
 Ref :1) Lr.No. MK/CE/36/2018-2019/ Dt.14.02.2019  
 2) Your D.D No. 121788/Dt.05.02.19 for Rs.4200/-  
 3) Our Invoice No. 8247/Dated 14.02.19 for Rs.4200/-

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The result of analysis for the water sample sent under reference is furnished below.

Scheme : Drinking

Source : Open well

Location: 38734-38735 : Drinking water tap near MSP

Date of Collection : 14.02.2019

38736-38737:Drinking water tap near Administrative office

Date of Receipt : 14.02.2019

38738-38739:Drinking water tap near VTC

BIS 10500 : 2012	Result		
	Lab No.38734	Lab No.38736	Lab No.38738
<b>I. PHYSICAL EXAMINATION.</b>			
1. Appearance	Clear	Clear	Clear
2. Colour	Colourless	Colourless	Colourless
3. Odour	None	None	None
4. Turbidity NT Units	5	2	1
5. Total dissolved Solids mg/L	467	487	480
6. Electrical Conductivity Micro mho/cm	708	738	728
<b>II. CHEMICAL EXAMINATION:</b>			
7. pH	6.91	7.73	7.32
8. Ph. Alkalinity as CaCO <sub>3</sub> mg/L	0	0	0
9. Total Alkalinity. as CaCO <sub>3</sub> mg/L	92	172	152
10. Total Hardness as CaCO <sub>3</sub> mg/L	164	172	160
11. Calcium as Ca mg/L	42	40	34
12. Magnesium as Mg mg/L	14	17	18
13. Sodium as Na mg/L	78	82	79
14. Potassium as K mg/L	19	18	16
15. Iron as Fe mg/L	0.59	0.35	0.12
16. Manganese mg/L	0.00	0.00	0.00
17. Free Ammonia as NH <sub>3</sub> mg/L	0.04	0.12	0.08
18. Nitrite as NO <sub>2</sub> mg/L	0.01	0.00	0.01
19. Nitrate as NO <sub>3</sub> mg/L	5	6	4
20. Chloride as Cl mg/L	146	134	128
21. Fluoride as F mg/L	0.4	0.4	0.4
22. Sulphate as SO <sub>4</sub> mg/L	24	17	23
23. Phosphate as PO <sub>4</sub> mg/L	0	0	0
24. Tidy's Test 4 hrs. as O <sub>2</sub> mg/L	0.2	0.08	0.12
<b>BACTERIOLOGICAL EXAMINATION</b>	Lab No.38735	Lab No.38737	Lab No.38739
Fecal coliform per 100 ml.	0	0	0

**Report: Lab No. 38734/38736/38738 : The water is chemically Potable**

**Lab No.38735/38737/38739 :The water is bacteriologically safe.**

Junior Water Analyst,  
 TWAD Board, D.W.T Lab,  
 Nagercoil.



**TEST WATER BEFORE TASTE 78**  
**TAMIL NADU WATER SUPPLY & DRAINAGE BOARD**  
 District Level Water Testing Laboratory,  
 TWAD Board, 46/50 Vellalar Colony, Ramavarmapuram, Nagercoil 629001.

Ph.04652-238315

By  
30/11/18

GWSB

**TEST REPORT**

From  
 J. Jayanthi Jayala, B.Sc.  
 Junior Water Analyst,  
 D.W.T. Lab, TWAD Board,  
 Nagercoil.

To  
 The Dy. General Manager,  
 Indian Rare Earths Ltd.,  
 Manavalakurichi.

Lr.No. Lab No. 38206-38211/IWA/Lab-NGL/18-19 Dated 31.10.2018

Sir,  
 Sub : Examination of water sample - Report furnished - Reg.  
 Ref : 1) Lr.No. MK/CE/36/2018-2019/ Dt.26.10.2017  
 2) Your D.D No. 041419/Dt.17.10.18 for Rs.4200/-  
 3) Our Invoice No. 8142/Dated 26.10.18 for Rs.4200/-  
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The result of analysis for the water sample sent under reference is furnished below.

Scheme : Drinking  
 Source : Open well  
 Location: 38206-38207 : Drinking water tap near MSP  
 38208-38209: Drinking water tap near Administrative office :  
 38210-38211: Drinking water tap near VTC

Date of Collection : 26.10.2018  
 Date of Receipt : 26.10.2018

BIS 10500 : 2012	Result		
	Lab No.38206	Lab No.38208	Lab No.38210
<b>I. PHYSICAL EXAMINATION.</b>			
1. Appearance	Clear	Clear	Clear
2. Colour	Colourless	Colourless	Colourless
3. Odour	None	None	None
4. Turbidity NT Units	0	0	0
5. Total dissolved Solids mg/L	500	447	487
6. Electrical Conductivity Micro mho/cm	758	678	738
<b>II. CHEMICAL EXAMINATION:</b>			
7. pH	7.15	7.63	7.22
8. Ph. Alkalinity as CaCO <sub>3</sub> mg/L	0	0	0
9. Total Alkalinity. as CaCO <sub>3</sub> mg/L	192	204	180
10. Total Hardness as CaCO <sub>3</sub> mg/L	224	224	192
11. Calcium as Ca mg/L	58	51	59
12. Magnesium as Mg mg/L	19	23	11
13. Sodium as Na mg/L	62	36	64
14. Potassium as K mg/L	24	11	19
15. Iron as Fe mg/L	0.00	0.00	0.00
16. Manganese mg/L	0.00	0.00	0.00
17. Free Ammonia as NH <sub>3</sub> mg/L	0	0	0
18. Nitrite as NO <sub>2</sub> mg/L	0.01	0.01	0.03
19. Nitrate as NO <sub>3</sub> mg/L	6	4	5
20. Chloride as Cl mg/L	102	90	92
21. Fluoride as F mg/L	0.4	0.4	0.4
22. Sulphate as SO <sub>4</sub> mg/L	26	20	23
23. Phosphate as PO <sub>4</sub> mg/L	0	0	0
24. Tidsys Test 4 hrs.as O <sub>2</sub> mg/L	0.16	0.12	0.20
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal coliform per 100 ml.	0	0	0

Report: Lab No. 38206/38208/38210 : The water is chemically Potable  
Lab No.38207/38209/38211 : The water is bacteriologically safe.

By  
 Junior Water Analyst,  
 TWAD Board, D.W.T Lab,  
 Nagercoil.



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**Details of Afforestation & Green belt Development for last 7 years by the Unit**

Year	Area Mined (Ha)	Area Planted in, (Ha)			No. of trees Planted		
		Mined out area	Others (Plant & Colony)	Total	Mined out area	Others (Plant & Colony)	Total
2012-13	1.8	1.5	-	1.5	6500	-	6500
2013-14	1.8	3.0	-	3.0	6500	-	6500
2014-15	2.57	3.0	-	3.0	7140	-	7140
2015-16	2.8	3.0	-	3.0	6410	-	6410
2016-17	2.45	3.0	-	3.0	6765	-	6765
2017-18	0	3.0	-	3.0	7000	-	7000
2018-19	3.0	3.0	-	3.0	6928	-	6928

Deputy Officer (S&T)

Chief Manager (S&T)



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03.05.2019

Plant (In-house) Noise-Survey for the period from October 2018 to March 2019

Sl. No.	Location	Noise level-dB (A)		Duration of Exposure	Personal Protective Equipments used
		Maximum	Minimum		
<b>I.</b>	<b>DRY MILL</b>				
1	22 tph FBD Control cabin - inside	77.0	80.7	5 hrs	
2	Improved primary section – outside supervisor cabin	Not in operation	Not in operation	-	
3	Rutile section - Bagging area	88.5	89.8	6.5 hrs	Ear Muff/Ear Plug
4	Zircon section - Bagging area	87.0	89.0	6.5 hrs	Ear Muff/Ear Plug
5	Zircon section- Final air tables area	87.0	89.9	6.5 hrs	Ear Muff/Ear Plug
6	Zircon section - Primary air tables area	87.5	89.8	5 hrs	Ear Muff/Ear Plug
7	Shift-In- Charge cabin	68.0	70.0	2 hrs	
8	2 tph – FBD control cabin	74.0	80.9	4 hrs	
9	Air tables in the Zircon wet section	89.0	89.0	5 hrs	Ear Muff/Ear Plug
10	Bagging area in the Zircon wet section	88.0	87.0	5 hrs	Ear Muff/Ear Plug
11	Garnet final collecting area	86.5	89.8	6.5 hrs	Ear Muff/Ear Plug
12	Ilmenite section (ground floor)	Not in operation	Not in operation	-	
13	Generator operator cabin	Not in operation	Not in operation	-	
<b>II.</b>	<b>HUP</b>				
1	Operator Control cabin I Floor	70.0	79.0	6.5 hrs	
2	Bunker area	86.0	86.5	7 hrs	Ear Muff/Ear Plug
3	Shift Incharges cabin II Floor	71.0	74.0	1 hrs	
<b>III.</b>	<b>PUMP-HOUSE</b>				
1	Operator's cabin-inside	73.0	73.0	6.5 hrs	
2	Operator's cabin-outside	83.5	83.5	6.5 hrs	
<b>IV.</b>	<b>OUT SIDE PLANT</b>				
1	Near Electrical work shop	74.0	74.5	8 hrs	
2	Housing complex (near water tank)	59.0	60.0	8 hrs	
3	Guest House	56.0	58.0	8 hrs	
<b>V.</b>	<b>HEM Machinery</b>				
1	Front End Loader - Inside cabin	88.0	88.9	5 hrs	Ear Muff/Ear Plug
<b>VI</b>	<b>Mining Sites</b>				
1	Periavili vilai -Inland	80.0	84.0	7 hrs	
2	Chinna Vilai -Inland	79.0	81.0	7 hrs	
3	Pillayar Coil- Inland	78.0	82.9	7 hrs	

Instrument name: Sound level meter- RT-5001 Calibrated on: 25.05.2018 Next calibration due on: 17.05.2019

Deputy Officer (S&T)

Chief Manager (S&T)

पंजीकृत कार्यालय: प्लॉट नं. 1207, वीर सावरकर मार्ग, सिद्धिविनायक मंदिर के पास, प्रभादेवी, मुंबई-400 028

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02.05.2019

**Sub: Fund allocation for environmental protection, prevention & control of pollution & CSR**

Period : April 2018-March 2019

Sl. No.	Item	Amount spent (in rupees)
1	Sewage treatment operation & maintenance	7,97,108
2	AAQ & Stack monitoring	3,29,928
3	Water & Air Consent fees, AAQ, Stack Noise and sewage monitoring fees to TNPCB	6,85,124
4	Radioactivity Monitoring	4,00,000
5	Afforestation Development	4,68,922
6	Watering to suppress the dust & spillage cleaning from the Road	16,65,000
7	Maintenance of garden & lawn	5,96,726
8	Removal of bushes & Jungles	4,34,233
9	Clearing drainage, haul road	4,76,543
10	Cleaning & House keeping	10,50,938
11	Cleaning of Plant floor & spillage	6,66,044
12	Up-Keeping works	3,68,896
13	Maintenance of aqua-guard for drinking	16,685
14	Awareness programs such as National Safety Week, World Environment Day, Fire Service Week	38,610
15	CSR activities	25,70,000
<b>Total</b>		<b>1,05,64,757</b>

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