



आईआरईएल (इंडिया) लिमिटेड IREL (India) Limited

(Formerly Indian Rare Earths Limited)

(भारत सरकार का उपक्रम)

(A Govt of India Undertaking)

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



ISO 9001 : 2015, ISO 14001 : 2015 & ISO 45001-2018 Company

TS/ENVR/ OSCOM/

4th December 2023

To,
The Additional Principal Chief Conservator of Forests,
Government of India,
Ministry of Environment, Forests & Climate Change (MoEF & CC),
Eastern Regional Office (Eastern Zone),
A/3, Chandrasekharapur, Bhubaneswar-751 023.

Dear Sir,

Sub.- Half-yearly progress report on Mining & Mineral Separation Units of OSCOM.

- Ref.-i. MoEF&CC letter no. 21/18/84 ENI/IA II dated 14th May 1991.
ii. Our compliance report TS/ENVR/05/OSCOM/4943A dated 23rd November 2018.
iii. MoEF&CC Environmental Clearance (EC) letter No.J-11015/528/2007-IA.II(M) dated 11th January 2019 for capacity expansion of Mining & Mineral Separation Units.

This has reference to the above subject & references; we are herewith enclosing the compliance report for OSCOM operation for the period April 2023 to September 2023 for your kind information.

Accordingly, OSPCB issued a Consent Order No.636/22-23 dated 16.02.2023 for production capacity of 6,35,000 TPA of total heavy minerals comprising of heavy minerals e.g. Ilmenite, Rutile, Zircon, Sillimanite, Monazite & Garnet.

As advised, we are submitting the soft-copy to email ID – roez.bsr-mef@nic.in for kind information.

With regards.

Yours truly,
For IREL (India) Limited,

Gaman Murty
(C V R Murty)
4/12/2023

GM & Head, Mining & Minerals Division, OSCOM

PW w r *S B*

उड़ीसा सैंड्स कॉम्प्लेक्स, माटिखालो (डाक), छत्रपुर (गंजाम), ओड़िशा - 761045, भारत

Orissa Sands Complex, Matikhalo (P.O.), Chatrapur (Ganjam), Odisha - 761 045

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

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IREL (India) Limited
Six Monthly Compliance Report (April 2023 to September 2023)

Format for filling up of Compliance report

Annexure-1

Name of the project: 1. Mining & Mineral Separation of OSCOM, IREL (India) Limited

Clearance letters No and Date:

- i. MoEF letter no.21/18/84 ENI/IA II dated 14th May 1991 & No.J-14011/5/91/IA-II dated 7th April'2000 for Mining & Mineral Separation of IREL, OSCOM.
- ii. Environmental Clearance (EC) vide letter No.J-11015/528/2007- IA.II(M) dated 11th January 2019 for capacity expansion of Mining & Mineral Separation Units.

Period of Compliance Report: **April 2023 to September 2023**

Sub: Compliance of various points raised by MoEF letter no. J-11015/528/2007- IA.II(M) dated 11th January 2019 for capacity expansion of Mining & Mineral Separation Units.

SI No.	Specific Conditions	Compliance
1	This Environmental Clearance is generated subject to outcome of Hon'ble Supreme Court of India, Hon'ble High Court of Odisha, Hon'ble NGT or any other Court of Law, if any, as may be applicable to this project.	Agreed upon
2	This Environmental Clearance will not be operational till such time the Project Proponent complies with all the statutory requirements and judgment of Hon'ble Supreme Court dated the 2 nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors.	Agreed upon
3	The Department of Mining & Geology, State Government shall ensure that mining operation shall not commence till the entire compensation levied, for illegal mining paid by the Project Proponent through their respective Department of Mining & Geology in strict compliance of judgment Hon'ble Supreme Court dated the 2 nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors.	Agreed upon
4	No mining activities will be allowed in forest area, if any, for which the forest Clearance is not available	Agreed upon
5	The Environmental Clearance is subject to obtaining requisite NBWL Clearance, if any, from the Standing Committee of National Board for Wildlife for mining project.	Agreed upon
6	The Project Proponent shall obtain Consent to Operate from State Pollution Control Board, Odisha and effectively implement all the conditions stipulated therein.	The Consent Order No. 636/22-23 dated 16.02.2023, issued by Odisha State Pollution Control Board (OSPCB) under Water & Air Act, is having validity up to 31.3.2024.
7	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.	Agreed upon



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8	Necessary AERB Clearance shall be obtained under the Atomic Energy (Radiation Protection) Rules, 2004 for operation of BSM (Beach Sand Minerals) facility.	AERB clearance has been obtained vide letter no .AERB/CN/OPSD/55222/IREL/BSM-O/2019/875 dated Aug 2019 valid up to 31.8.2024.
9	No mining shall be carried out in “NO GO ZONE / NO OPERATION ZONE” as stipulated in the conditions in the NOC letter No. 3536/WL(C) (SSP) – 149/2012, dated 11 th May 2012, granted by Principal Chief Conservator of Forests & Chief Wildlife Warden.	Agreed upon
10	No mining shall be carried out in the CRZ-I area i.e the area within HTL & LTL.	No mining is carried out in the area within HTL & LTL
11	No drilling and blasting shall be involved.	No drilling and blasting are involved.
12	After mining, the mined out area shall be backfilled and levelled to near original topography and plantation should be developed over the same, so that, mining activity do not affect the beach profile.	After mining, the mined out areas are back filled and leveled to near original topography and plantation activity carried out.
13	Conditions as laid down by the Odisha State Coastal Zone Management Authority as stipulated vide letter No. 13716/F&E dated 24 th July 2012 while recommending for CRZ clearance shall be strictly complied as given below: <ul style="list-style-type: none"> a) Green belt with local species has to be taken up if Govt. land is available. b) The present status of sand dunes in the Odisha Space Application Centre (ORSAC) & validated by DFO, Berhampur. c) The sand dunes should not be mined. d) During breeding season of Olive Ridley Turtles, the restrictions imposed by PCCF (Wildlife) are to be followed. 	Being complied
14	Conditions of NOC, granted by Principal Chief Conservator of Forests & Chief Wildlife Warden (PCCF& CWLW) vide letter No. 3536/WL/(C)(SSP)-149/2012 dated 11 th May 2012, shall be strictly complied as given below: <ul style="list-style-type: none"> a) No mining shall be carried out in “NO GO ZONE / NO OPERATION ZONE”. b) The capacity expansion of Mining and Mineral Separation Unit has to be within the premises of the existing unit of OSCOM premises of IREL (India) Limited at village Matikhalo, Chhatrapur, District: Ganjam, Odisha under operation and no extra land or deforestation shall be made. c) The 5 (five) Km zone of the nesting / mass nesting site of endangered Olive Ridley sea turtles from Rushikulya river mouth are shall be as a NO GO AREA or NO DEVELOPMENT ZONE. No mining or sand extraction or habitat alteration or 	Being complied <ul style="list-style-type: none"> a) Agreed upon b) The capacity expansion of Mining and Mineral Separation Unit is within the premises of the existing unit of OSCOM. c) No mining or sand extraction or habitat alteration or activities of similar nature are done in the area of endangered Olive Ridley sea turtles from Rushikulya.



	<p>activities of similar nature shall be done in the area as per the map authenticated by competent authorities of the Odisha Forest Department.</p> <p>d) The Proponent shall take up the mining or sand extraction activities starting from the southern extreme end of the lease hold area till 10 km zone of the Rushikulya river area as per the map authenticated by competent authorities of the Odisha Forest Department. This may give the working period of 8-9 years. Before one year of reaching the 10 km zone segment of the Rushikulya river mouth area, the User Agency shall apply for fresh “No Objection”.</p> <p>e) Within the existing unit as well as proposed expansion site, the User Agency shall take all necessary steps to reduce its outdoor illumination during the mass emergence of Olive Ridley sea turtles and their hatchings.</p> <p>f) Release of effluents or by-products of the factory shall be as per the norms of the OSPCB. Toxic chemicals and by-products shall not be released into the Rushikulya River since it is likely to result in reducing the food base of marine turtles. And likely to cause pollution of river/ sea water affecting estuarine and marine wildlife.</p> <p>g) This NOC will remain valid from the date of issue of this letter till 2019 or till reaching the 10 km zone from the Rushikulya River mouth or till the area remains under safe category on wildlife resource conservation considerations, whichever is earlier in the interest of environmental protection.</p>	<p>d) Agreed upon</p> <p>e) Being complied.</p> <p>f) Agreed upon</p> <p>g) Agreed upon</p>
15	<p>A 15 m barrier of no mining zone all along the side facing the nallah/ water body (Tampara lake) passing thorough the lease area or if passing adjacent the lease shall be demarcated and thick vegetation of native species raised. Status of implementation shall be submitted to the Regional Office of the Ministry on half yearly basis.</p>	<p>Agreed upon</p>
16	<p>Out of 1395.400ha of mineable land, 20,737ha of land covers four small villages of Arjipalli Panchayat namely Bara Arjipalli, Sana Arjipalli Sana Arjipalli (Katuru) and Kandra Arjipalli. As informed by the Proponent, though the displacement is temporary in nature, Rehabilitation & Resettlement (R&R) benefits to the temporarily displaced Project Affected Families (PAFs) shall be provided in consultation with Local Administration as per the provisions of Odisha Resettlement & Rehabilitation Policy, 2006, National Rehabilitation & Resettlement Policy, 2007 and payment of compensation & annual lease rent shall be as per the provisions under MM (D&R) Act,</p>	<p>Agreed upon</p>

**IREL (India) Limited****Six Monthly Compliance Report (April 2023 to September 2023)**

	1957. Need based assessment for the nearby villages shall be conducted to study economic measures which can help in upliftment of poor section of society. Income generating projects/tools such as development of fodder farm, fruit bearing orchards, vocational training etc. can form a part of such programme. Company shall provide separate budget for community development activities and income generating programmes. This will be in addition to vocational training for individuals imparted to take up self-employment and jobs.	
17	Implementation of conservation plan for schedule I species as approved by the Chief Wild life Warden, Bhubaneswar.	Being complied
18	Identification of sand dunes shall be done prior to undertaking mining activities and their conservation shall be as per MOEF&CC 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 submission/flooding.	Being complied
19	Tailing 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 circumstances, the tailings will be dumped in agricultural lands, wet lands, paddy fields, canals and the backfilling will be carried out only in the inland mined out areas.	Tailing and rejects are back filled systematically after separating the heavy/rare minerals. Tailing put back at the mined out area on completion of extraction of Atomic Minerals from inland areas. Afforestation are being carried out with suitable species on mined out areas.
20	The mining activities shall be regulated in such a way that there will be minimum disturbance to the fauna during spawning and brooding period i.e from November to March.	Being complied
21	Mining shall be carried out in phases only. Simultaneously opening of entire beach front is not permissible. There shall be uninterrupted access to the seafront. Minimum 20 m width of approach roads shall be provided where necessary.	Being complied
22	Mining shall be carried out by permitted methods without the use of 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.	Being complied
23	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 radioactivity minerals.	Radiation survey are carried out as stipulated by the Health Physics Unit of BARC.



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24	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 , Forests & Climate Change, its Regional Office, Odisha, Central Groundwater Authority , Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Control Board.	Regular monitoring of water quality upstream and downstream of adjoining water bodies are carried out by an NABL accredited agency and record of monitoring data are maintained and submitted to Ministry of Environment.
25	Mineral handling plant shall be provided with adequate number of high efficiency dust extraction system. Loading and unloading areas including all the transfer points should also have effluent dust control arrangements. These should be properly maintained and operated.	Mineral handling plant are provided with adequate number of high efficiency dust extraction system. Loading and unloading areas including all the transfer points are also have effluent dust control arrangements.
26	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.	Agreed upon.

**IREL (India) Limited****Six Monthly Compliance Report (April 2023 to September 2023)****Standard conditions:**

SINo	Standard Conditions	Compliance
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.	Agreed upon
2	No change in the calendar plan including excavation, quantum of beach sand mineral i.e. Illeminite, Rutile, Zircon, Monazite, Sillimanite and Garnet and waste should be made.	Agreed upon
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.	Agreed upon
4	Mining shall be carried out as per the provisions outlined in mining plan approved by AMD as well as by abiding to the guidelines of Directorate General Mines Safety (DGMS).	Being complied
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.	Being complied
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.	Agreed upon.
7	The critical parameters as per the Notifications 2009 such as PM ₁₀ , PM _{2.5} , NO _x , and SO _x etc. in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored [TDS, DO, PH and Total Suspended Solids (TSS)]. The monitored data shall be uploaded on the web site 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.	Ambient Air Quality Monitoring (AQM) stations and quality of discharged water monitoring is being carried out by M/s Centre for Envotech & Management Consultancy Pvt.Ltd., Bhubaneswar, a NABL accredited & MoEF&CC authorized agency, at four stations (Mining area(south sector), IREL Colony, Bada Arjipalli & Kanamana, Mining area (North) and in plant area on regular basis. From the monitoring data, it is seen that the all the data are within the norms. Monitored data is uploaded in company website.
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 ₁₀ , PM _{2.5} such as haul road, loading and unloading points and transfer points. Fugitive dust emissions from all the sources shall be controlled regularly. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard. Monitoring of Ambient Air	Regular water sprinkling are carried out in critical areas prone to air pollution and having high levels of PM ₁₀ , PM _{2.5} such as haul road, loading and unloading points and transfer points.



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	Quality to be carried out based on the Notifications 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 Directory, Central Ground Water Board.	Ground water monitoring is regularly carried out inside OSCOM on monthly basis and around OSCOM (from local villages) on quarterly basis in a year and half yearly reports are sent to the Regional Office, Ministry of Environment and Forests, Bhubaneswar regularly.
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 and 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.	Being complied Monitoring of water table in open dug wall located in villages is under taken by IREL through third party agency i.e M/s Centre for Envotech & Management Consultancy Pvt.Ltd., Bhubaneswar, a NABL accredited & MoEF&CC authorized agency. Results of study are kept in records.
11	Regular monitoring of water quality upstream and downstream of water bodies shall be carried out and record of monitoring data should be maintained and submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office, Central Ground Water Authority and Regional Directory, Central Ground Water Board, State Pollution Control Board and Central Pollution Control Board.	Water quality monitoring is regularly carried out inside OSCOM on monthly basis and around OSCOM (from local villages) on quarterly basis in a year and half yearly reports are sent to the Regional Office, Ministry of Environment and Forests, Bhubaneswar regularly.
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.	Being complied.

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13	Main haulage road in the mine should be provided with permanent water sprinkles and other roads should be regularly wetted with water tankers fitted with sprinkles. 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 bone dust; Use of effective sprinkler system to suppress fugitive dust on haul roads and other transport roads shall be ensured.	Main haulage road in the mine are provided with permanent water sprinkles.
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 pH are being carried out and reports are submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.
15	There shall be planning, developing and implementing facility of rainwater harvesting measures on long term basis and implementation of conservation measures to augment ground resources in the area in consultation with Central Ground Water Board.	Rainwater harvesting measures are implemented to recharge the ground resources.
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 slope, bottom of the dumps and top of the dumps are able to sustain these species. The aspect of the dump and is also a factor which regulates some climatic parameters and allows only species adopted species to that micro climate.	Being complied.
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 topsoil 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 area should continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.	Not applicable
18	Plantation shall be raised in a 7.5m 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 along the mine lease area in a phased manner and shall be completed within first five years.	Plantation activities are undertaken over backfilled reclaimed areas. Development of green belt would be undertaken in a phased manner.

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19	Project Proponent shall follow the mitigation measures provided in Office Memorandum No. Z-11013/57/2014-IA.II (M) , dated 29 th 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 areas or Habitations and villages are surrounded by the mine lease area”, if any, applicable to the project.	Agreed upon.
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.	Being complied.
21	As per the Company Act, the CSR cost should be 2 % of average net profit of last three years. Hence CSR expenses should be as per the Company Act/Rule for the Socio Economic Development of the neighborhood Habitants which could be planned and executed by the Project Proponent more systematically based on the ‘Need based door to door survey’ by established Social Institutes/Workers. The report shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.	Being complied.
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, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Complied.
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.	Noise levels are monitored and reports submitted to MoEF &CC. Workers engaged in operations of HEMM, etc. are provided with ear plugs/muffs.
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 th May, 1993 and 31 st December, 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of workshop effluents.	Being complied. The waste water generated from Mineral Separation Plant is taken to storage Pond No.1. After settling of slime in the pond, the water is recycled for the same plant. The monitoring results of liquid effluent to Pond No.1 are regularly evaluated. From the monitoring data, it is seen that all the parameters were within the permissible limit.

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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.	Being complied. Personnel working in dusty areas are providing PPE's and are wearing protective respiratory devices and they are also regularly provided with adequate training and information on safety and health aspects.
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.	Complied. Environment Management Cell is constituted and functioning. In addition, Environment Management Review meetings are being conducted on quarterly basis to carry out to review of the progress of requirements of Environment Management system as per ISO 14001: 2015.
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 Ministry and its Regional Office.	Being complied Year wise Expenditure reported: FY 2020-21 : Rs 411.38 Lakh 2021-22 : Rs 1041 Lakh 2022-23 : Rs 1750 Lakh
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.	Being complied
29	The project Proponent shall submit six 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.	Six monthly reports on the status of the implementation of the stipulated environmental safeguards are being submitted to the MoEF & CC, Regional office, BBSR and SPCB.
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.	Agreed upon.
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.	complied.
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.	Yes complied
33	The Project authorities should advertise at least in two local newspaper 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	Yes complied. i.e Advertisd in English new paper: Times of India on 18.01.2019 & Odia daily new paper on

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	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 www.environmentclearance.nic.in/ parivesh.nic.in and a copy of the same should be forwarded to the Regional Office.	17.01.2019
34	The Ministry or any other competent authority may alter/modify the above conditions or stipulate any further condition in the interest of environmental protection.	Agreed upon
35	Concealing factual data or submission of false/ fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986.	Agreed upon
36	The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance act, 1991 along with their amendments and rules made there under and also any other orders passed by the Hon'ble Supreme Court of India/ High Court Of Odisha and any other Court of Law relating to the subject matter.	Agreed upon
37	Any appeal against this environmental clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	Agreed upon



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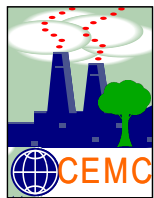
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OSCOM

Annexure -2

Ref: Details of monitoring reports & other reports

Period: April 2023 - September 2023

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CENTRE FOR ENVOTECH AND MANAGEMENT CONSULTANCY PVT. LTD.

An ISO 9001:2008 & OHSAS 18001:2007 Certified Company, Empanelled with OCCL, ORSAC and SPCB of Govt. of Odisha
Accredited by NABET, QCI for EIA Studies as 'A' Category Consultant Organization.
Empanelled with PCCF(Wildlife) & CWLW, Odisha
Enlisted in CIDC (established by the Planning Commission Govt. of India), NABL
MoEF&CC, Govt. of India, Recognised Environment Laboratory under Environment (Protection) Act, 1986.



Report no. - CEMC/IREL/St1

Issued Date-16.11.2023

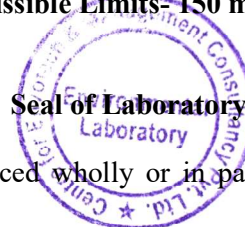
STACK EMISSION MONITORING TEST REPORT

Issued to	M/s.IREL(INDIA) LIMITED, Matikhala, Chatrapur, Ganjam, Odisha
Work Order No.	OSCOM MINERAL/22-23/07/O/S.C./10354, Dated- 15.10.2022
Locations	ST-1 Boiler, ST-2- Main Dryer, ST-3- Shaft Dryer-Ilemenite, ST-4- Shaft Dryer- Rutile, ST-5- Sillimanite Dryer, St-6- Garaet FBD of Garnet Plant ,ST-7- RE Minerals Section9, REEP -2 (RE Chloride) Stack-10 , ST-8-Zircon Dryer, REEP -1 (Active Plant) Stack-
Nature of Sampling	Source Emission
Sampling By	Mr.Suresh Pradhan
Instrument Used	Stack monitoring kit, Flue Gas Analyzer
Sampling Period	April'2023 to September'2023
Parameter	Particulate Matter

FREQUENCY		LOCATIONS									
Month	Week	ST-1	ST-2	ST-3	ST-4	ST-5	ST-6	ST-7	ST-8	ST-9	ST-10
April	1st	74.6	57.4	59.8	58.2	59.4	58.6	60.1	58.4	6.1	6.2
	3rd	70.4	58.4	59.6	57.6	59.8	59.2	61.4	57.4	6.1	6
May	1st	76.4	58.6	60.7	59.8	60.9	59.8	61.8	59.8	6.2	6
	3rd	72.8	59.6	60.4	58.7	60.7	60.8	62.5	58.6	6.2	6.1
June	1st	78.4	59.2	61.4	60.2	61.6	60.4	62.4	60.6	6	6.1
	3rd	73.6	60.8	62.2	60.4	62.3	62.6	64.1	60.5	6.1	6.2
July	1st	71.2	60.2	64.2	50.2	51.6	56.4	52.4	58.6	7.8	8.2
	3rd	63.6	60.8	61.2	60.4	62.3	62.6	64.1	60.5	7.2	--
August	1st	72.6	61.8	65.7	52.8	53.8	58.9	54.7	61.5	8.8	9.5
	3rd	64.8	65.7	63.5	61.6	64.9	65.8	65.5	62.3	7.8	9.1
September	1st	70.4	60.6	66.2	56.6	54.8	53.4	55.2	60.5	9.2	9.8
	3rd	68.2	63.4	64.8	60.8	60.4	59.4	60.6	63.3	8.2	9.2
MAXIMUM		78.4	65.7	66.2	61.6	64.9	65.8	65.5	63.3	9.2	9.8
MINIMUM		63.6	57.4	59.6	50.2	51.6	53.4	52.4	57.4	6	6
AVERAGE		71.42	60.54	62.48	58.11	59.38	59.83	60.40	60.17	7.14	7.49
STD DEVIATION		4.36	2.29	2.32	3.45	3.94	3.14	4.14	1.72	1.18	1.64

OSPCB Permissible Limits- 150 mg/Nm³

Authorized Signatory
Notes:



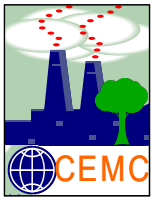
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Laboratory At: Plot No. 800/1274, Johal, Pahal, Bhubaneswar-752101, Odisha, India, Mobile: 7752014842
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Report no. - CEMC/IREL/St2

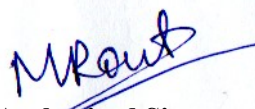
Issued Date-16.11.2023

STACK EMISSION MONITORING TEST REPORT

Issued to	M/s.IREL(INDIA) LIMITED, Matikhala, Chatrapur, Ganjam, Odisha
Work Order No.	OSCOM MINERAL/22-23/07/O/S.C./10354, Dated- 15.10.2022
Locations	REEP -1 (Active Plant) Stack-9, REEP -2 (RE Chloride) Stack-10
Nature of Sampling	Source Emission
Sampling By	Mr.Suresh Pradhan
Instrument Used	Stack monitoring kit, Flue Gas Analyzer
Sampling Period	April'2023 to September'2023
Parameter	Acid Mist

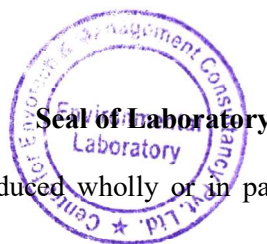
FREQUENCY		LOCATIONS	
Month	Week	ST-9	ST-10
April	1st	6	5.9
	3rd	5.9	5.8
May	1st	6.1	5.8
	3rd	6	5.9
June	1st	6.2	5.9
	3rd	5.7	5.8
July	1st	6.6	6.1
	3rd	6.1	--
August	1st	7.1	6.8
	3rd	7.8	7.1
September	1st	7.4	6.9
	3rd	6.8	6.5
MAXIMUM		7.8	7.1
MINIMUM		5.7	5.8
AVERAGE		6.48	6.23
STD DEVIATION		0.66	0.50

OSPCB Permissible Limits- 50 mg/Nm³


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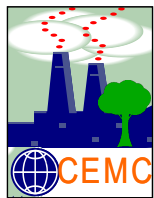


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Report no. - CEMC/IREL/A1

Date-16.11.2023

AMBIENT AIR QUALITY MONITORING TEST REPORT

Issued to	M/s.IREL(INDIA) LIMITED, Matikhala, Chatrapur, Ganjam, Odisha
Work Order No.	OSCOM MINERAL/22-23/07/O.S.C./10354, Dated- 15.10.2022
Nature of Sampling	Ambient Air Sample
Sampling By	Mr. Suresh Pradhan
Sampling Location	Mining Area (SMP-1) (A1)
Instrument Used	Respirable Dust Sampler, Fine Dust Sampler, Gaseous Attachment, CO Meter, Benzene Sampler
Sampling Period	April'2023- Sept'2023

ANALYSIS RESULT

Month	Week	SO ₂	NO _x	PM ₁₀	PM _{2.5}	Lead	As	NH ₃	O ₃	BaP	Ni	C ₆ H ₆ #	CO
April	1st	10.9	13.6	71.8	39.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	10.8	13.5	71.4	37.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.3	13.5	69.4	38.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
May	1st	11.2	14	79.4	45.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	11.1	13.9	79.2	42.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.6	13.9	78.2	43.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
June	1st	11.6	14.8	82.2	48.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	11.5	14.5	84.6	45.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.4	13.5	73.6	42.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
July	1st	9.6	12.8	75.2	38.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	7.5	12.5	74.6	35.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	6.4	10.5	63.6	32.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
August	1st	10.2	13.2	76	39.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	7.8	13.2	75.2	37.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	8	11.4	66.6	36.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
September	1st	11.6	15.8	82	40.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	6.6	10.2	75.2	38.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	8.4	12.8	72.6	36.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
MAXIMUM		11.60	15.80	84.60	48.40	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
MINIMUM		6.40	10.20	63.60	32.40	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
AVERAGE		9.55	13.16	75.48	40.11	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
SD		1.82	1.49	5.64	4.25	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
NAAQ Standard		80	80	100	60	1	6	400	180	1	20	5	4

*All units are representing in µg/m³ except CO in mg/m³ and BaP, Ni, As in ng/m³

#- Analyzed by Eko Pro Engineers, Gaziabad, Certificate No.- TC-5063

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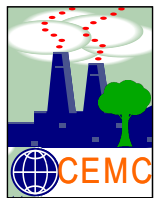
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Report no. - CEMC/IREL/A2

Date-16.11.2023

AMBIENT AIR QUALITY MONITORING TEST REPORT

Issued to	M/s.IREL(INDIA) LIMITED, Matikhala, Chatrapur, Ganjam, Odisha
Work Order No.	OSCOM MINERAL/22-23/07/O/S.C./10354, Dated- 15.10.2022
Nature of Sampling	Ambient Air Sample
Sampling By	Mr. Suresh Pradhan
Sampling Location	I.R.E.L Colony (A2)
Instrument Used	Respirable Dust Sampler, Fine Dust Sampler, Gaseous Attachment, CO Meter, Benzene Sampler
Sampling Period	April'2023- Sept'2023

ANALYSIS RESULT

Month	Week	SO ₂	NO _x	PM ₁₀	PM _{2.5}	Lead	As	NH ₃	O ₃	BaP	Ni	C ₆ H ₆ #	CO
April	1st	10.4	13.3	68.6	38.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	10.6	13.3	69.6	37.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10	13.1	68.3	36.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
May	1st	10.6	13.6	76.8	43.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	10.8	13.8	78.4	42.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.3	13.5	77.4	41.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
June	1st	11	14.1	80.4	46.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	11.2	14.3	83.3	45.1	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.1	13.1	72.8	39.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
July	1st	9	12.1	70.4	36.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	8.2	11.3	73.3	35.1	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	5.1	9.2	62.8	29.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
August	1st	9.8	12.8	71.2	36.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	8.8	11.8	74	36.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	5.8	9.8	63.8	32.3	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
September	1st	10.4	13.6	74.8	38.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	5.2	9.2	70.8	35.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	9.8	14.8	75.2	38.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
MAXIMUM		11.2	14.8	83.3	46.2	<0.06	<0.01	<20	<10	<1.0	<3.2	<1.0	<0.05
MINIMUM		5.1	9.2	62.8	29.2	<0.06	<0.01	<20	<10	<1.0	<3.2	<1.0	<0.05
AVERAGE		9.13	12.51	73.36	38.27	<0.06	<0.01	<20	<10	<1.0	<3.2	<1.0	<0.05
SD		2.03	1.79	5.52	4.55	<0.06	<0.01	<20	<10	<1.0	<3.2	<1.0	<0.05
NAAQ Standard		80	80	100	60	1	6	400	180	1	20	5	4

*All units are representing in $\mu\text{g}/\text{m}^3$ except CO in mg/m^3 and BaP, Ni, As in ng/m^3

#- Analyzed by Eko Pro Engineers, Gaziabad, Certificate No.- TC-5063

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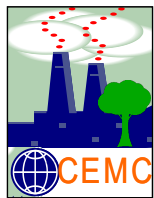
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Report no. - CEMC/IREL/A3

Date-16.11.2023

AMBIENT AIR QUALITY MONITORING TEST REPORT

Issued to	M/s.IREL(INDIA) LIMITED, Matikhala, Chatrapur, Ganjam, Odisha
Work Order No.	OSCOM MINERAL/22-23/07/O/S.C./10354, Dated- 15.10.2022
Nature of Sampling	Ambient Air Sample
Sampling By	Mr. Suresh Pradhan
Sampling Location	Bada Arjipalli Port (A3)
Instrument Used	Respirable Dust Sampler, Fine Dust Sampler, Gaseous Attachment, CO Meter, Benzene Sampler
Sampling Period	April' 2022- September' 2023

ANALYSIS RESULT

Month	Week	SO ₂	NO _x	PM ₁₀	PM _{2.5}	Lead	As	NH ₃	O ₃	BaP	Ni	C ₆ H ₆ #	CO
April	1st	10.6	13.5	67.8	38.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	10.8	13.4	70.2	37.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	9.9	13.2	67.6	37.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
May	1st	10.9	13.9	74.6	44.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	11	13.9	78.8	42.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.4	13.6	76.8	42.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
June	1st	11.4	14.6	79.2	47.3	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	11.3	14.4	83.6	44.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.2	13.2	71.4	39.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
July	1st	8.4	11.6	69.2	35.3	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	6.3	10.4	73.6	34.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	6.8	10.2	61.4	29.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
August	1st	9	12.4	70.2	37.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	7	10.8	74.2	35	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	7.2	11.8	62.4	31.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
September	1st	11.2	14.6	71.2	36.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	7.8	10.2	71.4	36.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	6.6	10.2	73.8	37.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
MAXIMUM		11.40	14.60	83.60	47.30	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
MINIMUM		6.30	10.20	61.40	29.60	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
AVERAGE		9.09	12.44	72.46	38.26	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
SD		1.91	1.69	5.81	4.91	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
NAAQ Standard		80	80	100	60	1	6	400	180	1	20	5	4

*All units are representing in µg/m³ except CO in mg/m³ and BaP, Ni, As in ng/m³

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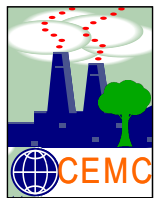
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Certificate No.-TC 6646

Report no. - CEMC/IREL/A4

Date-16.11.2023

AMBIENT AIR QUALITY MONITORING TEST REPORT

Issued to	M/s.IREL(INDIA) LIMITED, Matikhala, Chatrapur, Ganjam, Odisha
Work Order No.	OSCOM MINERAL/22-23/07/O/S.C./10354, Dated- 15.10.2022
Nature of Sampling	Ambient Air Sample
Sampling By	Mr. Suresh Pradhan
Sampling Location	Kana Mana Village (A4)
Instrument Used	Respirable Dust Sampler, Fine Dust Sampler, Gaseous Attachment, CO Meter, Benzene Sampler
Sampling Period	April'2023- Sept'2023

ANALYSIS RESULT

Month	Week	SO ₂	NO _x	PM ₁₀	PM _{2.5}	Lead	As	NH ₃	O ₃	BaP	Ni	C ₆ H ₆ #	CO
April	1st	10.3	13.4	68.2	39.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	10.4	13.2	70.8	37.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.2	13.4	68.8	38.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
May	1st	10.5	13.8	77.8	43.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	10.6	13.6	77.9	41.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.5	13.8	78.8	43.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
June	1st	10.9	14.4	81.4	46.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	11	14.1	82.4	43.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.3	13.4	73.2	41.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
July	1st	7.9	10.4	71.4	36.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	7	10.1	72.4	33.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	7.3	11.4	63.2	31.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
August	1st	8.2	11.2	72.2	38	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	7.8	11.2	73.6	34.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	7.8	12.2	64.5	32.9	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
September	1st	9.2	13.2	73.4	37.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	8.2	12.8	69.6	34.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	7	12	74.2	37.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
MAXIMUM		11.00	14.40	82.40	46.60	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
MINIMUM		7.00	10.10	63.20	31.40	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
AVERAGE		9.03	12.56	73.43	38.46	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
SD		1.51	1.37	5.41	4.48	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
NAAQ Standard		80	80	100	60	1	6	400	180	1	20	5	4

*All units are representing in µg/m³ except CO in mg/m³ and BaP, Ni, As in ng/m³

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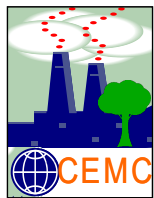
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Certificate No.-TC 6646

Report no. - CEMC/IREL/A5

Date-16.11.2023

AMBIENT AIR QUALITY MONITORING TEST REPORT

Issued to	M/s.IREL(INDIA) LIMITED, Matikhala, Chatrapur, Ganjam, Odisha
Work Order No.	OSCOM MINERAL/22-23/07/O/S.C./10354, Dated- 15.10.2022
Nature of Sampling	Ambient Air Sample
Sampling By	Mr. Suresh Pradhan
Sampling Location	North Mining Area(SMP-3) (A5)
Instrument Used	Respirable Dust Sampler, Fine Dust Sampler, Gaseous Attachment, CO Meter, Benzene Sampler
Sampling Period	April' 2022- September' 2023

ANALYSIS RESULT

Month	Week	SO ₂	NO _x	PM ₁₀	PM _{2.5}	Lead	As	NH ₃	O ₃	BaP	Ni	C ₆ H ₆ #	CO
-April	1st	10.5	13.2	70.4	38.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	10.3	13	68.6	36.7	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	9.8	13.1	67.6	37.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
May	1st	10.8	13.6	78.2	43.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	10.5	13.4	76.2	42	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	10.1	13.6	76.7	41.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
June	1st	11.2	14.5	81.8	47.1	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	10.9	13.9	81.4	44.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	9.8	13.2	71.6	39	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
July	1st	7.2	11.1	72.8	37.1	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	6.9	11.9	71.4	34.6	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	4.8	9.2	61.6	29	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
August	1st	7.8	11.8	73.2	38.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	7.2	12.6	72.6	35	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	6.4	10	63.4	30.4	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
September	1st	7.8	11.8	70.6	35.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	2nd	5.2	9.8	73.4	37.2	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
	3rd	9.2	13.4	71.8	34.8	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
MAXIMUM		11.20	14.50	81.80	47.10	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
MINIMUM		4.80	9.20	61.60	29.00	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
AVERAGE		8.48	12.31	72.77	37.99	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
SD		2.08	1.59	5.55	4.91	<0.01	<0.44	<20	<10	<1.0	<3.2	<1.0	<0.05
NAAQ Standard		80	80	100	60	1	6	400	180	1	20	5	4

*All units are representing in µg/m³ except CO in mg/m³ and BaP, Ni, As in ng/m³

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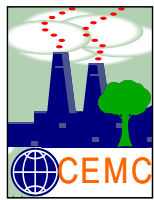
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Report no. - CEMC/IREL/WW1

Date-16.11.2023

EFFLUENT WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Treated Effluent Quality (Pond-1)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Permissible Norms by CPCB	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value	--	5.5 to 9.0	7.84	7.68	7.68	7.8	7.6	7.52	7.84	7.52	7.69	0.120
2	Temp	°C	--	27.8	28.1	28.9	28	29.1	29.9	29.9	27.8	28.63	0.809
3	Turbidity	NTU	--	8.1	8.8	9.2	9.9	9.2	8.8	9.9	8.1	9.00	0.597
4	Colour	Hazen	--	10	10	10	15	15	5	15	5	10.83	3.764
5	Alkalinity	mg/l	--	130	140	160	166	172	150	172	130	153.00	16.037
6	TDS	mg/l	--	376.4	392.8	572.2	710	720	480	720	376.4	541.90	151.22
7	TSS	mg/l	100	16.4	20.8	26.4	36.4	37.2	25.6	37.2	16.4	27.13	8.312
8	O&G	mg/l	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
9	BOD	mg/l	100	2.6	2.4	2.6	5.6	6.2	2.4	6.2	2.4	3.63	1.768
10	COD	mg/l	250	35	40	50	60	68	40	68	35	48.83	12.968
11	DO	mg/l	--	4.6	4.7	4.6	4.4	4.8	5.2	5.2	4.4	4.72	0.271
12	Chloride	mg/l	--	32.9	34.9	52.9	59.9	62.9	49.9	62.9	32.9	48.90	12.538
13	Sulphate	mg/l	--	14.2	15.6	28.4	30.4	32.6	27.6	32.6	14.2	24.80	7.874
14	Fluoride	mg/l	15.0	0.23	0.25	0.29	0.32	0.38	0.24	0.38	0.23	0.29	0.058
15	TH	mg/l	--	128	132	144	152	168	130	168	128	142.33	15.616
16	Calcium	mg/l	--	33.6	34.46	39.27	43.48	47.13	36.47	47.13	33.6	39.07	5.336
17	Magnesium	mg/l	--	10.69	11.18	11.18	10.69	12.25	9.48	12.25	9.48	10.91	0.904
18	Sodium	mg/l	--	34.6	36.4	42.6	46.8	48.9	40.8	48.9	34.6	41.68	5.621
19	Potassium	mg/l	--	14.2	15.8	19.2	22.4	25.8	18.4	25.8	14.2	19.30	4.265
20	TN#	mg/l	--	7.8	8.2	8.8	8	8.8	8	8.8	7.8	8.27	0.432
21	Diss PO ₄	mg/l	--	0.38	0.42	0.51	0.58	0.64	0.48	0.64	0.38	0.50	0.097
22	Iron	mg/l	3.0	0.41	0.45	0.54	0.6	0.68	0.5	0.68	0.41	0.53	0.099
23	Copper	mg/l	3.0	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium	mg/l	2.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	2.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc	mg/l	15.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	TCr	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Cr ⁺⁶	mg/l	1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	C ₆ H ₅ OH	mg/l	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	RFC#	mg/l	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
31	TKN#	mg/l	100	1.48	1.54	1.72	1.8	1.4	1.8	1.8	1.4	1.62	0.173
32	Free NH ₃ #	mg/l	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33	Arsenic	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
34	Mercury#	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Selenium#	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
36	Nickel	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Cyanide	mg/l	0.02	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

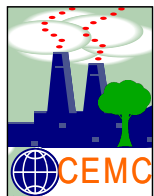
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MoEF&CC, Govt. of India, Recognised Environment Laboratory under Environment (Protection) Act, 1986.



Certificate No.-TC 6646

38	Sulphides#	mg/l	5.0	0.23	0.24	0.26	0.38	0.44	0.3	0.44	0.23	0.31	0.084
39	Manganese	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
40	Vanadium#	mg/l	0.2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
41	NO ₃	mg/l	20	1.32	1.44	1.81	2.8	3.4	1.9	3.4	1.32	2.11	0.818
42	Bio-assay Test#	--	90% Survival of Fish after 96 hrs in 100% Effluent	95%	94%	95%	95%	95%	95%	0.95	0.94	0.95	0.004
43	α- emitters*	Bq/l	3.7	0.18	0.17	0.2	0.21	0.98	0.25	0.98	0.17	0.33	0.319
44	β- emitters*	Bq/l	37	0.48	0.58	0.49	0.39	0.33	0.8	0.8	0.33	0.51	0.166

N.B: ND-Not Detectable, MPN-Most Probable Number, NA- Not Applicable

*Sample Tested By Health Physics Unit of BARC, OSCOM

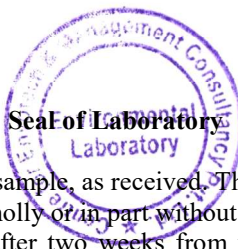
#- Analyzed by Eko Pro Engineers, Gaziabad, Certificate No.-T-6646

M. Raut

Authorized Signatory

Notes:

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Seal of Laboratory

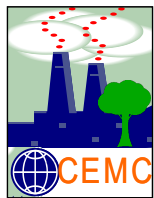
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Report no. - CEMC/IREL/WW2

Date-16.11.2023

EFFLUENT WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Treated Effluent Quality (Pond-2)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Permissible Norms by CPCB	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value	--	5.5 to 9.0	7.91	7.74	7.74	7.2	7.4	7.66	7.91	7.2	7.61	0.260
2	Temp	°C	--	27.7	28.2	29.1	28.1	30.2	31.1	31.1	27.7	29.07	1.340
3	Turbidity	NTU	--	7.6	8.2	10.4	10.6	11.2	9.4	11.2	7.6	9.57	1.428
4	Colour	Hazen	--	10	10	15	20	25	10	25	10	15.00	6.325
5	Alkalinity	mg/l	--	140	150	170	178	182	160	182	140	163.33	16.379
6	TDS	mg/l	--	388.6	408.4	590.4	602	660	510	660	388.6	526.57	110.31
7	TSS	mg/l	100	18.8	24.6	32.8	42.8	48.8	30.8	48.8	18.8	33.10	11.160
8	O&G	mg/l	20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
9	BOD	mg/l	100	2.8	2.6	2.8	6.6	6.6	3	6.6	2.6	4.07	1.966
10	COD	mg/l	250	40	45	60	70	76	50	76	40	56.83	14.289
11	DO	mg/l	--	4.5	4.6	4.5	4.3	5.6	5	5.6	4.3	4.75	0.476
12	Chloride	mg/l	--	34.9	37.9	61.9	69.9	72.4	58.9	72.4	34.9	55.98	15.989
13	Sulphate	mg/l	--	16.4	17.2	30.6	34.6	36.4	32.6	36.4	16.4	27.97	8.868
14	Fluoride	mg/l	15.0	0.24	0.26	0.31	0.36	0.45	0.3	0.45	0.24	0.32	0.076
15	TH	mg/l	--	132	138	152	160	178	150	178	132	151.67	16.367
16	Calcium	mg/l	--	34.46	35.27	43.48	44.89	49.94	42.08	49.94	34.46	41.69	5.919
17	Magnesium	mg/l	--	11.18	12.15	10.69	11.66	12.98	10.93	12.98	10.69	11.60	0.856
18	Sodium	mg/l	--	38.2	40.8	48.3	50.2	54.6	42.2	54.6	38.2	45.72	6.304
19	Potassium	mg/l	--	16.7	17.6	22.4	24.8	27.9	24.2	27.9	16.7	22.27	4.351
20	TN#	mg/l	--	8.1	8.4	9.2	9.8	10.6	8.8	10.6	8.1	9.15	0.929
21	Diss PO ₄	mg/l	--	0.42	0.46	0.58	0.64	0.68	0.56	0.68	0.42	0.56	0.101
22	Iron	mg/l	3.0	0.48	0.52	0.62	0.66	0.72	0.6	0.72	0.48	0.60	0.089
23	Copper	mg/l	3.0	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium	mg/l	2.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	2.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc	mg/l	15.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	TCr	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Cr ⁺⁶	mg/l	1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	C ₆ H ₅ OH	mg/l	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	RFC#	mg/l	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
31	TKN#	mg/l	100	1.76	1.82	2.14	2.14	2.22	2.4	2.4	1.76	2.08	0.245
32	Free NH ₃ #	mg/l	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33	Arsenic	mg/l	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
34	Mercury#	mg/l	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Selenium#	mg/l	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
36	Nickel	mg/l	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Cyanide	mg/l	0.02	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

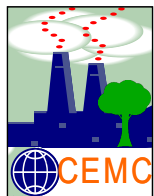
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Certificate No.: TC 6646

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39	Manganese	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
40	Vanadium#	mg/l	0.2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
41	NO ₃	mg/l	20	1.58	1.62	1.94	2.2	2.8	1.8	2.8	1.58	1.99	0.457
42	Bio-assay Test#	--	90% Survival of Fish after 96 hrs in 100% Effluent	94%	93%	94%	94%	94%	94%	0.94	0.93	0.94	0.004
43	α- emitters*	Bq/l	3.7	--	--	--	--	--	--	--	--	--	--
44	β- emitters*	Bq/l	37	--	--	--	--	--	--	--	--	--	--

N.B: ND-Not Detectable, MPN-Most Probable Number, NA- Not Applicable

*Sample Tested By Health Physics Unit of BARC, OSCOM

#- Analyzed by Eko Pro Engineers, Gaziabad, Certificate No.-T-6646

Authorized Signatory

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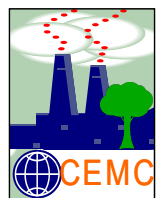
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Certificate No.: TC 6646

Report no. - CEMC/IREL/S1

Issued Date-16.11.2023

SOIL QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Matikhal (S1), Basan Putty (S2)

Sample Quantity

: 1.0 kg

LOCATION-Matikhal (S1)

Month	Week	pH	EC	SAR	CEC	SO ₄	NO ₃	N	P	Ca	Na	K	Fe	Org Mat
Unit		--	µS/cm	--	Meq/100	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
Jun	2nd	7.28	139.2	15.9	13.1	18.3	3.1	0.047	13.2	14.9	16.3	8.9	328.2	0.51
Sept	2nd	7.6	146	12.8	14.2	18.6	3.8	0.062	14.6	15.6	17.2	9.6	334	0.62
MAXIMUM		7.6	146	15.9	14.2	18.6	3.8	0.062	14.6	15.6	17.2	9.6	334	0.62
MINIMUM		7.28	139.2	12.8	13.1	18.3	3.1	0.047	13.2	14.9	16.3	8.9	328.2	0.51
AVERAGE		7.44	142.6	14.35	13.65	18.45	3.45	0.0547	13.9	15.25	16.75	9.25	331.1	0.565
STD DEVIATION		0.226	4.808	2.192	0.778	0.212	0.495	0.0103	0.99	0.495	0.636	0.495	4.101	0.078

LOCATION-Basan Putty(S2)

Month	Week	pH	EC	SAR	CEC	SO ₄	NO ₃	N	P	Ca	Na	K	Fe	Org Mat
Unit		--	µS/cm	--	Meq/100	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
Jun	2nd	7.11	133.6	18.1	11.6	19.5	2.9	0.038	12.3	15.1	17.2	9.3	339.4	0.46
Sept	2nd	7.14	131.6	18.6	12.6	19.8	2.4	0.048	13.4	14.8	16.8	10.2	344	0.5
MAXIMUM		7.14	133.6	18.6	12.6	19.8	2.9	0.048	13.4	15.1	17.2	10.2	344	0.5
MINIMUM		7.11	131.6	18.1	11.6	19.5	2.4	0.038	12.3	14.8	16.8	9.3	339.4	0.46
AVERAGE		7.13	132.6	18.35	12.1	19.65	2.65	0.043	12.85	14.95	17	9.75	341.7	0.48
STD DEVIATION		0.021	1.414	0.354	0.707	0.212	0.354	0.007	0.778	0.212	0.283	0.636	3.253	0.028

Authorized Signatory

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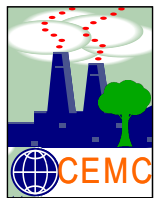
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Report no. - CEMC/IREL/S2

Issued Date-16.11.2023

SOIL QUALITY MONITORING TEST REPORT

Name & Address of the Client

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Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Solid Waste Storage (S3), Sodium Nitrate
Storage (S4)

Sample Quantity

: 1.0 kg

LOCATION-Solid Waste Storage (S3)

Month	Week	pH	EC	SAR	CEC	SO ₄	NO ₃	N	P	Ca	Na	K	Fe	Org Mat
Unit		--	µS/cm	--	Meq/100	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
Jun	2nd	7.32	148.4	26.2	12.8	23.8	4.9	0.0563	16.4	18.6	19.3	16.9	546.4	0.61
Sept	2nd	7.37	144.4	25.2	14.8	26.8	6.9	0.058	17.2	19.2	20.4	17.8	552	0.6
MAXIMUM		7.37	148.4	26.2	14.8	26.8	6.9	0.058	17.2	19.2	20.4	17.8	552	0.61
MINIMUM		7.32	144.4	25.2	12.8	23.8	4.9	0.0563	16.4	18.6	19.3	16.9	546.4	0.6
AVERAGE		7.345	146.4	25.7	13.8	25.3	5.9	0.0572	16.8	18.9	19.85	17.35	549.2	0.605
STD DEVIATION		0.035	2.828	0.707	1.414	2.121	1.414	0.0012	0.566	0.424	0.778	0.636	3.96	0.0071

LOCATION-Sodium Nitrate Storage (S4)

Month	Week	pH	EC	SAR	CEC	SO ₄	NO ₃	N	P	Ca	Na	K	Fe	Org Mat
Unit		--	µS/cm	--	Meq/100	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
Jun	2nd	7.14	202.2	29.6	14.9	30.4	5.7	0.0595	17.7	22.4	25.5	18.9	968.6	0.76
Sept	2nd	7.11	202.6	24.6	13.9	30.1	5.1	0.061	18	21.8	26	24.4	974	0.72
MAXIMUM		7.14	202.6	29.6	14.9	30.4	5.7	0.061	18	22.4	26	24.4	974	0.76
MINIMUM		7.11	202.2	24.6	13.9	30.1	5.1	0.0595	17.7	21.8	25.5	18.9	968.6	0.72
AVERAGE		7.125	202.4	27.1	14.4	30.25	5.4	0.0602	17.85	22.1	25.75	21.65	971.3	0.74
STD DEVIATION		0.021	0.283	3.536	0.707	0.212	0.424	0.0011	0.212	0.424	0.354	3.889	3.818	0.028

Authorized Signatory

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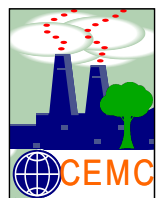
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Certificate No.: TC 6646

Report no. - CEMC/IREL/S3

Issued Date-16.11.2023

SOIL QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Kanamana (S5), BadaArjipalli (S6)

Sample Quantity

: 1.0 kg

LOCATION-Kanamana (S5)

Month	Week	pH	EC	SAR	CEC	SO ₄	NO ₃	N	P	Ca	Na	K	Fe	Org Mat
Unit		--	μS/cm	--	Meq/100	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
Jun	2nd	7.08	127.2	20.8	12.6	18.4	2.8	0.0349	12.2	14.9	13.3	8.6	298.2	0.48
Sept	2nd	7.18	122.2	20.2	11.6	17.4	2.6	0.038	10.8	15.4	14.2	10.6	308	0.46
MAXIMUM		7.18	127.2	20.8	12.6	18.4	2.8	0.038	12.2	15.4	14.2	10.6	308	0.48
MINIMUM		7.08	122.2	20.2	11.6	17.4	2.6	0.0349	10.8	14.9	13.3	8.6	298.2	0.46
AVERAGE		7.13	124.7	20.5	12.1	17.9	2.7	0.0365	11.5	15.15	13.75	9.6	303.1	0.47
STD DEVIATION		0.071	3.536	0.424	0.707	0.707	0.141	0.0022	0.99	0.354	0.636	1.414	6.93	0.014

LOCATION-Bada Arjipalli(S6)

Month	Week	pH	EC	SAR	CEC	SO ₄	NO ₃	N	P	Ca	Na	K	Fe	Org Mat
Unit		--	μS/cm	--	Meq/100	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%
Jun	2nd	7.23	144.4	21.9	11.9	19.8	3.9	0.044	13.7	12.1	16.2	9.2	348.4	0.59
Sept	2nd	7.2	140.4	20.9	11.4	18.8	3.2	0.04	15.4	17.6	16.8	11.6	354	0.58
MAXIMUM		7.23	144.4	21.9	11.9	19.8	3.9	0.044	15.4	17.6	16.8	11.6	354	0.59
MINIMUM		7.2	140.4	20.9	11.4	18.8	3.2	0.04	13.7	12.1	16.2	9.2	348.4	0.58
AVERAGE		7.215	142.4	21.4	11.65	19.3	3.55	0.042	14.55	14.85	16.5	10.4	351.2	0.585
STD DEVIATION		0.021	2.828	0.707	0.354	0.707	0.495	0.003	1.202	3.889	0.424	1.697	3.96	0.007

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Seal of Laboratory

Notes:

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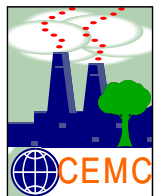
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Certificate No.: TC 6646

Report no. - CEMC/IREL/W1

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Hand Pump of Matikhil Village

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	6.55	6.58	6.65	6.75	6.78	6.82	6.82	6.55	6.69	0.11
2	Temperature	°C	28.4	28.8	29.2	27.2	29.2	32.8	32.8	27.2	29.45	1.88
3	Turbidity	NTU	3.2	3.8	4.2	5.2	6.2	2.6	6.2	2.6	4.20	1.32
4	Colour	Hazen	<5	<5	<5	5	5	<5	5	5	5.00	0.00
5	Alkalinity (as CaCO ₃)	mg/l	130	140	148	150	160	140	160	130	144.75	8.23
6	Total Dissolved Solids	mg/l	552.4	568.6	574.2	774	764	568	774	552.4	633.53	105.23
7	Total Suspended Solids	mg/l	<5	<5	<5	15.6	21.6	<5	21.6	15.6	18.60	4.24
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days @ 27°C	mg/l	<2	<2	<2	2.8	2.2	<2	2.8	2.2	2.50	0.42
10	Chemical Oxygen Demand	mg/l	10	5	5	15	12	<5	15	5	9.57	4.39
11	Dissolved Oxygen	mg/l	5.6	5.7	5.6	5.1	5.4	5.2	5.7	5.1	5.43	0.24
12	Chloride (as Cl)	mg/l	43.9	46.9	44.9	59.9	62.9	41.9	62.9	41.9	50.07	8.98
13	Sulphate (as SO ₄)	mg/l	28.6	30.2	19.6	19.6	32.8	21.6	32.8	19.6	25.40	5.83
14	Fluoride (as F)	mg/l	0.17	0.18	0.18	0.22	0.22	0.14	0.22	0.14	0.19	0.03
15	Total Hardness (as CaCO ₃)	mg/l	160	168	166	180	192	160	192	160	171.00	12.63
16	Calcium (as Ca)	mg/l	40.88	41.68	40.88	50.5	53.87	44.8	53.87	40.88	45.44	5.53
17	Magnesium (as Mg)	mg/l	14.09	15.55	15.55	13.12	14	11.66	15.55	11.66	14.00	1.49
18	Sodium (as Na)	mg/l	30.2	36.4	35.2	45.6	47.8	32.8	47.8	30.2	38.00	7.10
19	Potassium (as K)	mg/l	18.4	22.2	21.8	31.8	34.4	18.2	34.4	18.2	24.47	6.94
20	Total Nitrogen	mg/l	2.4	2.6	2.2	3.2	4.2	4.2	4.2	2.2	3.13	0.89
21	Phosphorus (as PO ₄)	mg/l	0.19	0.22	0.21	0.31	0.41	0.24	0.41	0.19	0.26	0.08
22	Iron (as Fe)	mg/l	0.32	0.34	0.32	0.42	0.56	0.28	0.56	0.28	0.40	0.10
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

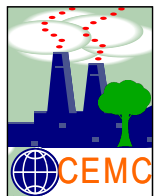
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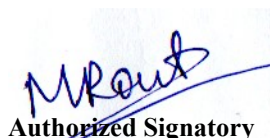
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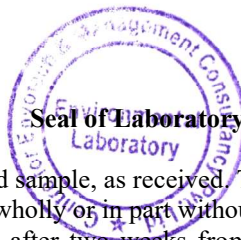
	Cr)											
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
33	Depth of Water Level	Meter	--	--	--	--	--	--	--	--	--	--

N.B: MPN-Most Probable Number


Authorized Signatory

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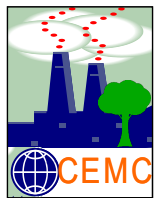


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Report no. - CEMC/IREL/W2

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Railway Platform

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.42	7.14	7.76	7.62	6.62	7.68	7.76	6.62	7.37	0.43
2	Temperature	°C	28.2	28.7	28.9	27.9	28.9	29.6	29.6	27.9	28.70	0.60
3	Turbidity	NTU	8.4	9.1	8.6	7.6	6.6	7.3	9.1	6.6	7.93	0.93
4	Colour	Hazen	10	10	10	10	5	<5	10	5	9	2.24
5	Alkalinity (as CaCO ₃)	mg/l	190	180	190	170	166	170	190	166	177.67	10.61
6	Total Dissolved Solids	mg/l	912.2	972.4	1024	704	741	964	1024	704	886.27	132.23
7	Total Suspended Solids	mg/l	16.2	24.4	20.6	26.8	24.8	<5	26.8	16.2	22.56	4.20
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	2.1	2.3	2.4	2.2	2.6	<2	2.6	2.1	2.32	0.192
10	Chemical Oxygen Demand	mg/l	5	15	20	22	20	<5	22	5	15.67	6.88
11	Dissolved Oxygen	mg/l	5.1	5	4.9	4.8	4.6	4.6	5.1	4.6	4.83	0.21
12	Chloride (as Cl)	mg/l	69.9	76.9	82.9	72.9	70.9	69.9	82.9	69.9	73.9	5.14
13	Sulphate (as SO ₄)	mg/l	42.8	51.4	54.6	54.6	44.8	36.8	54.6	36.8	47.5	7.21
14	Fluoride (as F)	mg/l	0.38	0.41	0.43	0.46	0.32	0.4	0.46	0.32	0.4	0.05
15	Total Hardness (as CaCO ₃)	mg/l	228	240	248	210	220	200	248	200	224.33	18.08
16	Calcium (as Ca)	mg/l	63.32	64.93	65.73	58.91	61.72	56.11	65.73	56.11	61.79	3.70
17	Magnesium (as Mg)	mg/l	17.01	18.95	20.41	15.3	16.04	14.58	20.41	14.58	17.05	2.24
18	Sodium (as Na)	mg/l	62.4	71.6	73.2	63.8	68.6	66.6	73.2	62.4	67.70	4.26
19	Potassium (as K)	mg/l	32.6	38.4	40.6	50.6	40.3	30.6	50.6	30.6	38.85	7.08
20	Total Nitrogen	mg/l	11.82	12.12	12.34	14.8	15.8	9	15.8	9	12.65	2.41
21	Phosphorus (as PO ₄)	mg/l	0.36	0.41	0.48	0.52	0.62	0.44	0.62	0.36	0.47	0.09
22	Iron (as Fe)	mg/l	0.61	0.63	0.71	0.78	0.68	0.66	0.78	0.61	0.68	0.06
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

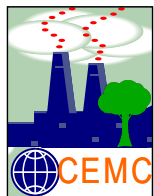
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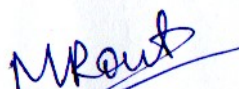
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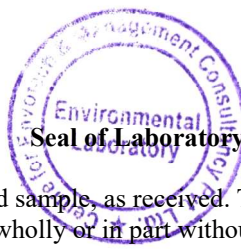
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
33	Depth of Water Level	Meter	2.8	2.9	3.2	3.8	4.8	3.5	4.8	2.8	3.5	0.74

N.B: MPN-Most Probable Number


Authorized Signatory

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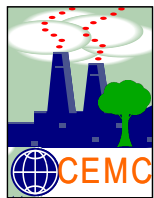


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Certificate No.-TC 6646

Report no. - CEMC/IREL/W3

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL (INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Composite Water from MSP

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.16	7.18	8.16	7.8	6.8	7.9	8.16	6.8	7.50	0.53
2	Temperature	°C	28.4	28.6	29.1	28.1	29.1	29.7	29.7	28.1	28.83	0.58
3	Turbidity	NTU	5.6	7.4	7.8	8.8	7.8	6.6	8.8	5.6	7.33	1.11
4	Colour	Hazen	5	5	5	15	5	<5	15	5	7.00	4.47
5	Alkalinity (as CaCO ₃)	mg/l	180	170	180	180	150	160	180	5	7.00	4.47
6	Total Dissolved Solids	mg/l	646.8	672.6	640.2	840	808	620	840	620	704.60	94.55
7	Total Suspended Solids	mg/l	14.4	20.2	18.4	22.8	20.8	<5	22.8	14.4	19.32	3.17
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days @ 27°C	mg/l	2.6	2.8	2.5	2.6	2.4	<2	2.4	2.4	2.40	0.15
10	Chemical Oxygen Demand	mg/l	10	10	10	18	16	<5	18	10	12.80	3.90
11	Dissolved Oxygen	mg/l	4.8	4.7	4.8	4.6	5.2	5	5.2	4.6	4.85	0.22
12	Chloride (as Cl)	mg/l	54.9	60.9	54.9	64.9	66.9	51.9	66.9	51.9	59.07	6.08
13	Sulphate (as SO ₄)	mg/l	32.4	36.2	32.4	32.4	38.2	24.4	38.2	24.4	32.67	4.73
14	Fluoride (as F)	mg/l	0.27	0.29	0.21	0.28	0.38	0.2	0.38	0.2	0.27	0.06
15	Total Hardness (as CaCO ₃)	mg/l	196	202	194	204	214	190	214	190	200.00	8.58
16	Calcium (as Ca)	mg/l	51.3	52.1	50.5	57.23	60.04	53.3	60.04	50.5	54.08	3.76
17	Magnesium (as Mg)	mg/l	16.52	17.5	16.5	14.87	15.6	13.85	17.5	13.85	15.81	1.31
18	Sodium (as Na)	mg/l	46.8	50.2	44.6	54.4	58.6	38.4	58.6	38.4	48.83	7.20
19	Potassium (as K)	mg/l	29.2	31.4	20.1	26.2	36.2	10.8	36.2	10.8	25.65	9.04
20	Total Nitrogen	mg/l	7.53	8.91	8.8	9.8	12.8	8.2	12.8	7.53	9.34	1.86
21	Phosphorus (as PO ₄)	mg/l	0.44	0.48	0.42	0.62	0.52	0.46	0.62	0.42	0.49	0.07
22	Iron (as Fe)	mg/l	0.43	0.51	0.48	0.58	0.66	0.42	0.66	0.42	0.51	0.09
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

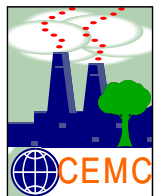
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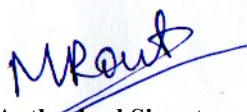
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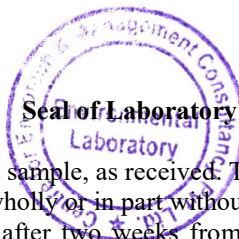
	Cr)											
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
33	Depth of Water Level	Meter	2.9	3.1	3.4	4	5	3.8	5	2.9	3.7	0.76

N.B: MPN-Most Probable Number


Authorized Signatory

Notes:

- The result given above related to the tested sample, as received. The customer asked for the above test only.
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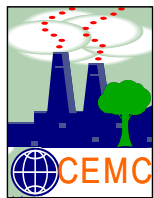


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Certificate No.-TC 6646

Report no. - CEMC/IREL/W4

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: REEP up (No.1)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	8.23	8.58	9.82	8.8	8.2	9.74	9.82	8.2	8.90	0.72
2	Temperature	°C	28.4	28.7	29	27	29	29.9	29.9	27	28.67	0.96
3	Turbidity	NTU	10.2	11.4	10.2	14	8	8.8	14	8	10.43	2.89
4	Colour	Hazen	10	10	10	15	15	5	15	5	10.83	3.76
5	Alkalinity (as CaCO ₃)	mg/l	196	206	212	220	220	200	220	196	209.00	10.10
6	Total Dissolved Solids	mg/l	688	704	648	688	724	652	724	648	684.00	29.50
7	Total Suspended Solids	mg/l	14.2	20.4	18.2	18.2	19.8	10.2	20.4	10.2	16.83	3.90
8	Oil & Grease	mg/l	1.3	1.4	1.3	1.6	1.9	<1.0	1.9	1.3	1.50	0.25
9	Biochemical Oxygen Demand 3 days @ 27°C	mg/l	2.1	2.3	2.2	3.2	3.6	2.4	3.6	2.4	3	0.85
10	Chemical Oxygen Demand	mg/l	10	15	15	18	24.6	10	24.6	10	15.43	5.48
11	Dissolved Oxygen	mg/l	4.6	4.5	4.6	4.4	5.2	4.8	5.2	4.4	4.68	0.29
12	Chloride (as Cl)	mg/l	58.9	62.2	54.9	59.9	63.9	50.9	63.9	50.9	58.45	4.81
13	Sulphate (as SO ₄)	mg/l	32.6	34.5	29.4	32.4	34.6	28.2	34.6	28.2	31.95	2.63
14	Fluoride (as F)	mg/l	0.22	0.24	0.22	0.32	0.42	0.18	0.42	0.18	0.27	0.09
15	Total Hardness (as CaCO ₃)	mg/l	216	222	218	210	240	210	240	210	219.33	11.15
16	Calcium (as Ca)	mg/l	60.92	61.72	60.12	58.91	67.33	58.92	67.33	58.91	61.32	3.14
17	Magnesium (as Mg)	mg/l	15.55	16.52	16.52	15.3	17.5	15.31	17.5	15.3	16.12	0.88
18	Sodium (as Na)	mg/l	58.2	61.4	56.8	58.2	55.2	52.4	61.4	52.4	57.03	3.06
19	Potassium (as K)	mg/l	31.4	32.6	29.4	24.4	29.4	26.8	32.6	24.4	29	3.00
20	Total Nitrogen	mg/l	14.8	15.1	13.2	14.6	19.6	12.8	19.6	12.8	15.017	2.43
21	Phosphorus (as PO ₄)	mg/l	0.24	0.26	0.22	0.28	0.38	0.22	0.38	0.22	0.3	0.11
22	Iron (as Fe)	mg/l	0.39	0.41	0.37	0.32	0.42	0.34	0.42	0.32	0.375	0.04
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

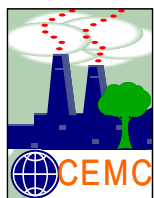
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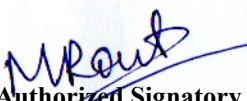
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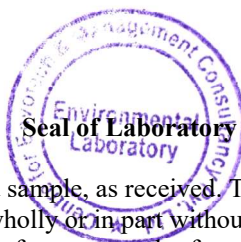
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
33	Depth of Water Level	Meter	2.8	2.9	3	3.5	3.8	3.8	3.8	2.8	3.3	0.46

N.B: MPN-Most Probable Number


Authorized Signatory

Notes:

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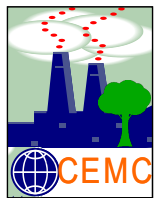


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Certificate No.-TC 6646

Report no. - CEMC/IREL/W5

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL (INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: REEP down (No.2)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	8.16	9.18	8.34	7.4	7.9	8.22	9.18	7.4	8.20	0.59
2	Temperature	°C	28.6	28.8	29.1	28.1	30.1	31.1	31.1	28.1	29.30	1.10
3	Turbidity	NTU	12.4	14.2	13.4	16	14	9.4	16	9.4	13.23	2.22
4	Colour	Hazen	10	15	15	15	15	10	15	10	13.33	2.58
5	Alkalinity (as CaCO ₃)	mg/l	222	230	220	212	234	210	234	210	221.33	9.52
6	Total Dissolved Solids	mg/l	712	736	674	764	756	621	764	621	710.50	54.64
7	Total Suspended Solids	mg/l	16.6	22.2	20.6	20.6	22.8	15.6	22.8	15.6	19.73	2.96
8	Oil & Grease	mg/l	1.4	1.5	1.4	1.2	1.6	<1.0	1.6	1.2	1.42	0.15
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	2.3	2.6	2.4	4.4	4.8	2	4.8	2	3.40	1.98
10	Chemical Oxygen Demand	mg/l	15	20	20	30	26.2	20	30	15	21.87	5.34
11	Dissolved Oxygen	mg/l	4.5	4.4	4.5	4.2	5	5.2	5.2	4.2	4.63	0.38
12	Chloride (as Cl)	mg/l	64.9	68.4	60.9	61.9	65.9	53.9	68.4	53.9	63.00	5.59
13	Sulphate (as SO ₄)	mg/l	43.2	45.8	32.2	38.2	41.2	30.2	45.8	30.2	38.47	6.19
14	Fluoride (as F)	mg/l	0.26	0.27	0.25	0.28	0.38	0.22	0.38	0.22	0.28	0.11
15	Total Hardness (as CaCO ₃)	mg/l	232	240	226	220	250	220	250	220	231.33	11.91
16	Calcium (as Ca)	mg/l	68.14	70.54	67.33	61.72	70.14	61.72	70.54	61.72	66.60	3.96
17	Magnesium (as Mg)	mg/l	15.06	15.55	14.1	16.04	18.23	16.04	18.23	14.1	15.84	1.38
18	Sodium (as Na)	mg/l	64.4	67.8	61.4	64	66	56.4	67.8	56.4	63.33	4.01
19	Potassium (as K)	mg/l	34.6	35.3	33.6	36.2	39.2	30.6	39.2	30.6	34.92	2.85
20	Total Nitrogen	mg/l	15.9	16.2	14.6	13.2	17.2	10.6	17.2	10.6	14.62	2.41
21	Phosphorus (as PO ₄)	mg/l	0.38	0.41	0.36	0.46	0.56	0.26	0.56	0.26	0.41	0.21
22	Iron (as Fe)	mg/l	0.42	0.44	0.41	0.44	0.54	0.4	0.54	0.4	0.44	0.05

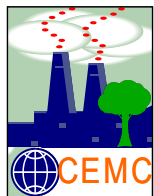
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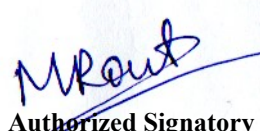
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23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁶⁺)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
33	Depth of Water Level	Meter	2.9	3.1	3.3	4.3	4.3	3.9	4.3	2.9	3.63	0.62

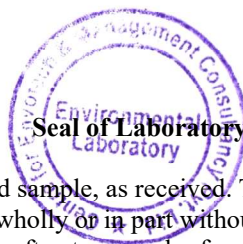
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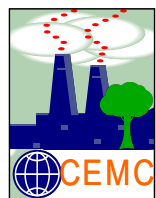
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Report no. - CEMC/IREL/W6

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL (INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Upstream of Solar Evaporation Storage
Pond

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.32	6.44	6.42	7.2	8	6.54	8	6.42	6.99	0.63
2	Temperature	°C	28.5	28.9	29.2	27.2	29.2	29.7	29.7	27.2	28.78	0.87
3	Turbidity	NTU	9.6	10.4	11.1	18	12	8.1	18	8.1	11.53	3.44
4	Colour	Hazen	5	5	5	20	20	5	20	5	10.00	7.75
5	Alkalinity (as CaCO ₃)	mg/l	172	184	180	160	180	190	190	160	177.67	10.46
6	Total Dissolved Solids	mg/l	540	582	618	658	694	602	694	540	615.67	54.73
7	Total Suspended Solids	mg/l	12.8	16.4	19.6	19.6	20.3	14.6	20.3	12.8	17.22	3.09
8	Oil & Grease	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	2.2	2.4	2.1	5.1	5.8	2.1	5.8	2.1	3.95	2.62
10	Chemical Oxygen Demand	mg/l	10	10	10	40	34.4	10	40	10	19.07	14.16
11	Dissolved Oxygen	mg/l	4.4	4.3	4.2	4.6	4.9	4.6	4.9	4.2	4.50	0.25
12	Chloride (as Cl)	mg/l	46.9	49.8	52.9	60.9	70.9	49.9	70.9	46.9	55.22	9.06
13	Sulphate (as SO ₄)	mg/l	28.4	31.2	34.2	30.2	36.2	24.2	36.2	24.2	30.73	4.26
14	Fluoride (as F)	mg/l	0.16	0.18	0.21	0.26	0.36	0.16	0.36	0.16	0.22	0.08
15	Total Hardness (as CaCO ₃)	mg/l	180	188	194	190	230	190	230	180	195.33	17.60
16	Calcium (as Ca)	mg/l	53.71	54.51	59.32	53.3	64.53	53.3	64.53	53.3	56.45	4.57
17	Magnesium (as Mg)	mg/l	11.18	12.64	11.18	13.85	16.77	13.85	16.77	11.18	13.25	2.10
18	Sodium (as Na)	mg/l	50.6	52.2	54.6	56.6	64.6	50.6	64.6	50.6	54.87	5.32
19	Potassium (as K)	mg/l	21.8	22.4	23.2	28.8	38.8	20.2	38.8	20.2	25.87	6.98
20	Total Nitrogen	mg/l	11.6	11.8	12.4	15.4	25.4	8.4	25.4	8.4	14.17	5.94
21	Phosphorus (as PO ₄)	mg/l	0.16	0.19	0.23	0.44	0.48	0.18	0.48	0.18	0.33	0.21
22	Iron (as Fe)	mg/l	0.32	0.36	0.41	0.4	0.5	0.28	0.5	0.28	0.38	0.08
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

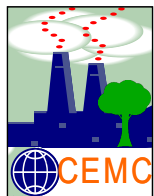
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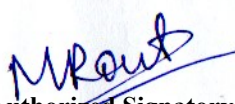
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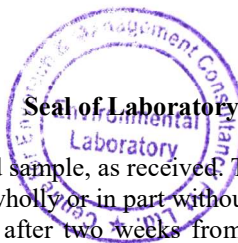
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
33	Depth of Water Level	Meter	2.7	2.8	2.9	3.4	3.5	3.2	3.5	2.7	3.08	0.33

N.B: MPN-Most Probable Number


Authorized Signatory

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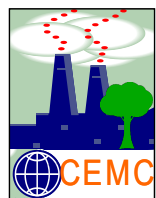


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Certificate No.-TC 6646

Report no. - CEMC/IREL/W7

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Downstream of Solar Evaporation Storage
Pond

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	6.49	6.71	6.53	6.7	6.9	6.62	6.9	6.49	6.66	0.15
2	Temperature	°C	28.4	28.8	29.3	27.3	29.3	29.8	29.8	27.3	28.82	0.88
3	Turbidity	NTU	10.6	11.4	14.3	18	15	10.6	18	10.6	13.32	2.97
4	Colour	Hazen	10	10	10	10	5	5	10	5	8.33	2.58
5	Alkalinity (as CaCO ₃)	mg/l	150	160	190	180	176	180	190	150	172.67	14.79
6	Total Dissolved Solids	mg/l	582.6	624.2	632	400	456	622	632	400	552.80	99.77
7	Total Suspended Solids	mg/l	14.4	20.4	22.4	34.8	39.8	28.8	39.8	14.4	26.77	9.50
8	Oil & Grease	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	2.2	2.3	2.3	4.4	5.2	2	5.2	2	3.07	1.37
10	Chemical Oxygen Demand	mg/l	10	15	10	20	24	10	24	10	14.83	6.01
11	Dissolved Oxygen	mg/l	4.4	4.3	4.1	4.6	4.4	5.4	5.4	4.1	4.53	0.45
12	Chloride (as Cl)	mg/l	52.9	59.9	58.9	38.9	41.9	51.9	59.9	38.9	50.73	8.66
13	Sulphate (as SO ₄)	mg/l	26.8	32.4	39.4	30.4	38.4	38.6	39.4	26.8	34.33	5.22
14	Fluoride (as F)	mg/l	0.18	0.19	0.23	0.33	0.43	0.22	0.43	0.18	0.26	0.10
15	Total Hardness (as CaCO ₃)	mg/l	182	194	200	180	190	190	200	180	189.33	7.45
16	Calcium (as Ca)	mg/l	55.31	56.11	60.12	50.5	53.31	53.3	60.12	50.5	54.78	3.26
17	Magnesium (as Mg)	mg/l	10.69	13.12	12.15	13.12	13.85	13.85	13.85	10.69	12.80	1.21
18	Sodium (as Na)	mg/l	55.2	58.1	58.2	52.2	56.8	50	58.2	50	55.08	3.34
19	Potassium (as K)	mg/l	28.6	29.4	24.6	20.4	24.2	24.6	29.4	20.4	25.30	3.28
20	Total Nitrogen	mg/l	11.8	12.2	12.8	13.8	14.6	12.2	14.6	11.8	12.90	1.09
21	Phosphorus (as PO ₄)	mg/l	0.21	0.22	0.28	0.32	0.22	0.26	0.32	0.21	0.25	0.04
22	Iron (as Fe)	mg/l	0.32	0.34	0.46	0.42	0.32	0.44	0.46	0.32	0.38	0.06
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

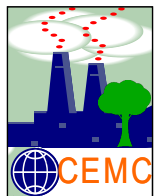
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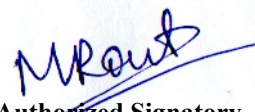
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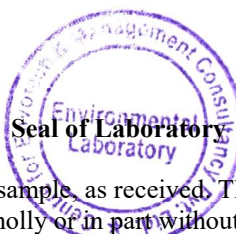
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
33	Depth of Water Level	Meter	2.5	2.6	2.7	3.8	3.6	2.9	3.8	2.5	3.02	0.55

N.B: MPN-Most Probable Number


Authorized Signatory

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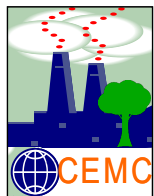


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Certificate No.: TC 6646

Report no. - CEMC/IREL/W8

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Solid Waste-Up (W8)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	4.73	4.68	4.83	5.41	6.5	5.31	6.5	4.68	5.24	0.69
2	Temperature	°C	28.8	28.9	29.1	27.1	28.1	29.6	29.6	27.1	28.60	0.88
3	Turbidity	NTU	14.4	15.6	17.4	21	12	13.4	21	12	15.63	3.21
4	Colour	Hazen	25	20	15	15	5	10	25	5	15.00	7.07
5	Alkalinity (as CaCO ₃)	mg/l	372	390	440	100	160	400	440	100	310.3 3	142.72
6	Total Dissolved Solids	mg/l	1824	1938	3022	780	640	3022	3022	640	1871. 00	1035.5 6
7	Total Suspended Solids	mg/l	36.2	46.8	52.4	42.4	44.4	48.4	52.4	36.2	45.10	5.55
8	Oil & Grease	mg/l	1.8	1.9	2.2	2.2	2.2	2	2.2	1.8	2.05	0.18
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	3.8	4.1	5.6	6.2	5.5	6.6	6.6	3.8	5.30	1.12
10	Chemical Oxygen Demand	mg/l	30	40	50	60	30	60	60	30	45.00	13.78
11	Dissolved Oxygen	mg/l	4.3	4.2	4.1	4	5	4.2	5	4	4.30	0.36
12	Chloride (as Cl)	mg/l	120.9	132.9	230.9	130.9	80.9	210.9	230.9	80.9	151.2 3	57.49
13	Sulphate (as SO ₄)	mg/l	64.4	76.2	154.4	104.4	104.4	140	154.4	64.4	107.3 0	34.96
14	Fluoride (as F)	mg/l	0.44	0.46	0.61	0.54	0.54	0.58	0.61	0.44	0.53	0.07
15	Total Hardness (as CaCO ₃)	mg/l	450	472	530	280	220	510	530	220	410.3 3	128.72
16	Calcium (as Ca)	mg/l	124.24	125.85	161.2	78.56	61.7 2	143.1	161.2	61.72	115.7 8	38.18
17	Magnesium (as Mg)	mg/l	34.02	38.39	31.1	20.41	16.0 4	37.18	38.39	16.04	29.52	9.22
18	Sodium (as Na)	mg/l	150.2	162.3	162.3	144	132	120	162.3	120	145.1 3	16.86
19	Potassium (as K)	mg/l	69.6	75.2	75.2	70.6	60.6	60.8	75.2	60.6	68.67	6.59
20	Total Nitrogen	mg/l	32.4	34.6	34.6	28.2	20.2	30.2	34.6	20.2	30.03	5.43
21	Phosphorus (as	mg/l	0.46	0.48	0.48	0.52	0.62	0.32	0.62	0.32	0.48	0.10

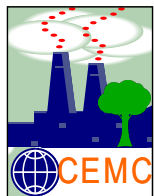
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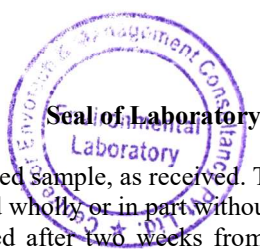


Certificate No.: TC 6646

	PO ₄)											
22	Iron (as Fe)	mg/l	0.84	0.91	0.91	0.88	0.78	0.82	0.91	0.78	0.86	0.05
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
33	Depth of Water Level	Meter	2.9	3.1	3.3	4.1	4	3.6	4.1	2.9	3.5	0.49

N.B: MPN-Most Probable Number

Authorized Signatory
Notes:



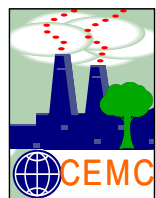
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W9

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

Solid Waste- Down (W9)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	6.49	6.44	6.49	7.31	7.61	6.7	7.61	6.44	6.84	0.50
2	Temperature	°C	28.6	28.8	29.2	27.2	29.2	31	31	27.2	29.00	1.23
3	Turbidity	NTU	16.2	17.1	19.2	25	20	11.8	25	11.8	18.22	4.40
4	Colour	Hazen	10	10	10	15	5	5	15	5	9.17	3.76
5	Alkalinity (as CaCO ₃)	mg/l	178	188	160	190	180	170	190	160	177.67	11.27
6	Total Dissolved Solids	mg/l	622.4	680.8	490	480	520	445	680.8	445	539.70	91.80
7	Total Suspended Solids	mg/l	28.4	34.6	28.2	38.2	48.9	32.2	48.9	28.2	35.08	7.76
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	2.3	2.5	2.2	4.2	4.8	2.6	4.8	2.2	3.1	1.110
10	Chemical Oxygen Demand	mg/l	20	25	20	30	20	20	30	20	22.5	4.183
11	Dissolved Oxygen	mg/l	4.4	4.3	4.4	4.4	5.4	4.8	5.4	4.3	4.6166 67	0.422
12	Chloride (as Cl)	mg/l	70.9	79.9	59.9	69.9	49.9	57.9	79.9	49.9	64.733 33	10.81 5
13	Sulphate (as SO ₄)	mg/l	39.2	43.6	38.2	32.8	32.8	36.6	43.6	32.8	37.2	4.124
14	Fluoride (as F)	mg/l	0.35	0.36	0.32	0.42	0.42	0.28	0.42	0.28	0.3583 33	0.055
15	Total Hardness (as CaCO ₃)	mg/l	200	208	180	120	160	170	208	120	173	31.59 1
16	Calcium (as Ca)	mg/l	47.29	48.09	44.08	33.66	44.89	47.7	48.09	33.66	44.285	5.449
17	Magnesium (as Mg)	mg/l	19.92	21.38	17.01	8.74	11.66	12.4	21.38	8.74	15.185	5.017
18	Sodium (as Na)	mg/l	66.8	69.4	58.6	48.6	41.6	58.2	69.4	41.6	57.2	10.59 5
19	Potassium (as K)	mg/l	28.4	30.1	26.2	22.8	32.8	28.4	32.8	22.8	28.12	3.405
20	Total Nitrogen	mg/l	16.1	17.2	16.4	21.4	18.4	14	21.4	14	17.25	2.496

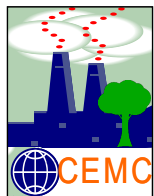
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Certificate No.: TC 6646

21	Phosphorus (as PO ₄)	mg/l	<0.03	<0.03	<0.03	0.1	0.13	<0.03	0.13	0.1	0.12	0.021
22	Iron (as Fe)	mg/l	0.48	0.5	0.42	0.38	0.43	0.6	0.6	0.38	0.47	0.078
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
33	Depth of Water Level	Meter	2.8	2.9	3	3.5	3.3	3.4	3.5	2.8	3.15	0.288

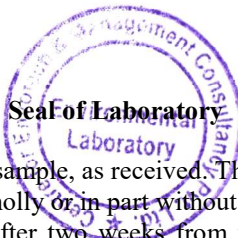
N.B: MPN-Most Probable Number

MPRout

Authorized Signatory

Notes:

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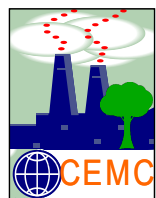
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W10

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Odisha PHD

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	6.95	6.78	6.65	7.32	7.22	6.62	7.32	6.62	6.92	0.29
2	Temperature	°C	28.6	28.9	29.2	28	29	31.4	31.4	28	29.18	1.16
3	Turbidity	NTU	2.6	2.9	3.1	5	5	2.8	5	2.6	3.57	1.12
4	Colour	Hazen	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
5	Alkalinity (as CaCO ₃)	mg/l	110	118	126	132	142	120	142	110	124.67	11.29
6	Total Dissolved Solids	mg/l	372.6	388.2	306.4	398	408	290	408	290	360.53	49.95
7	Total Suspended Solids	mg/l	<5	<5	<5	11	20.3	<5	20.3	11	15.65	6.58
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	6.4	6.5	6.6	5.9	5.5	6	6.6	5.5	6.15	0.423
12	Chloride (as Cl)	mg/l	18.9	21.9	18.9	21.9	21.0.9	16.9	21.9	16.9	19.70	2.17
13	Sulphate (as SO ₄)	mg/l	11.8	13.2	10.8	18.8	18.8	9.8	18.8	9.8	13.87	3.98
14	Fluoride (as F)	mg/l	0.09	0.11	0.09	0.11	0.15	0.1	0.15	0.09	0.11	0.02
15	Total Hardness (as CaCO ₃)	mg/l	116	118	110	120	128	110	128	110	117.00	6.78
16	Calcium (as Ca)	mg/l	26.45	26.45	24.05	33.66	35.91	30.86	35.91	24.05	29.56	4.66
17	Magnesium (as Mg)	mg/l	12.15	12.64	12.15	8.74	9.33	8.02	12.64	8.02	10.51	2.03
18	Sodium (as Na)	mg/l	14.2	14.8	12.4	14.6	15.8	11.8	15.8	11.8	13.93	1.53
19	Potassium (as K)	mg/l	7.4	7.9	6.2	8.8	9.4	6	9.4	6	7.62	1.37
20	Total Nitrogen	mg/l	5.4	5.6	5.4	6.6	6.8	5.2	6.8	5.2	5.83	0.69
21	Phosphorus (as PO ₄)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
22	Iron (as Fe)	mg/l	0.13	0.15	0.13	0.18	0.22	0.13	0.22	0.13	0.157	0.037
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

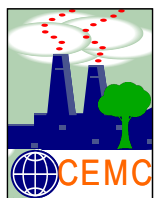
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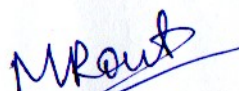
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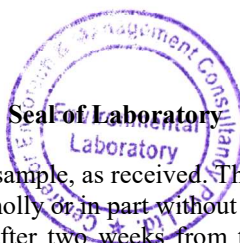
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number


Authorized Signatory

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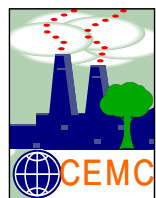


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Certificate No.-TC 6646

Report no. - CEMC/IREL/W11

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April' 2023 to September' 2023

Sampling by

: Mr.Suresh Pradhan

Sample Location

: Lily Pond

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.62	7.58	8.62	7.92	7.82	8.66	8.66	7.58	8.04	0.48
2	Temperature	°C	28.8	28.9	29.1	28.1	29.1	30.1	30.1	28.1	29.02	0.65
3	Turbidity	NTU	10.4	12.6	18.2	24	3.9	14.2	24	3.9	13.88	6.85
4	Colour	Hazen	5	5	5	5	5	5	5	5	5	0
5	Alkalinity (as CaCO ₃)	mg/l	160	166	174	188	176	170	188	160	172.33	9.58
6	Total Dissolved Solids	mg/l	384.6	408.4	322.6	412	422	306	422	306	375.93	49.57
7	Total Suspended Solids	mg/l	10.2	18.4	26.2	26.2	29.2	22.2	29.2	10.2	22.07	6.92
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	2.3	2.2	2.1	2.8	2.4	2.1	2.8	2.1	2.32	0.26
10	Chemical Oxygen Demand	mg/l	10	10	10	16	14	10	16	10	11.67	2.66
11	Dissolved Oxygen	mg/l	6.3	6.4	6.5	6.1	5.4	5.5	6.5	5.4	6.03	0.47
12	Chloride (as Cl)	mg/l	22.9	25.9	20.9	24.9	27.9	21.9	27.9	20.9	24.07	2.64
13	Sulphate (as SO ₄)	mg/l	14.2	16.4	12.6	22.2	20.2	10.6	22.2	10.6	16.03	4.48
14	Fluoride (as F)	mg/l	0.12	0.14	0.12	0.16	0.18	0.16	0.18	0.12	0.15	0.02
15	Total Hardness (as CaCO ₃)	mg/l	130	136	132	140	140	120	140	120	133.00	7.56
16	Calcium (as Ca)	mg/l	32.06	32.86	31.26	39.28	39.28	33.66	39.28	31.26	34.73	3.61
17	Magnesium (as Mg)	mg/l	12.15	13.12	13.12	10.2	10.21	8.75	13.12	8.75	11.26	1.80
18	Sodium (as Na)	mg/l	17.6	18.4	15.2	16.8	17.9	13.8	18.4	13.8	16.62	1.78
19	Potassium (as K)	mg/l	10.4	11.6	9.2	11.2	10.6	9	11.6	9	10.33	1.05
20	Total Nitrogen	mg/l	8	8.6	7.6	8.2	8.8	7.2	8.8	7.2	8.07	0.60
21	Phosphorus (as PO ₄)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
22	Iron (as Fe)	mg/l	0.16	0.18	0.16	0.21	0.21	0.16	0.21	0.16	0.180	0.024
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

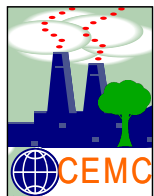
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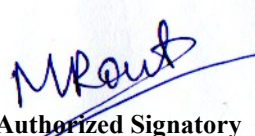
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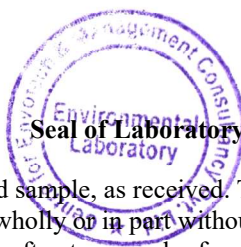
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	28	22	17	21	17	17	28	17	20.33	4.37
31	Faecal Coliform	MPN/100ml	7	5	2	2	<2	2	7	2	3.60	2.30
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number


Authorized Signatory

Notes:

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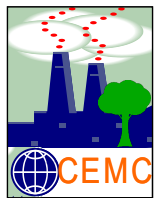


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Certificate No.: TC 6646

Report no. - CEMC/IREL/W12

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL (INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Kanamana Village (W12)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.26	7.23	7.26	7.23	7.245	0.021
2	Temperature	°C	27.9	29.9	29.9	27.9	28.9	1.414
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	186	180	186	180	183	4.243
6	Total Dissolved Solids	mg/l	902.2	828	902.2	828	865.1	52.467
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	ND	ND	ND	ND
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	3.2	4.2	4.2	3.2	3.7	0.707
12	Chloride (as Cl)	mg/l	184.9	121.9	184.9	121.9	153.4	44.548
13	Sulphate (as SO ₄)	mg/l	47.2	44.8	47.2	44.8	46	1.697
14	Fluoride (as F)	mg/l	0.14	0.16	0.16	0.14	0.15	0.014
15	Total Hardness (as CaCO ₃)	mg/l	212	210	212	210	211	1.414
16	Calcium (as Ca)	mg/l	51.3	58.92	58.92	51.3	55.11	5.388
17	Magnesium (as Mg)	mg/l	20.41	15.31	20.41	15.31	17.86	3.606
18	Sodium (as Na)	mg/l	49.2	48.8	49.2	48.8	49	0.283
19	Potassium (as K)	mg/l	16.4	12.6	16.4	12.6	14.5	2.687
20	Total Nitrogen	mg/l	1.1	1.04	1.1	1.04	1.07	0.042
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.32	0.3	0.32	0.3	0.31	0.0141
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

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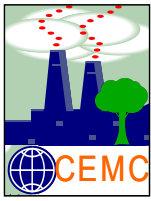
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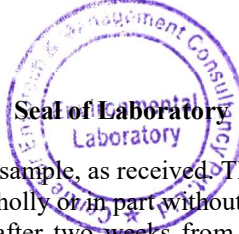
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Report no. - CEMC/IREL/W12

Date-16.11.2023


Authorized Signatory
Notes:



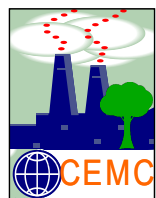
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Certificate No.: TC 6646

Report no. - CEMC/IREL/W13

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Bada Arjipally (W13)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	8.11	7.91	8.11	7.91	8.01	0.141
2	Temperature	°C	27.8	30.9	30.9	27.8	29.35	2.192
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	90	84	90	84	87	4.243
6	Total Dissolved Solids	mg/l	392.4	376	392.4	376	384.2	11.597
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	3.1	4.1	4.1	3.1	3.6	0.707
12	Chloride (as Cl)	mg/l	54.9	53.9	54.9	53.9	54.4	0.707
13	Sulphate (as SO ₄)	mg/l	20.6	24.4	24.4	20.6	22.5	2.687
14	Fluoride (as F)	mg/l	0.11	0.1	0.11	0.1	0.105	0.007
15	Total Hardness (as CaCO ₃)	mg/l	120	130	130	120	125	7.071
16	Calcium (as Ca)	mg/l	28.06	36.47	36.47	28.06	32.265	5.947
17	Magnesium (as Mg)	mg/l	12.15	9.48	12.15	9.48	10.815	1.888
18	Sodium (as Na)	mg/l	21.6	20.4	21.6	20.4	21	0.849
19	Potassium (as K)	mg/l	8.1	7.4	8.1	7.4	7.75	0.495
20	Total Nitrogen	mg/l	0.88	0.82	0.88	0.82	0.85	0.042
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.21	0.18	0.21	0.18	0.195	0.021
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number

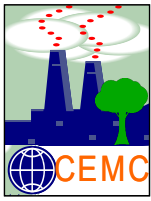
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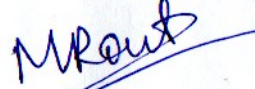
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Report no. - CEMC/IREL/W13

Date-16.11.2023


Authorized Signatory
Notes:



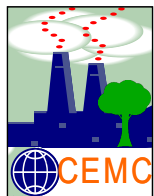
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W14

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Sana Arjipally (W14)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	8.12	7.82	8.12	7.82	7.97	0.212
2	Temperature	°C	27.7	28.9	28.9	27.7	28.3	0.849
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	104	100	104	100	102	2.828
6	Total Dissolved Solids	mg/l	408.2	394	408.2	394	401.1	10.041
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	2.8	4.8	4.8	2.8	3.8	1.414
12	Chloride (as Cl)	mg/l	61.9	59.9	61.9	59.9	60.9	1.414
13	Sulphate (as SO ₄)	mg/l	29.4	28.4	29.4	28.4	28.9	0.707
14	Fluoride (as F)	mg/l	0.12	0.1	0.12	0.1	0.11	0.014
15	Total Hardness (as CaCO ₃)	mg/l	136	140	140	136	138	2.828
16	Calcium (as Ca)	mg/l	28.86	39.28	39.28	28.86	34.07	7.368
17	Magnesium (as Mg)	mg/l	15.55	10.2	15.55	10.2	12.875	3.783
18	Sodium (as Na)	mg/l	23.2	22.6	23.2	22.6	22.9	0.424
19	Potassium (as K)	mg/l	9.8	9.2	9.8	9.2	9.5	0.424
20	Total Nitrogen	mg/l	0.91	0.94	0.94	0.91	0.925	0.021
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.18	0.22	0.22	0.18	0.2	0.028
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number

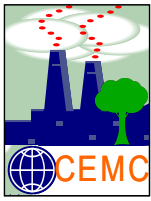
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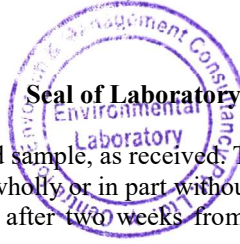
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Date-16.11.2023

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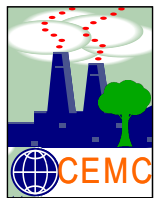


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Certificate No.-TC 6646

Report no. - CEMC/IREL/W15

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Upallu Putty (W15)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.64	7.52	7.64	7.52	7.58	0.085
2	Temperature	°C	27.7	29.2	29.2	27.7	28.45	1.061
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	114	110	114	110	112	2.828
6	Total Dissolved Solids	mg/l	702.4	682	702.4	682	692.2	14.425
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	3.4	4.2	4.2	3.4	3.8	0.566
12	Chloride (as Cl)	mg/l	128.9	112.9	128.9	112.9	120.9	11.314
13	Sulphate (as SO ₄)	mg/l	29.2	28.4	29.2	28.4	28.8	0.566
14	Fluoride (as F)	mg/l	0.29	0.26	0.29	0.26	0.275	0.021
15	Total Hardness (as CaCO ₃)	mg/l	144	140	144	140	142	2.828
16	Calcium (as Ca)	mg/l	40.08	39.28	40.08	39.28	39.68	0.566
17	Magnesium (as Mg)	mg/l	10.69	10.2	10.69	10.2	10.445	0.346
18	Sodium (as Na)	mg/l	40.1	38.2	40.1	38.2	39.15	1.344
19	Potassium (as K)	mg/l	17.2	12.4	17.2	12.4	14.8	3.394
20	Total Nitrogen	mg/l	1.44	1.24	1.44	1.24	1.34	0.141
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.38	0.32	0.38	0.32	0.35	0.042
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

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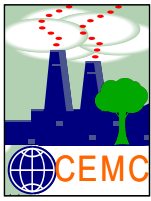
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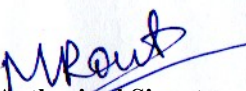
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Report no. - CEMC/IREL/W15

Date-16.11.2023


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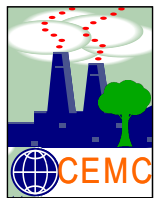
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W16

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Bada Putty (W16)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.14	7.03	7.14	7.03	7.085	0.078
2	Temperature	°C	27.6	28.9	28.9	27.6	28.25	0.919
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	100	90	100	90	95	7.071
6	Total Dissolved Solids	mg/l	562.8	606	606	562.8	584.4	30.547
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	4.7	4.6	4.7	4.6	4.65	0.071
12	Chloride (as Cl)	mg/l	98.9	86.9	98.9	86.9	92.9	8.485
13	Sulphate (as SO ₄)	mg/l	20.6	18.6	20.6	18.6	19.6	1.414
14	Fluoride (as F)	mg/l	0.14	0.12	0.14	0.12	0.13	0.0141
15	Total Hardness (as CaCO ₃)	mg/l	116	110	116	110	113	4.243
16	Calcium (as Ca)	mg/l	31.26	30.86	31.26	30.86	31.06	0.283
17	Magnesium (as Mg)	mg/l	9.23	8.02	9.23	8.02	8.625	0.856
18	Sodium (as Na)	mg/l	31.1	32.8	32.8	31.1	31.95	1.202
19	Potassium (as K)	mg/l	8.8	7.2	8.8	7.2	8	1.131
20	Total Nitrogen	mg/l	1	0.8	1	0.8	0.9	0.141
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.23	0.22	0.23	0.22	0.225	0.0071
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number

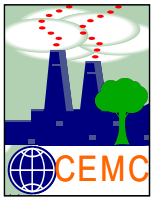
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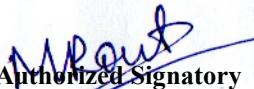
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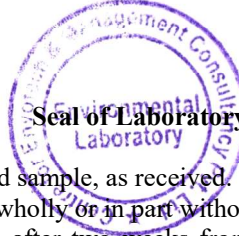
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Report no. - CEMC/IREL/W16

Date-16.11.2023


Authorized Signatory
Notes:



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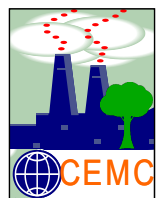
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W17

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Busan Putty (W17)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.73	7.55	7.73	7.55	7.64	0.127
2	Temperature	°C	27.7	30.1	30.1	27.7	28.9	1.697
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	116	120	120	116	118	2.828
6	Total Dissolved Solids	mg/l	568.4	568	568.4	568	568.2	0.283
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	4.3	4.4	4.4	4.3	4.35	0.071
12	Chloride (as Cl)	mg/l	97.9	94.9	97.9	94.9	96.4	2.121
13	Sulphate (as SO ₄)	mg/l	20.1	19.2	118.4	113.9	67.9	0.636
14	Fluoride (as F)	mg/l	0.16	0.18	0.18	0.16	0.17	0.0141
15	Total Hardness (as CaCO ₃)	mg/l	116	120	120	116	118	2.828
16	Calcium (as Ca)	mg/l	32.06	33.66	33.66	32.06	32.86	1.131
17	Magnesium (as Mg)	mg/l	8.75	8.22	8.75	8.22	8.485	0.375
18	Sodium (as Na)	mg/l	32.4	34.6	34.6	32.4	33.5	1.556
19	Potassium (as K)	mg/l	9.4	8.8	9.4	8.8	9.1	0.424
20	Total Nitrogen	mg/l	1.1	1	1.1	1	1.05	0.071
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.27	0.28	0.28	0.27	0.275	0.0071
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number

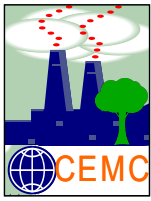
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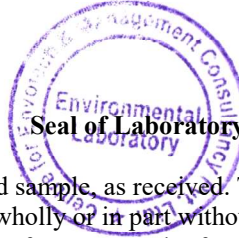
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Date-16.11.2023

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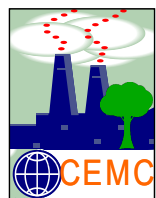
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W18

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Takeriya Borewell (W18)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.26	7.22	7.26	7.22	7.24	0.028
2	Temperature	°C	27.5	28.6	28.6	27.5	28.05	0.778
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	366	350	366	350	358	11.314
6	Total Dissolved Solids	mg/l	1040	940	1040	940	990	70.711
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	4.4	4.8	4.8	4.4	4.6	0.283
12	Chloride (as Cl)	mg/l	102.9	99.9	102.9	99.9	101.4	2.121
13	Sulphate (as SO ₄)	mg/l	68.2	64.6	68.2	64.6	66.4	2.546
14	Fluoride (as F)	mg/l	0.36	0.32	0.36	0.32	0.34	0.028
15	Total Hardness (as CaCO ₃)	mg/l	288	280	288	280	284	5.657
16	Calcium (as Ca)	mg/l	72.14	70.14	72.14	70.14	71.14	1.414
17	Magnesium (as Mg)	mg/l	26.24	24.24	26.24	24.24	25.24	1.414
18	Sodium (as Na)	mg/l	91.4	90	91.4	90	90.7	0.990
19	Potassium (as K)	mg/l	38.6	32.8	38.6	32.8	35.7	4.101
20	Total Nitrogen	mg/l	3.21	2.28	3.21	2.28	2.745	0.658
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.38	0.28	0.38	0.28	0.33	0.071
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

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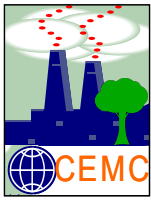
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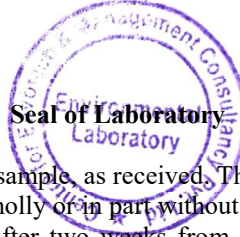
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Date-16.11.2023

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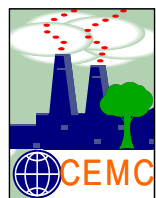
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W19

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Kandara Arjipalli (W19)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.86	7.35	7.86	7.35	7.605	0.361
2	Temperature	°C	27.6	29.1	29.1	27.6	28.35	1.061
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	134	130	134	130	132	2.828
6	Total Dissolved Solids	mg/l	244	230	244	230	237	9.899
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	4.3	4.4	4.4	4.3	4.35	0.071
12	Chloride (as Cl)	mg/l	66.9	63.9	66.9	63.9	65.4	2.121
13	Sulphate (as SO ₄)	mg/l	23.6	20.8	23.6	20.8	22.2	1.980
14	Fluoride (as F)	mg/l	0.14	0.22	0.22	0.14	0.18	0.057
15	Total Hardness (as CaCO ₃)	mg/l	126	120	126	120	123	4.243
16	Calcium (as Ca)	mg/l	32.86	30.86	32.86	30.86	31.86	1.414
17	Magnesium (as Mg)	mg/l	10.69	9.62	10.69	9.62	10.155	0.757
18	Sodium (as Na)	mg/l	26.4	25.2	26.4	25.2	25.8	0.849
19	Potassium (as K)	mg/l	16.8	20.2	20.2	16.8	18.5	2.404
20	Total Nitrogen	mg/l	1.44	1.26	1.44	1.26	1.35	0.127
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.22	0.2	0.22	0.2	0.21	0.014
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number

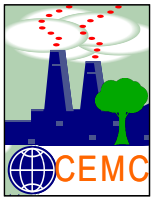
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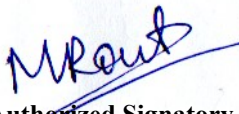
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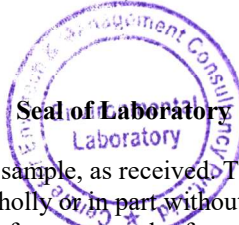
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Report no. - CEMC/IREL/W19

Date-16.11.2023


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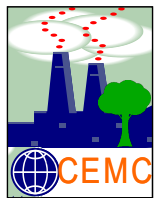
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W20

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: SW Near Port (W20)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.27	7.28	7.28	7.27	7.275	0.007
2	Temperature	°C	27.7	28.4	28.4	27.7	28.05	0.495
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	130	110	130	110	120	14.142
6	Total Dissolved Solids	mg/l	398	390	398	390	394	5.657
7	Total Suspended Solids	mg/l	14.1	15	15	14.1	14.55	0.636
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	4.7	4.2	4.7	4.2	4.45	0.354
12	Chloride (as Cl)	mg/l	98.9	91.9	98.9	91.9	95.4	4.950
13	Sulphate (as SO ₄)	mg/l	41.8	40.4	41.8	40.4	41.1	0.990
14	Fluoride (as F)	mg/l	0.21	0.26	0.26	0.21	0.235	0.035
15	Total Hardness (as CaCO ₃)	mg/l	200	190	200	190	195	7.071
16	Calcium (as Ca)	mg/l	53.71	51.71	53.71	51.71	52.71	1.414
17	Magnesium (as Mg)	mg/l	16.04	14.04	16.04	14.04	15.04	1.414
18	Sodium (as Na)	mg/l	46.6	44.8	46.6	44.8	45.7	1.273
19	Potassium (as K)	mg/l	19.2	22.8	22.8	19.2	21	2.546
20	Total Nitrogen	mg/l	2.12	2.02	2.12	2.02	2.07	0.071
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.26	0.24	0.26	0.24	0.25	0.014
23	Copper (as Cu)	mg/l	0.07	0.07	0.07	0.07	0.07	0
24	Cadmium (as Cd)	mg/l	0.03	0.03	0.03	0.03	0.03	0
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	0.1	0.11	0.11	0.1	0.105	0.0071
27	Total Chromium (as Cr)	mg/l	0.08	0.05	0.08	0.05	0.065	0.0212
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number

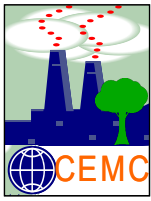
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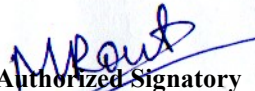
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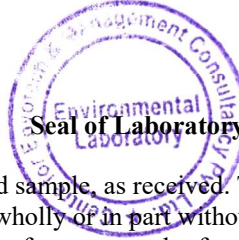
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Report no. - CEMC/IREL/W20

Date-16.11.2023


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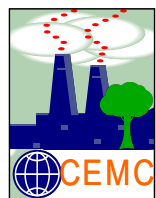
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Certificate No.: TC 6646

Report no. - CEMC/IREL/W21

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Kalibali Village (W21)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.67	7.61	7.67	7.61	7.64	0.042
2	Temperature	°C	27.7	28.2	28.2	27.7	27.95	0.354
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	130	120	130	120	125	7.071
6	Total Dissolved Solids	mg/l	624.4	595	624.4	595	609.7	20.789
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	4.4	4.8	4.8	4.4	4.6	0.283
12	Chloride (as Cl)	mg/l	64.9	61.9	64.9	61.9	63.4	2.121
13	Sulphate (as SO ₄)	mg/l	26.2	28.8	28.8	26.2	27.5	1.838
14	Fluoride (as F)	mg/l	0.14	0.2	0.2	0.14	0.17	0.042
15	Total Hardness (as CaCO ₃)	mg/l	138	140	140	138	139	1.4142
16	Calcium (as Ca)	mg/l	30.46	39.28	39.28	30.46	34.87	6.2367
17	Magnesium (as Mg)	mg/l	15.06	10.2	15.06	10.2	12.63	3.4365
18	Sodium (as Na)	mg/l	52.1	54.2	54.2	52.1	53.15	1.485
19	Potassium (as K)	mg/l	26.4	30.8	30.8	26.4	28.6	3.111
20	Total Nitrogen	mg/l	1.8	2.2	2.2	1.8	2	0.283
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.32	0.38	0.38	0.32	0.35	0.042
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number

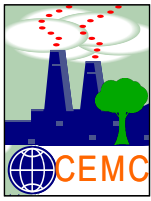
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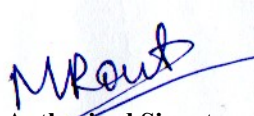
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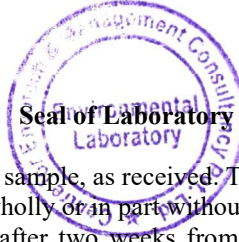
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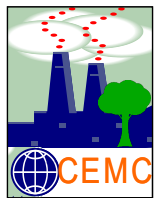


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Certificate No.: TC 6646

Report no. - CEMC/IREL/W22

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Haripur (W22)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.12	7.32	7.32	7.12	7.22	0.141
2	Temperature	°C	27.5	29.1	29.1	27.5	28.3	1.131
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	120	110	120	110	115	7.071
6	Total Dissolved Solids	mg/l	460.8	480	480	460.8	470.4	13.576
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5
11	Dissolved Oxygen	mg/l	4.8	5.1	5.1	4.8	4.95	0.212
12	Chloride (as Cl)	mg/l	35.9	39.9	39.9	35.9	37.9	2.828
13	Sulphate (as SO ₄)	mg/l	18.4	21.2	21.2	18.4	19.8	1.980
14	Fluoride (as F)	mg/l	0.12	0.16	0.16	0.12	0.14	0.028
15	Total Hardness (as CaCO ₃)	mg/l	122	130	130	122	126	5.657
16	Calcium (as Ca)	mg/l	28.86	36.47	36.47	28.86	32.665	5.381
17	Magnesium (as Mg)	mg/l	12.15	9.48	12.15	9.48	10.815	1.888
18	Sodium (as Na)	mg/l	36.8	38.4	38.4	36.8	37.6	1.131
19	Potassium (as K)	mg/l	20.1	24.2	24.2	20.1	22.15	2.899
20	Total Nitrogen	mg/l	1.6	1.8	1.8	1.6	1.7	0.141
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.26	0.34	0.34	0.26	0.3	0.057
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number

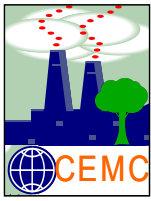
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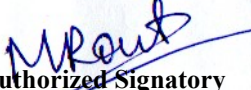
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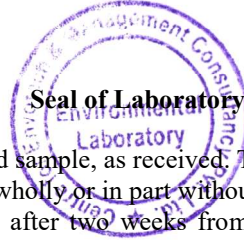
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Report no. - CEMC/IREL/W22

Date-16.11.2023


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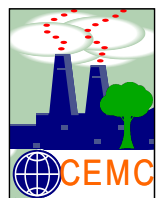
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W23

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Tampara Lake (W23)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.41	7.52	7.52	7.41	7.465	0.078
2	Temperature	°C	26.3	27.2	27.2	26.3	26.75	0.636
3	Turbidity	NTU	10.3	9.4	10.3	9.4	9.85	0.636
4	Colour	Hazen	15	10	15	10	12.5	3.536
5	Total Alkalinity (as CaCO ₃)	mg/l	240	250	250	240	245	7.071
6	Total Dissolved Solids	mg/l	742.4	760	760	742.4	751.2	12.445
7	Total Suspended Solids	mg/l	18.4	22.8	22.8	18.4	20.6	3.111
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	2.1	2.2	2.2	2.1	2.15	0.071
10	Chemical Oxygen Demand	mg/l	16	18	18	16	17	1.414
11	Dissolved Oxygen	mg/l	5.9	5.7	5.9	5.7	5.8	0.141
12	Chloride (as Cl)	mg/l	56.9	59.9	59.9	56.9	58.4	2.121
13	Sulphate (as SO ₄)	mg/l	34.4	38.2	38.2	34.4	36.3	2.687
14	Fluoride (as F)	mg/l	0.22	0.28	0.28	0.22	0.25	0.042
15	Total Hardness (as CaCO ₃)	mg/l	250	260	260	250	255	7.071
16	Calcium (as Ca)	mg/l	75.35	72.94	75.35	72.94	74.145	1.704
17	Magnesium (as Mg)	mg/l	15.06	18.95	18.95	15.06	17.005	2.751
18	Sodium (as Na)	mg/l	62.1	66.2	66.2	62.1	64.15	2.899
19	Potassium (as K)	mg/l	26.8	28.8	28.8	26.8	27.8	1.414
20	Total Nitrogen	mg/l	10.2	12.8	12.8	10.2	11.5	1.838
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.41	0.46	0.46	0.41	0.435	0.035
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	54	41	54	41	47.5
31	Faecal Coliform	MPN/100ml	<2.0	8	6	8	6	7
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number

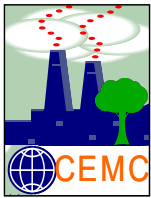
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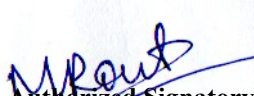
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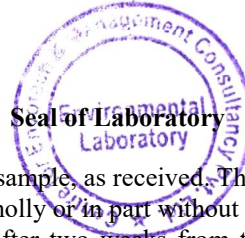


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Date-16.11.2023


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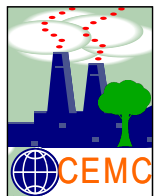
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W24

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: Nolia Niuagoan (W24)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.46	7.88	7.88	7.46	7.67	0.297
2	Temperature	°C	26.4	30.1	30.1	26.4	28.25	2.616
3	Turbidity	NTU	<1	<1	<1	<1	<1	<1
4	Colour	Hazen	<5	<5	<5	<5	<5	<5
5	Total Alkalinity (as CaCO ₃)	mg/l	186	180	186	180	183	4.243
6	Total Dissolved Solids	mg/l	556.8	550	556.8	550	553.4	4.808
7	Total Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5
8	Oil & Grease	mg/l	<1	<1	<1	<1	<1	<1
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	<2	<2	<2	<2	<2	<2
10	Chemical Oxygen Demand	mg/l	10	10	10	10	10	0.000
11	Dissolved Oxygen	mg/l	5.8	5.6	5.8	5.6	5.7	0.141
12	Chloride (as Cl)	mg/l	42.9	40.9	42.9	40.9	41.9	1.414
13	Sulphate (as SO ₄)	mg/l	26.6	25.6	26.6	25.6	26.1	0.707
14	Fluoride (as F)	mg/l	0.19	0.14	0.19	0.14	0.165	0.035
15	Total Hardness (as CaCO ₃)	mg/l	182	178	182	178	180	2.828
16	Calcium (as Ca)	mg/l	58.52	51.06	58.52	51.06	54.79	5.275
17	Magnesium (as Mg)	mg/l	8.75	13.26	13.26	8.75	11.005	3.189
18	Sodium (as Na)	mg/l	48.2	46.4	48.2	46.4	47.3	1.273
19	Potassium (as K)	mg/l	24.3	23.8	24.3	23.8	24.05	0.354
20	Total Nitrogen	mg/l	3.6	2.8	3.6	2.8	3.2	0.566
21	Phosphorus (as PO ₄)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Iron (as Fe)	mg/l	0.29	0.26	0.29	0.26	0.275	0.021
23	Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Total Chromium (as Cr)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
31	Faecal Coliform	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
32	E. Coli	MPN/100ml	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

N.B: MPN-Most Probable Number

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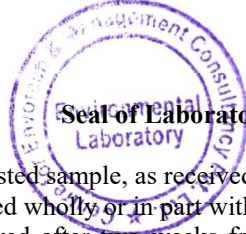
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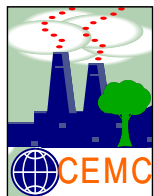
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Certificate No.-TC 6646

Report no. - CEMC/IREL/W25

Date-16.11.2023

SURFACE/GROUND WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client

: M/s.IREL(INDIA) LIMITED, Matikhala,
Chatrapur, Ganjam, Odisha

Work Order No.

: OSCOM MINERAL/22-23/07/O/S.C./10354, Dated-
15.10.2022

Sampling Period

: April'2023 to September'2023

Sampling by

: Mr.Suresh Pradhan

Sample Description

: IREL Sea Water (W25)

Sample Quantity

: 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	June	Sept	Max	Min	Avg	SD
1	pH Value @ 25°C	--	7.92	7.76	7.92	7.76	7.84	0.113
2	Temperature	°C	26.6	29.8	29.8	26.6	28.2	2.263
3	Turbidity	NTU	32.1	12.2	32.1	12.2	22.15	14.071
4	Colour	Hazen	35	20	35	20	27.5	10.607
5	Total Alkalinity (as CaCO ₃)	mg/l	1080	1100	1100	1080	1090	14.142
6	Total Dissolved Solids	mg/l	24400	20000	24400	20000	22200	3111.3
7	Total Suspended Solids	mg/l	58.4	60.6	60.6	58.4	59.5	1.556
8	Oil & Grease	mg/l	<1	<1	ND	ND	ND	ND
9	Biochemical Oxygen Demand 3 days@ 27°C	mg/l	7.8	9.2	9.2	7.8	8.5	0.990
10	Chemical Oxygen Demand	mg/l	110	130	ND	ND	ND	ND
11	Dissolved Oxygen	mg/l	8.1	8.2	8.2	8.1	8.15	0.071
12	Chloride (as Cl)	mg/l	8600	7900	8600	7900	8250	494.97
13	Sulphate (as SO ₄)	mg/l	588.2	530	588.2	530	559.1	41.154
14	Fluoride (as F)	mg/l	1.6	2.2	2.2	1.6	1.9	0.424
15	Total Hardness (as CaCO ₃)	mg/l	2720	2400	2720	2400	2560	226.27
16	Calcium (as Ca)	mg/l	961.92	673.34	961.92	673.34	817.63	204.06
17	Magnesium (as Mg)	mg/l	77.76	175	175	77.76	126.38	68.76
18	Sodium (as Na)	mg/l	6720	6100	6720	6100	6410	438.41
19	Potassium (as K)	mg/l	2910	2700	2910	2700	2805	148.49
20	Total Nitrogen	mg/l	164	152	164	152	158	8.485
21	Phosphorus (as PO ₄)	mg/l	16.2	18.8	18.8	16.2	17.5	1.838
22	Iron (as Fe)	mg/l	2.6	4.6	4.6	2.6	3.6	1.414
23	Copper (as Cu)	mg/l	1.1	0.82	1.1	0.82	0.96	0.198
24	Cadmium (as Cd)	mg/l	0.16	0.2	0.2	0.16	0.18	0.0283
25	Lead (as Pb)	mg/l	0.81	0.9	0.9	0.81	0.855	0.0636
26	Zinc (as Zn)	mg/l	1.36	1.4	1.4	1.36	1.38	0.0283
27	Total Chromium (as Cr)	mg/l	0.28	0.3	0.3	0.28	0.29	0.0141
28	Hexavalent Chromium (as Cr ⁺⁶)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Coliform	MPN/100ml	350	278	350	278	314	50.912
31	Faecal Coliform	MPN/100ml	46	33	46	33	39.5	9.192
32	E. Coli	MPN/100ml	13	11	13	11	12	1.414

N.B: MPN-Most Probable Number

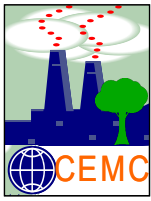
Environmental Studies (EIA & EMP), Monitoring, Forest Diversion Planning, DPR, Wildlife Management Plan, Hazardous & Safety Studies, RS& GIS, Baseline Survey, Hydrological & Geological Studies, Socio-economic Studies, DGPS & ETS Survey.

Regd. Office: Plot No.-522/3458, Near Utkal Hyundai, Opposite Apex College, Pahal, Bhubaneswar-752101, Odisha, India, Mobile: 9861032826

E-mail- ccmc_consultancy@yahoo.co.in, ccmc122@gmail.com, website: www.ccmc.in.

Laboratory At: Plot No. 800/1274, Johal, Pahal, Bhubaneswar-752101, Odisha, India, Mobile: 7752014842

E-mail: cemclab@yahoo.in




CENTRE FOR ENVOTECH AND MANAGEMENT CONSULTANCY PVT. LTD.

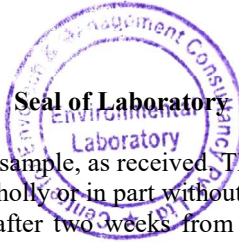
An ISO 9001-2008 & OHSAS 18001:2007 Certified Company, Empanelled with OCCL, ORSAC and SPCB of Govt. of Odisha
Accredited by NABET, QCI for EIA Studies as 'A' Category Consultant Organization.
Empanelled with PCCF(Wildlife) & CWLW, Odisha
Enlisted in CIDC (established by the Planning Commission Govt. of India), NABL
MoEF&CC, Govt. of India, Recognised Environment Laboratory under Environment (Protection) Act, 1986.



Report no. - CEMC/IREL/W25

Date-16.11.2023


Authorized Signatory
Notes:



- The result given above related to the tested sample, as received. The customer asked for the above test only.
- This Test Report shall not be reproduced wholly or in part without prior written consent of the laboratory.
- The samples received shall be destroyed after two weeks from the date of issue of the Test Report unless specified otherwise.
- This Test Report shall not be used in any advertising media or as evidence in the court of Law without prior written consent of the laboratory.

Environmental Studies (EIA & EMP), Monitoring, Forest Diversion Planning, DPR, Wildlife Management Plan, Hazardous & Safety Studies, RS& GIS, Baseline Survey, Hydrological & Geological Studies, Socio-economic Studies, DGPS & ETS Survey.

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E-mail: cemclab@yahoo.in**

Government of India
Bhabha Atomic Research Centre
Health Physics Division,
Radiation Protection Section (NF)
(Health Physics Unit, IREL (India) Limited, OSCOM)

Ref: HPU/03(08)/ 975

Date: 14/11/2023

(a) Noise level monitored during the period
April 2023 to September 2023

Sl. No	Area Monitored	Exact Location	Noise Level dB(A)	Duration of Exposure	Personal Protective Equipment's used
01	Dredge & Wet up gradation Plant (General Area)	Ground Floor	50-56	8 hrs.	
02	Dredge & Wet upgradation Plant (Other Area)	Control Room	49-66	8 hrs.	
03	Mineral Separation Plant (General Area)	Shift Office Room	59-74	8 hrs.	
04	Mineral Separation Plant (At 12 m, near IRMS)	Near IRMS	70-86	8 hrs.	Ear Muff/ Ear Plug
05	Mineral Separation Plant (Near Air Table)	General area	74-85	Occasional	Ear Muff/ Ear Plug
06	Mineral Separation Plant (Near Vibrating Screen)	Vibrating Screen	80-88	8 hrs.	Ear Muff/ Ear Plug
07	Compressor House REEP	At REEP	89-98	Occasional	Ear Muff/ Ear Plug
08	Compressor House REEP (Operator Room)	At REEP	71-82	8 hrs.	
09	Attack Plant REEP (General Area)	Middle Area of Process Building (GF)	76-82	Occasional	
10	Active Plant REEP (General Area)	Middle Area of Process Building (GF)	68-88	8 hrs.	Ear Muff/ Ear Plug
11	Active Plant REEP (Scrubber Fan Area)	Near Scrubber Fan	68-85	Occasional	Ear Muff/ Ear Plug
12	Boiler House (General Area)	In Side Boiler House	82-96	8 hrs.	Ear Muff/ Ear Plug
13	Workshop (General Area)	Carpentry area in general	50-63	8 hrs.	
14	Auto shop (General Area)	Near Auto pool Area	51-63	8 hrs.	

TLV-85 dB(A)/ 8 hrs.

(b) Radiation level monitored during the period April 2023 to September 2023

Sl.No	Location	Gamma Exposure Rate ($\mu\text{Gy.h}^{-1}$)	
		Contact	1 m away
1.1	Mining Area (Before Mining)	-	0.7-1.5
1.2	Mined Out Area (After Mining)	-	0.07-0.1
2.0	MINERAL SEPARATION PLANT		
2.1	Ground Floor (In General)	-	2.0-8.0
2.2	4.5 m Level (In General)	-	2.0-5.0
2.3	9.0 m Level (In General)	-	1.0-9.0
2.4	12.0 m Level (In General)	-	2.0-6.0
2.5	16.0 m Level (In General)	-	1.0-2.5
2.6	Monazite Trench	-	50-55
2.7	Reject Disposal Site	-	
3.0	REEP		
3.1	Monazite Stores	80-180	35-60
3.2	Feed Area	-	4-25
3.3	Attack Plant in general	-	1-8
3.4	Control room Attack Plant	-	0.2-0.7
3.5	RE Chloride Plant/Stores	-	0.1-0.7
3.4	Active Plant GF	-	20-70
3.5	Active Plant Top	-	7-25
3.6	Active Plant Control room	-	0.4-2.0
3.7	Uranium -thorium separation section	-	1.2-5.0
3.8	Uranium -Section	-	1-4
3.9	Thorium section	-	6-40
3.10	Product Stores	-	4-17
3.11	Solid Waste Stacking Area(temp)	-	7-30
3.12	Solid Waste Trench	0.4-17	0.1-6.0
3.13	Sodium nitrate storage pond area	-	20-55
3.14	REEP-Effluent treatment plant	-	3-16
3.15	REEP Office Area	-	0.2-0.9
4.0	Boiler House	-	0.2-0.6
5.0	Workshop Area	-	0.2-0.3

(c) Analysis of Soil Samples collected during the period
April 2023 to September 2023

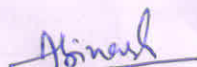
Sl.No	Location	Period	Analysis Details	
			Gross α , Bq/g	Gross β , Bq/g
01	Mining Area	April 2023 to June 2023	2.54	2.96
02	Mined Out Area		0.32	0.45
03	Matikhalo Village Area		1.67	1.80
04	Kanamana Village		4.21	4.87
05	Solid Waste Trench area		1.98	1.99
06	Sodium Nitrate Storage Pond area		4.78	5.22

Sl.No	Location	Period	Analysis Details	
			Gross α , Bq/g	Gross β , Bq/g
01	Mining area	July 2023 to Sept 2023	2.76	3.45
02	Mined Out Area		0.41	0.72
03	Matikhalo Village Area		1.20	1.21
04	Kanamana Village		4.89	4.72
05	Solid Waste Trench area		2.01	2.12
06	Sodium Nitrate Storage Pond area		5.08	5.11

(d) Water activity level monitored during
April 2023 to September 2023

Sl.No	Location	Activity Levels (Bq/L)	
		Gross α	Gross β
1	Matikhalo	0.09	0.71
2	Badaputty	0.08	0.60
3	Basana putty	0.08	0.57
4	T Berhampur	0.09	0.76
5	K Arjipalli	0.08	0.43
6	Bada Arjipalli	0.08	0.45
7	Kanamana	0.09	0.68
8	Dredge Pond	-	-
9	Lily pond	0.09	0.49
10	OPHD	0.09	0.41
11	Pond-1	0.22	0.62
12	RPP pit	-	-
13	MOPP-UP	0.19	0.59
14	MOPP-DOWN	0.33	0.67
15	Bore hole near platform	0.57	0.82
16	Composite MSP	-	-
17	SEP-UP	0.27	0.56
18	SEP-DOWN	0.22	0.67
19	SWT-UP	0.40	0.70

TLV- Gross α = 0.1 Bq/l Gross β = 1.0 Bq/l


(Abinash Sahu)
OIC, HPU

To
I/C TS.

CC: GM & Head, REEP & TSD, OSCOM for kind information.

O/C

Disease Profile Analysis for the Year-2022

1. Disease Profile Analysis of OSCOM Unit for the year 2022 is submitted below.
2. Data have been collected from various registers maintained at OHC & FHC. The picture thus emerged by analysing all types of diseases are submitted as below:-

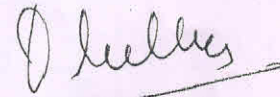
S. No	CATEGORIES OF DISEASE OBSERVED	EMPLOYEES					LOCAL VILLAGERS				
		OHC	FHC	Total	Total Patient	%	OHC	FHC	Total	Total Patient	%
1	DIARRHOEA & DYSENTRY	103	242	345	6650	5.18	137	142	279	5046	5.52
2	PARASITIC/ INFECTION	04	27	31	6650	0.46	08	10	18	5046	0.35
3	DYSPEZIA & FLATULENCE	08	07	15	6650	0.22	04	02	06	5046	0.11
4	A P D / HYPERACIDITY	242	385	627	6650	9.42	235	189	424	5046	8.40
5	ENTERIC FEVER	01	01	02	6650	0.03	01	00	01	5046	0.01
6	MALARIA FEVER	00	00	00	6650	00	00	02	02	5046	0.03
7	OTHER FEVER CASES	38	225	263	6650	3.95	86	99	185	5046	3.66
8	COMMON COLD	242	750	992	6650	14.91	476	436	912	5046	18.07
9	OTHER RESPIRATORY INFECTION	255	571	826	6650	12.42	255	338	593	5046	11.75
10	URINARY TRACT INFECTION	10	37	47	6650	0.70	00	15	15	5046	0.29
11	BRONCHIAL ASTHMA	01	11	12	6650	0.18	00	02	02	5046	0.03
12	HYPERTENSION	97	130	227	6650	3.41	48	51	99	5046	1.96
13	HYPOTENSION	08	13	21	6650	0.31	02	07	09	5046	1.77
14	CARDIAC CASES	40	03	43	6650	0.64	15	00	15	5046	0.29
15	DIABETES MELLITUS	29	65	94	6650	1.41	10	08	18	5046	0.35
16	TUBERCULOSIS	03	00	03	6650	0.04	00	00	00	5046	00
17	HENSENS' DISEASES	00	00	00	6650	00	00	00	00	5046	00
18	SKIN DISEASES	08	01	09	6650	0.13	03	02	05	5046	0.09
	A. FUNGAL INFECTION	59	175	234	6650	3.51	73	69	142	5046	2.81
	B. SCABIES	03	02	05	6650	0.07	00	01	01	5046	0.01
	C. ECZEMA (ALLIED etc.)	00	00	00	6650	00	00	00	00	5046	00
	D. LEUCODERMA	03	00	03	6650	0.04	00	01	01	5046	0.01
19	PROTEIN CALORIE DEFICIENCY	00	01	01	6650	0.01	00	01	01	5046	0.01
20	VITAMIN DEFICIENCY	82	288	370	6650	5.56	49	87	136	5046	2.69
21	ANEMIA	09	10	19	6650	0.28	00	01	01	5046	0.01
22	HEPATITIS (JAUNDICE)	00	00	00	6650	00	00	00	00	5046	00
23	ALLERGIC DISEASES	02	03	05	6650	0.07	06	02	08	5046	0.15
	A. DRUG ALLERGIC	00	01	01	6650	0.01	00	00	00	5046	00
	B. URTICARIAS etc.	10	37	47	6650	0.70	12	12	24	5046	0.47
24	FILARIASIS	00	00	00	6650	00	00	00	00	5046	00
25	VENEREAL DISEASES	00	00	00	6650	00	00	00	00	5046	00
26	CHRONIC ARTHRITIS	02	01	03	6650	0.04	00	00	00	5046	00
	A. LIMB JOINTS	82	246	328	6650	4.93	164	140	304	5046	5.02
	B. VERTEBRAL JOINTS	96	49	145	6650	2.36	150	30	180	5046	3.56
27	PSYCHIATRIC CASES / EPILEPSY	02	00	02	6650	0.03	00	00	00	5046	00
28	EYE DISEASES	07	01	08	6650	0.12	02	00	02	5046	0.03
	A. EYE INFECTIONS	49	100	149	6650	2.24	144	44	188	5046	3.72
	B. EYE INJURY	02	02	04	6650	0.06	10	00	10	5046	0.19
	C. DEFECTIVE VISIONS	26	00	26	6650	0.39	36	00	36	5046	0.71
29	DENTAL INFECTIONS	20	60	80	6650	1.20	21	33	54	5046	1.07
30	EAR INFECTIONS (CSOM / ASOM)	13	50	63	6650	0.94	17	24	41	5046	0.81

Contd.....2/-

Disease Profile Analysis for the Year-2022

S No	CATEGORIES OF DISEASE OBSERVED	EMPLOYEES					LOCAL VILLAGERS				
		OHC	FHC	Total	Total Patient	%	OHC	FHC	Total	Total Patient	%
31	PILES	25	10	35	6650	0.52	01	00	01	5046	0.01
32	MENSTRUAL DISORDERS	17	13	30	6650	0.45	00	01	01	5046	0.01
33	DISLOCATIONS & SPRAINS	50	83	133	6650	2.00	71	38	109	5046	2.16
34	BURNS & SCALDS	03	07	10	6650	0.15	19	02	21	5046	0.41
35	INJURY INCIDENCES	40	57	97	6650	1.45	116	51	167	5046	3.30
36	NEUROLOGICAL DEFICIENCIES	07	00	07	6650	0.10	01	01	02	5046	0.03
37	MALIGNANCY	02	00	02	6650	0.03	00	00	00	5046	00
38	CONGENITAL ANOMALY	00	00	00	6650	00	00	00	00	5046	00
39	NOTIFIABLE DISEASES	00	00	00	6650	00	00	00	00	5046	00
40	MISC CASES	433	853	1286	6650	19.33	573	460	1033	5046	20.13

2. The above is for your information please.



Dr (Lt Col) B Subha
Dy Manager & HoD (Med)
for IREL (India) Limited / OSCOM

✓ Copy: Internal (Disease Profile File)//RKP

To,
Shri PK Mishra
Chief Manager (Tech Services) & MR



IREL (India) Limited

Six Monthly Compliance Report (April 2023 to September 2023)

Ref : Details of Afforestation & Green belt Development

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
1987-88	4.0	7.0	--	7.0	14,000	--	14,000
1988-89	5.0	10.0	--	10.0	20,000	--	20,000
1989-90	8.0	7.5	--	7.5	15,000	--	15,000
1990-91	6.0	3.0	--	3.0	6,000	--	6,000
1991-92	12.0	8.5	--	8.5	16,500	--	16,500
1992-93	8.0	14.5	--	14.5	29,000	--	29,000
1993-94	6.67	9.88	--	9.88	25,000	--	25,000
1994-95	12.92	8.23	3.0	11.23	40,000	8,500	48,500
1995-96	16.94	8.5	--	8.5	42,000	--	42,000
1996-97	11.7	8.5	2.0	10.5	40,000	6,000	46,000
1997-98	15.5	8.5	3.0	11.5	40,000	5,000	45,000
1998-99	14.16	9.0	4.4	13.4	45,000	5,000	50,000
1999-2000	12.42	5.0	--	5.0	50,900	--	50,900
2000-2001	20.94	7.5	1.5	9.0	74,800	3,575	78,375
2001-2002	13.12	10.23	--	10.23	80,000	1,959	81,959
2002-2003	14.51	16.8	--	16.8	75,300	--	75,300
2003-2004	17.25	18.5	Avenue plantation	18.5	82,000	400	82,400
2004-2005	26.76	18.0	Avenue plantation	18.0	80,000	500	80,500
2005-2006	21.02	17.0	0.24	17.24	75,600	5,500	81,100
2006-2007	25.2	21.47	0.13	21.6	95,553	5,500	1,01,053
2007-2008	22.11	22.68	--	22.68	1,00,583	229	1,00,812
2008-2009	24.62	16.95	Avenue plantation	16.95	75,130	5,400	80,530
2009-2010	28.45	24.89	--	24.89	1,10,623	--	1,10,623
2010-2011	28.73	13.79	--	13.79	59,482	--	59,482
2011-2012	25.03	18.61	--	18.61	84,523	--	84,523
2012-2013	26.55	16.0	0.5	16.5	60,674	640	61,314
2013-2014	24.86	10	--	10	62,870	--	62,870
2014-2015	35.42	20	0.12	20.12	54,500	300	54,800
2015-2016	32.78	22	0.5	22.5	54,000	500	54,500
2016-2017	29.44	32	Avenue plantation	32.0	80,000	200	80,200
2017-2018	33.32	16	--	16	40,600	--	40,600
2018-2019	63.94	22	0.1	22.1	54,900	200	55,100
2019-2020	24.28	23	0.6	24.88	56000	600	56,600
2020-2021	22.5	20.23	1.53	21.76	50,000	3800	53,800
2021-2022	20.44	20.44	.....	20.44	50,500	.....	50,500
2022-2023	30.35	30.35	.....	30.35	75,500	.....	75,500
2023-2024	40.46	40.46	1.0	41.46	100500	1000	101500



IREL (India) Limited
Six Monthly Compliance Report (April 2023 to September 2023)

Ref: Details of Raw Materials used, Production & Waste Generation from OSCOM & REEP during the period: April 2023 to September 2023.

A. List of the raw materials used for OSCOM & REEP

Sl.No.	Description		During April 2023 to September 2023
1	Mining		
1.1	Raw sand, t	(for production of upgraded heavy minerals consisting of ilmenite, rutile, zircon, sillimanite , garnet etc.)	29,11,032
2	MSP		
2.1	Furnace oil, KL	(for production of ilmenite, rutile, zircon, , sillimanite , garnet etc .)-	2190.239
2.2	Sodium chloride, Kg	(for production of sillimanite)	17900
2.3	Soda ash, Kg	-do-	7705
2.4	Sodium silicate, Kg	-do-	5600
2.5	Oleic acid, Kg	-do-	7630
3	REEP & Boiler		
3.1	RE mineral,t	For processing & production total products in REEP	3003.25
3.2	Hydrochloric acid (~30% w/w), t	For production of Rare earths chloride etc.	3977.35
3.3	Barium chloride, Kg	For production of Rare earths (RE) chloride.	36750
3.4	Sodium sulphide, Kg		31150
3.5	Magnesium Sulphate, Kg		36750
3.6	Iron powder, Kg		-
3.7	Sodium sulphate, Kg	For TSP production	26300
3.8	Caustic lye, t	For production Rare earths chloride, Tri-sodium Phosphate etc.	4253.98
3.9	Thorium Oxalate, t	For production of Thorium Nitrate	32.90
3.10	Nitric acid, t		170.03
3.11	Soda ash, t		70.90



IREL (India) Limited
Six Monthly Compliance Report (April 2023 to September 2023)

3.12	Hydrogen peroxide, Kg	For solvent extraction purpose	1620
3.13	Alamine, Kg		800
3.14	Oxalic acid, t		142.45
3.15	Flocculants, Kg (Flomine & Kemfloc)		380
3.16	Tri-n-butyl phosphate(TBP), Kg		1400
3.17	Petrofin, Kg		8440
3.18	Isodecanol, Kg		900
3.19	Ammonia, Kg		800
3.20	EDTA, Kg		17.12
3.21	DTPA, Kg		6.52
3.22	Hydrochloric acid (~30% w/w), t	For DM Plant	Included above
3.23	Sodium hydroxide, t		Included above
3.24	Coal, t	For steam generation	10582

B. Production

(During the period April 2023 to September 2023):

Sl.No	Description	Quantity						
OSCOM								
MINING		Apr'23	May'23	June'23	July'23	Aug'23	Sept'23	TOTAL (t)
1.	Heavy Mineral Output, t	49576	55972	55794	67885	68186	66391	3,63,804
MSP								
1	Ilmenite, t	20420	20513	19449	20074	20553	16625	117634
2	Rutile, t	643	759	677	708	643	593	4023
3	Sillimanite, t	1422	1979	1970	1888	2109	1832	11200
4	Zircon, t	481	470	431	584	529	409	2904
5	RE Mineral, t	243	424	461	444	294	143	2009
6	Garnet, t	3901	5920	4477	5316	6322	5753	31689
REEP								
1	Thorium Nitrate, t	2.90	2.40	3.0	4.10	5.5	5.6	23.50
2.	Thorium Oxide, t	-	-	-	-	-	-	-
3.	Thorium Oxalate, t	82	96.35	102.5	108.65	106.6	104.55	600.65
4.	Trisodium Phosphate, t	473	575	550	630	600	620	3448
5.	Rare Earths Chloride, t	370	501	500	501	473	501	2846
6.	Nuclear grade Ammonium Di-Uranate as U3O8, t	0.625	0.750	0.750	0.780	0.800	0.800	4.505



IREL (India) Limited
Six Monthly Compliance Report (April 2023 to September 2023)

C. Solid Waste & Radioactive Waste generation:

(During the period April 2023 to September 2023):

Sl. No	Description	Quantity	Disposal activity
OSCOM			
MINING	Tails generated, t	25,47,228	For back filling.
MSP	Subgrade minerals, t	MSP: 30301 HUS: 50634	
REEP & Boiler			
1.	ETP cake, t	37.65	
2.	Iron Carbonate cake, t	90.36	
3.	Lead Barium cake, t	245.1	
4.	Insoluble Muck cake, t	875.69	
5.	Ash from Boiler, t	5425	

HUS: Heavy up gradation section, MSP: Mineral separation plant

D. Liquid Waste generation:

(During the period April 2023 to September 2023):

Sl. No	Description	Quantity	Disposal activity
OSCOM			
MSP	Waste water, m ³	323740	
REEP & Boiler			
1.	Non-Nitrate Effluent ,m ³	1430	
2.	Nitrate Effluent, m ³	23.5	