

Ref: GKFI/MOEF/2017-18/6521

Date: 29. 11.2018

To

**The Joint Director**

**Eastern Regional Office**

Ministry of Environment, Forests & Climate Change, Govt. of India  
A/3, Chandrasekharpur, Bhubaneswar, Odisha - 751023

**Sub: Submission of 14<sup>th</sup> Half Yearly EC Compliance Status Report Expansion by additional of 1x350 MW, TPP (Phase-II) at Village Kamalanga, Dhenkanal District, Odisha.**

**Ref: Env. Clearance vides your letter No. J\_13012/73/2011-IA.II(T) dtd. 5<sup>th</sup> Dec' 2011**

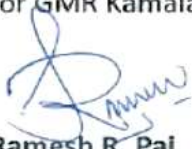
Dear Sir,

With reference to the subject referred above, we are pleased to submit the 14<sup>th</sup> Half Yearly EC Compliance Status Report of our 1 x 350 MW Thermal Power Plant (Phase-II) at village Kamalanga, Dhenkanal District, Odisha, for your kind perusal please.

Kindly acknowledge receipt of the same.

Thanking You,

Yours Sincerely,  
for GMR Kamalanga Energy Limited



**Ramesh R. Pai**  
**Chief Operating Officer**

Encl. – As above

Copy for kind information to:

- 1) Director, MoEF&CC, GOI, New Delhi
- 2) Regional Director, CPCB Zonal Office, Kolkata
- 3) Member Secretary, SPCB - Odisha, Bhubaneswar
- 4) Regional Officer, SPCB - Odisha, Hakimpada, Angul



**GMR Kamalanga Energy Limited, Kamalanga**

Dated: 24<sup>th</sup> NOV' 2018

Environmental clearances of Phase - II (1x350MW)

(Vide Letter No. J 13012/73/2011-IA.II(T) dtd. 5th Dec 2011]

| <b>Sl.</b> | <b>A. SPECIFIC CONDITIONS</b>                                                                                                                                                                                                                                                                                                                                                                                                | <b>Compliance Status</b><br>(Period APL' 18 to SEPT' 18)                                           |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 1          | Vision document specifying prospective plan for the site shall be formulated and submitted to the Regional Office of the "Ministry within six months.                                                                                                                                                                                                                                                                        | Vision document Submitted                                                                          |
| 2          | Scheme for implementation for harnessing solar power within the premises of the plant particularly at available roof tops shall be formulated and status of implementation shall be submitted to the Regional Office of the Ministry from time to time                                                                                                                                                                       | Already implemented at GET hostel of our township area and solar fencing around the boundary wall. |
| 3          | In case source of fuel supply is to be changed at a later stage (now proposed to use imported coal from Indonesia) the project proponent shall intimate the Ministry well in advance along with necessary requisite documents for its concurrence for allowing the change. In such a case the necessity for re-conducting public hearing may be decided by the Ministry in consultation with the Expert Appraisal Committee. | Will be complied as applicable                                                                     |
| 4          | Provision for installation of FGD shall be provided for future use.                                                                                                                                                                                                                                                                                                                                                          | Space provided for FGD.                                                                            |
| 5          | Coal transportation to plant site shall be undertaken by rail and no road transportation shall be permitted.                                                                                                                                                                                                                                                                                                                 | Complied.<br>Rail transportation facility is developed.                                            |
| 6          | A detailed study on chemical composition particularly heavy metal and radioactive contents shall be carried out through a reputed institute and the report shall be submitted to Regional Office of the Ministry. Only after ascertaining its radioactive level shall fly ash be utilized for brick manufacturing or supplied to brick manufacturers.                                                                        | Complied.                                                                                          |
| 7          | The project proponent shall carry out a long term R&D on Boiler efficiency vis-a-vis large variation on ash content of coal and submit its findings to the Ministry at a later stage.                                                                                                                                                                                                                                        | Will be complied                                                                                   |
| 8          | A stack of 275m height with flue gas velocity not less than 22 m/s shall be installed and provided with continuous online monitoring equipment for SO <sub>x</sub> , NO <sub>x</sub> and PM <sub>2.5</sub> & PM <sub>10</sub> . Mercury emissions from stack may also monitored on periodic basis.                                                                                                                           | Will be complied                                                                                   |
| 9          | High Efficiency Electrostatic Precipitators (ESPs) shall be installed to ensure that particulate emission does not exceed 50 mg/Nm <sup>3</sup>                                                                                                                                                                                                                                                                              | The same has been included in the EPC contractor specification and will be complied.               |

|    |                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 10 | Adequate dust extraction system such as cyclones/ bag filters and water spray system in dusty areas such as in coal handling and ash handling points, transfer areas and other vulnerable dusty areas shall be provided.                                                                                                                                                                                | The same has been included in the EPC contractor specification and will be complied. |
| 11 | Utilisation of 100% Fly Ash generated shall be made from 4th year of operation. Status of implementation shall be reported to the Regional Office of the Ministry from time to time. Fly ash in the mine void should be used only after carrying the study regarding the impact on ground water and after permission of the DGMS. It should not be used for agriculture purpose.                        | Will be complied as specified                                                        |
| 12 | Fly ash shall be collected in dry form and storage facility (silos) shall be provided. Unutilized fly ash shall be disposed off in the ash pond in the form of slurry form. Mercury and other heavy metals (As, Hg, Cr, Pb etc.) will be monitored in the bottom ash, as also in the effluents emanating from the existing ash pond. No ash shall be disposed off in low lying area.                    | The same has been included in the EPC contractor specification and will be complied. |
| 13 | Ash pond shall be lined with HDP/LDPE lining or any other suitable impermeable media such that no leachate takes place at any point of time. Adequate safety measures shall also be implemented to protect the ash dyke from getting breached. Ash pond water shall be re circulated and utilized.                                                                                                      | The same has been included in the EPC contractor specification and being complied.   |
| 14 | Sulphur and ash contents in the coal to be used in the project shall not exceed 0.5 % and 34 % respectively at any given time. In case of variation of coal quality at any point of time fresh reference shall be made to the Ministry for suitable amendments to environmental clearance condition wherever necessary.                                                                                 | Will be complied                                                                     |
| 15 | Hydrogeology of the area shall be reviewed annually from an institute/ organization of repute to assess impact of surface water and ground regime (especially around ash dyke). In case any deterioration is observed specific mitigation measures shall be undertaken and reports/ data of water quality monitored regularly and maintained shall be submitted to the Regional Office of the Ministry. | Will be complied.                                                                    |
| 16 | No ground water shall be extracted for use in operation of the power plant even in lean season.                                                                                                                                                                                                                                                                                                         | Will be complied                                                                     |
| 17 | No water bodies (including natural drainage system) in the area shall be disturbed due to activities associated with the setting up of operation of the power plant.                                                                                                                                                                                                                                    | Complied.                                                                            |
| 18 | Minimum required environmental flow suggested by the Competent Authority of the State Govt. shall be maintained in the Channel/ Rivers (as applicable) even in lean season.                                                                                                                                                                                                                             | Noted.                                                                               |

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|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 19 | Land and Water requirement shall be restricted as per latest CEA norms issued.                                                                                                                                                                                                                                                                                                                                                                                                                | Will be complied.                                                                                                       |
| 20 | COC of 5.0 shall be adopted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | The same has been included in the EPC contractor specification and will be complied.                                    |
| 21 | Regular monitoring of ground water level shall be carried out by establishing a network of existing wells and constructing new piezometers. Monitoring around the ash pond area shall be carried out particularly for heavy metals (Hg, Cr, As, Pb) and records maintained and submitted to the Regional Office of this Ministry. The data so obtained should be compared with the baseline data so as to ensure that the ground water quality 'is not adversely affected due to the project. | Being Complied.                                                                                                         |
| 22 | Monitoring surface water quality in the area shall also be regularly conducted and records maintained. The monitored data shall be submitted to the Ministry regularly. Further, monitoring points shall be located between the plant and drainage in the direction of flow of ground water and records maintained. Monitoring for heavy metals in ground water shall be undertaken.                                                                                                          | Being Monitored regularly & record maintained. Copy the <b>Surface Water quality Report is enclosed as Annexure - I</b> |
| 23 | Waste water generated from the plant shall be treated before discharge to comply limits prescribed by the SPCB.                                                                                                                                                                                                                                                                                                                                                                               | Being Complied.                                                                                                         |
| 24 | The project proponent shall undertake rain water harvesting measures and shall develop water storage for use in operation of the plant. Rain water harvesting system shall be put in place which shall comprise of rain water collection from the built up and open area in the plant premises. Action plan for implementation shall be submitted to the Regional Office of the Ministry within six months.                                                                                   | Complied.                                                                                                               |
| 25 | Additional soil for leveling of the proposed site shall be generated within the sites (to the extent possible) so that natural drainage system of the area is protected and improved.                                                                                                                                                                                                                                                                                                         | Complied.                                                                                                               |
| 26 | At least three nearest village shall be adopted and basic amenities like development of roads, drinking water supply, primary health Centre, primary school etc. shall be developed in co-ordination with the district administration.                                                                                                                                                                                                                                                        | Complied                                                                                                                |
| 27 | The project proponent shall also adequately contribute in the development of the neighbouring villages. Special package with implementation schedule for providing potable drinking water supply in the nearby villages and schools shall be undertaken in a time bound manner.                                                                                                                                                                                                               | Complied                                                                                                                |

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|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 28 | <p>CSR scheme shall be undertaken based on need based assessment in and around the villages within 5.0 km of the site and in constant consultation with the village Panchayat and the District Administration. As part of CSR employment of local youth after imparting relevant training as may be necessary shall be undertaken as committed.</p> | <p>Complied.</p> <ul style="list-style-type: none"> <li>➤ A comprehensive scheme was developed as per the felt needs of the communities. Different activities were undertaken in the thrust areas of livelihoods, health and education in 9 villages.</li> <li>➤ A total of 124 local youths and around 100 ladies have been trained in different trades.</li> <li>➤ School Fee concession in GMRVF DAV Public School for the children of land looser families started from the session 2015-16. <ul style="list-style-type: none"> <li>- There are 83 children availed this facility during 2015-16, 115 children during 2017-18 and 130 children in current year 2018-19.</li> </ul> </li> <li>➤ 10 Govt. schools and 16 Anganbadi centers have been supported for education development.</li> <li>➤ 19 girls received scholarship for promoting education</li> <li>➤ The insurance for the land looser family covering 2256 families started since March -2016 and the same is renewed for 2018-19 covering 2344 families.</li> <li>➤ A Mobile Medical Unit provides health care services to poor and needy families at their doorstep. In 2016-17, it has provided service to 6545 patients in the project affected villages and in 2017-18 year, 6741 patients received health service. In 2018-19 till date 2700 cases treated through MMU. Three Nutrition centers are running benefitting 40 pregnant and lactating mothers,</li> <li>➤ A special Livelihood Restoration program has been implemented since 2016-17. This shall cover about 1500 project affected families in 3 years. In the first year it has benefitted 285 families in Farm &amp; livestock, skill training and enterprise development. In 2017-18 year 538 families and in 2018-19 till date 152 project affected families received support for livelihood development. Total 975 project affected families received livelihood support.</li> </ul> |
| 29 | <p>A special scheme for upliftment of SC &amp; ST population in the study area shall be formulated and implemented in a time bound manner. The project proponent shall also identify the rights of Tribals under existing Laws and ensure its protection and implementation thereof.</p>                                                            | <p>Complied.</p> <p>Special counseling has been carried out to identify appropriate livelihood suited for the project affected families including SC and ST families. Through this counseling so far 1400 families have chosen their livelihood options.</p> <p>The activities undertaken were farming, mushroom cultivation, Goatary, poultry, dairy, micro enterprise development activities.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

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|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |                                                                                                                                                                                                                                                                                                                                                                                                                   | Besides these activities vocational training was also provided to youth and women belonging to SC and ST community. One ST girl undertaken short term BPO course with our support and is engaged in a Call centre in Kolkata.                                                                                                                                                                                                                                                                        |
| 30         | An amount of Rs 5.0 Crores shall be earmarked as one-time capital cost for CSR programme as committed by the project proponent. Subsequently a recurring expenditure of Rs 1.0 Crores per annum till the life of the plant shall be earmarked as recurring expenditure for CSR activities. Details of the activities to be undertaken shall be submitted within six month along with road map for implementation. | Being complied.<br><ul style="list-style-type: none"> <li>➤ Approx. expenditure till date is Rs. 37 Cores.</li> <li>➤ Company has established DAV Public School</li> <li>➤ A 27 bedded Hospital for the communities.</li> <li>➤ Pipe water supply started to 5 villages in collaboration with RWSS department of Govt. of Odisha.</li> </ul>                                                                                                                                                         |
| 31         | It shall be ensured that an in-built monitoring mechanism for the CSR schemes identified is in place and annual social audit shall be got done from the nearest government institute of repute in the region. The project proponent shall also submit the status of implementation of the scheme from time to time. The achievements should be put on company's website.                                          | Community consultation is being held on quarterly basis in which sharing of progress is done.<br>The feedback/suggestion of community is being incorporated in the planning and implementation process.<br>Quarterly monitoring of livelihood support programs are carried by an external agency.                                                                                                                                                                                                    |
| 32         | Green Belt consisting of 3 tiers of plantations of native species around plant and 100m width shall be raised. The density of trees shall not be less than 2500 per ha with survival rate not less than 80 %.                                                                                                                                                                                                     | Complied.<br><ul style="list-style-type: none"> <li>• Green belt with Indigenous species is being developed in phase wise. We have planted around 3,44,258 saplings till Sept-18 in around plant &amp; township premises to cover land area of 335 Acres.</li> <li>• Survival rate is around 85%.</li> </ul> <p style="text-align: center;">In addition to this, we have also developed avenue plantation and green belt in Dhenkanal &amp; Kapilas area as required by District Administration.</p> |
| 33         | An Environmental Cell shall be created at the project site itself and shall be headed by an officer of appropriate seniority and qualification. It shall be ensured that the head of the cell shall directly report to the Head of the Organization.                                                                                                                                                              | Environmental cell is in place.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>SL.</b> | <b>B. GENERAL CONDITIONS</b>                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 1          | The treated effluents conforming to the prescribed standards only shall be re-circulated and reused within the plant. Arrangements shall be made that effluents and storm water do not get mixed.                                                                                                                                                                                                                 | Being Complied                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 2          | Sewage treatment plant shall be provided (as applicable) and the treated sewage shall be used for raising greenbelt/ plantation.                                                                                                                                                                                                                                                                                  | Being Complied                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                         |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3 | Adequate safety measures shall be provided in the plant area to check/minimize spontaneous fires in coal yard, especially during summer season. Copy of these measures with full details along with location of plant layout shall be submitted to the Ministry as well as to the Regional Office of the Ministry.                                                                                                                                                                                                                                                                                       | Being complied.                                                                                                                                                         |
| 4 | Storage facilities for auxiliary liquid fuel such as LDO /HFO/LSHS shall be made in the plant area in consultation with Department of Explosives, Nagpur. Sulphur content in the liquid fuel shall not exceed 0.5%. Disaster Management Plan shall be prepared to meet any eventuality in case of an accident taking place due to storage of oil.                                                                                                                                                                                                                                                        | Complied.                                                                                                                                                               |
| 5 | First Aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Complied                                                                                                                                                                |
| 6 | Noise levels emanating from turbines shall be so controlled such that the noise in the work zone shall be limited to 85 dB(A) from source. For people working in the high noise area, requisite personal protective equipment like earplugs/ear muffs etc. shall be provided. Workers engaged in noisy areas such as turbine area, air compressors etc. shall be periodically examined to maintain audiometric record and for treatment for any hearing loss including shifting to non-noisy /less noisy areas.                                                                                          | Noise level will be maintained as per prescribed limit. Required PPE's will be provided to people working in noise prone areas.                                         |
| 7 | Regular monitoring of ambient air ground level concentration of SO <sub>2</sub> , NO <sub>x</sub> , PM <sub>2.5</sub> & PM <sub>10</sub> and Hg shall be carried out in the impact zone and records maintained. If at any stage these levels are found to exceed the prescribed limits, necessary control measures shall be provided immediately. The location of the monitoring stations and frequency of monitoring shall be decided in consultation with SPCB. Periodic reports shall be submitted to the Regional Office of this Ministry. The data shall also be put on the website of the company. | Being Complied.<br>AAQ is being monitored regularly by MOEF&CC accredited laboratory and records maintained.<br>Copies of the reports are being submitted periodically. |
| 8 | Provision shall be made for the housing of construction labour (as applicable) 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.                                                                                                                                                                                                                                   | Presently no labour camp available at site.                                                                                                                             |

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|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9  | The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned within seven days from the date of this clearance letter, informing that the project has been accorded environmental clearance and copies of clearance letter are available with the State Pollution Control Board/Committee and may also be seen at Website of the Ministry of Environment and Forests at <a href="http://envfor.nic.in">http:// envfor.nic.in</a> . | Complied                                                                                                                                                                                                                                                                |
| 10 | A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parisad, Municipal Corporation, urban local Body and the Local NGO, if any, from whom suggestions/representations, if any, received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.                                                                                                                                                                                                                        | Complied.<br>The EC copy has been uploaded in the following Company URL:<br><a href="http://www.gmrgroup.in/energy-gmr-orissa-power-project.aspx">http://www.gmrgroup.in/energy-gmr-orissa-power-project.aspx</a>                                                       |
| 11 | The proponent shall upload the status of compliance of the stipulated environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM (PM2.s & PM1o), SO2, NOx (ambient levels as well as stack emissions) shall be displayed at a convenient location near the main gate of the company in the public domain.                           | Being Complied<br>Pl. See compliance status on Company URL:<br><a href="http://www.gmrgroup.in/energy-gmr-orissa-power-project.aspx">http://www.gmrgroup.in/energy-gmr-orissa-power-project.aspx</a><br><br>Online monitoring data is being displayed at gate No-2 & 3. |
| 12 | The environment statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Offices of the Ministry by e-mail.                                                                                  | Complied.                                                                                                                                                                                                                                                               |
| 13 | The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment and Forests, its Regional Office, Central Pollution Control Board and State Pollution Control Board. The project proponent shall upload the status of compliance of the environment of the environmental clearance conditions on their website and update the same periodically and simultaneously send the same by e-mail to the Regional Office, Ministry of Environment and Forests.                | Being complied as Specified<br><br>See company website url-<br><a href="http://www.gmrgroup.in/energy-gmr-orissa-power-project.aspx">www.gmrgroup.in/energy-gmr-orissa-power-project.aspx</a>                                                                           |



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| 14 | Regional Office of the Ministry of Environment & Forests will monitor the implementation of the stipulated conditions. A complete set of documents including Environmental Impact Assessment Report and Environment Management Plan along with the additional information submitted from time to time shall be forwarded to the Regional Office for their use during monitoring. Project proponent will up-load the compliance status in their website and up-date the same from time to time at least six monthly basis. Criteria pollutants levels including NOx (from stack & ambient air) shall be displayed at the main gate of the power plant. | Submitted,<br>Vide our letter ref: GKEL/KTPP/BBSR/MOEF/2011-12/1222 Dated 20 <sup>th</sup> September 2011. |
| 15 | Separate funds shall be allocated for implementation of environmental protection measures along with item-wise break-up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year-wise expenditure should be reported to the Ministry.                                                                                                                                                                                                                                                                                                 | Complied                                                                                                   |
| 16 | The project authorities shall inform the Regional Office as well as the Ministry regarding the date of financial closure and final approval of the project by the concerned authorities and the dates of start of land development work and commissioning of plant.                                                                                                                                                                                                                                                                                                                                                                                   | Financial Closure not done yet.                                                                            |
| 17 | Full cooperation shall be extended to the Scientists/Officers from the Ministry, Regional Office of the Ministry, CPCB/ SPCB who would be monitoring the compliance of environmental status.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Being complied as advised.                                                                                 |



*[Handwritten signature]*



# Visiontek Consultancy Services Pvt. Ltd.

(An Enviro Engineering Consulting Cell)



ISO 9001 : 2008

ISO 14001 : 2004  
OHSAS 18001 : 2007

Ref.: *Envr/06/18/R-5469*

Date: *03/07/18*

## SURFACE WATER ANALYSIS REPORT (BUFFER ZONE)

- Name of the Industry : M/s GMR Kamalanga Energy Ltd., Dhenkanal
- Sampling Location : SW1: Brahmani River Upstream  
SW2: Brahmani River Downstream  
SW3: Village Pond of Maniabeda
- Date of Sampling : 22-06-2018
- Date of Analysis : 23-06-2018 TO 29-06-2018
- Sample Collected By : VCSPL Representative in presence of Client's Representative

| Sl. No | Parameter                                         | Unit  | Testing Methods                         | Standard as per IS 2296:1992 Part C | Analysis Results |                 |                 |
|--------|---------------------------------------------------|-------|-----------------------------------------|-------------------------------------|------------------|-----------------|-----------------|
|        |                                                   |       |                                         |                                     | SW-1             | SW-2            | SW-3            |
| 1      | Colour                                            | Hazen | APHA 2120 B                             | 300.0                               | Colorless        | Colorless       | Colorless       |
| 2      | Odour                                             | --    | APHA 2150B                              | ---                                 | Unobjectionable  | Unobjectionable | Unobjectionable |
| 3      | pH                                                | --    | APHA 4500I <sup>4</sup> B               | 6.0-9.0                             | 7.41             | 7.44            | 7.28            |
| 4      | Suspended Solids                                  | NTU   | APHA 2540 D                             | ---                                 | 40.0             | 44.0            | 48.0            |
| 5      | Total Dissolved Solids                            | --    | APHA 2540 C                             | 1500.0                              | 218.0            | 272.0           | 290.0           |
| 6      | Electrical Conductivity                           | mg/l  | APHA 2510 B                             | --                                  | 512.0            | 806.2           | 606.2           |
| 7      | Temperature                                       | mg/l  | APHA 2550 B                             | --                                  | 25.0             | 25.0            | 25.0            |
| 8      | Biochemical Oxygen Demand as BOD (3 days) at 27°C | mg/l  | APHA 5210 B                             | 3.0                                 | 1.1              | 1.8             | 1.6             |
| 9      | Chemical Oxygen Demand as COD                     | mg/l  | APHA 5220 C                             | ---                                 | 4.6              | 5.6             | 5.4             |
| 10     | Dissolved Oxygen                                  | mg/l  | APHA 4500 O'C                           | 4.0 (minimum)                       | 4.8              | 5.2             | 5.4             |
| 11     | Oil & Grease                                      | mg/l  | APHA 5520 B                             | ---                                 | ND               | ND              | ND              |
| 12     | Arsenic (as As)                                   | mg/l  | APHA 3114 B                             | 0.2                                 | BDL              | BDL             | BDL             |
| 13     | Hexavalent Chromium (as Cr <sup>6+</sup> )        | mg/l  | APHA 3500 Cr B                          | 0.05                                | BDL              | BDL             | BDL             |
| 14     | Total Chromium (as Cr)                            | mg/l  | APHA 3111 B                             | ---                                 | ND               | ND              | ND              |
| 15     | Copper (as Cu)                                    | mg/l  | APHA 3111 B,C                           | 1.5                                 | BDL              | BDL             | BDL             |
| 16     | Manganese (as Mn)                                 | mg/l  | APHA 3500 Mn B                          | ---                                 | BDL              | BDL             | BDL             |
| 17     | Lead (as Pb)                                      | mg/l  | APHA 3111 B,C                           | 0.1                                 | BDL              | BDL             | BDL             |
| 18     | Zinc (as Zn)                                      | mg/l  | APHA 3111 B,C                           | 15                                  | 0.18             | 0.52            | 0.46            |
| 19     | Selenium (as Se)                                  | mg/l  | APHA 3114 B                             | 0.05                                | BDL              | BDL             | BDL             |
| 20     | Iron (as Fe)                                      | mg/l  | APHA 3500Fe B                           | 0.5                                 | 0.26             | 0.24            | 0.26            |
| 21     | Total Coli form                                   | mg/l  | APHA 9221 B                             | 5000                                | 240.0            | 280.0           | 240.0           |
| 22     | Chloride (as Cl)                                  | mg/l  | APHA 4500CT B                           | 600                                 | 38.2             | 36.4            | 40.2            |
| 23     | Sodium Absorption Ratio                           | mg/l  | By Calculation                          | ---                                 | 0.66             | 0.78            | 0.84            |
| 24     | Boron (as B)                                      | mg/l  | APHA 4500 B,B                           | ---                                 | 4.6              | 5.1             | 4.8             |
| 25     | Sulphate (as SO <sub>4</sub> )                    | mg/l  | APHA 4500 SO <sub>4</sub> <sup>2-</sup> | 400                                 | 2.4              | 2.4             | 3.4             |
| 26     | Nitrates (as NO <sub>3</sub> )                    | mg/l  | APHA 4500 NO <sub>3</sub> E             | 50                                  | ND               | ND              | ND              |
| 27     | Free Ammonia                                      | mg/l  | By Calculation                          | ---                                 | ND               | ND              | ND              |
| 28     | Fluorides (as F)                                  | mg/l  | APHA 4500 F,C                           | 1.5                                 | 0.66             | 0.71            | 0.69            |
| 29     | Sodium (as Na)                                    | mg/l  | APHA 3500 Na B                          | ---                                 | 18.2             | 21.8            | 21.2            |
| 30     | Calcium (as Ca)                                   | mg/l  | APHA 3500Ca B                           | ---                                 | 10.2             | 10.4            | 10.6            |
| 31     | Magnesium (as Mg)                                 | mg/l  | APHA 3500Mg B                           | ---                                 | 0.61             | 0.60            | 0.58            |
| 32     | Ammonical Nitrogen                                | mg/l  | APHA 4500 NH <sub>4</sub> F             | ---                                 | 3.0              | 3.1             | 3.42            |

Note: CL: Colourless, A: Agreeable, U/O: Unobjectionable, ND: Not Detected, BDL (Below Detectable Limit), Pb<0.01 mg/l, Cr<sup>6+</sup><0.05 mg/l, Mn<0.05 mg/l, Cu<0.001 mg/l, Hg<0.001 mg/l, Cd<0.01 mg/l, Se<0.005 mg/l, As<0.01 mg/l, Pb<0.01 mg/l, Zn<0.05 mg/l, Cr<0.05 mg/l, Al<0.01 mg/l, B<0.01 mg/l.

For Visiontek Consultancy Services Pvt. Ltd.



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Ref: Env/lab/15/R-8729

Date: 05/10/18

## SURFACE WATER ANALYSIS REPORT (BUFFER ZONE)-SEPT 2018

- Name of the Industry : M/s GMR Kamalanga Energy Ltd,Dhenkanal
- Sampling Location : SW1: Brahmani River Upstream  
SW2: Brahmani River Downstream  
SW3: Maniabeda
- Date of Sampling : 21-09-2018
- Date of Analysis : 22-09-2018 TO 28-09-2018
- Sample Collected By : VCSPL Representative in presence of Client's Representative

| Sl No | Parameter                                         | Unit  | Testing Methods                          | Standard as per IS 2296:1992 Part C | Analysis Results |                 |                 |
|-------|---------------------------------------------------|-------|------------------------------------------|-------------------------------------|------------------|-----------------|-----------------|
|       |                                                   |       |                                          |                                     | SW-1             | SW-2            | SW-3            |
| 1     | Colour                                            | Hazen | APHA 2120 B                              | 300.0                               | Colorless        | Colorless       | Colorless       |
| 2     | Odour                                             | --    | APHA 2150B                               | ---                                 | Unobjectionable  | Unobjectionable | Unobjectionable |
| 3     | pH                                                | --    | APHA 4500H <sup>+</sup> B                | 6.0-9.0                             | 7.36             | 7.41            | 7.21            |
| 4     | Suspended Solids                                  | NTU   | APHA 2540 D                              | ---                                 | 40.0             | 42.0            | 44.0            |
| 5     | Total Dissolved Solids                            | --    | APHA 2540 C                              | 1500.0                              | 216.0            | 278.0           | 284.0           |
| 6     | Electrical Conductivity                           | mg/l  | APHA 2510 B                              | --                                  | 448.0            | 812.0           | 578.0           |
| 7     | Temperature                                       | mg/l  | APHA 2550 B                              | --                                  | 24.0             | 24.0            | 24.0            |
| 8     | Biochemical Oxygen Demand as BOD (3 days) at 27°C | mg/l  | APHA 5210 B                              | 3.0                                 | 1.4              | 1.6             | 1.8             |
| 9     | Chemical Oxygen Demand as COD                     | mg/l  | APHA 5220 C                              | ---                                 | 4.4              | 5.2             | 4.6             |
| 10    | Dissolved Oxygen                                  | mg/l  | APHA 4500 O/C                            | 4.0 (minimum)                       | 5.6              | 6.1             | 5.8             |
| 11    | Oil & Grease                                      | mg/l  | APHA 5520 B                              | ---                                 | ND               | ND              | ND              |
| 12    | Arsenic (as As)                                   | mg/l  | APHA 3114 B                              | 0.2                                 | BDL              | BDL             | BDL             |
| 13    | Hexavalent Chromium (as Cr <sup>6+</sup> )        | mg/l  | APHA 3500 Cr B                           | 0.05                                | BDL              | BDL             | BDL             |
| 14    | Total Chromium (as Cr)                            | mg/l  | APHA 3111 B                              | ---                                 | ND               | ND              | ND              |
| 15    | Copper (as Cu)                                    | mg/l  | APHA 3111 B,C                            | 1.5                                 | BDL              | BDL             | BDL             |
| 16    | Manganese (as Mn)                                 | mg/l  | APHA 3500 Mn B                           | ---                                 | BDL              | BDL             | BDL             |
| 17    | Lead (as Pb)                                      | mg/l  | APHA 3111 B,C                            | 0.1                                 | BDL              | BDL             | BDL             |
| 18    | Zinc (as Zn)                                      | mg/l  | APHA 3111 B,C                            | 15                                  | 0.32             | 0.44            | 0.51            |
| 19    | Selenium (as Se)                                  | mg/l  | APHA 3114 B                              | 0.05                                | BDL              | BDL             | BDL             |
| 20    | Iron (as Fe)                                      | mg/l  | APHA 3500 Fe B                           | 0.5                                 | 0.21             | 0.16            | 0.18            |
| 21    | Total Coli form                                   | mg/l  | APHA 9221 B                              | 5000                                | 220.0            | 240.0           | 220.0           |
| 22    | Chloride (as Cl)                                  | mg/l  | APHA 4500 Cl <sup>-</sup> B              | 600                                 | 34.2             | 36.0            | 39.2            |
| 23    | Sodium Absorption Ratio                           | mg/l  | By Calculation                           | ---                                 | 0.68             | 0.78            | 0.84            |
| 24    | Boron (as B)                                      | mg/l  | APHA 4500 B,B                            | ---                                 | 4.8              | 5.4             | 5.2             |
| 25    | Sulphate (as SO <sub>4</sub> )                    | mg/l  | APHA 4500 SO <sub>4</sub> <sup>2-</sup>  | 400                                 | 2.8              | 3.0             | 3.6             |
| 26    | Nitrates (as NO <sub>3</sub> )                    | mg/l  | APHA 4500 NO <sub>3</sub> <sup>-</sup> E | 50                                  | ND               | ND              | ND              |
| 27    | Free Ammonia                                      | mg/l  | By Calculation                           | ---                                 | ND               | ND              | ND              |
| 28    | Fluorides (as F)                                  | mg/l  | APHA 4500 F,C                            | 1.5                                 | 0.61             | 0.66            | 0.78            |
| 29    | Sodium (as Na)                                    | mg/l  | APHA 3500 Na B                           | ---                                 | 19.2             | 24.2            | 20.8            |
| 30    | Calcium (as Ca)                                   | mg/l  | APHA 3500 Ca B                           | ---                                 | 10.2             | 9.8             | 9.2             |
| 31    | Magnesium (as Mg)                                 | mg/l  | APHA 3500 Mg B                           | ---                                 | 0.54             | 0.58            | 0.51            |
| 32    | Ammonical Nitrogen                                | mg/l  | APHA 4500 NH <sub>3</sub> -F             | ---                                 | 3.2              | 2.9             | 3.2             |

Note: CL: Colourless, A: Agreeable, U/O: Unobjectionable, ND: Not Detected, BDL (Below Detectable Limit) Values: Cu-0.025 mg/l, Mn<0.05 mg/l, Cd<0.001 mg/l, Hg<0.001 mg/l, Cr<0.01 mg/l, Se<0.005 mg/l, As<0.01 mg/l, Pb<0.01 mg/l, Zn<0.05 mg/l, Cr<sup>6+</sup><0.05 mg/l, Al<0.01 mg/l, B<0.01 mg/l.

For Visiontek Consultancy Services Pvt.Ltd.

