

# SIX MONTHLY COMPLIANCE REPORT OF ENVIRONMENTAL CLEARANCE (EC)

600 (1x600) MW THERMAL POWER PLANT

At

BADE BHANDAR VILLAGE, PUSSORE TEHSIL  
RAIGARH DISTRICT CHHATTISGARH

*Submitted to:*

Regional Office (WCZ)  
Ministry of Environment Forest, Climate Change  
Central Pollution Control Board, New Delhi &  
Chhattisgarh Environment Conservation Board, Raipur



*Submitted By:*

Environment Management Department,  
Raigarh Energy Generation Limited,  
Bade & Chhote Bhandar Village, Pussore Tehsil  
Raigarh District,  
Chhattisgarh

PERIOD: October'2019 – March'2020

**Raigarh Energy Generation Limited**  
(1x600 MW Coal Based Thermal Power Plant)

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(1x600 MW Coal Based Thermal Power Plant)

**Introduction**

Raigarh Energy Generation Limited (formerly known as Korba West Power Company Limited) has set up a coal based Thermal Power Plant of capacity 1x600 MW at village Chote Bhandar, Bade Bhandar, Sarvani & Amali Bhona, in Tehsil Pussore of Raigarh District.

REGL has been granted Environmental Clearance by Hon'ble MoEF&CC vide letter No. J-13012/57/2008-IA.II (T), dated 20.05.2010 and Amendment of Environmental Clearance for Coal transportation by way of Road for an interim period of three years dated 16.04.2015. However, the Railway project was not completed by KWPCCL and the company went under insolvency resolution process under the Insolvency and Bankruptcy code 16.

Hon'ble NCLT, Ahmedabad has approved the resolution plan submitted by Adani Power Ltd. for acquiring KWPCCL Vide order IA 236 of 2019 in C.P (I.B) No. 190/NCLT/AHM/2018 dated 24th June 2019 and subsequently Adani Power Ltd. has taken over management of KWPCCL.

Korba West Power Company Ltd. is 100% subsidiary of Adani Power Ltd. The name has been changed from Korba West Power Company Limited to **Raigarh Energy Generation Limited**.

MoEF&CC has already issued the letter for change in name of Environmental Clearance vide letter dated 22.10.2019.

The company has adopted four peripheral villages and executing most of the CSR works in those villages in the field of their livelihood, infrastructure development, cleanliness, community health and education.

REGL has engaged M/s Vardan Envirolab, Gurgaon, Haryana for their service of sampling, monitoring and analysis as per statutory guidelines.

The Thermal Power Plant was not in operation since **May'2017** due to major breakdown of generator earth failure, The unit was revived in the month of December 2019

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**COMPLIANCE STATUS ON ENVIRONMENTAL CLEARANCE**

Vide Letter no.: F. No. J 13012/57/2008-IA.II (T), dated: 20<sup>th</sup> May 2010.  
And amendment dated: 16<sup>th</sup> April 2015 & 26<sup>th</sup> November'2019

<b>A. SPECIFIC CONDITIONS</b>		
Sr. No.	CONDITIONS	COMPLIANCE STATUS
i	Detailed hydro-geological study shall be conducted and submitted within six months from an institute/organization of repute to assess impact of surface water regime. Specific mitigation measures shall be spelt out and action plan for implementation of the same shall be provided. It shall be ensured that the area drainage is not disturbed due to the proposed power plant.	Complied. Hydro-geological study has been done by reputed institute "National Institute of Hydrology, Roorkee" and report has already been submitted. The entire plant area is almost flat. There are no streams within the plant premises. Regular water quality monitoring being carried out by an agency accredited by MoEFCC & NABL.
ii	Hydro-geological study of the area shall be also reviewed annually and results submitted to the Ministry and concerned agency in the State Govt. In case adverse impact on ground water quantity and quality is observed at any stage, immediate mitigating steps to contain any adverse impact on ground water shall be undertaken.	Being Complied. The ground water quality and ground water level monitoring being carried out on regular basis Monitoring report is enclosed as <b>Annexure - I</b> .
iii	Source of water for meeting the requirement during lean season shall be specified and submitted to the Regional Office of the Ministry within three months.	Being complied. 15 MCM per year Water allocation from Mahanadi River from Water Resources Dept. Govt. of Chhattisgarh. This quantity is adequate to meet the plant's requirement, including the lean season. Vide letter no. 2705/F4-66/S-2/31/OJPRE/07, Raipur dated 25.04.2018.
iv	No ground water shall be extracted for use in operation of the power plant even in lean season.	Noted, Being Complied.
v	No water bodies including natural drainage system in the area shall be disturbed due to activities associated with the setting up/operation of the power plant.	Noted There is no water body within the power plant premises.
vi	COC of 5.0 shall be adopted.	COC of 5.0 is being maintained during plant operation.
vii	Local employable youth shall be trained in skills relevant to the project for eventual employment in the project itself. The action taken report and details thereof to this effect shall be submitted to the	Being Complied. Local employable youths were identified and were sent for ITI training in two batches of 43 and 15 in nos. respectively, training starting from Aug'11 for electrical and fitter

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	Regional Office of the Ministry and the State Govt. Dept. concerned from time to time.	trade for their employment in the company. 41 and 14 youths respectively from the first and second batch successfully completed the training and 39 were given employment in the company. They were also given one month's extensive "Power Plant Familiarization training" from OMS TPRI, Bhubaneshwar. Also 20 youths were given construction skill training. Employment given to 5 youths who successfully completed the training. Employment camps in nearby villages have been organized by the company to identify potential candidates. Cooperative of local people has been formed wherein total 93 people were given employment as plantation/ greenbelt development activities etc. Besides above 213 number of local people given employment from nearby villages/ tehsil.
viii	Additional soil for levelling 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.	The entire plant area is almost flat. There are no streams within the plant premises.
ix	Provision for installation of FGD shall be provided for future use.	Space for FGD is provided in plant layout. As per CPCB directions vide letter no. B-33014/07/2017-18/IPC-II/TPP/15860 dated 11.12.2017 "The Plant shall install FGD by March 31, 2022.
x	A stack 275 m with flue gas velocity of 25 m/s shall be installed.	Complied. Flue Stack of 275 meter constructed. The designed flue gas velocity is more than 25 m/sec.
xi	High Efficiency Electrostatic Precipitators (ESPs) shall be installed to ensure that particulate emission does not exceed 50 mg/Nm <sup>3</sup> .	A High Efficiency Electrostatic Precipitators has been provided (ESP) to meet particulate emission less than 50 mg/Nm <sup>3</sup> . Monitoring report enclosed as Annexure- I
xii	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.	Adequate dust suppression system like water sprinkling system, dust extraction system, dry fog dust suppression system has been installed throughout coal handling chain and bag filters in LHS, RHS bunkers and crusher house, The high concentrated slurry disposal system and closed transferring pipelines have installed for ash disposal in dyke.

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xiii	Utilization of 100% Fly Ash generated shall be made from 4 <sup>th</sup> year of operation of the plant. Status of implementation shall be reported to the Regional Office of the Ministry from time to time.	Plant/unit was not in operation since 22 <sup>nd</sup> May 2017 to Dec'2019. However 100% of Fly Ash utilization is achieved in FY 19-20. Fly Ash utilization report is attached as <b>Annexure - II.</b>
xiv	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.	Being Complied. We have established two nos. of silo (Intermediate and Main) with capacity of 1000 MT & 2500 MT respectively for utilization of dry fly ash. High concentration slurry disposal system is provided for disposal of unutilized ash in ash pond. Ash water circulation system is provided. Monitoring of Mercury and other heavy metals (As, Cr, Pb etc.) is being carried out regularly and report is enclosed in <b>Annexure - I.</b>
xv	Ash pond shall be lined with HDP/LDP 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.	Well-designed Ash pond with LDPE lining has been established as per guidelines of MoEFCC/CEA/CPCB. Safety measure such as bund with toe wall and lining of side slope done to prevent any leachate.
xvi	For disposal of Bottom Ash in abandoned mines (if proposed to be undertaken) it shall be ensured that the bottom and sides of the mined out areas are adequately lined with clay before Bottom Ash is filled up. The project proponent shall inform the State Pollution Control Board well in advance before undertaking the activity.	Compliance assured.
xvii	Green Belt consisting of 3 tiers of plantations of native species around plant and at least 100 m width shall be raised. Wherever 100 m width is not feasible a 50 m width shall be raised and adequate justification shall be submitted to the Ministry. Tree density shall not less than 2500 per ha with survival rate not less than 75 %.	Green belt / plantation are being developed. Approximate 2,02,048 trees have been planted. Local plant species being preferred for the plantation as fast growing with thick canopy cover adequate height with longer duration of foliage, Perennial and evergreen along with fruit bearing plants have also been planted. Greenbelt development plan has been approved by DFO, which has already been submitted. Please refer <b>Annexure - III.</b>
xviii	Two 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.	Being Complied Four villages are adopted for Development of basic amenities such as construction of approach road, community hall, school room, safe drinking water facilities have been completed in all the adopted villages. Pond deepening work has been under taken in

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		village Badebhandar and Sarwani.
xix	The project proponent shall also adequately contribute in the development of the neighbouring villages. Special package with implementation schedule for providing fluoride free potable drinking water supply in the nearby villages and schools shall be undertaken in a time bound manner.	CSR activities being carried out in consultation with district administration for the development of neighbouring villages. Also actively participating in GOI flagship program "Swachh Bharat Abhiyan" in coordination with district administration. Extended support for Mason and helper for construction of 141 individual household toilets in five nearby villages. Water analysis report attached is showing fluoride data in nearby ground water regime.
xx	A good action plan for R&R (if applicable) with package for the project affected persons be submitted and implemented as per prevalent R&R policy within three months from the date of issue of this letter.	The project is out of Abadi/population area. The R&R plan has already been prepared & implemented as per Govt. and progress report submitted to MoEF & CECB, Raipur.
xxi	An amount of Rs 6.0 Crores shall be specially earmarked for development activities for tribals of the nearby villages as committed by the project proponent vide its letter dated 23.03.2010. Specific schemes for upliftment of tribal families mentioning sustainable livelihood schemes shall be submitted to the Ministry within three months with time bound implementation and in-built monitoring programme. The above amount shall be over and above the fund earmarked for CSR activities.	The requisite amount for tribal development has been spent and the expenditure report of 6.52 crore has been submitted. Specific livelihood schemes like poultry, mushroom production and vegetable cultivation is being carried out for upliftment of the tribal families. Tailoring training is also undergoing where interested tribal women is attending the training. Self-Help-Groups (SHGs) of women have been formed in the villages to take up various livelihood schemes. Two tribal cooperatives formed to take up various livelihood schemes. These are registered cooperative society. Besides above, infrastructure development activities like construction of CC road, community hall, sanskritik manch, drinking water facility etc. have been undertaken in the tribal villages for their upliftment.
xxii	Further an amount of Rs 15.0 Crores shall be earmarked as one time capital cost for CSR programme as committed by the project proponent vide its letter dated 23.03.2010. Subsequently a recurring expenditure of Rs 3.0 Crores per annum shall be earmarked as recurring expenditure for CSR activities. Details of the activities to be undertaken shall be submitted within one month along with road map for implementation.	Being complied The CSR activities undertaken for: 1. Infrastructure development in the villages, 2. Livelihood Enhancement and training, 3. Quality Education, 4. Community Health and 5. Promotion of Sports and Culture. Activities under Swachh Bharat Abhiyan also executed in neighbouring villages. Extended support for Mason and helper for construction of 141 individual household toilets in five nearby villages. Two community shed constructed in two villages.

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		The Plant/unit was under major break down (Force Majeure) from 22 <sup>nd</sup> May 2017 to December'2019, the unit revived in the month of December2019 but due to adverse financial situation we are unable to carry out the proposed CSR activities during the FY. The activities carried earlier are being monitored and sustained by the beneficiaries.
xxiii	While identifying CSR programme the company shall conduct need based assessment for the nearby villages to study economic measures with action plan which can help in upliftment of poor section of society. Income generating projects consistent with the traditional skills of the people besides 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.	Need Assessment Study Is conducted and submitted with previous compliance report Income generating activities consists of poultry farming, mushroom production, vegetable cultivation, dairy farming, cross breeding of non-descriptive cattle, grocery shops etc. 20th batch of 4-months tailoring training is running, by end of 18th batch total 497 women has been trained out of which 120 belongs to ST. Three cooperative societies formed for income generation named Surbhi Dugdh Utpadan Samiti, Gram Vikas Kamgar Samiti and Mahanadi Gramin Mahila Bahudesiye Sahkari Samiti. These cooperative societies are functional and members are having income out of it. Executed MOA under PPP for up-gradation of ITI Saria, Raigarh district, constituted IMC. Conducted clean drive, rallies, street plays, poster competition, rangoli competition under Swachhta Abhiyan at ITI Saria. Also conducted safety awareness program to the ITI students.
xxiv	It shall be ensured that in-built monitoring mechanism for the 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.	Social audit will be carried out & scheduled in Oct-Nov'2020, and the report shall be submitted along with coming compliance report.
xxv	Harnessing solar power within the premises of the plant particularly at available roof tops shall be undertaken and status of implementation shall be submitted periodically to the Regional Office of the Ministry.	Being complied Solar geysers are installed in roof top of residential complexes within plant premises.
xxvi	A long term study on radio activity and heavy metals contents on coal to be used shall be carried out through a reputed institute. Thereafter mechanism for an in-built continuous monitoring for radio activity and heavy metals in coal and fly	Being complied The work for carrying out radioactive analysis was carried out by Board of Radiation and Isotope Technology, Department of Atomic Energy, Govt. of India. However the plant was under breakdown



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	ash (including bottom ash) shall be put in place.	since 22 <sup>nd</sup> May 2017 to Dec'2019, Heavy metals in coal and fly ash report is enclosed as <b>Annexure - I.</b>
xxvii	Mercury emissions shall also be monitored on periodic basis.	Analytical report for Mercury emission monitoring from stack is enclosed in <b>Annexure - I.</b>
xxix	Fly ash shall not be used for agricultural purpose. No mine void filling will be undertaken as an option for ash utilization without adequate lining of mine with suitable media such that no leachate shall take place at any point of time. In case, the option of mine void filling is to be adopted, proper detailed study of soil characteristics of the mine area shall be undertaken from an institute of repute and adequate clay lining shall be ascertained by the State Pollution Control Board and implementation done in close co-ordination with the State Pollution Control Board.	Noted, Compliance assured, if the activity is undertaken.
xxx	Green Belt shall also be developed around the ash pond over and above the Green Belt around the plant boundary.	Being complied Green belt / plantation are being developed. Approximate 2,02048 trees have been planted. Local plant species being preferred for the plantation as fast growing with thick canopy cover adequate height with longer duration of foliage, Perennial and evergreen along with fruit bearing plants have also been planted.
xxxii	An Environmental Cell comprising of at least one expert in environmental science/ engineering, ecology, occupational health and social science, shall be created preferably at the project site itself and shall be headed by an officer of appropriate superiority and qualification. It shall be ensured that the Head of the Cell shall directly report to the Head of the Plant who would be accountable for implementation of environmental regulations and social impact improvement/ mitigation measures.	Complied We have already established an Environmental Management Cell headed by Manager & supported by Env. Engineer, Officer, Chemist & Horticulturist.
xxxiii	The project proponent shall formulate a well laid Corporate Environmental Policy and identify and designate responsible officers at all levels of its hierarchy for ensuring adherence to the policy and compliance with the conditions stipulated in this clearance letter and other applicable environmental laws and	Noted. Complied

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	regulations.	
<b>B. GENERAL CONDITIONS</b>		
i	The treated effluents conforming to the prescribed standards only shall be re-circulated and reused within the plant. There shall be no discharge outside the plant boundary except during monsoon. Arrangements shall be made that effluents and storm water do not get mixed.	ETP has been established to treat effluents and treated water is being reuse within the premises. The concept of "Zero Discharge Condition" is implemented. Separate drainage network is established for storm water. Effluent water quality report is enclosed in <b>Annexure - I</b> .
ii	A sewage treatment plant shall be provided (as applicable) and the treated sewage shall be used for raising greenbelt/plantation.	Sewage Treatment Plants has been installed and the treated effluent is being used for plantation/greenbelt. Analysis report of STP is enclosed in <b>Annexure - I</b> .
iii	Rainwater harvesting should be adopted. Central Groundwater Authority/ Board shall be consulted for finalization of appropriate rainwater harvesting technology within a period of three months from the date of clearance and details shall be furnished.	A rain water harvesting & recharging system has already been constructed. 08 nos. of rain water harvesting ponds/well have been constructed within premises.
iv	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 plant layout shall be submitted to the Ministry as well as to the Regional Office of the Ministry.	Adequate safety personnel's are available in the plant site to take preventive control measures. Fire hydrant system provided for prevention of spontaneous fires in coal yard, especially during summer season. Emergency preparedness plan is submitted at respective authorities.
v	Storage facilities for auxiliary liquid fuel such as LDO and/ HFO/LSHS shall be made in the plant area in consultation with Department of Explosives, Nagpur. Sulphur content in the liquid fuel will 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.	The fuel such as LDO and HFO are properly stored in minimum risk area & in consultation with Department of Explosives, Nagpur after getting NOC for the same. Disaster management plan (DMP) has been prepared to handle the any eventuality in case of an accident taking place due to storage of oil.
vi	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.	Peizometric wells is already installed and the monitoring results is enclosed as <b>Annexure - I</b> .

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vii	Monitoring surface water quantity and quality 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.	The surface water samples being collected and analysis report is enclosed as <b>Annexure - I.</b>
viii	First Aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase.	First aid and sanitation for labours was provided during the construction.
ix	Noise levels emanating from turbines shall be so controlled such that the noise in the work zone shall be limited to 75 dBA. 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.	Necessary action has been taken to maintain noise levels in work zone area within 75 dB (A) from source during the plant operation. The personal protective equipment's (PPE) are provided to workers & employees working in noisy areas. Noise level monitoring is carried out regularly. Periodic audiometric check-up is being carried out.
x	Regular monitoring of 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.	Regular monitoring of SO <sub>2</sub> , NO <sub>x</sub> , PM <sub>2.5</sub> & PM <sub>10</sub> CO and Hg is being carried and records are being maintained during construction phase as well as operational phase. Environmental monitoring report is enclosed as <b>Annexure - I.</b> Three online Continuous Ambient Air Quality Monitoring Station (CAAQM) System and one mobile Van for Ambient Air Quality Monitoring have been establish within plant premise in consultation with Regional Office, Chhattisgarh Environment Conservation Board, Raigarh.
xi	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.	Complied. All necessary facilities were provided during construction for contractual labours.

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xii	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. Advertised in three newspapers Hindustan Times, Dainik bhaskar & Nai Duniya on 28.02.2010
xiii	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. Copy of Environment Clearance has been provided to concerned authority. Previous compliance status updated in company website. <a href="http://www.adanipower.com">http://www.adanipower.com</a>
xiv	A separate Environment Management Cell with qualified staff shall be set up for implementation of the stipulated environmental safeguards.	Being Complied. We have already established an Environment Management Cell with well qualified staff for implementation of the stipulated environmental safeguards.
xv	The proponent shall upload the status of compliance of the stipulated EC 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 (PM <sub>2.5</sub> & PM <sub>10</sub> ), SO <sub>2</sub> , NO <sub>x</sub> (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. Regular Environmental Monitoring report is being submitted to Regional office, MoEF, CPCB and CECB, Chhattisgarh. The environmental parameters display board provided at main gate of the plant. Previous compliance status was updated in company website. <a href="http://www.adanipower.com">http://www.adanipower.com</a>
xvi	The environment statement for each financial year ending 31 <sup>st</sup> 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	Being complied The environment Statement for the year 2018-19 has been submitted to Chhattisgarh Environment Conservation Board (CECB) vide letter no. REGL/EMD/Sept./1, dated-28/09/2019. Copy of Environmental statement report was submitted with last compliance report for the period of April'19 - September'19 via our letter no. REGL/EMD/EC/MoEF/118/19

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	shall also be sent to the respective Regional Offices of the Ministry by e-mail.	dated- 21/11/2019.
xvii	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. Six monthly Environmental Clearance compliance status report is regularly submitted to MoEF, CPCB and SPCB. The same is sent by email also. Last compliance report for the period of April'19 - September'19 had been submitted to your good office via our letter no. REGL/EMD/EC/MoEF/118/19 dated- 21/11/2019.
xviii	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.	Complied
xix	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.	Being Complied A separate fund has already been allocated for implementation of environmental protection.
xx	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.	Complied.

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xxi	Full cooperation shall be extended to the Scientists/Officers from the Ministry / Regional Office of the Ministry at Bangalore / CPCB/ SPCB who would be monitoring the compliance of environmental status.	Noted, Full co-operation shall be extended to all concerned authorities.
<b>C. Conditions of EC Amendment Letter</b>		
i	The coal shall be transported on road through mechanically covered trucks.	Noted. The vehicles are engaged for coal transporting are mechanically/tarpaulin covered and periodic refresher training is also being imparted on traffic for safety and environment rules.
ii	Avenue plantation of 2/3 rows all along the road for transportation of coal shall be carried out by the project proponent at its own expenses in consultation with the State Government Authorities.	We have requested Forest Department for budgetary proposal of 2/3 avenue plantation all along the coal transportation road. However Our plant was not in operation since 22 <sup>nd</sup> May 2017 to Dec'2019.
iii	Periodic maintenance of the roads used for transportation of coal shall be carried out by the project proponent at its own expenses and shall also facilitate the traffic control on the roads in consultation with State Government Authorities.	Noted, The proposed coal transportation road has been recently constructed by NHAI. However Our plant was not in operation since 22 <sup>nd</sup> May 2017 to Dec'2019.

# Environmental Monitoring Report



## **Submitted To:**

**M/s Raigarh Energy Generation Ltd.  
Village Chhote Bhandar, Post office Bade Bhandar,  
Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)**

## **Conducted by:**

**M/s Vardan EnviroLab  
Plot no. 82A, Sector-5, IMT Manesar, Gurugram (Haryana)**

**(Recognized by MoEF & CC, NABL Government of India)**

## PREFACE

The growing concern for environmental protection and the passing of various environmental legislations have increased the responsibilities of Ministry of Environment, Forests & Climate Change, Pollution Control boards in many folds. Besides enforcing the various environmental legislations MoEF&CC, CPCB & SPCB strive to propagate the necessity awareness regarding the various legal provisions and environmental protection measures in the country.

Electric Power scenario has occupied a significant place in the development program of the country. Development and environment can neither be separated nor ignored. In fact, they are complimentary to each other. These issues have become a concern of the community, particularly the environment impact due to industries in the developing countries.

However, the prerequisite for sustainable development is judicious planning of environmental status, likely impacts of the approach adopted on the environment including inhabitants of the locality, availability of the eco-friendly technology, emerging waste disposal and waste utilization processes, techniques of land reclamation for the restoration of aesthetic beauty and soon.

M/s Raigarh Energy Generation Ltd., Village Chhote Bhandar, Post Office Bade Bhandar, Raigarh-496100, India, has engaged M/S Vardan EnviroLab, Gurugram, (HR) to provide Environmental Services in respect of ambient air quality monitoring, stack emission, noise level monitoring & Sampling and Analysis of ground water quality, surface water quality, treated effluent sewage, effluent water from ETP, and soil for Raigarh Energy Generation Ltd., Raigarh district of Chhattisgarh, as per guidelines of MoEF & CC and CPCB Gazette notification.

M/S Vardan EnviroLab, Gurugram, (HR) has deployed entirely its own personnel, facilities and expertise for doing this service. Sampling / Monitoring Stations were identified by the Environmental Officer of Raigarh Energy Generation Ltd., The samples were analyzed partly at site and partly at our MoEF Recognized laboratory situated at Gurugram (HR).

This report presents the data generated for the period from 24<sup>th</sup> December 2019 to 26<sup>th</sup> December 2019, i.e. for Third quarter which includes sampling locations, Methodology, testing procedure and compilation for the Environmental parameters i.e. Air, Water & Noise with a view to evaluate the impact due to the thermal power plant activities.

During the course of our operations for the above task, the staff and management of Raigarh Energy Generation Ltd., were extremely co-operative. We are grateful to them for their invaluable support and assistance rendered to us during the course of the sampling and monitoring.

Date : 03/01/2020





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## **Chapter – 1.0**

### **INTRODUCTION**

M/s Raigarh Energy Generation Ltd., a subsidiary of Adani Power, is a power generation company based at Raigarh in the State of Chattisgarh. Raigarh Energy Generation Ltd., has recently commissioned its Thermal Power Plant first 600MW Unit at Village Chhote Bhandar, Post Office Bade Bhandar, Raigarh- 496100, India. The second unit of 600MW is under implementation.

Raigarh Energy Generation Ltd., is also committed towards the environment and the community it operates in. It has successfully implemented several community welfare schemes in the field of livelihood, infrastructure, community health and education which has so far benefited over 60,000 people from close to 75 villages.



**Figure No.1. Raigarh Energy Generation Ltd.**

## **Chapter – 2.0**

### **PROJECT PROFILE**

#### **2.1 Topography & Drainage**

Topography of this area is generally undulating. The area is drained by Mand River approximately 3 km. away from plant in North direction and Mahanadi River approximately 5 km. away from plant in South direction.

#### **2.2 Location**

Plant is bounded by Northern Latitudes of 21° 44' 00" to 21° 44' 42" and Eastern Longitude of 83° 16' 30" to 83° 17' 18". This area falls in the survey of India toposheet no. 64 O/1, 64 O/2, 64 O/5 and 64 O/6. The location of the mine area is shown in **Fig. No. 2**

#### **2.3 Climate**

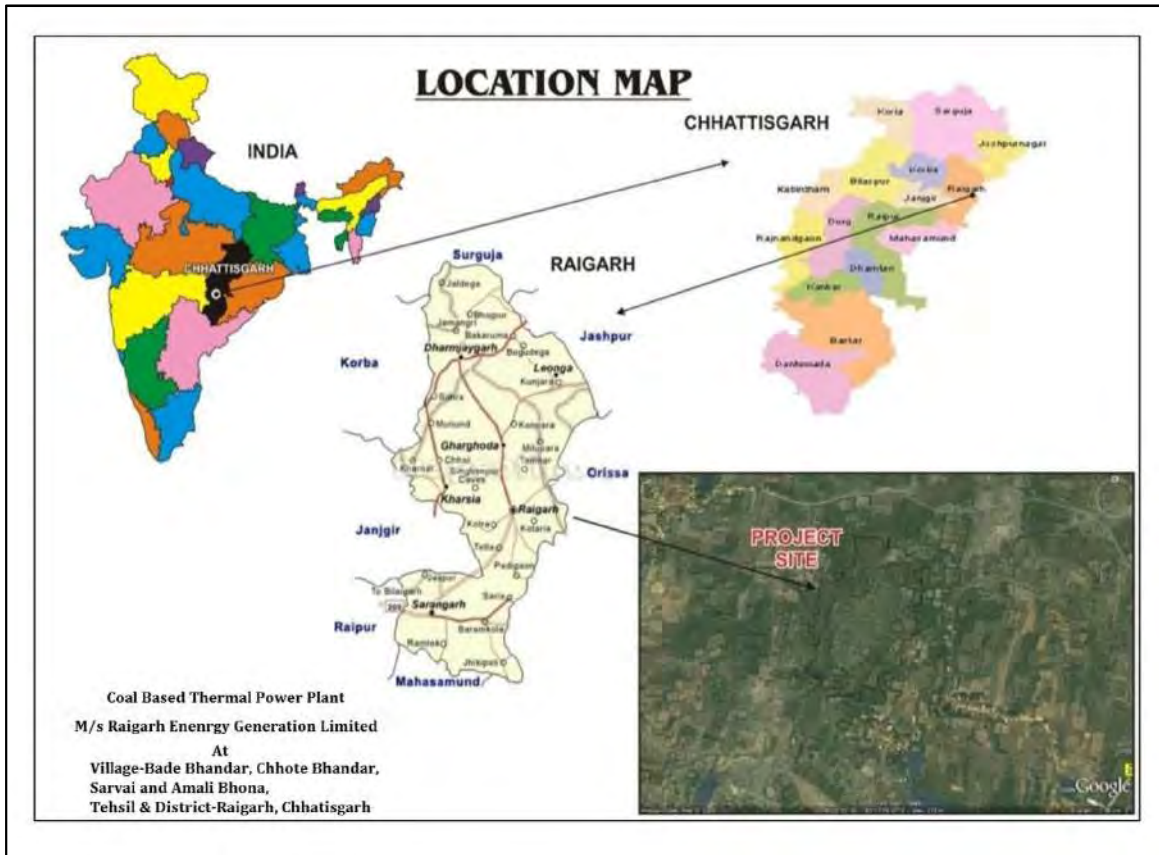
The climate of the area is Sub-tropical type. It is in the zone of humid tropic climate where temperature and humidity of air are very high. The temperature varies from the minimum - maximum temperature range between 29.5°C - 49 °C in summer, and 8°C - 25 °C in winter. The humidity varies from 35% to 82%. The annual average rainfall in the area is about 1300 mm.

#### **2.4 Communication**

The nearest railway station is Kirodimal, which is at a distance of ~23 Km towards North direction. The area is well connected with N.H. No. 216. Nearest Airport is Raipur ~250 km in SW direction. Nearest village is Bade Bhandar ~ 1 km. in North direction and nearest town is Raigarh ~21 km. in North-East direction.

#### **2.5 Location Map**

**Figure No.2. Location Map**



## **Chapter – 3.0**

### **SCOPE OF STUDY AND METHODOLOGY**

#### **3.1 Scope of Study**

The scope of study includes Environmental Services in respect of ambient air quality monitoring, noise level monitoring & Sampling and Analysis of ground water quality, surface water quality, treated effluent sewage, effluent water from ETP and soil.

#### **3.2 Methodology**

As mentioned in the scope of work covering the various Environmental components monitoring and sampling and its analysis was carried out on the basis of guidelines of Ministry of Environment Forest & Climate Control of Government of India & Chattisgarh State Pollution Control Board. Sampling procedure method reference and Analysis procedure method reference are mentioned in monitoring reports.

##### **3.2.1 Ambient Air Quality Monitoring**

The ambient air quality has been carried out at various sources of air pollution surrounding and in the Plant. The prime objective of the ambient air quality monitoring is to assess the existing air quality of the area.

The ambient air quality monitoring was carried out for 24 hours at each station. At all stations SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, CO and Mercury were monitored. All the samples collected were analyzed for quantitative analysis of various pollutants.

The ambient air quality sampling locations were identified by the Environmental Officer of Raigarh Energy Generation Ltd.

##### **3.2.2 Water Environment**

The ground water samples, surface water samples were collected from selected locations in two liter sterilized plastic cans. These samples were analyzed as per IS 10500:2012. The domestic effluent and Industrial effluent samples were collected and analyzed for parameters: pH, Total suspended solids, Biochemical Oxygen Demand, Chemical Oxygen Demand and Oil & Grease.

### **3.2.3 Noise Environment**

Sound level meter was used to know the sound levels generated due to plant activities at different locations. The measurements were taken for Equivalent sound level over a time period for day and night which is expressed in dB(A).

### **3.2.4 Soil**

The Soil samples were collected from selected locations. These samples were analyzed for Physico-Chemical parameters including heavy metals.

## Chapter – 4.0

### SAMPLING LOCATION MAP AND ANALYSIS REPORTS

#### 4.1 Ambient Air Quality Monitoring



**Figure No.3. Plan Showing Ambient Air Quality Location Map**

- Location Code: -
- A1- Site Office
  - A2- PalsadaVillage
  - A3- Kathali Village
  - A4- Chhote Bhandar Village
  - A5- Bade Bhandar Village



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## Test Report

Sample Number: VEL/REGL/A/01      Report No.: VEL/A/1912280001  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd.  
Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh)      Format No.: 5.10 F-01  
Party Reference No.: NIL  
Reporting Date: 31/12/2019  
Receipt Date: 28/12/2019      Period of Analysis: 28-31/12/2019

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
Sample collected by : Vardan EnviroLab Representative  
Sampling Location : Site Office  
Instrument Used : RDS & FPS sampler with all Accessories  
Instrument Code : VEL/RDS/01 & VEL/FPS/03  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 24/12/2019 to 25/12/2019  
Time of Monitoring : 24 hours (09:00 Hrs to 09:00 Hrs)  
Ambient Temperature (°C) : Min. 13.0      Max. 25.0  
Surrounding Activity : Human and Vehicular activities  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : ---  
Sampling & Analysis Protocol : IS-5182  
Parameter Required : PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>x</sub>, SO<sub>2</sub>, CO, Hg

S. No.	Parameter	Protocol	Result	Unit	NAAQS* Limit
1.	Particulate Matter (PM <sub>2.5</sub> )	#SOP No. VEL/SOP/01, Section No. SP 63	38.6	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS: 5182 (P-23), 2006	72.5	µg/m <sup>3</sup>	100
3.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	23.1	µg/m <sup>3</sup>	80
4.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	15.2	µg/m <sup>3</sup>	80
5.	Carbon Monoxide (CO)	IS: 5182 (P-10), Reaffirmed-2003	0.86	mg/m <sup>3</sup>	4
6.	Mercury as Hg	CPCB Guidelines	BDL (DL 0.5)	ng/m <sup>3</sup>	..

\* NAAQS - National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 18.11.2009.

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## Test Report

Sample Number: VEL/ REGL /A/02 Report No.: VEL/A/1912280002  
 Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh) Format No.: 5.10 F-01  
 Party Reference No.: NIL  
 Reporting Date: 31/12/2019  
 Receipt Date: 28/12/2019 Period of Analysis: 28-31/12/2019

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
 Sample collected by : Vardan EnviroLab Representative  
 Sampling Location : Village Palsada  
 Instrument Used : RDS & FPS sampler with all Accessories  
 Instrument Code : VEL/RDS/01 & VEL/FPS/03  
 Instrument Calibration Status : Calibrated  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 25/12/2019 to 26/12/2019  
 Time of Monitoring : 24 hours(10:00 Hrs to 10:00 Hrs)  
 Ambient Temperature (°C) : Min. 15.0 Max. 25.0  
 Surrounding Activity : Human and Vehicular activities  
 Scope of Monitoring : Regulatory Requirement  
 Control measure if Any : ---  
 Sampling & Analysis Protocol : IS-5182  
 Parameter Required : PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>x</sub>, SO<sub>2</sub>, CO, Hg

S. No.	Parameter	Protocol	Result	Unit	NAAQS* Limit
1.	Particulate Matter (PM <sub>2.5</sub> )	#SOP No. VEL/SOP/01, Section No. SP 63	37.0	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS: 5182 (P-23), 2006	69.8	µg/m <sup>3</sup>	100
3.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	22.5	µg/m <sup>3</sup>	80
4.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	13.2	µg/m <sup>3</sup>	80
5.	Carbon Monoxide (CO)	IS: 5182 (P-10), Reaffirmed-2003	0.75	mg/m <sup>3</sup>	4
6.	Mercury as Hg	CPCB Guidelines	BDL (DL 0.5)	ng/m <sup>3</sup>	..

\* NAAQS – National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 18.11.2009.

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## Test Report

Sample Number: VEL/REGL/A/03 Report No.: VEL/A/1912280003  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post office  
Bade Bhandar, Tehsil Pussore, Dist.-  
Raigarh -496100 (Chhattisgarh) Party Reference No.: NIL  
Reporting Date: 31/12/2019  
Receipt Date: 28/12/2019 Period of Analysis: 28-31/12/2019

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
Sample collected by : Vardan EnviroLab Representative  
Sampling Location : Village Kathli  
Instrument Used : RDS & FPS sampler with all Accessories  
Instrument Code : VEL/RDS/03 & VEL/FPS/01  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 25/12/2019 to 26/12/2019  
Time of Monitoring : 24 hours(11:00 Hrs to 11:00 Hrs)  
Ambient Temperature (°C) : Min. 15.0 Max. 25.0  
Surrounding Activity : Human and Vehicular activities  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : ---  
Sampling & Analysis Protocol : IS-5182  
Parameter Required : PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>x</sub>, SO<sub>2</sub>, CO, Hg

S. No.	Parameter	Protocol	Result	Unit	NAAQS* Limit
1.	Particulate Matter (PM <sub>2.5</sub> )	#SOP No. VEL/SOP/01, Section No. SP 63	41.2	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS: 5182 (P-23), 2006	70.5	µg/m <sup>3</sup>	100
3.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	24.2	µg/m <sup>3</sup>	80
4.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	9.2	µg/m <sup>3</sup>	80
5.	Carbon Monoxide (CO)	IS: 5182 (P-10), Reaffirmed-2003	0.78	mg/m <sup>3</sup>	4
6.	Mercury as Hg	CPCB Guidelines	BDL (DL 0.5)	ng/m <sup>3</sup>	--

\* NAAQS - National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec-3(i)] 18.11.2009.

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NOTE: a) The results listed refer only to the tested samples & applicable parameters  
b) Total liabilities of our lab will be restricted to the invoice amount only  
c) The sample will be destroyed after retention time unless otherwise specified

## Test Report

Sample Number: VEL/ REGL /A/04 Report No.: VEL/A/1912280004  
 Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
 Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh) Party Reference No.: NIL  
 Reporting Date: 31/12/2019  
 Receipt Date: 28/12/2019 Period of Analysis: 28-31/12/2019

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
 Sample collected by : Vardan EnviroLab Representative  
 Sampling Location : Village Chhote Bhandar  
 Instrument Used : RDS & FPS sampler with all Accessories  
 Instrument Code : VEL/RDS/02 & VEL/FPS/04  
 Instrument Calibration Status : Calibrated  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 24/12/2019 to 25/12/2019  
 Time of Monitoring : 24 hours(11:00 Hrs to 11:00 Hrs)  
 Ambient Temperature (°C) : Min. 13.0 Max. 25.0  
 Surrounding Activity : Human and Vehicular activities  
 Scope of Monitoring : Regulatory Requirement  
 Control measure if Any : ---  
 Sampling & Analysis Protocol : IS-5182  
 Parameter Required : PM<sub>2.5</sub>, PM<sub>10</sub>, NO<sub>x</sub>, SO<sub>2</sub>, CO, Hg

S. No.	Parameter	Protocol	Result	Unit	NAAQS* Limit
1.	Particulate Matter (PM <sub>2.5</sub> )	#SOP No. VEL/SOP/01, Section No. SP 63	39.5	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS: 5182 (P-23), 2006	75.1	µg/m <sup>3</sup>	100
3.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	25.2	µg/m <sup>3</sup>	80
4.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	10.2	µg/m <sup>3</sup>	80
5.	Carbon Monoxide (CO)	IS: 5182 (P-10), Reaffirmed-2003	0.89	mg/m <sup>3</sup>	4
6.	Mercury as Hg	CPCB Guidelines	BDL (DL 0.5)	ng/m <sup>3</sup>	--

\* NAAQS – National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 18.11.2009.

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## Test Report

Sample Number:	VEL/ REGL /A/05	Report No.:	VEL/A/1912280005
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Receipt Date:	28/12/2019	Party Reference No.:	NIL
		Reporting Date:	31/12/2019
		Period of Analysis:	28-31/12/2019

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Client Representative	: Mr. Amit Kumar Soni
Sample collected by	: Vardan EnviroLab Representative
Sampling Location	: Village Bade Bhandar
Instrument Used	: RDS & FPS sampler with all Accessories
Instrument Code	: VEL/RDS/02 & VEL/FPS/04
Instrument Calibration Status	: Calibrated
Meteorological condition during monitoring	: Clear Sky
Date of Monitoring	: 25/12/2019 to 26/12/2019
Time of Monitoring	: 24 hours(11:30 Hrs to 11:30 Hrs)
Ambient Temperature (°C)	: Min. 15.0 Max. 25.0
Surrounding Activity	: Human and Vehicular activities
Scope of Monitoring	: Regulatory Requirement
Control measure if Any	: ---
Sampling & Analysis Protocol	: IS-5182
Parameter Required	: PM <sub>2.5</sub> , PM <sub>10</sub> , NO <sub>x</sub> , SO <sub>2</sub> , CO, Hg

S. No.	Parameter	Protocol	Result	Unit	NAAQS* Limit
1.	Particulate Matter (PM <sub>2.5</sub> )	#SOP No. VEL/SOP/01, Section No. SP 63	39.9	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS: 5182 (P-23), 2006	76.0	µg/m <sup>3</sup>	100
3.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	25.1	µg/m <sup>3</sup>	80
4.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	9.41	µg/m <sup>3</sup>	80
5.	Carbon Monoxide (CO)	IS: 5182 (P-10), Reaffirmed-2003	0.83	mg/m <sup>3</sup>	4
6.	Mercury as Hg	CPCB Guidelines	BDL (DL 0.5)	ng/m <sup>3</sup>	..

\* NAAQS – National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 18.11.2009.

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## 4.2 Noise Level Monitoring



**Figure No.4. Plan Showing Noise Level Monitoring Location Map**

### **Ambient Noise Level Monitoring Locations**

Location Code: -  
N1- Field Hostel  
N2- Palsada Village  
N3- Kathali Village  
N4- Chote Bhandar Village  
N5- Bade Bhandar Village

### **Work Zone Noise Level Monitoring Locations**

Location Code: -  
N6- Site Office  
N7- Behind Switchyard  
N8- Railway Entry Gate

## Test Report

Sample Number:	VEL/REGL/AN/01	Report No.:	VEL/AN/1912280001
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Reporting Date:	31/12/2019
		Receipt Date:	28/12/2019

**Sample Description:** AMBIENT NOISE LEVEL MONITORING

**General Information:-**

Client Representative	: Mr. Amit Kumar Soni
Sample collected by	: Vardan EnviroLab Representative
Sampling Location	: Field Hostel
Instrument Used	: Sound Level Meter
Instrument Code	: VEL/S/SLM/04
Instrument Calibration Status	: Calibrated
Meteorological condition during monitoring	: Clear Sky
Date of Monitoring	: 24/12/2019 to 25/12/2019
Time of Monitoring	: 06:00 AM to 06:00AM
Ambient Temperature (°C)	: Min. 13.0 Max. 25.0
Surrounding Activity	: Human and Vehicular Activities
Scope of Monitoring	: Regulatory Requirement
Control measure if Any	: No any
Sampling & Analysis Protocol	: IS-9989 R-2003
Sampling Duration	: 24 Hours
Parameter Required	: As per Work Order

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	$L_{max}$	IS 9989 R-2003	67.2	55.3	dB(A)
2.	$L_{min}$	IS 9989 R-2003	42.1	40.1	dB(A)
3.	$L_{eq}$	IS 9989 R-2003	53.12	43.21	dB(A)
4.	CPCB Limits in dB(A*) Leq (Industrial Area)		75.00	70.00	dB(A)

Note: \*A "decibel" is a unit in which noise is measured.

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NABL Accredited | ISO 9001|ISO 14001|ISO 45001

## Test Report

Sample Number: VEL/ REGL /AN/02 Report No.: VEL/AN/1912280002  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post office  
Bade Bhandar, Tehsil Pussore, Dist.-  
Raigarh -496100 (Chhattisgarh) Party Reference No.: NIL  
Reporting Date: 31/12/2019  
Receipt Date: 28/12/2019

Sample Description: AMBIENT NOISE LEVEL MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
Sample collected by : Vardan EnviroLab Representative  
Sampling Location : Village Palsada  
Instrument Used : Sound Level Meter  
Instrument Code : VEL/S/SLM/04  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 25/12/2019 to 26/12/2019  
Time of Monitoring : 06:00 AM to 06:00AM  
Ambient Temperature (°C) : Min. 15.0 Max. 25.0  
Surrounding Activity : Human and Vehicular Activities  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : No any  
Sampling & Analysis Protocol : IS-9989 R-2003  
Sampling Duration : 24 Hours  
Parameter Required : As per Work Order

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	L <sub>max</sub>	IS 9989 R-2003	65.2	53.1	dB(A)
2.	L <sub>min</sub>	IS 9989 R-2003	41.8	36.2	dB(A)
3.	L <sub>eq</sub>	IS 9989 R-2003	53.47	44.51	dB(A)
4.	CPCB Limits in dB(A)* Leq (Residential Area)	-	55.00	45.00	dB(A)

Note: \*A "decibel" is a unit in which noise is measured.

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NOTE: a) The results listed refer only to the tested samples & applicable parameters  
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c) The sample will be destroyed after retention time unless otherwise specified



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## Test Report

Sample Number: VEL/ REGL /AN/03 Report No.: VEL/AN/1912280003  
 Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
 Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh) Party Reference No.: NIL  
 Reporting Date: 31/12/2019  
 Receipt Date: 28/12/2019

Sample Description: AMBIENT NOISE LEVEL MONITORING

General Information:-  
 Client Representative : Mr. Amit Kumar Soni  
 Sample collected by : Vardan EnviroLab Representative  
 Sampling Location : Village Kathli  
 Instrument Used : Sound Level Meter  
 Instrument Code : VEL/S/SLM/02  
 Instrument Calibration Status : Calibrated  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 25/12/2019 to 26/12/2019  
 Time of Monitoring : 06:00 AM to 06:00AM  
 Ambient Temperature (°C) : Min. 15.0 Max. 25.0  
 Surrounding Activity : Human and Vehicular Activities  
 Scope of Monitoring : Regulatory Requirement  
 Control measure if Any : No any  
 Sampling & Analysis Protocol : IS-9989 R-2003  
 Sampling Duration : 24 Hours  
 Parameter Required : As per Work Order

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	L <sub>max</sub>	IS 9989 R-2003	61.2	48.2	dB(A)
2.	L <sub>min</sub>	IS 9989 R-2003	41.7	35.7	dB(A)
3.	L <sub>eq</sub>	IS 9989 R-2003	51.40	41.79	dB(A)
4.	CPCB Limits in dB(A*) L <sub>eq</sub> ( Residential Area )		55.00	45.00	dB(A)

Note: \*A "decibel" is a unit in which noise is measured.

(Checked By)

Approved By:   
 Date:

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Corp. Office: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram - 122052, Haryana

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## Test Report

Sample Number:	VEL/ REGL /AN/04	Report No.:	VEL/AN/1912280004
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Reporting Date:	31/12/2019
		Receipt Date:	28/12/2019

Sample Description: AMBIENT NOISE LEVEL MONITORING

### General Information:-

Client Representative	: Mr. Amit Kumar Soni
Sample collected by	: Vardan EnviroLab Representative
Sampling Location	: Village Chhote Bhandar
Instrument Used	: Sound Level Meter
Instrument Code	: VEL/S/SLM/02
Instrument Calibration Status	: Calibrated
Meteorological condition during monitoring	: Clear Sky
Date of Monitoring	: 24/12/2019 to 25/12/2019
Time of Monitoring	: 06:00 AM to 06:00AM
Ambient Temperature (°C)	: Min. 13.0 Max. 25.0
Surrounding Activity	: Human and Vehicular Activities
Scope of Monitoring	: Regulatory Requirement
Control measure if Any	: No any
Sampling & Analysis Protocol	: IS-9989 R-2003
Sampling Duration	: 24 Hours
Parameter Required	: As per Work Order

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	L <sub>max</sub>	IS 9989 R-2003	63.5	52.2	dB(A)
2.	L <sub>min</sub>	IS 9989 R-2003	42.1	36.8	dB(A)
3.	L <sub>eq</sub>	IS 9989 R-2003	53.18	44.41	dB(A)
4.	CPCB Limits in dB(A)* L <sub>eq</sub> ( Residential Area )	-	55.00	45.00	dB(A)

Note: \* A "decibel" is a unit in which noise is measured.

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Page 1 of 1

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## Test Report

Sample Number:	VEL/ REGL /AN/05	Report No.:	VEL/AN/1912280005
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office- Bade Bhandar, Tehsil Pussore, Dist- Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Reporting Date:	31/12/2019
		Receipt Date:	28/12/2019

Sample Description: **AMBIENT NOISE LEVEL MONITORING**

### General Information:

Client Representative	: Mr. Amit Kumar Soni
Sample collected by	: Vardan EnviroLab Representative
Sampling Location	: Village Bade Bhandar
Instrument Used	: Sound Level Meter
Instrument Code	: VEL/S/SLM/03
Instrument Calibration Status	: Calibrated
Meteorological condition during monitoring	: Clear Sky
Date of Monitoring	: 25/12/2019 to 26/12/2019
Time of Monitoring	: 06:00 AM to 06:00AM
Ambient Temperature (°C)	: Min. 15.0 Max. 25.0
Surrounding Activity	: Human and Vehicular Activities
Scope of Monitoring	: Regulatory Requirement
Control measure if Any	: No any
Sampling & Analysis Protocol	: IS-9989 R-2003
Sampling Duration	: 24 Hours
Parameter Required	: As per Work Order

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	L <sub>max</sub>	IS 9989 R-2003	68.2	58.3	dB(A)
2.	L <sub>min</sub>	IS 9989 R-2003	42.8	39.2	dB(A)
3.	L <sub>eq</sub>	IS 9989 R-2003	54.10	43.72	dB(A)
4.	CPCB Limits in dB(A*) Leq ( Residential Area )	-	55.00	45.00	dB(A)

Note: \*A "decibel" is a unit in which noise is measured.

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## Test Report

Sample Number:	VEL/REGL/N/01	Report No.:	VEL/N/1912280001
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Reporting Date:	31/12/2019
		Receipt Date:	28/12/2019

**Sample Description: WORK ZONE NOISE LEVEL MONITORING**

<b>General Information:-</b>	
Client Representative	: Mr. Amit Kumar Soni
Sample collected by	: Vardan EnviroLab Team
Sampling Location	: Site Office
Instrument Used	: Sound Level Meter
Instrument Code	: VEL/S/SLM/05
Instrument Calibration Status	: Calibrated
Meteorological condition during monitoring	: Clear Sky
Date of Monitoring	: 24/12/2019
Time of Monitoring	: 09:00 AM to 09:30AM
Ambient Temperature (°C)	: Min. 13.0 Max. 25.0
Scope of Monitoring	: Regulatory Requirement
Control measure if Any	: No any
Sampling & Analysis Protocol	: IS-9989 R-2003
Sampling Duration	: 24 Hours
Parameter Required	: As per Work Order

S. No.	Parameters	Protocol	Test Result dB (A)	Unit
1.	Leq	IS 9989 R-2003	58.20	dB(A)
2.	Limits in dB(A) Leq	-	85	dB(A)

Note: \* A "decibel" is a unit in which noise is measured.

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## Test Report

Sample Number:	VEL/REGL/N/02	Report No.:	VEL/N/1912280002
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Reporting Date:	31/12/2019
		Receipt Date:	28/12/2019

Sample Description: **WORK ZONE NOISE LEVEL MONITORING**

### General Information:-

Client Representative	: Mr. Amit Kumar Soni
Sample collected by	: Vardan EnviroLab Team
Sampling Location	: Behind Switchyard
Instrument Used	: Sound Level Meter
Instrument Code	: VEL/S/SLM/05
Instrument Calibration Status	: Calibrated
Meteorological condition during monitoring	: Clear Sky
Date of Monitoring	: 24/12/2019
Time of Monitoring	: 10:00 AM to 10:30AM
Ambient Temperature (°C)	: Min. 13.0      Max. 25.0
Scope of Monitoring	: Regulatory Requirement
Control measure if Any	: No any
Sampling & Analysis Protocol	: IS-9989 R-2003
Sampling Duration	: 24 Hours
Parameter Required	: As per Work Order

S. No.	Parameters	Protocol	Test Result dB (A)	Unit
1.	Leq	IS 9989 R-2003	53.22	dB(A)
2.	Limits in dB(A') Leq	-	85	dB(A)

Note: \*A "decibel" is a unit in which noise is measured.

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## Test Report

Sample Number:	VEL/REGL/N/03	Report No.:	VEL/N/1912280003
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Reporting Date:	31/12/2019
		Receipt Date:	28/12/2019

Sample Description: **WORK ZONE NOISE LEVEL MONITORING**

General Information:-	
Client Representative	: Mr. Amit Kumar Soni
Sample collected by	: Vardan EnviroLab Team
Sampling Location	: Railway Entry Gate
Instrument Used	: Sound Level Meter
Instrument Code	: VEL/S/SLM/05
Instrument Calibration Status	: Calibrated
Meteorological condition during monitoring	: Clear Sky
Date of Monitoring	: 24/12/2019
Time of Monitoring	: 11:00 PM to 11:30PM
Ambient Temperature (°C)	: Min. 13.0 Max. 25.0
Scope of Monitoring	: Regulatory Requirement
Control measure if Any	: No any
Sampling & Analysis Protocol	: IS-9989 R-2003
Sampling Duration	: 24 Hours
Parameter Required	: As per Work Order

S. No.	Parameters	Protocol	Test Result dB (A)	Unit
1.	Leq	IS 9989 R-2003	54.20	dB(A)
2.	Limits in dB(A) Leq		85	dB(A)

Note: \*A "decibel" is a unit in which noise is measured.

  
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### 4.3 Ground water Quality Analysis



**Figure No.5. Plan Showing Ground Water Quality Monitoring Location Map**

Location Code: -

- GW1- Site Office
- GW2- PalsadaVillage
- GW3- Kathali Village
- GW4- Chote Bhandar Village
- GW5- Bade Bhandar Village



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## Test Report

Sample Number:	VEL/REGL/W/01	Report No.:	VEL/W/1912280001
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussoore, Dist.-Raigarh - 496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	GROUND WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Site Office	Reporting Date:	31/12/2019
Sample Collected by:	Vardan EnviroLab Representative	Period of Analysis:	28-31/12/2019
Preservation:	Refrigerated	Receipt Date:	28/12/2019
Parameter Required:	As per IS 10500-2012	Sampling Date:	24/12/2019
Sampling and Analysis Protocol:	IS-10500-2012, APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Requirement (Acceptable Limit)	Permissible limit in the Absence of Alternate Source
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H* B	7.35	--	6.5 to 8.5	No Relaxation
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	*BDL (**DL 5Hazen)	Hazen	5	15
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	*BDL (**DL 0. 1 NTU)	NTU	1	5
4.	Odour	APHA (22 <sup>nd</sup> Edition)2012, 2150 B	Agreeable	--	Agreeable	Agreeable
5.	Taste	APHA (22 <sup>nd</sup> Edition)2012, 2160 B	Agreeable	--	Agreeable	Agreeable
6.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	185.2	mg/l	200	600
7.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	62.3	mg/l	75	200
8.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	156.0	mg/l	200	600
9.	Chloride as Cl	APHA (22 <sup>nd</sup> Edition)2012, 4500-Cl B	55.8	mg/l	250	1000
10.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	*BDL(**DL 0.2mg/l)	mg/l	0.2	1
11.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN* D	*BDL(**DL 0.02 mg/l)	mg/l	0.05	No Relaxation
12.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	7.23	mg/l	30	100
13.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	298.0	mg/l	500	2000
14.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	26.8	mg/l	200	400
15.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F* D	0.32	mg/l	1.0	1.5
16.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	0.36	mg/l	45	No Relaxation
17.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.24	mg/l	0.3	No relaxation
18.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.03	0.2
19.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l	0.5	1
20.	Total Chromium as Cr	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.05	No Relaxation

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## Test Report

Sample No.:		VEL/REGL/W/01		Report No:		VEL/AV/1912280001	
S. No	Parameter	Test-Method	Result	Unit	Limits of IS:10500-2012		
					Requirement (Acceptable) Limit	Permissible limit in the Absence of Alternate Source	
21.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l	0.001	0.002	
22.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l	0.2	1.0	
23.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	5	15	
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.05	1.5	
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l	0.1	0.3	
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l	0.003	No Relaxation	
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l	0.01	No Relaxation	
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l	0.01	No Relaxation	
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l	0.01	0.05	
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l	0.001	No Relaxation	
31.	Total Coliform	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Shall not be detectable in any 100 ml sample		
32.	E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Shall not be detectable in any 100 ml sample		

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

  
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## Test Report

Sample Number:	VEL/REGL/W/02	Report No.:	VEL/W/1912280002
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	GROUND WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Village Palsada	Reporting Date:	31/12/2019
Sample Collected by:	Vardan EnviroLab Representative	Period of Analysis:	28-31/12/2019
Preservation:	Refrigerated	Receipt Date:	28/12/2019
Parameter Required:	As per IS 10500-2012	Sampling Date:	24/12/2019
Sampling and Analysis Protocol:	IS-10500-2012, APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Requirement (Acceptable Limit)	Permissible limit in the Absence of Alternate Source
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.51	--	6.5 to 8.5	No Relaxation
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	*BDL (**DL 5Hazen)	Hazen	5	15
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	*BDL (**DL 0.1 NTU)	NTU	1	5
4.	Odour	APHA (22 <sup>nd</sup> Edition)2012, 2150 B	Agreeable	--	Agreeable	Agreeable
5.	Taste	APHA (22 <sup>nd</sup> Edition)2012, 2160 B	Agreeable	--	Agreeable	Agreeable
6.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	201.3	mg/l	200	600
7.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	70.2	mg/l	75	200
8.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	198.0	mg/l	200	600
9.	Chloride as Cl	APHA (22 <sup>nd</sup> Edition)2012, 4500-Cl B	60.3	mg/l	250	1000
10.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	*BDL (**DL 0.2mg/l)	mg/l	0.2	1
11.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN <sup>-</sup> D	*BDL (**DL 0.02 mg/l)	mg/l	0.05	No Relaxation
12.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	6.35	mg/l	30	100
13.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	322.0	mg/l	500	2000
14.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	26.7	mg/l	200	400
15.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F <sup>-</sup> D	0.40	mg/l	1.0	1.5
16.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	0.34	mg/l	45	No Relaxation
17.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.29	mg/l	0.3	No relaxation
18.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL (**DL 0.03 mg/l)	mg/l	0.03	0.2
19.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL (**DL 0.1 mg/l)	mg/l	0.5	1
20.	Total Chromium as Cr	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL (**DL 0.03 mg/l)	mg/l	0.05	No Relaxation

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## Test Report

Sample No.:		VEL/REGL/W/02		Report No:		VEL/W/1912280002	
S. No	Parameter	Test-Method	Result	Unit	Limits of IS:10500-2012		
					Requirement (Acceptable) Limit	Permissible limit in the Absence of Alternate Source	
21.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l	0.001	0.002	
22.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l	0.2	1.0	
23.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	5	15	
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.05	1.5	
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mmg/l)	mg/l	0.1	0.3	
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l	0.003	No Relaxation	
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l	0.01	No Relaxation	
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l	0.01	No Relaxation	
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l	0.01	0.05	
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l	0.001	No Relaxation	
31.	Total Coliform	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Shall not be detectable in any 100 ml sample		
32.	E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Shall not be detectable in any 100 ml sample		

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

(Checked By)  
N/D



NOTE: a) The results listed refer only to the tested samples & applicable parameters.  
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# Vardan EnviroLab

Laboratory: Plot No. 24 & 25, Narayan Vihar, B-Block, Jaipur - 302035, Rajasthan

Corp. Office: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram - 122052, Haryana

NABL Accredited | ISO 9001|ISO 14001|ISO 45001

## Test Report

Sample Number:	VEL/REGL/W/03	Report No.:	VEL/W/1912280003
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh - 496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	GROUND WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Village Kathli	Reporting Date:	31/12/2019
Sample Collected by:	Vardan EnviroLab Representative	Period of Analysis:	28-31/12/2019
Preservation:	Refrigerated	Receipt Date:	28/12/2019
Parameter Required:	As per IS 10500-2012	Sampling Date:	25/12/2019
Sampling and Analysis Protocol:	IS-10500-2012,APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Requirement (Acceptable Limit)	Permissible limit in the Absence of Alternate Source
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H' B	7.33	--	6.5 to 8.5	No Relaxation
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	*BDL (**DL 5Hazen)	Hazen	5	15
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	*BDL (**DL 0.1 NTU)	NTU	1	5
4.	Odour	APHA (22 <sup>nd</sup> Edition)2012, 2150 B	Agreeable	--	Agreeable	Agreeable
5.	Taste	APHA (22 <sup>nd</sup> Edition)2012, 2160 B	Agreeable	--	Agreeable	Agreeable
6.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	376.5	mg/l	200	600
7.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	105.8	mg/l	75	200
8.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	311.0	mg/l	200	600
9.	Chloride as Cl	APHA (22 <sup>nd</sup> Edition)2012, 4500-Cl' B	89.6	mg/l	250	1000
10.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	*BDL(**DL 0.2mg/l)	mg/l	0.2	1
11.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN' D	*BDL(**DL 0.02 mg/l)	mg/l	0.05	No Relaxation
12.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	27.34	mg/l	30	100
13.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	524.0	mg/l	500	2000
14.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	54.6	mg/l	200	400
15.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F' D	0.52	mg/l	1.0	1.5
16.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	3.01	mg/l	45	No Relaxation
17.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.29	mg/l	0.3	No relaxation
18.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.03	0.2
19.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l	0.5	1
20.	Total Chromium as Cr	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.05	No Relaxation

(Checked By)



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# Vardan EnviroLab

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 Corp. Office: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram - 122052, Haryana  
 NABL Accredited | ISO 9001 | ISO 14001 | ISO 45001

## Test Report

Sample No.:		VEL/REGL/W/03		Report No:		VEL/W/1912280003	
S. No	Parameter	Test-Method	Result	Unit	Limits of IS:10500-2012		
					Requirement (Acceptable) Limit	Permissible limit in the Absence of Alternate Source	
21.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l	0.001	0.002	
22.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l	0.2	1.0	
23.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	5	15	
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.05	1.5	
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l	0.1	0.3	
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l	0.003	No Relaxation	
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l	0.01	No Relaxation	
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l	0.01	No Relaxation	
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l	0.01	0.05	
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l	0.001	No Relaxation	
31.	Total Coliform	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Shall not be detectable in any 100 ml sample		
32.	E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Shall not be detectable in any 100 ml sample		

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit  
 #These parameter are not covered in our NABL scope.

(Checked By)



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NABL Accredited | ISO 9001 | ISO 14001 | ISO 45001

## Test Report

Sample Number:	VEL/REGL/W/04	Report No.:	VEL/W/1912280004
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh - 496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	GROUND WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Village Chhote Bhandar	Reporting Date:	31/12/2019
Sample Collected by:	Vardan EnviroLab Representative	Period of Analysis:	28-31/12/2019
Preservation:	Refrigerated	Receipt Date:	28/12/2019
Parameter Required:	As per IS 10500-2012	Sampling Date:	24/12/2019
Sampling and Analysis Protocol:	IS-10500-2012, APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Requirement (Acceptable Limit)	Permissible limit in the Absence of Alternate Source
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.56	--	6.5 to 8.5	No Relaxation
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	*BDL (**DL 5Hazen)	Hazen	5	15
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	*BDL (**DL 0.1 NTU)	NTU	1	5
4.	Odour	APHA (22 <sup>nd</sup> Edition)2012, 2150 B	Agreeable	--	Agreeable	Agreeable
5.	Taste	APHA (22 <sup>nd</sup> Edition)2012, 2160 B	Agreeable	--	Agreeable	Agreeable
6.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	316.5	mg/l	200	600
7.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	101.8	mg/l	75	200
8.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	223.0	mg/l	200	600
9.	Chloride as Cl	APHA (22 <sup>nd</sup> Edition)2012, 4500-Cl <sup>-</sup> B	75.6	mg/l	250	1000
10.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	*BDL(**DL 0.2mg/l)	mg/l	0.2	1
11.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN <sup>-</sup> D	*BDL(**DL 0.02 mg/l)	mg/l	0.05	No Relaxation
12.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	15.19	mg/l	30	100
13.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	435.0	mg/l	500	2000
14.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	42.3	mg/l	200	400
15.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F <sup>-</sup> D	0.39	mg/l	1.0	1.5
16.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	4.02	mg/l	45	No Relaxation
17.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.25	mg/l	0.3	No relaxation
18.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.03	0.2
19.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l	0.5	1
20.	Total Chromium as Cr	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.05	No Relaxation

(Checked By)

(Approved By)



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Corp. Office: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram - 122052, Haryana  
NABL Accredited | ISO 9001|ISO 14001|ISO 45001

## Test Report

Sample No.:		VEL/REGL/W/04	Report No: VEL/W/1912280004			
S. No	Parameter	Test-Method	Result	Unit	Limits of IS:10500-2012	
					Requirement (Acceptable) Limit	Permissible limit in the Absence of Alternate Source
21.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l	0.001	0.002
22.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l	0.2	1.0
23.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	5	15
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.05	1.5
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mmg/l)	mg/l	0.1	0.3
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l	0.003	No Relaxation
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l	0.01	No Relaxation
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l	0.01	No Relaxation
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l	0.01	0.05
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l	0.001	No Relaxation
31.	Total Coliform	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Shall not be detectable in any 100 ml sample	
32.	E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Shall not be detectable in any 100 ml sample	

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit  
#These parameter are not covered in our NABL scope.

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NOTE: a)The results listed refer only to the tested samples & applicable parameters  
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 Corp. Office: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram - 122052, Haryana  
 NABL Accredited | ISO 9001|ISO 14001|ISO 45001

## Test Report

Sample Number:	VEL/REGL/W/05	Report No.:	VEL/W/1912280005
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh - 496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	GROUND WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Village Bade Bhandar	Reporting Date:	31/12/2019
Sample Collected by:	Vardan EnviroLab Representative	Period of Analysis:	28-31/12/2019
Preservation:	Refrigerated	Receipt Date:	28/12/2019
Parameter Required:	As per IS 10500-2012	Sampling Date:	25/12/2019
Sampling and Analysis Protocol:	IS-10500-2012, APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Requirement (Acceptable Limit)	Permissible limit in the Absence of Alternate Source
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.38	--	6.5 to 8.5	No Relaxation
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	*BDL (**DL 5Hazen)	Hazen	5	15
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	*BDL (**DL 0.1 NTU)	NTU	1	5
4.	Odour	APHA (22 <sup>nd</sup> Edition)2012, 2150 B	Agreeable	--	Agreeable	Agreeable
5.	Taste	APHA (22 <sup>nd</sup> Edition)2012, 2160 B	Agreeable	--	Agreeable	Agreeable
6.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	322.0	mg/l	200	600
7.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	98.6	mg/l	75	200
8.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	300.0	mg/l	200	600
9.	Chloride as Cl	APHA (22 <sup>nd</sup> Edition)2012, 4500-Cl <sup>-</sup> B	97.5	mg/l	250	1000
10.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl <sup>-</sup> B	*BDL (**DL 0.2mg/l)	mg/l	0.2	1
11.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN <sup>-</sup> D	*BDL (**DL 0.02 mg/l)	mg/l	0.05	No Relaxation
12.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	18.46	mg/l	30	100
13.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	452.0	mg/l	500	2000
14.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	39.5	mg/l	200	400
15.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F <sup>-</sup> D	0.42	mg/l	1.0	1.5
16.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	4.22	mg/l	45	No Relaxation
17.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.27	mg/l	0.3	No relaxation
18.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL (**DL 0.03 mg/l)	mg/l	0.03	0.2
19.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL (**DL 0.1 mg/l)	mg/l	0.5	1
20.	Total Chromium as Cr	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL (**DL 0.03 mg/l)	mg/l	0.05	No Relaxation

  
(Checked By)

  
(Approved By)

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Corp. Office: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram - 122052, Haryana

NABL Accredited | ISO 9001|ISO 14001|ISO 45001

## Test Report

Sample No.:		VEL/REGL/W/05	Report No:		VEL/W/1912280005	
S. No	Parameter	Test-Method	Result	Unit	Limits of IS:10500-2012	
					Requirement (Acceptable) Limit	Permissible limit in the Absence of Alternate Source
21.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l	0.001	0.002
22.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l	0.2	1.0
23.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	5	15
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l	0.05	1.5
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mmg/l)	mg/l	0.1	0.3
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l	0.003	No Relaxation
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l	0.01	No Relaxation
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l	0.01	No Relaxation
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l	0.01	0.05
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l	0.001	No Relaxation
31.	Total Coliform	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Shall not be detectable in any 100 ml sample	
32.	E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Shall not be detectable in any 100 ml sample	

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

(Checked By)



NOTE: a) The results listed refer only to the tested samples & applicable parameters  
b) Total liabilities of our lab will be restricted to the invoice amount only  
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#### 4.4 Surface water Quality Analysis



**Figure. No. 6. Plan Showing Surface Water Quality Monitoring Location Map**

Location Code: - 1. Mand Nadi River (Up Stream)

2. Mand Nadi River (Down Stream)



# Vardan EnviroLab

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 Corp. Office: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram - 122052, Haryana  
**NABL Accredited | ISO 9001|ISO 14001|ISO 45001**

## Test Report

Sample Number:	VEL/REGL/W/01	Report No.:	VEL/W/1912280001
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village ChhoteBhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	SURFACE WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Mand River (Down Stream)	Reporting Date:	31/12/2019
Sample Collected by:	VardanEnviroLab Representative	Period of Analysis:	28-31/12/2019
Preservation:	Refrigerated	Receipt Date:	28/12/2019
Parameter Required:	As per IS 10500-2012	Sampling Date:	25/12/2019
Sampling and Analysis Protocol:	IS-10500-2012,APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.38	--
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	4.0	Hazen
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	4.0	NTU
4.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl- B	45.6	mg/l
5.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	125.3	mg/l
6.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	32.5	mg/l
7.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	114.0	mg/l
8.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	26.8	mg/l
9.	COD	APIIA 22 <sup>nd</sup> Edition 2012, 5220 B	46.9	mg/l
10.	Dissolved Oxygen	APHA 22 <sup>nd</sup> Edition 2012, 4500	6.7	mg/l
11.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	BDL(DL 0.2mg/l)	mg/l
12.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN <sup>-</sup> D	*BDL(**DL 0.02 mg/l)	mg/l
13.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	10.74	mg/l
14.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	169.0	mg/l
15.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	32.5	mg/l
16.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F <sup>-</sup> D	0.28	mg/l
17.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	5.1	mg/l
18.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.27	mg/l
19.	Chromium as Cr <sup>6+</sup>	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l

  
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# Vardan EnviroLab

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Corp. Office: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram - 122052, Haryana  
NABL Accredited | ISO 9001 | ISO 14001 | ISO 45001

## Test Report

Sample No.:		VEL/REGL/W/01	Report No.:	VEL/W/1912280001
S. No	Parameter	Test-Method	Result	Unit
20.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l
21.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l
22.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	0.20	mg/l
23.	Oil & Grease	APHA 22 <sup>nd</sup> Edition, 5220 E	*BDL(**DL 0.2 mg/l)	mg/l
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l
31.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
32.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

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NABL Accredited | ISO 9001 | ISO 14001 | ISO 45001

## Test Report

Sample Number: VEL/REGL/W/02  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd.  
Village ChhoteBhandar, Post office Bade  
Bhandar, Tehsil Pussore, Dist.-Raigarh -496100  
(Chhattisgarh)  
Sample Description: SURFACE WATER SAMPLE  
Sample Location: Mand River (Up Stream)  
Sample Collected by: VardanEnviroLab Representative  
Preservation: Refrigerated  
Parameter Required: As per IS 10500-2012  
Sampling and Analysis Protocol: IS-10500-2012, APHA 22nd Edition 2012

Report No.: VEL/W/1912280002  
Format No.: 5.10 F-01  
Party Reference No.: NIL  
Reporting Date: 31/12/2019  
Period of Analysis: 28-31/12/2019  
Receipt Date: 28/12/2019  
Sampling Date: 25/12/2019  
Sampling Quantity: 2.0 Ltr  
Sampling Type: Grab

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.43	--
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	3.0	Hazen
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	3.0	NTU
4.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl- B	36.8	mg/l
5.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	102.3	mg/l
6.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	28.6	mg/l
7.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	86.0	mg/l
8.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	18.2	mg/l
9.	COD	APHA 22 <sup>nd</sup> Edition 2012, 5220 B	45.1	mg/l
10.	Dissolved Oxygen	APHA 22 <sup>nd</sup> Edition 2012, 4500	7.1	mg/l
11.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	BDL(DL 0.2mg/l)	mg/l
12.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN <sup>-</sup> D	*BDL(**DL 0.02 mg/l)	mg/l
13.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	7.51	mg/l
14.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	128.0	mg/l
15.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	22.3	mg/l
16.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F <sup>-</sup> D	0.28	mg/l
17.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	4.2	mg/l
18.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.25	mg/l
19.	Chromium as Cr <sup>6+</sup>	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l

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## Test Report

Sample No.:		VEL/REGL/W/02	Report No.:	VEL/W/1912280002
S. No	Parameter	Test-Method	Result	Unit
20.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l
21.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l
22.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	0.16	mg/l
23.	Oil & Grease	APHA 22 <sup>nd</sup> Edition, 5220 E	*BDL(**DL 0.2 mg/l)	mg/l
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l
31.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
32.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l

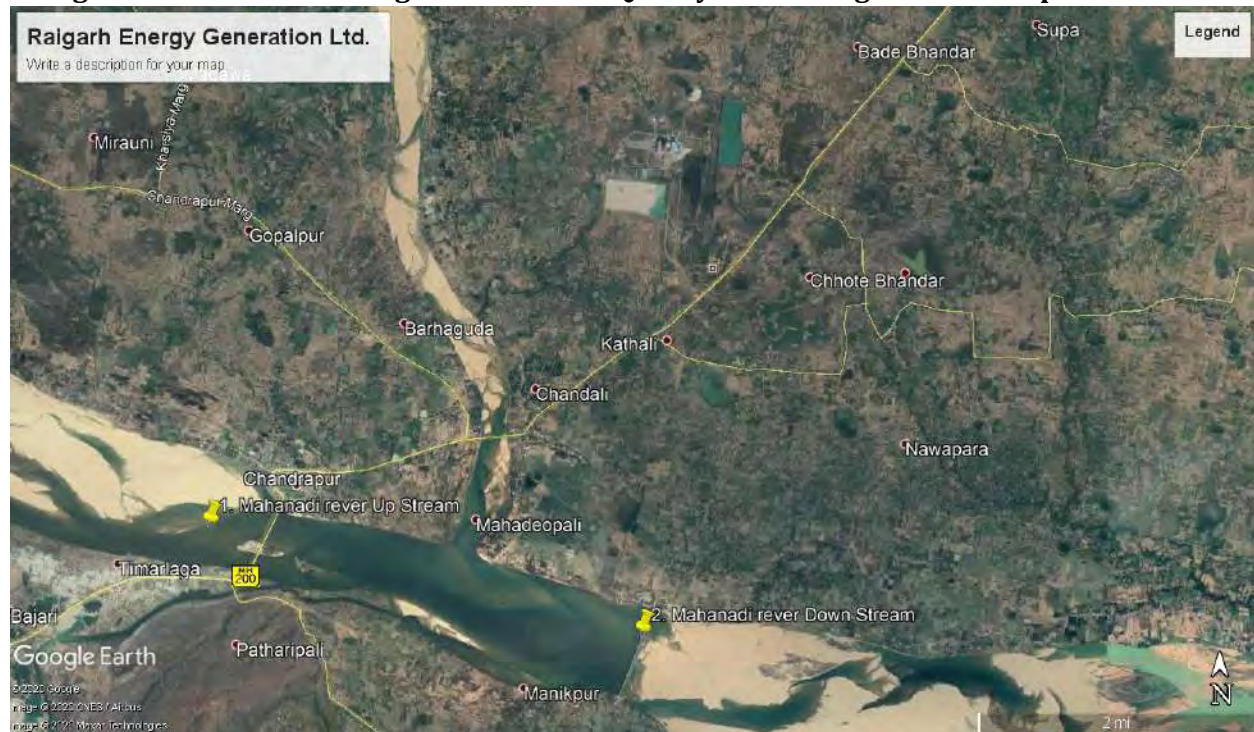
Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

  
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**Figure. No. 7. Plan Showing Surface Water Quality Monitoring Location Map**



Location Code: - 1 Mahanadi River Up Stream  
2 Mahanadi River down Stream



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## Test Report

Sample Number:	VEL/REGL/W/03	Report No.:	VEL/W/1912280003
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	SURFACE WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Mahanadi (Down Stream)	Reporting Date:	31/12/2019
Sample Collected by:	VardanEnviroLab Representative	Period of Analysis:	28-31/12/2019
Preservation:	Refrigerated	Receipt Date:	28/12/2019
Parameter Required:	As per IS 10500-2012	Sampling Date:	25/12/2019
Sampling and Analysis Protocol:	IS-10500-2012, APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.29	--
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	5.0	Hazen
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	4.0	NTU
4.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl- B	49.5	mg/l
5.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	122.3	mg/l
6.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	43.5	mg/l
7.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	140.0	mg/l
8.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	23.6	mg/l
9.	COD	APHA 22 <sup>nd</sup> Edition 2012, 5220 B	45.8	mg/l
10.	Dissolved Oxygen	APHA 22 <sup>nd</sup> Edition 2012, 4500	6.6	mg/l
11.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	BDL(DL 0.2mg/l)	mg/l
12.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN <sup>-</sup> D	*BDL(**DL 0.02 mg/l)	mg/l
13.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	3.34	mg/l
14.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	251.0	mg/l
15.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E.	28.6	mg/l
16.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F <sup>-</sup> D	0.30	mg/l
17.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	16.8	mg/l
18.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.29	mg/l
19.	Chromium as Cr <sup>6+</sup>	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l

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## Test Report

Sample No.:		VEL/REGL/W/03		Report No.:		VEL/W/1912280003	
S. No	Parameter	Test-Method	Result	Unit			
20.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l			
21.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l			
22.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	0.33	mg/l			
23.	Oil & Grease	APHA 22 <sup>nd</sup> Edition, 5220 E	*BDL(**DL 0.2 mg/l)	mg/l			
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l			
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mmg/l)	mg/l			
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l			
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l			
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l			
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l			
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l			
31.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l			
32.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l			

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

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## Test Report

Sample Number:	VEL/REGL/W/04	Report No.:	VELAV/1912280004
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	SURFACE WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Mahanadi (Up Stream)	Reporting Date:	31/12/2019
Sample Collected by:	Vardan EnviroLab Representative	Period of Analysis:	28-31/12/2019
Preservation:	Refrigerated	Receipt Date:	28/12/2019
Parameter Required:	As per IS 10500-2012	Sampling Date:	25/12/2019
Sampling and Analysis Protocol:	IS-10500-2012, APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.25	--
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	3.0	Hazen
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	4.0	NTU
4.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl- B	38.9	mg/l
5.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	112.5	mg/l
6.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	35.6	mg/l
7.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	120.0	mg/l
8.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	15.5	mg/l
9.	COD	APHA 22 <sup>nd</sup> Edition 2012, 5220 B	38.0	mg/l
10.	Dissolved Oxygen	APHA 22 <sup>nd</sup> Edition 2012, 4500	6.8	mg/l
11.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	BDL(DL 0.2mg/l)	mg/l
12.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN <sup>-</sup> D	*BDL(**DL 0.02 mg/l)	mg/l
13.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	5.75	mg/l
14.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	205.0	mg/l
15.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	24.3	mg/l
16.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F <sup>-</sup> D	0.26	mg/l
17.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	9.5	mg/l
18.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.26	mg/l
19.	Chromium as Cr <sup>6+</sup>	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.05 mg/l)	mg/l

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# Vardan EnviroLab

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## Test Report

Sample No.:		VEL/REGL/W/04		Report No.:		VEL/W/1912280004	
S. No	Parameter	Test-Method	Result	Unit			
20.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l			
21.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l			
22.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	0.26	mg/l			
23.	Oil & Grease	APHA 22 <sup>nd</sup> Edition, 5220 E	*BDL(**DL 0.2 mg/l)	mg/l			
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l			
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l			
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l			
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l			
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l			
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l			
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l			
31.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l			
32.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l			

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

  
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**Figure No. 8. Plan Showing Soil Sample Monitoring Location Map**

Location Code: -

- S1- PalsadaVillage
- S2- Kthali Village
- S3- Chote Bhandar Village
- S4- Bade Bhandar Village
- S5- Nursery



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Corp. Office: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram - 122052, Haryana  
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## Test Report

Sample Number: VEL/REGL/S/01  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd.  
Village Chhote Bhandar, Post office  
Bade Bhandar, Tehsil Pussore, Dist.-  
Raigarh -496100 (Chhattisgarh)  
Sample Description: SOIL SAMPLE  
Sample Location: Village- Palsada  
Sample Collected by: Vardan EnviroLab Team  
Packing Status: Temp Sealed  
Parameter Required: As per Work Order  
Sampling and Analysis Protocol: IS 2720, USEPA 3050B & USDA

Report No.: VEL/ S/1912280001  
Format No.: 5.10 F-01  
Party Reference No.: NIL  
Reporting Date: 31/12/2019  
Period of Analysis: 28-31/12/2019  
Receipt Date: 28/12/2019  
Sampling Date: 24/12/2019  
Sampling Quantity: 2.0 Kg  
Sampling Type: Composite

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	IS : 2720 (P-26,RA2011)	7.46	--
2.	Conductivity	IS:14767-2000 Reaffirmed 2006	0.329	mS/cm
3.	Soil Texture	IS : 2720 (P-4, RA1995)	Silty Loam	--
4.	Color	USDA Method, 1968	Yellowish Red	--
5.	Water holding capacity	USDA Method, 1968	33.0	%
6.	Bulk density	USDA Method, 1968	1.36	gm/cc
7.	Chloride as Cl	USDA Method, 1968	80.5	mg/kg
8.	Calcium as Ca	USDA Method, 1968	361.2	mg/kg
9.	Sodium as Na	USDA Method, 1968	72.5	mg/kg
10.	Potassium as K	USDA Method, 1968	91.2	kg/hect.
11.	Organic Matter	IS:2720 (P-22, RA2009)	0.62	%
12.	Magnesium as Mg	USDA Method, 1968	91.4	mg/kg
13.	Available Nitrogen as N	IS:14684, RA2006	201.3	kg/hect.
14.	Available Phosphorus	USDA Method, 1968	19.5	kg/hect.
15.	Zinc (as Zn)	USEPA 3050B	12.0	mg/kg
16.	Manganese (as Mn)	USEPA 3050B	132.0	mg/kg
17.	Lead (as Pb)	USEPA 3050B	4.0	mg/kg
18.	Cadmium (as Cd)	USEPA 3050B	0.72	mg/kg
19.	Chromium (as Cr)	USEPA 3050B	0.80	mg/kg
20.	Copper (as Cu)	USEPA 3050B	11.9	mg/kg

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Corp. Office: Plot No. 82A, Sector - 5, IMT Manesar, Gurugram - 122052, Haryana  
NABL Accredited | ISO 9001|ISO 14001|ISO 45001

## Test Report

Sample Number: VEL/REGL/S/02 Report No.: VEL/S/1912280002  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post office Party Reference No.: NIL  
Bade Bhandar, Tehsil Pussore, Dist.- Reporting Date: 31/12/2019  
Raigarh -496100 (Chhattisgarh)  
Sample Description: SOIL SAMPLE Period of Analysis: 28-31/12/2019  
Sample Location: Village- Kathli Receipt Date: 28/12/2019  
Sample Collected by: Vardan EnviroLab Team Sampling Date: 25/12/2019  
Packing Status: Temp Sealed Sampling Quantity: 2.0 Kg  
Parameter Required: As per Work Order Sampling Type: Composite  
Sampling and Analysis Protocol: IS 2720, USEPA 3050B & USDA

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	IS : 2720 (P-26,RA2011)	7.53	--
2.	Conductivity	IS:14767-2000 Reaffirmed 2006	0.317	mS/cm
3.	Soil Texture	IS : 2720 (P-4, RA1995)	Silty Loam	--
4.	Color	USDA Method, 1968	Yellowish Red	--
5.	Water holding capacity	USDA Method, 1968	30.7	%
6.	Bulk density	USDA Method, 1968	1.26	gm/cc
7.	Chloride as Cl	USDA Method, 1968	68.7	mg/kg
8.	Calcium as Ca	USDA Method, 1968	340.1	mg/kg
9.	Sodium as Na	USDA Method, 1968	80.2	mg/kg
10.	Potassium as K	USDA Method, 1968	152.3	kg/hect.
11.	Organic Matter	IS:2720 (P-22, RA2009)	0.88	%
12.	Magnesium as Mg	USDA Method, 1968	81.7	mg/kg
13.	Available Nitrogen as N	IS:14684, RA2006	274.1	kg/hect.
14.	Available Phosphorus	USDA Method, 1968	33.5	kg/hect.
15.	Zinc (as Zn)	USEPA 3050B	11.3	mg/kg
16.	Manganese (as Mn)	USEPA 3050B	149.6	mg/kg
17.	Lead (as Pb)	USEPA 3050B	2.70	mg/kg
18.	Cadmium (as Cd)	USEPA 3050B	0.52	mg/kg
19.	Chromium (as Cr)	USEPA 3050B	1.2	mg/kg
20.	Copper (as Cu)	USEPA 3050B	11.0	mg/kg

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## Test Report

Sample Number: VEL/REGL/S/03 Report No.: VEL/S/1912280003  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh) Party Reference No.: NIL  
Reporting Date: 31/12/2019  
Sample Description: SOIL SAMPLE Period of Analysis: 28-31/12/2019  
Sample Location: Village-Chhote Bhandar Receipt Date: 28/12/2019  
Sample Collected by: Vardan EnviroLab Team Sampling Date: 24/12/2019  
Packing Status: Temp Sealed Sampling Quantity: 2.0 Kg  
Parameter Required: As per Work Order Sampling Type: Composite  
Sampling and Analysis Protocol: IS 2720, USEPA 3050B & USDA

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	IS : 2720 (P-26,RA2011)	7.50	--
2.	Conductivity	IS:14767-2000 Reaffirmed 2006	0.310	mS/cm
3.	Soil Texture	IS : 2720 (P-4, RA1995)	Silty Loam	--
4.	Color	USDA Method, 1968	Yellowish Red	--
5.	Water holding capacity	USDA Method, 1968	31.4	%
6.	Bulk density	USDA Method, 1968	1.46	gm/cc
7.	Chloride as Cl	USDA Method, 1968	82.5	mg/kg
8.	Calcium as Ca	USDA Method, 1968	336.1	mg/kg
9.	Sodium as Na	USDA Method, 1968	62.7	mg/kg
10.	Potassium as K	USDA Method, 1968	97.5	kg/hect.
11.	Organic Matter	IS:2720 (P-22, RA2009)	0.52	%
12.	Magnesium as Mg	USDA Method, 1968	72.3	mg/kg
13.	Available Nitrogen as N	IS:14684, RA2006	228.9	kg/hect.
14.	Available Phosphorus	USDA Method, 1968	16.7	kg/hect.
15.	Zinc (as Zn)	USEPA 3050B	12.2	mg/kg
16.	Manganese (as Mn)	USEPA 3050B	137.8	mg/kg
17.	Lead (as Pb)	USEPA 3050B	4.0	mg/kg
18.	Cadmium (as Cd)	USEPA 3050B	0.66	mg/kg
19.	Chromium (as Cr)	USEPA 3050B	1.2	mg/kg
20.	Copper (as Cu)	USEPA 3050B	15.0	mg/kg

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## Test Report

Sample Number: VEL/REGL/S/04 Report No.: VEL/ S/1912280004  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post office  
Bade Bhandar, Tehsil Pussore, Dist.-  
Raigarh -496100 (Chhattisgarh) Party Reference No.: NIL  
Reporting Date: 31/12/2019  
Sample Description: SOIL SAMPLE Period of Analysis: 28-31/12/2019  
Sample Location: Village-Bade Bhandar Receipt Date: 28/12/2019  
Sample Collected by: Vardan EnviroLab Team Sampling Date: 25/12/2019  
Packing Status: Temp Sealed Sampling Quantity: 2.0 Kg  
Parameter Required: As per Work Order Sampling Type: Composite  
Sampling and Analysis Protocol: IS 2720, USEPA 3050B & USDA

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	IS : 2720 (P-26,RA2011)	7.62	--
2.	Conductivity	IS:14767-2000 Reaffirmed 2006	0.325	mS/cm
3.	Soil Texture	IS : 2720 (P-4, RA1995)	Silty Loam	--
4.	Color	USDA Method, 1968	Yellowish Red	--
5.	Water holding capacity	USDA Method, 1968	35.0	%
6.	Bulk density	USDA Method, 1968	1.28	gm/cc
7.	Chloride as Cl	USDA Method, 1968	68.5	mg/kg
8.	Calcium as Ca	USDA Method, 1968	421.1	mg/kg
9.	Sodium as Na	USDA Method, 1968	61.3	mg/kg
10.	Potassium as K	USDA Method, 1968	132.5	kg/hect.
11.	Organic Matter	IS:2720 (P-22, RA2009)	0.82	%
12.	Magnesium as Mg	USDA Method, 1968	15.2	mg/kg
13.	Available Nitrogen as N	IS:14684, RA2006	314.7	kg/hect.
14.	Available Phosphorus	USDA Method, 1968	30.1	kg/hect.
15.	Zinc (as Zn)	USEPA 3050B	18.9	mg/kg
16.	Manganese (as Mn )	USEPA 3050B	126.3	mg/kg
17.	Lead (as Pb)	USEPA 3050B	3.0	mg/kg
18.	Cadmium (as Cd )	USEPA 3050B	0.62	mg/kg
19.	Chromium (as Cr)	USEPA 3050B	1.4	mg/kg
20.	Copper (as Cu )	USEPA 3050B	11.8	mg/kg

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## Test Report

Sample Number:	VEL/REGL/S/05	Report No.:	VEL/ S/1912280005
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	SOIL SAMPLE	Party Reference No.:	NIL
Sample Location:	Nursery	Reporting Date:	31/12/2019
Sample Collected by:	Vardan EnviroLab Team	Period of Analysis:	28-31/12/2019
Packing Status:	Temp Sealed	Receipt Date:	28/12/2019
Parameter Required:	As per Work Order	Sampling Date:	24/12/2019
Sampling and Analysis Protocol:	IS 2720, USEPA 3050B & USDA	Sampling Quantity:	2.0 Kg
		Sampling Type:	Composite

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	IS : 2720 (P-26,RA2011)	7.65	--
2.	Conductivity	IS:14767-2000 Reaffirmed 2006	0.304	mS/cm
3.	Soil Texture	IS : 2720 (P-4, RA1995)	Silty Loam	--
4.	Color	USDA Method, 1968	Yellowish Red	--
5.	Water holding capacity	USDA Method, 1968	38.0	%
6.	Bulk density	USDA Method, 1968	1.40	gm/cc
7.	Chloride as Cl	USDA Method, 1968	78.9	mg/kg
8.	Calcium as Ca	USDA Method, 1968	362.5	mg/kg
9.	Sodium as Na	USDA Method, 1968	65.8	mg/kg
10.	Potassium as K	USDA Method, 1968	128.7	kg/hect.
11.	Organic Matter	IS:2720 (P-22, RA2009)	0.58	%
12.	Magnesium as Mg	USDA Method, 1968	70.1	mg/kg
13.	Available Nitrogen as N	IS:14684, RA2006	255.3	kg/hect.
14.	Available Phosphorus	USDA Method, 1968	24.7	kg/hect.
15.	Zinc (as Zn)	USEPA 3050B	20.3	mg/kg
16.	Manganese (as Mn)	USEPA 3050B	140.9	mg/kg
17.	Lead (as Pb)	USEPA 3050B	4.0	mg/kg
18.	Cadmium (as Cd)	USEPA 3050B	0.52	mg/kg
19.	Chromium (as Cr)	USEPA 3050B	3.3	mg/kg
20.	Copper (as Cu)	USEPA 3050B	15.6	mg/kg

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#### **4.6 Effluent Sample Analysis Report**

##### Locations

1. STP Outlet
2. ETP Outlet



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## Test Report

Sample Number:	VEL/REGL/WW/01	Report No.:	VEL/WW/1912280001
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	WASTE WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	STP Outlet	Reporting Date:	31/12/2019
Sample Collected by:	Vardan EnviroLab Team	Period of Analysis:	28-31/12/2019
Preservation:	Refrigerated	Receipt Date:	28/12/2019
Parameter Required:	As per work order	Sampling Date:	25/12/2019
Analysis Protocol:	APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr

S. No.	Parameter	Test-Method	Result	Unit	*Standards		
					In-Land Surface Water	Public Sewers	Land for Irrigation
1.	pH (at 25 °C)	APHA 22nd Edition 2012, 4500-H+B	7.35	mg/l	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
2.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	20.0	mg/l	30	350	100
3.	COD	APHA 22nd Edition 2012, 5220 B	114.0	mg/l	250	--	--
4.	Total Suspended Solids	APHA 22nd Edition 2012, 2540 D	23.2	mg/l	100	600	200
5.	Oil and Grease	APHA 22nd Edition 2012,5520 B	0.74	mg/l	10	20	10

  
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## Test Report

<b>Sample Number:</b>	VEL/ REGL /WW/02	<b>Report No.:</b>	VEL/WW/1912280002
<b>Name &amp; Address of the Party:</b>	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh -496100 (Chhattisgarh)	<b>Format No.:</b>	5.10 F-01
<b>Sample Description:</b>	WASTE WATER SAMPLE	<b>Party Reference No.:</b>	NIL
<b>Sample Location:</b>	ETP Outlet	<b>Reporting Date:</b>	31/12/2019
<b>Sample Collected by:</b>	Vardan EnviroLab Team	<b>Period of Analysis:</b>	28-31/12/2019
<b>Preservation:</b>	Refrigerated	<b>Receipt Date:</b>	28/12/2019
<b>Parameter Required:</b>	As per work order	<b>Sampling Date:</b>	24/12/2019
<b>Analysis Protocol:</b>	APHA 22nd Edition 2012	<b>Sampling Quantity:</b>	2.0 Ltr

S. No.	Parameter	Test-Method	Result	Unit	*Standards		
					In-Land Surface Water	Public Sewers	Land for Irrigation
1.	pH (at 25 °C)	APHA 22nd Edition 2012, 4500-H+ B	7.52	mg/l	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
2.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	18.0	mg/l	30	350	100
3.	COD	APHA 22nd Edition 2012, 5220 B	90.1	mg/l	250	--	--
4.	Total Suspended Solids	APHA 22nd Edition 2012, 2540 D	18.4	mg/l	100	600	200
5.	Oil and Grease	APHA 22nd Edition 2012,5520 B	0.80	mg/l	10	20	10

  
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## **Chapter – 5.0 CONCLUSION**

RAIGARH ENERGY GENERATION LTD., authorities have been taken successful steps in controlling environmental pollution in and around the project. This fact is clear from analytical results of different environmental parameters. A brief conclusion is as follows.

<b>Sr. No.</b>	<b>Environmental Parameters</b>	<b>Conclusion</b>
5.1	Air Environment	After analysis of the samples from five different locations it is observed that both the individuals and average concentration of air pollutants in respect of SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> , CO and Mercury are well within the prescribed limits of NAAQM standards. People of township and of surrounding villages do not have any problems regarding the air quality and have no grievances because of Thermal Power Plant activities.
5.2	Water Environment	The analytical result of the samples from the ground water of villages, surface water from river, and domestic & industrial effluent after treatment shows that the concentrations of different water parameters are well within prescribed limits and will not cause any adverse impact on human health and on surrounding area. People of surrounding areas express satisfaction about the water quality of That area.
5.3	Noise Environment	The observations taken at four village location during day and night time shows that the noise level are well within prescribed limits of CPCB. Hence there is no possibility of any adverse effect of noise generated due to Thermal Power Plant activities on peoples of Surrounding areas.

All the above details show that Thermal Power Plant of RAIGARH ENERGY GENERATION LTD. is not causing any adverse impact on the human health and ecological balance.

# **Environmental Monitoring Report**



## **Submitted To:**

**M/s Raigarh Energy Generation Ltd.  
Village Chhote Bhandar, Post office Bade Bhandar,  
Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)**

## **Conducted by:**

**M/s Vardan EnviroLab  
Plot no. 82A, Sector-5, IMT Manesar, Gurugram (Haryana)**

**(Recognized by MoEF & CC, NABL Government of India)**

## PREFACE

The growing concern for environmental protection and the passing of various environmental legislations have increased the responsibilities of Ministry of Environment, Forests & Climate Change, Pollution Control boards in many folds. Besides enforcing the various environmental legislations MoEF&CC, CPCB & SPCB strive to propagate the necessity awareness regarding the various legal provisions and environmental protection measures in the country.

Electric Power scenario has occupied a significant place in the development program of the country. Development and environment can neither be separated nor ignored. In fact, they are complimentary to each other. These issues have become a concern of the community, particularly the environment impact due to industries in the developing countries.

However, the prerequisite for sustainable development is judicious planning of environmental status, likely impacts of the approach adopted on the environment including inhabitants of the locality, availability of the eco-friendly technology, emerging waste disposal and waste utilization processes, techniques of land reclamation for the restoration of aesthetic beauty and soon.

M/s Raigarh Energy Generation Ltd., Village Chhote Bhandar, Post Office Bade Bhandar, Raigarh-496100, India, has engaged M/S Vardan EnviroLab, Gurugram, (HR) to provide Environmental Services in respect of ambient air quality monitoring, stack emission, noise level monitoring & Sampling and Analysis of ground water quality, surface water quality, treated effluent sewage, effluent water from ETP, and soil for Raigarh Energy Generation Ltd., Raigarh district of Chhattisgarh, as per guidelines of MoEF & CC and CPCB Gazette notification.

M/S Vardan EnviroLab, Gurugram, (HR) has deployed entirely its own personnel, facilities and expertise for doing this service. Sampling / Monitoring Stations were identified by the Environmental Officer of Raigarh Energy Generation Ltd., The samples were analyzed partly at site and partly at our MoEF Recognized laboratory situated at Gurugram (HR).

This report presents the data generated for the period from 21<sup>st</sup> February 2020 to 23<sup>rd</sup> February 2020, i.e. for Fourth quarter which includes sampling locations, Methodology, testing procedure and compilation for the Environmental parameters i.e. Air, Water & Noise with a view to evaluate the impact due to the thermal power plant activities.

During the course of our operations for the above task, the staff and management of Raigarh Energy Generation Ltd., were extremely co-operative. We are grateful to them for their invaluable support and assistance rendered to us during the course of the sampling and monitoring.

Date : 06/03/2020

  
Authorized Signatory

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## **Chapter – 1.0**

### **INTRODUCTION**

M/s Raigarh Energy Generation Ltd., a subsidiary of Adani Power, is a power generation company based at Raigarh in the State of Chattisgarh. Raigarh Energy Generation Ltd., has recently commissioned its Thermal Power Plant first 600MW Unit at Village Chhote Bhandar, Post Office Bade Bhandar, Raigarh- 496100, India. The second unit of 600MW is under implementation.

Raigarh Energy Generation Ltd., is also committed towards the environment and the community it operates in. It has successfully implemented several community welfare schemes in the field of livelihood, infrastructure, community health and education which has so far benefited over 60,000 people from close to 75 villages.



**Figure No.1. Raigarh Energy Generation Ltd.**



## **Chapter – 2.0**

### **PROJECT PROFILE**

#### **2.1 Topography & Drainage**

Topography of this area is generally undulating. The area is drained by Mand River approximately 3 km. away from plant in North direction and Mahanadi River approximately 5 km. away from plant in South direction.

#### **2.2 Location**

Plant is bounded by Northern Latitudes of 21° 44' 00" to 21° 44' 42" and Eastern Longitude of 83° 16' 30" to 83° 17' 18". This area falls in the survey of India toposheet no. 64 O/1, 64 O/2, 64 O/5 and 64 O/6. The location of the mine area is shown in **Fig. No. 2**

#### **2.3 Climate**

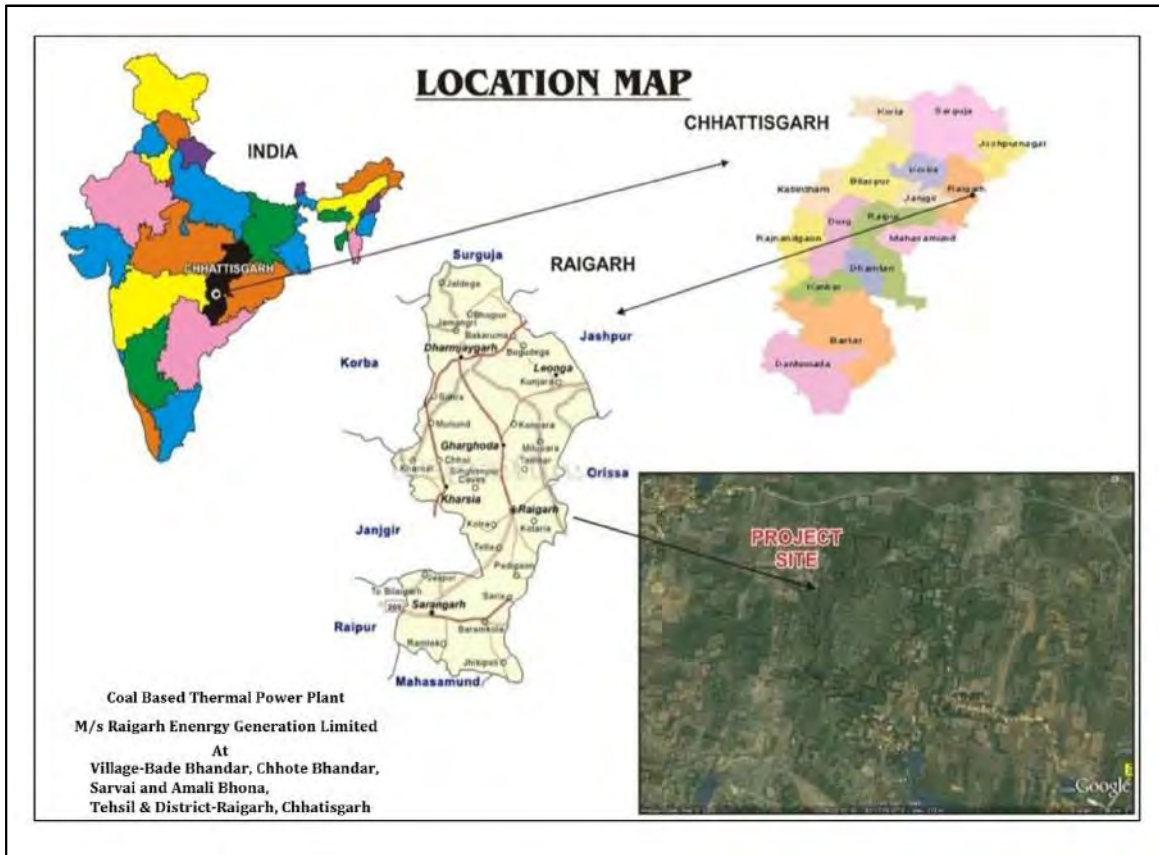
The climate of the area is Sub-tropical type. It is in the zone of humid tropic climate where temperature and humidity of air are very high. The temperature varies from the minimum - maximum temperature range between 29.5°C - 49 °C in summer, and 8°C - 25 °C in winter. The humidity varies from 35% to 82%. The annual average rainfall in the area is about 1300 mm.

#### **2.4 Communication**

The nearest railway station is Kirodimal, which is at a distance of ~23 Km towards North direction. The area is well connected with N.H. No. 216. Nearest Airport is Raipur ~250 km in SW direction. Nearest village is Bade Bhandar ~ 1 km. in North direction and nearest town is Raigarh ~21 km. in North-East direction.

#### **2.5 Location Map**

**Figure No.2. Location Map**



## **Chapter – 3.0**

### **SCOPE OF STUDY AND METHODOLOGY**

#### **3.1 Scope of Study**

The scope of study includes Environmental Services in respect of ambient air quality monitoring, noise level monitoring & Sampling and Analysis of ground water quality, surface water quality, treated effluent sewage, effluent water from ETP and soil.

#### **3.2 Methodology**

As mentioned in the scope of work covering the various Environmental components monitoring and sampling and its analysis was carried out on the basis of guidelines of Ministry of Environment Forest & Climate Control of Government of India & Chattisgarh State Pollution Control Board. Sampling procedure method reference and Analysis procedure method reference are mentioned in monitoring reports.

##### **3.2.1 Ambient Air Quality Monitoring**

The ambient air quality has been carried out at various sources of air pollution surrounding and in the Plant. The prime objective of the ambient air quality monitoring is to assess the existing air quality of the area.

The ambient air quality monitoring was carried out for 24 hours at each station. At all stations SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, CO and Mercury were monitored. All the samples collected were analyzed for quantitative analysis of various pollutants.

The ambient air quality sampling locations were identified by the Environmental Officer of Raigarh Energy Generation Ltd.

##### **3.2.2 Water Environment**

The ground water samples, surface water samples were collected from selected locations in two liter sterilized plastic cans. These samples were analyzed as per IS 10500:2012. The domestic effluent and Industrial effluent samples were collected and analyzed for parameters: pH, Total suspended solids, Biochemical Oxygen Demand, Chemical Oxygen Demand and Oil & Grease.

### **3.2.3 Noise Environment**

Sound level meter was used to know the sound levels generated due to plant activities at different locations. The measurements were taken for Equivalent sound level over a time period for day and night which is expressed in dB(A).

### **3.2.4 Soil**

The Soil samples were collected from selected locations. These samples were analyzed for Physico-Chemical parameters including heavy metals.

## Chapter – 4.0

### SAMPLING LOCATION MAP AND ANALYSIS REPORTS

#### 4.1 Ambient Air Quality Monitoring



**Figure No.3. Plan Showing Ambient Air Quality Location Map**

Location Code: -

- A1- Site Office
- A2- PalsadaVillage
- A3- Kathali Village
- A4- Chhote Bhandar Village
- A5- Bade Bhandar Village



# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jalpur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

Sample Number: VEL/ REGL/A/01 Report No.: VEL/A/2002260001  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post Office  
Bade Bhandar, Tehsil Pusstore, Dist-  
Raigarh - 496100(Chhattisgarh) Party Reference No.: NIL  
Reporting Date: 03/03/2020  
Receipt Date: 26/02/2020 Period of Analysis: 22/02/2020-03/03/2020

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Sample collected by : Vardan EnviroLab Representative  
Sampling Location : Site Office  
Instrument Used : RDS & FPS sampler with all Accessories  
Instrument Code : VEL/RDS/01 & VEL/FPS/01  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 21/02/2020 to 22/02/2020  
Time of Monitoring : 24 Hrs.  
Ambient Temperature (°C) : Min.10 Max. 33  
Surrounding Activity : Human & Vehicular Activities  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : No  
Sampling & Analysis Protocol : IS-5182  
Parameter Required : As per Work Order

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter (PM <sub>2.5</sub> )	IS : 5182 (P-23),2019	39.1	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS : 5182 (P-23),2006	74.6	µg/m <sup>3</sup>	100
3.	Mercury as Hg	CPCB Guideline	BDL(DL0.5)	ng/m <sup>3</sup>	--
4.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	22.8	µg/m <sup>3</sup>	80
5.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	13.7	µg/m <sup>3</sup>	80
6.	#Carbon Monoxide (CO)	IS: 5182 (P-10), Reaffirmed-2003	0.82	mg/m <sup>3</sup>	4

\* NAAQS – National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 18.11.2009.

#Not Covered in NABL Scope

(Checked By)

(Approved By)



- Note: a) The results listed refer only to the tested samples & applicable parameters  
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c) The Sample will be destroyed after retention time unless otherwise specified  
d) This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law



# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoFF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

Sample Number: VEL/ REGL/A/02 Report No.: VEL/A/2002260002  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post Office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh - 496100(Chhattisgarh) Party Reference No.: NIL  
Reporting Date: 03/03/2020  
Receipt Date: 26/02/2020 Period of Analysis: 22/02/2020-03/03/2020  
Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Sample collected by : Vardan EnviroLab Representative  
Sampling Location : Village Palsada  
Instrument Used : RDS & FPS sampler with all Accessories  
Instrument Code : VEL/RDS/02 & VEL/FPS/02  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 21/02/2020 to 22/02/2020  
Time of Monitoring : 24 Hrs.  
Ambient Temperature (°C) : Min.10 Max. 33  
Surrounding Activity : Human & Vehicular Activities  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : No  
Sampling & Analysis Protocol : IS-5182  
Parameter Required : As per Work Order

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter (PM <sub>2.5</sub> )	IS : 5182 (P-23),2019	36.4	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS : 5182 (P-23),2006	70.2	µg/m <sup>3</sup>	100
3.	Mercury as Hg	CPCB Guideline	BDL(DL0.5)	ng/m <sup>3</sup>	--
4.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	20.4	µg/m <sup>3</sup>	80
5.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	12.1	µg/m <sup>3</sup>	80
6.	#Carbon Monoxide (CO)	IS: 5182 (P-10), Reaffirmed-2003	0.69	mg/m <sup>3</sup>	4

\* NAAQS – National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 18.11.2009.

#Not Covered in NABL Scope

(Checked By)

(Approved By)

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number: VEL/REGI./A/03 Report No.: VEL/A/2002260003  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post Office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh - 496100 (Chhattisgarh) Party Reference No.: NIL  
Reporting Date: 03/03/2020  
Receipt Date: 26/02/2020 Period of Analysis: 22/02/2020-03/03/2020

Sample Description: AMBIENT AIR QUALITY MONITORING

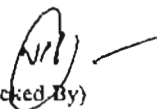
### General Information:-

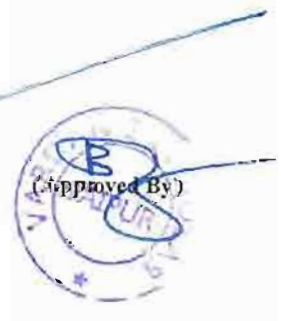
Sample collected by : Vardan EnviroLab Representative  
Sampling Location : Village Kathli  
Instrument Used : RDS & FPS sampler with all Accessories  
Instrument Code : VEL/RDS/03 & VEL/FPS/03  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 21/02/2020 to 22/02/2020  
Time of Monitoring : 24 Hrs.  
Ambient Temperature (°C) : Min.10 Max. 33  
Surrounding Activity : Human & Vehicular Activities  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : No  
Sampling & Analysis Protocol : IS-5182  
Parameter Required : As per Work Order

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter (PM <sub>2.5</sub> )	IS : 5182 (P-23),2019	38.7	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS : 5182 (P-23),2006	72.9	µg/m <sup>3</sup>	100
3.	Mercury as Hg	CPCB Guideline	BDL(DL0.5)	ng/m <sup>3</sup>	--
4.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	23.6	µg/m <sup>3</sup>	80
5.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	10.3	µg/m <sup>3</sup>	80
6.	#Carbon Monoxide (CO)	IS: 5182 (P-10), Reaffirmed-2003	0.78	mg/m <sup>3</sup>	4

\* NAAQS - National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 18.11.2009.

#Not Covered in NABL Scope

  
(Checked By)

  
(Approved By)

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number: VEL/REGL/A/04 Report No.: VEL/A/2002260004  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: E.10 T 01  
Village Chhote Bhandar, Post Office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh - 496100(Chhattisgarh) Party Reference No.: NIL  
Reporting Date: 03/03/2020  
Receipt Date: 26/02/2020 Period of Analysis: 22/02/2020-03/03/2020

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Sample collected by : Vardan EnviroLab Representative  
Sampling Location : Village Chhote Bhandar  
Instrument Used : RDS & FPS sampler with all Accessories  
Instrument Code : VEL/RDS/01 & VEL/FPS/01  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 22/02/2020 to 23/02/2020  
Time of Monitoring : 24 Hrs.  
Ambient Temperature (°C) : Min.10 Max. 34  
Surrounding Activity : Human & Vehicular Activities  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : No  
Sampling & Analysis Protocol : IS-5182  
Parameter Required : As per Work Order

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter (PM <sub>2.5</sub> )	IS: 5182 (P-23),2019	40.2	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS: 5182 (P-23),2006	74.5	µg/m <sup>3</sup>	100
3.	Mercury as Hg	CPCB Guideline	BDL(DL0.5)	ng/m <sup>3</sup>	--
4.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	25.3	µg/m <sup>3</sup>	80
5.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	11.2	µg/m <sup>3</sup>	80
6.	#Carbon Monoxide (CO)	IS: 5182 (P-10), Reaffirmed-2003	0.87	mg/m <sup>3</sup>	4

\*NAAQS – National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 18.11.2009.

†Not Covered in NABL Scope

  
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# Vardan EnviroLab

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Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

Sample Number: VEL/ REGL/A/05 Report No.: VEL/A/2002260005  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post Office  
Bade Bhandar, Tehsil Pussore, Dist.-  
Raigarh - 496100(Chhattisgarh) Party Reference No.: NTL  
Reporting Date: 03/03/2020  
Receipt Date: 26/02/2020 Period of Analysis: 22/02/2020-03/03/2020

Sample Description: AMBIENT AIR QUALITY MONITORING

### General Information:-

Sample collected by : Vardan EnviroLab Representative  
Sampling Location : Village Bade Bhandar  
Instrument Used : RDS & FPS sampler with all Accessories  
Instrument Code : VEL/RDS/02 & VEL/FPS/02  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 22/02/2020 to 23/02/2020  
Time of Monitoring : 24 Hrs.  
Ambient Temperature (°C) : Min.10 Max. 34  
Surrounding Activity : Human & Vehicular Activities  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : No  
Sampling & Analysis Protocol : IS-5182  
Parameter Required : As per Work Order

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter (PM <sub>2.5</sub> )	IS : 5182 (P-23),2019	41.6	µg/m <sup>3</sup>	60
2.	Particulate Matter (PM <sub>10</sub> )	IS : 5182 (P-23),2006	75.8	µg/m <sup>3</sup>	100
3.	Mercury as Hg	CPCB Guideline	BDL(DL0.5)	ng/m <sup>3</sup>	--
4.	Nitrogen Dioxide (NO <sub>2</sub> )	IS: 5182 (P-6), Reaffirmed-2006	25.6	µg/m <sup>3</sup>	80
5.	Sulphur Dioxide (SO <sub>2</sub> )	IS: 5182 (P-2), Reaffirmed-2012	12.4	µg/m <sup>3</sup>	80
6.	#Carbon Monoxide (CO)	IS: 5182 (P-10), Reaffirmed-2003	0.89	mg/m <sup>3</sup>	4

\* NAAQS - National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 18.11.2009.  
#Not Covered in NABL Scope

  
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## 4.2 Noise Level Monitoring



**Figure No.4. Plan Showing Noise Level Monitoring Location Map**

### **Ambient Noise Level Monitoring Locations**

Location Code: - N1- Field Hostel  
N2- Palsada Village  
N3- Kathali Village  
N4- Chote Bhandar Village  
N5- Bade Bhandar Village

### **Work Zone Noise Level Monitoring Locations**

Location Code: - N6- Site Office  
N7- Behind Switchyard  
N8- Railway Entry Gate



# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurgaon- 122051  
 MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number: VEL/ REGL/AN/01 Report No.: VEL/AN/ 2002260001  
 Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
 Village Chhote Bhandar, Post Office Party Reference No.: NIL  
 Bodo Bhandar, Tehsil Puzosole, Dist.- Raigarh - 496100 (Chhattisgarh) Reporting Date: 03/03/2020  
 Receipt Date: 26/02/2020

Sample Description: AMBIENT NOISE LEVEL MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
 Sample collected by : Vardan Enviro Lab Representative  
 Sampling Location : Field Hostel  
 Instrument Used : Sound Level Meter  
 Instrument Code : VEL/SLM/01  
 Instrument Calibration Status : Calibrated  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 21/02/2020 to 22/02/2020  
 Time of Monitoring : 06:00 AM to 06:00 AM  
 Surrounding Activity : Human, Vehicular & Plant activities  
 Scope of Monitoring : Regulatory Requirement  
 Control measure if Any : --  
 Sampling & Analysis Protocol : IS-9989 R-2003  
 Sampling Duration : 24 Hours  
 Parameter Required : As per work order

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	L <sub>max</sub>	IS 9989 R-2003	66.2	56.6	dB(A)
2.	L <sub>min</sub>	IS 9989 R-2003	41.3	39.3	dB(A)
3.	L <sub>eq</sub>	IS 9989 R-2003	55.27	44.26	dB(A)
4.	CPCB Limits in dB(A*) Leq (Industrial Area)	-	75.00	70.00	dB(A)

Note: \*A "decibel" is a unit in which noise is measured.

(Signature)  
(Inspector)



Page 1 of 1

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number:	VEL/ REGL/AN/02	Report No.:	VEL/AN/ 2002260002
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd.	Format No.:	5.10 F-01
	Village Chhote Bhandar, Post Office	Party Reference No.:	NIL
	Bade Bhandar, Tehsil Pussore, Dist.-	Reporting Date:	03/03/2020
	Raigarh - 496100(Chhattisgarh)	Receipt Date:	26/02/2020

Sample Description: AMBIENT NOISE LEVEL MONITORING

### General Information:-

Client Representative	: Mr. Anil Kumar Soni
Sample collected by	: Vardan Enviro Lab Representative
Sampling Location	: Village Palsada
Instrument Used	: Sound Level Meter
Instrument Code	: VEL/SLM/02
Instrument Calibration Status	: Calibrated
Meteorological condition during monitoring	: Clear Sky
Date of Monitoring	: 21/02/2020 to 22/02/2020
Time of Monitoring	: 08:00 AM to 08:00 AM
Surrounding Activity	: Human, Vehicular & Plant activities
Scope of Monitoring	: Regulatory Requirement
Control measure if Any	: --
Sampling & Analysis Protocol	: IS-9989 R-2003
Sampling Duration	: 24 Hours
Parameter Required	: As per work order

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	$L_{max}$	IS 9989 R-2003	64.7	54.8	dB(A)
2.	$L_{min}$	IS 9989 R-2003	42.5	37.6	dB(A)
3.	$L_{eq}$	IS 9989 R-2003	54.72	44.35	dB(A)
4.	CPCB Limits in dB(A) $L_{eq}$ (Industrial Area)	-	55.00	45.00	dB(A)

Note: \* A "decibel" is a unit in which noise is measured.

(Checked By)

(Approved By)

Page 1 of 1

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number: VEL/ REGL/AN/03 Report No.: VEL/AN/ 2002260003  
 Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 P-01  
 Village Chhote Dhandal, Post Office Party Reference No.: NIL  
 Bade Bhandar, Tehsil Pussore, Dist.- Reporting Date: 03/03/2020  
 Raigarh - 496100 (Chhattisgarh) Receipt Date: 26/02/2020

Sample Description: AMBIENT NOISE LEVEL MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
 Sample collected by : Vardan Enviro Lab Representative  
 Sampling Location : Village Kathli  
 Instrument Used : Sound Level Meter  
 Instrument Code : VEL/SLM/03  
 Instrument Calibration Status : Calibrated  
 Meteorological condition during monitoring : Clear Sky  
 Date of Monitoring : 21/02/2020 to 22/02/2020  
 Time of Monitoring : 06:00 AM to 06:00 AM  
 Surrounding Activity : Human, Vehicular & Plant activities  
 Scope of Monitoring : Regulatory Requirement  
 Control measure if Any : --  
 Sampling & Analysis Protocol : IS-9989 R-2003  
 Sampling Duration : 24 Hours  
 Parameter Required : As per work order

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	L <sub>max</sub>	IS 9989 R-2003	62.4	51.8	dB(A)
2.	L <sub>min</sub>	IS 9989 R-2003	41.9	36.7	dB(A)
3.	L <sub>eq</sub>	IS 9989 R-2003	52.86	42.69	dB(A)
4.	CPCB Limits in dB(A) Leq ( Industrial Area ]	-	55.00	45.00	dB(A)

Note: \* A "decibel" is a unit in which noise is measured.

  
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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number: VEL/ REGL/AN/04 Report No.: VEL/AN/ 2002260004  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post Office Party Reference No.: NIL  
Bade Bhandar, Tehsil Pussore, Dist- Raigarh - 496100 (Chhattisgarh) Reporting Date: 03/03/2020  
Receipt Date: 26/02/2020

Sample Description: AMBIENT NOISE LEVEL MONITORING

General Information:-  
Client Representative : Mr. Amit Kumar Soni  
Sample collected by : Vardan Enviro Lab Representative  
Sampling Location : Village Chhote Bhandar  
Instrument Used : Sound Level Meter  
Instrument Code : VEL/SLM/01  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 22/02/2020 to 23/02/2020  
Time of Monitoring : 06:00 AM to 06:00 AM  
Surrounding Activity : Human, Vehicular & Plant activities  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : --  
Sampling & Analysis Protocol : IS-9989 R-2003  
Sampling Duration : 24 Hours  
Parameter Required : As per work order

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	L <sub>max</sub>	IS 9989 R-2003	64.3	48.5	dB(A)
2.	L <sub>min</sub>	IS 9989 R-2003	42.8	38.3	dB(A)
3.	L <sub>eq</sub>	IS 9989 R-2003	54.29	44.56	dB(A)
4.	CPCB Limits in dB(A*) Leq ( Industrial Area )		55.00	45.00	dB(A)

Note: \* A "decibel" is a unit in which noise is measured.

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number: VEL/ RECL/AN/05 Report No.: VEL/AN/ 2002260005  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: S.10 F-01  
Village Chhote Bhandar, Post Office Party Reference No.: NIL  
Bade Bhandar, Tehsil Pussore, Dist.- Raigarh - 496100 (Chhattisgarh) Reporting Date: 03/03/2020  
Receipt Date: 26/02/2020

Sample Description: AMBIENT NOISE LEVEL MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
Sample collected by : Vardan Enviro Lab Representative  
Sampling Location : Village Bada Bhandar  
Instrument Used : Sound Level Meter  
Instrument Code : VEL/SLM/02  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 22/02/2020 to 23/02/2020  
Time of Monitoring : 06:00 AM to 06:00 AM  
Surrounding Activity : Human, Vehicular & Plant activities  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : -  
Sampling & Analysis Protocol : IS-9989 R-2003  
Sampling Duration : 24 Hours  
Parameter Required : As per work order

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	$L_{max}$	IS 9989 R-2003	67.1	56.8	dB(A)
2.	$L_{min}$	IS 9989 R-2003	43.6	38.2	dB(A)
3.	$L_{eq}$	IS 9989 R-2003	53.39	44.72	dB(A)
4.	CPCB Limits (n dB(A*) $L_{eq}$ ( Industrial Area )		55.00	45.00	dB(A)

Note: \* A "decibel" is a unit in which noise is measured.

  
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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number: VFL/ REGL/WN/01 Report No.: VFL/WN/ 2002260001  
Name & Address of the Party: M/c Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post Office Party Reference No.: NIL  
Bade Bhandar, Tehsil Pussore, Dist.- Reporting Date: 03/03/2020  
Raigarh - 496100(Chhattisgarh) Receipt Date: 26/02/2020

Sample Description: AMBIENT NOISE LEVEL MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
Sample collected by : Vardan Enviro Lab Representative  
Sampling Location : Site Office  
Instrument Used : Sound Level Meter  
Instrument Code : VFL/SLM/01  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 21/02/2020  
Time of Monitoring : 09:00 AM to 09:30 AM  
Ambient Temperature : 17°C  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : --  
Sampling & Analysis Protocol : IS-9989 R-2003  
Sampling Duration : 30 Min.  
Parameter Required : As per work order

S. No.	Parameters	Protocol	Test Result dB(A)	Unit
1.	Leq	IS 9989 R-2003	60.76	dB(A)
2.	CPCB Limits in dB(A*) Leq	-	85	dB(A)

Note: \*A "decibel" is a unit in which noise is measured.

  
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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number: VEL/ REGL/WN/02 Report No.: VEL/WN/ 2002260002  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post Office Party Reference No.: NIL  
Bade Bhandar, Tehsil Pussore, Dist.- Raigarh - 496100(Chhattisgarh) Reporting Date: 03/03/2020  
Receipt Date: 26/02/2020

Sample Description: AMBIENT NOISE LEVEL MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
Sample collected by : Vardan Enviro Lab Representative  
Sampling Location : Behind Switchyard  
Instrument Used : Sound Level Meter  
Instrument Code : VEL/SLM/01  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 21/02/2020  
Time of Monitoring : 10:00 AM to 10:30 AM  
Ambient Temperature : 17°C  
Scope of Monitoring : Regulatory Requirement  
Control measure If Any : --  
Sampling & Analysis Protocol : IS-9989 R-2003  
Sampling Duration : 30 Min.  
Parameter Required : As per work order

S. No.	Parameters	Protocol	Test Result dB(A)	Unit
1.	Leq	IS 9989 R-2003	55.31	dB(A)
2.	CPCB Limits in dB(A) Leq	-	85	dB(A)

Note: \*A "decibel" is a unit in which noise is measured.

  
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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number: VEL/ REGL/WN/03 Report No.: VEL/WN/ 2002260003  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post Office Party Reference No.: NIL  
Bade Bhandar, Tehsil Pussore, Dist.- Reporting Date: 03/03/2020  
Raigarh - 496100(Chhattisgarh) Receipt Date: 26/02/2020

Sample Description: AMBIENT NOISE LEVEL MONITORING

### General Information:-

Client Representative : Mr. Amit Kumar Soni  
Sample collected by : Vardan Enviro Lab Representative  
Sampling Location : Railway Entry Gate  
Instrument Used : Sound Level Meter  
Instrument Code : VEL/SLM/01  
Instrument Calibration Status : Calibrated  
Meteorological condition during monitoring : Clear Sky  
Date of Monitoring : 21/02/2020  
Time of Monitoring : 12:00 AM to 12:30 AM  
Ambient Remperature : 17°C  
Scope of Monitoring : Regulatory Requirement  
Control measure if Any : -  
Sampling & Analysis Protocol : IS-9989 R 2003  
Sampling Duration : 30 Min.  
Parameter Required : As per work order

S. No.	Parameters	Protocol	Test Result dB(A)	Unit
1.	Leq	IS 9989 R-2003	58.56	dB(A)
2.	CPCB Limits in dB(A*) Leq	-	85	dB(A)

Note: \*A "decibel" is a unit in which noise is measured.

  
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### 4.3 Ground water Quality Analysis



**Figure No.5. Plan Showing Ground Water Quality Monitoring Location Map**

Location Code: -

- GW1- Site Office
- GW2- PalsadaVillage
- GW3- Kathali Village
- GW4- Chote Bhandar Village
- GW5- Bade Bhandar Village



# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. B2A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MOET & CL Recognised ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number:	<b>VEL/ REGL/W/01</b>	Report No.:	<b>VEL/W/ 2002260001</b>
Name & Address of the Project:	<b>M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post Office Bade Bhandar, Tehsil Pussore, Dist.-Rajgarh - 496100(Chhattisgarh)</b>	Format No.:	<b>5.10 F-01</b>
Sample Description:	<b>Ground Water Sample</b>	Party Reference No.:	<b>NIL</b>
Sampling Location:	<b>Site Office</b>	Reporting Date:	<b>03/03/2020</b>
Sample Collected by:	<b>Vardan EnviroLab Team</b>	Receipt Date:	<b>26/02/2020</b>
Sampling & Analysis Protocol:	<b>IS-10500-2012, APHA 22<sup>nd</sup> Edition 2012</b>	Sampling Date:	<b>22/02/2020</b>
		Sampling Type:	<b>Grab</b>
		Preservation:	<b>Refrigerated</b>
		Sampling Quantity:	<b>20 Ltr</b>
		Parameter Required:	<b>As per Work Order</b>

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Acceptable limit	Permissible limit in the Absence of Alternate Source
1.	pH (at 25 °C)	APHA 22 <sup>nd</sup> Edition, 4500-H• B	7.29	--	6.5 to 8.5	No Relaxation
2.	#Colour	APHA 22 <sup>nd</sup> Edition, 2120 B	BDL (DL 5Hazen)	Hazen	5	15
3.	Turbidity	APHA 22 <sup>nd</sup> Edition, 2130 B	BDL (DL 1 NTU)	NTU	1	5
4.	#Odour	APHA 22 <sup>nd</sup> Edition, 2150 B	Agreeable	--	Agreeable	Agreeable
5.	#Taste	APHA 22 <sup>nd</sup> Edition, 2160 B	Agreeable	--	Agreeable	Agreeable
6.	Total Hardness as CaCO <sub>3</sub>	APHA 22 <sup>nd</sup> Edition, 2340 C	189.4	mg/l	200	600
7.	Calcium as Ca	APHA 22 <sup>nd</sup> Edition, 3500 Ca D	65.9	mg/l	75	200
8.	Alkalinity as CaCO <sub>3</sub>	APHA 22 <sup>nd</sup> Edition, 2320 B	162	mg/l	200	600
9.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl- B	60.8	mg/l	250	1000
10.	#Cyanide as CN	APHA 22 <sup>nd</sup> Edition, 4500-CN- D	BDL(DL 0.02 mg/l)	mg/l	0.05	No Relaxation
11.	Magnesium as Mg	APHA 22 <sup>nd</sup> Edition, 2340 B	6.07	mg/l	30	100
12.	Total Dissolved Solids	APHA 22 <sup>nd</sup> Edition, 2540 C	305	mg/l	500	2000
13.	Sulphate as SO <sub>4</sub>	APHA 22 <sup>nd</sup> Edition, 4500 E	23.8	mg/l	200	400
14.	Fluoride as F	APHA 22 <sup>nd</sup> Edition, 4500-F• D	0.36	mg/l	1.0	1.5
15.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 1988	0.43	mg/l	45	No Relaxation
16.	Iron as Fe	APHA 22 <sup>nd</sup> Edition, 3500-Fe B	0.22	mg/l	0.3	No relaxation
17.	Aluminium as Al	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.03	0.2
18.	Boron	APHA 22 <sup>nd</sup> Edition, 4500B C	BDL(DL 0.01 mg/l)	mg/l	0.5	1
19.	Chromium as Cr	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.05	No Relaxation

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035

Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051

MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample No.: VEL/ REGL/W/01			Report No.: VEL/W/ 2002260001			
S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Acceptable limit	Permissible limit in the Absence of Alternate Source
20.	Phenolic Compounds	APHA 22 <sup>nd</sup> Edition, 5530 C	BDL(DL 0.001 mg/l)	mg/l	0.001	0.002
21.	Residual Free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl-B	BDL(DL 0.02mg/l)	mg/l	0.2	1
22.	#Anionic Detergents as MBAS	APHA 22 <sup>nd</sup> Edition, 5540 C	BDL(DL 0.02 mg/l)	mg/l	0.2	1.0
23.	Zinc as Zn	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	5	15
24.	Copper as Cu	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.05	1.5
25.	Manganese as Mn	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.06 mg/l)	mg/l	0.1	0.3
26.	Cadmium as Cd	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.06 mg/l)	mg/l	0.003	No Relaxation
27.	Lead as Pb	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.13 mg/l)	mg/l	0.01	No Relaxation
28.	Solonium as Se	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.01 mg/l)	mg/l	0.01	No Relaxation
29.	Arsenic as As	APHA 22 <sup>nd</sup> Edition, 3114 B	BDL(DL 0.01 mg/l)	mg/l	0.01	0.05
30.	Mercury as Hg	APHA 22 <sup>nd</sup> Edition, 3112 B	BDL (DL 0.001 mg/l)	mg/l	0.001	No Relaxation
31.	#Total Coliform	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	-	10.00
32.	#E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Absent	Absent

Note: - \*BDL-Below Detection Limit, \*DL- Detection Limit

# Not Covered in NABL Scope

  
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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number:	VEL/REG1./W/02	Report No.:	VEL/W/ 2002260002
Name & Address of the Project:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post Office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh - 496100(Chhattisgarh)	Format No.:	5.10 P-01
Sample Description:	Ground Water Sample	Party Reference No.:	NIL
Sampling Location:	Village Palsada	Reporting Date:	03/03/2020
Sample Collected by:	Vardan EnviroLab Team	Receipt Date:	26/02/2020
Sampling & Analysis Protocol:	IS-10500-2012, APHA 22 <sup>nd</sup> Edition 2012	Sampling Date:	22/02/2020
		Sampling Type:	Grab
		Preservation:	Refrigerated
		Sampling Quantity:	2.0 Ltr
		Parameter Required:	As per Work Order

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Acceptable Limit	Permissible limit in the Absence of Alternate Source
1.	pH (at 25 °C)	APHA 22 <sup>nd</sup> Edition, 4500-H B	7.46	--	6.5 to 8.5	No Relaxation
2.	#Colour	APHA 22 <sup>nd</sup> Edition, 2120 B	BDL (DL 5Hazen)	Hazen	5	15
3.	Turbidity	APHA 22 <sup>nd</sup> Edition, 2130 B	BDL (DL 1 NTU)	NTU	1	5
4.	#Odour	APHA 22 <sup>nd</sup> Edition, 2150 B	Agreeable	--	Agreeable	Agreeable
5.	#Taste	APHA 22 <sup>nd</sup> Edition, 2160 B	Agreeable	--	Agreeable	Agreeable
6.	Total Hardness as CaCO <sub>3</sub>	APHA 22 <sup>nd</sup> Edition, 2340 C	196.5	mg/l	200	600
7.	Calcium as Ca	APHA 22 <sup>nd</sup> Edition, 3500 Ca B	68.7	mg/l	75	200
8.	Alkalinity as CaCO <sub>3</sub>	APHA 22 <sup>nd</sup> Edition, 2320 B	204.3	mg/l	200	600
9.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl B	67.1	mg/l	250	1000
10.	#Cyanide as CN	APHA 22 <sup>nd</sup> Edition, 4500 CN- D	BDL(DL 0.02 mg/l)	mg/l	0.05	No Relaxation
11.	Magnesium as Mg	APHA 22 <sup>nd</sup> Edition, 2340 B	6.10	mg/l	30	100
12.	Total Dissolved Solids	APHA 22 <sup>nd</sup> Edition, 2540 C	325	mg/l	500	2000
13.	Sulphate as SO <sub>4</sub>	APHA 22 <sup>nd</sup> Edition, 4500 E	25.5	mg/l	200	400
14.	Fluoride as F	APHA 22 <sup>nd</sup> Edition, 4500-F D	0.42	mg/l	1.0	1.5
15.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 1988	0.39	mg/l	45	No Relaxation
16.	Iron as Fe	APHA 22 <sup>nd</sup> Edition, 3500-Fe B	0.25	mg/l	0.3	No relaxation
17.	Aluminium as Al	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.03	0.2
18.	Boron	APHA 22 <sup>nd</sup> Edition, 4500B C	BDL(DL 0.01 mg/l)	mg/l	0.5	1
19.	Chromium as Cr	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.05	No Relaxation

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 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised IISO 9001 | OHSAS 45001

## Test Certificate

Sample No.: VEL/ REGL/W/02				Report No.: VEL/W/ 2002260002		
S. Nu.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Acceptable limit	Permissible limit in the Absence of Alternate Source
20.	Phenolic Compounds	APHA 22 <sup>nd</sup> Edition, 5530 C	BDL(DL 0.001 mg/l)	mg/l	0.001	0.002
21.	Residual Free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 C1-B	BDL(DL 0.02mg/l)	mg/l	0.2	1
22.	#Anionic Detergents as MBAS	APHA 22 <sup>nd</sup> Edition, 5540 C	BDL(DL 0.02 mg/l)	mg/l	0.2	1.0
23.	Zinc as Zn	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	5	15
24.	Copper as Cu	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.05	1.5
25.	Manganese as Mn	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.06 mg/l)	mg/l	0.1	0.3
26.	Cadmium as Cd	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.06 mg/l)	mg/l	0.003	No Relaxation
27.	Lead as Pb	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.13 mg/l)	mg/l	0.01	No Relaxation
28.	Selenium as Se	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.01 mg/l)	mg/l	0.01	No Relaxation
29.	Arsenic as As	APHA 22 <sup>nd</sup> Edition, 3114 B	BDL(DL 0.01 mg/l)	mg/l	0.01	0.05
30.	Mercury as Hg	APHA 22 <sup>nd</sup> Edition, 3112 B	BDL (DL 0.001 mg/l)	mg/l	0.001	No Relaxation
31.	#Total Coliform	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	-	10.00
32.	#E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Absent	Absent

Note: - \*BDL-Below Detection Limit, \*DL- Detection Limit  
 # Not Covered in NABL Scope

  
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 Page 2 of 2

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised JISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number:	<b>VEL/ REGI./W/03</b>	Report No.:	<b>VEL/W/ 2002260003</b>
Name & Address of the Project:	<b>M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post Office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh - 496100 (Chhattisgarh)</b>	Format No.:	<b>5.10 F-01</b>
		Party Reference No.:	<b>NIL</b>
		Reporting Date:	<b>03/03/2020</b>
		Receipt Date:	<b>26/02/2020</b>
		Sampling Date:	<b>22/02/2020</b>
		Sampling Type:	<b>Grab</b>
		Preservation:	<b>Refrigerated</b>
		Sampling Quantity:	<b>2.0 Ltr</b>
		Parameter Required:	<b>As per Work Order</b>

Sample Description: **Ground Water Sample**  
 Sampling Location: **Village - Kathli**  
 Sample Collected by: **Vardan EnviroLab Team**  
 Sampling & Analysis Protocol: **IS-10500-2012, APHA 22<sup>nd</sup> Edition 2012**

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Acceptable limit	Permissible limit in the Absence of Alternate Source
1.	pH (at 25 °C)	APHA 22 <sup>nd</sup> Edition, 4500-H B	7.36	--	6.5 to 8.5	No Relaxation
2.	#Colour	APHA 22 <sup>nd</sup> Edition, 2120 B	BDL (DL 5Hazen)	Hazen	5	15
3.	Turbidity	APHA 22 <sup>nd</sup> Edition, 2130 B	BDL (DL 1 NTU)	NTU	1	5
4.	#Odour	APHA 22 <sup>nd</sup> Edition, 2150 B	Agreeable	--	Agreeable	Agreeable
5.	#Taste	APHA 22 <sup>nd</sup> Edition, 2160 B	Agreeable	--	Agreeable	Agreeable
6.	Total Hardness as CaCO <sub>3</sub>	APHA 22 <sup>nd</sup> Edition, 2340 C	368.4	mg/l	200	600
7.	Calcium as Ca	APHA 22 <sup>nd</sup> Edition, 3500 Ca B	108.6	mg/l	75	200
8.	Alkalinity as CaCO <sub>3</sub>	APHA 22 <sup>nd</sup> Edition, 2320 B	316.2	mg/l	200	600
9.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl B	94.7	mg/l	250	1000
10.	#Cyanide as CN	APHA 22 <sup>nd</sup> Edition, 4500-CN D	BDL(DL 0.02 mg/l)	mg/l	0.05	No Relaxation
11.	Magnesium as Mg	APHA 22 <sup>nd</sup> Edition, 2340 B	23.68	mg/l	30	100
12.	Total Dissolved Solids	APHA 22 <sup>nd</sup> Edition, 2540 C	530	mg/l	500	2000
13.	Sulphate as SO <sub>4</sub>	APHA 22 <sup>nd</sup> Edition, 4500 E	51.2	mg/l	200	400
14.	Fluoride as F	APHA 22 <sup>nd</sup> Edition, 4500-F D	0.54	mg/l	1.0	1.5
15.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 1988	2.98	mg/l	45	No Relaxation
16.	Iron as Fe	APHA 22 <sup>nd</sup> Edition, 3500-Fe B	0.32	mg/l	0.3	No relaxation
17.	Aluminium as Al	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.03	0.2
18.	Boron	APHA 22 <sup>nd</sup> Edition, 4500B C	BDL(DL 0.01 mg/l)	mg/l	0.5	1
19.	Chromium as Cr	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.05	No Relaxation

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

Sample No.: VEL/ REGL/W/03			Report No.: VEL/W/ 2002260003			
S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Acceptable limit	Permissible (Limit in the Absence of Alternate Source)
20.	Phenolic Compounds	APHA 22 <sup>nd</sup> Edition, 5530 C	BDL(DL 0.001 mg/l)	mg/l	0.001	0.002
21.	Residual Free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl-B	BDL(DL 0.02mg/l)	mg/l	0.2	1
22.	#Anionic Detergents as MBAS	APHA 22 <sup>nd</sup> Edition, 5540 C	BDL(DL 0.02 mg/l)	mg/l	0.2	1.0
23.	Zinc as Zn	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	5	15
24.	Copper as Cu	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.05	1.5
25.	Manganese as Mn	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.06 mg/l)	mg/l	0.1	0.3
26.	Cadmium as Cd	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.06 mg/l)	mg/l	0.003	No Relaxation
27.	Lead as Pb	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.13 mg/l)	mg/l	0.01	No Relaxation
28.	Selenium as Se	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.01 mg/l)	mg/l	0.01	No Relaxation
29.	Arsenic as As	APHA 22 <sup>nd</sup> Edition, 3114 B	BDL(DL 0.01 mg/l)	mg/l	0.01	0.05
30.	Mercury as Hg	APHA 22 <sup>nd</sup> Edition, 3112 B	BDL (DL 0.001 mg/l)	mg/l	0.001	No Relaxation
31.	#Total Coliform	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	-	10.00
32.	#E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Absent	Absent

Note: - \*BDL-Below Detection Limit, \*DL- Detection Limit  
 # Not Covered in NARI. Scope

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEt & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number:	VEL/ RREGI./W/04	Report No.:	VEL/W/ 2002260004
Name & Address of the Project:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post Office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh - 496100(Cbhattigarh)	Format No.:	5.10 P 01
		Party Reference No.:	NIL
		Reporting Date:	03/03/2020
		Receipt Date:	26/02/2020
		Sampling Date:	22/02/2020
Sample Description:	Ground Water Sample	Sampling Type:	Grab
Sampling Location:	Village- Chhote Bhandar	Preservation:	Refrigerated
Sample Collected by:	Vardan EnviroLab Team	Sampling Quantity:	2.0 Ltr
Sampling & Analysis Protocol:	IS-10500-2012, APHA 22 <sup>nd</sup> Edition 2012	Parameter Required:	As per Work Order

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Acceptable limit	Permissible limit in the Absence of Alternate Source
1.	pH (at 25 °C)	APHA 22 <sup>nd</sup> Edition, 4500-11 B	7.51	-	6.5 to 8.5	No Relaxation
2.	#Colour	APHA 22 <sup>nd</sup> Edition, 2120 B	BDL (DL 5Hazen)	Hazen	5	15
3.	Turbidity	APHA 22 <sup>nd</sup> Edition, 2130 B	BDL (DL 1 NTU)	NTU	1	5
4.	#Odour	APHA 22 <sup>nd</sup> Edition, 2150 B	Agreeable	-	Agreeable	Agreeable
5.	#Taste	APHA 22 <sup>nd</sup> Edition, 2160 B	Agreeable	-	Agreeable	Agreeable
6.	Total Hardness as CaCO <sub>3</sub>	APHA 22 <sup>nd</sup> Edition, 2340 C	320.4	mg/l	200	600
7.	Calcium as Ca	APHA 22 <sup>nd</sup> Edition, 3500 Ca B	104.6	mg/l	75	200
8.	Alkalinity as CaCO <sub>3</sub>	APHA 22 <sup>nd</sup> Edition, 2320 B	228.4	mg/l	200	600
9.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl B	82.3	mg/l	250	1000
10.	#Cyanide as CN	APHA 22 <sup>nd</sup> Edition, 4500-CN-D	BDL(DL 0.02 mg/l)	mg/l	0.05	No Relaxation
11.	Magnesium as Mg	APHA 22 <sup>nd</sup> Edition, 2340 B	14.44	mg/l	30	100
12.	Total Dissolved Solids	APHA 22 <sup>nd</sup> Edition, 2540 C	442	mg/l	500	2000
13.	Sulphate as SO <sub>4</sub>	APHA 22 <sup>nd</sup> Edition, 4500 E	44.5	mg/l	200	400
14.	Fluoride as F	APHA 22 <sup>nd</sup> Edition, 4500-F-D	0.41	mg/l	1.0	1.5
15.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 1988	3.89	mg/l	45	No Relaxation
16.	Iron as Fe	APHA 22 <sup>nd</sup> Edition, 3500-Fe B	0.26	mg/l	0.3	No relaxation
17.	Aluminium as Al	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.03	0.2
18.	Boron	APHA 22 <sup>nd</sup> Edition, 4500B C	BDL(DL 0.01 mg/l)	mg/l	0.5	1
19.	Chromium as Cr	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.05	No Relaxation

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

Sample No.: VEL/ REGL/W/04			Report No.: VEL/W/ 2002260004			
S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Acceptable limit	Permissible limit in the Absence of Alternate Source
20	Phenolic Compounds	APHA 22 <sup>nd</sup> Edition, 5500 C	BDL(DL 0.001 mg/l)	mg/l	0.001	0.001
21.	Residual Free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl-B	BDL(DL 0.02mg/l)	mg/l	0.2	1
22.	#Anionic Detergents as MBAS	APHA 22 <sup>nd</sup> Edition, 5540 C	BDL(DL 0.02 mg/l)	mg/l	0.2	1.0
23.	Zinc as Zn	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	5	15
24.	Copper as Cu	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.05	1.5
25.	Manganese as Mn	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.06 mg/l)	mg/l	0.1	0.3
26.	Cadmium as Cd	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.06 mg/l)	mg/l	0.003	No Relaxation
27.	Lead as Pb	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.13 mg/l)	mg/l	0.01	No Relaxation
28.	Selenium as Se	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.01 mg/l)	mg/l	0.01	No Relaxation
29.	Arsenic as As	APHA 22 <sup>nd</sup> Edition, 3114 B	BDL(DL 0.01 mg/l)	mg/l	0.01	0.05
30.	Mercury as Hg	APHA 22 <sup>nd</sup> Edition, 3112 B	BDL (DL 0.001 mg/l)	mg/l	0.001	No Relaxation
31.	#Total Coliform	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	-	10.00
32.	#E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Absent	Absent

Note: - \*BDL-Below Detection Limit, \*DL- Detection Limit  
 # Not Covered in NABL Scope

  
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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number:	VEL/ REGL/W/05	Report No.:	VEL/W/ 2002260005
Name & Address of the Project:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post Office Bade Rhandar, Tehsil Pussore, Dist.-Raigarh - 426100(Chhattisgarh)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Permitting Date:	03/03/2020
		Receipt Date:	28/02/2020
		Sampling Date:	22/02/2020
Sample Description:	Ground Water Sample	Sampling Type:	Grab
Sampling Location:	Village - Bade Bhandar	Preservation:	Refrigerated
Sample Collected by:	Vardan EnviroLab Team	Sampling Quantity:	2.0 Ltr
Sampling & Analysis Protocol:	IS-10500-2012, APHA 22 <sup>nd</sup> Edition 2012	Parameter Required:	As per Work Order

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Acceptable limit	Permissible limit In the Absence of Alternate Source
1.	pH (at 25 °C)	APHA 22 <sup>nd</sup> Edition, 4500-H B	7.39	--	6.5 to 8.5	No Relaxation
2.	#Colour	APHA 22 <sup>nd</sup> Edition, 2120 B	BDL (DL 5Hazen)	Hazen	5	15
3.	Turbidity	APHA 22 <sup>nd</sup> Edition, 2130 B	BDL (DL 1 NTU)	NTU	1	5
4.	#Odour	APHA 22 <sup>nd</sup> Edition, 2150 B	Agreeable	--	Agreeable	Agreeable
5.	#Taste	APHA 22 <sup>nd</sup> Edition, 2160 B	Agreeable	--	Agreeable	Agreeable
6.	Total Hardness as CaCO <sub>3</sub>	APHA 22 <sup>nd</sup> Edition, 2340 C	328.6	mg/l	200	600
7.	Calcium as Ca	APHA 22 <sup>nd</sup> Edition, 3500 Ca B	102.3	mg/l	75	200
8.	Alkalinity as CaCO <sub>3</sub>	APHA 22 <sup>nd</sup> Edition, 2320 B	305.6	mg/l	200	600
9.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl B	94.8	mg/l	250	1000
10.	#Cyanide as CN	APHA 22 <sup>nd</sup> Edition, 4500 CN D	BDL(DL 0.02 mg/l)	mg/l	0.05	No Relaxation
11.	Magnesium as Mg	APHA 22 <sup>nd</sup> Edition, 2340 B	17.83	mg/l	30	100
12.	Total Dissolved Solids	APHA 22 <sup>nd</sup> Edition, 2540 C	492	mg/l	500	2000
13.	Sulphate as SO <sub>4</sub>	APHA 22 <sup>nd</sup> Edition, 4500 E	41.7	mg/l	200	400
14.	Fluoride as F	APHA 22 <sup>nd</sup> Edition, 4500-F D	0.38	mg/l	1.0	1.5
15.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 1988	4.16	mg/l	45	No Relaxation
16.	Iron as Fe	APHA 22 <sup>nd</sup> Edition, 3500-Fe B	0.29	mg/l	0.3	No relaxation
17.	Aluminium as Al	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.03	0.2
18.	Boron	APHA 22 <sup>nd</sup> Edition, 4500B C	BDL(DL 0.01 mg/l)	mg/l	0.5	1
19.	Chromium as Cr	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.05	No Relaxation

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 ) OHSAS 45001)

## Test Certificate

Sample No.: VEL/REGL/W/05			Report No.: VEL/W/ 2002260005			
S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Acceptable Limit	Permissible limit in the Absence of Alternate Source
20.	Phenolic Compounds	APHA 22 <sup>nd</sup> Edition, 5530 C	BDL(DL 0.001 mg/l)	mg/l	0.001	0.002
21.	Residual Free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl-B	BDL(DL 0.02mg/l)	mg/l	0.2	1
22.	#Anionic Detergents as MBAS	APHA 22 <sup>nd</sup> Edition, 5540 C	BDL(DL 0.02 mg/l)	mg/l	0.2	1.0
23.	Zinc as Zn	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	5	15
24.	Copper as Cu	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.03 mg/l)	mg/l	0.05	1.5
25.	Manganese as Mn	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.06 mg/l)	mg/l	0.1	0.3
26.	Cadmium as Cd	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.06 mg/l)	mg/l	0.003	No Relaxation
27.	Lead as Pb	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.13 mg/l)	mg/l	0.01	No Relaxation
28.	Selenium as Se	APHA 22 <sup>nd</sup> Edition, 3111 B	BDL(DL 0.01 mg/l)	mg/l	0.01	No Relaxation
29.	Arsenic as As	APHA 22 <sup>nd</sup> Edition, 3114 B	BDL(DL 0.01 mg/l)	mg/l	0.01	0.05
30.	Mercury as Hg	APHA 22 <sup>nd</sup> Edition, 3112 B	BDL (DL 0.001 mg/l)	mg/l	0.001	No Relaxation
31.	#Total Coliform	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	-	10.00
32.	#E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	MPN/100ml	Absent	Absent

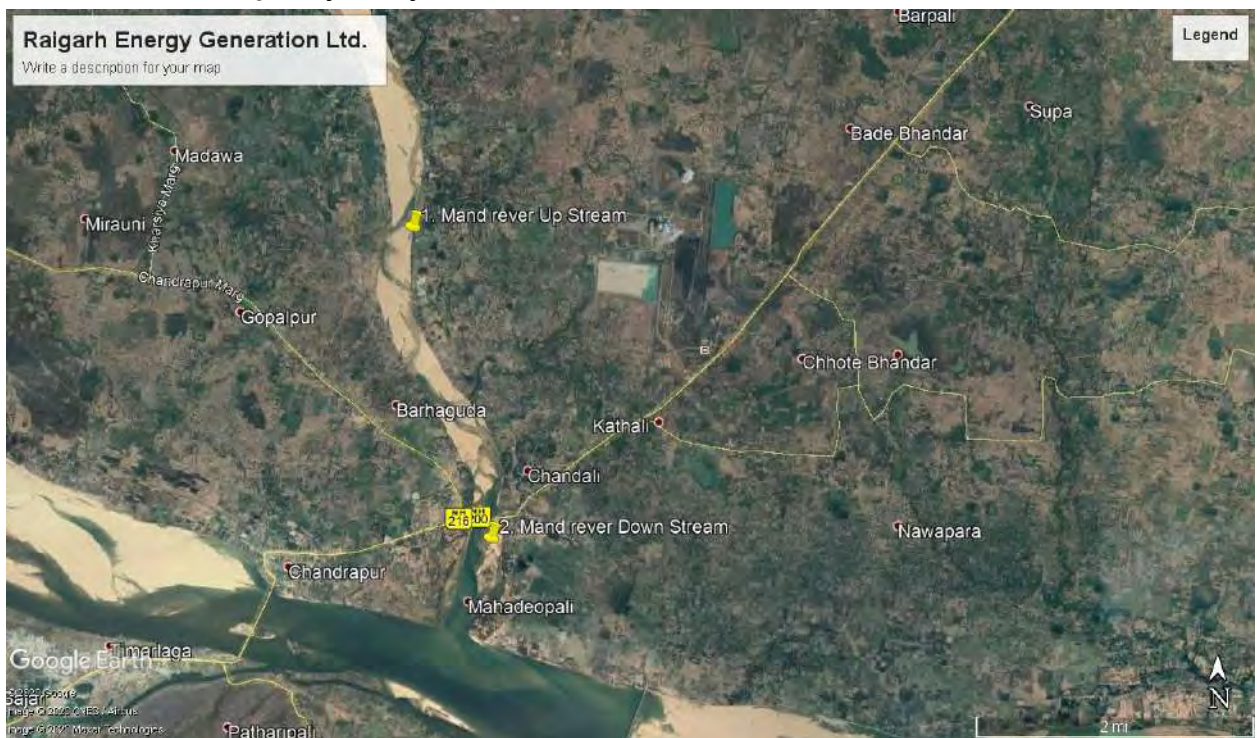
Note: - \*BDL-Below Detection Limit, \*DL- Detection Limit  
# Not Covered in NABL Scope

  
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#### 4.4 Surface water Quality Analysis



**Figure. No. 6. Plan Showing Surface Water Quality Monitoring Location Map**

Location Code: - 1. Mand Nadi River (Up Stream)

2. Mand Nadi River (Down Stream)



# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoEF & CC Recognised ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number:	VFI/REG/AV/01	Report No.:	VEL/W/2002280001
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village ChhoteBhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	SURFACE WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Mand River (Down Stream)	Reporting Date:	03/03/2020
Sample Collected by:	VardanEnviroLab Representative	Period of Analysis:	26/02/2020 to 03/03/2020
Preservation:	Refrigerated	Receipt Date:	26/02/2020
Parameter Required:	As per IS 10500-2012	Sampling Date:	23/02/2020
Sampling and Analysis Protocol:	IS-10500-2012, APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.42	--
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	5	Hazen
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	5	NTU
4.	Chloride as Cl	APHA 22nd Edition, 4500-Cl- B	51.2	mg/l
5.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	132.6	mg/l
6.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	36.5	mg/l
7.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	129	mg/l
8.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	28.3	mg/l
9.	COD	APHA 22nd Edition 2012, 5220 B	50.3	mg/l
10.	Dissolved Oxygen	APHA 22nd Edition 2012, 4500	6.5	mg/l
11.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	DDL(DL: 0.2mg/l)	mg/l
12.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN- D	*BDL(**DL 0.02 mg/l)	mg/l
13.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	10.09	mg/l
14.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	258	mg/l
15.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	32.5	mg/l
16.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F <sup>-</sup> D	0.28	mg/l
17.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	5.1	mg/l
18.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.26	mg/l
19.	Chromium as Cr <sup>6+</sup>	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Certificate

Sample No.:		VEL/REGI/W/01	Report No.: VEL/W/2002260001	
S. No	Parameter	Test-Method	Result	Unit
20.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l
21.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l
22.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	0.20	mg/l
23.	Oil & Grease	APHA 22 <sup>nd</sup> Edition, 5220 E	*BDL(**DL 0.2 mg/l)	mg/l
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 µg/l)	µg/l
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 R	*BDL(**DL 0.01 µg/l)	µg/l
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112-D	*BDL (**DL 0.001 mg/l)	mg/l
31.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 D	*BDL (**DL 0.03 mg/l)	mg/l
32.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l

Note: - \*BDL -Below Detection Limit, \*\*DL Detection Limit

  
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# Vardan EnviroLab

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Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number:	VEL/REGL/W/02	Report No.:	VEL/W/2002260002
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village ChhoteBhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	SURFACE WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Mand River (Up Stream)	Reporting Date:	03/03/2020
Sample Collected by:	VardanEnviroLab Representative	Period of Analysis:	26/02/2020 to 03/03/2020
Preservation:	Refrigerated	Receipt Date:	26/02/2020
Parameter Required:	As per IS 10500-2012	Sampling Date:	23/02/2020
Sampling and Analysis Protocol:	IS-10500-2012, APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.46	--
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	4	Hazen
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	4	NTU
4.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl- B	40.9	mg/l
5.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	108.4	mg/l
6.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	32.8	mg/l
7.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	96	mg/l
8.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	21.3	mg/l
9.	COD	APHA 22 <sup>nd</sup> Edition 2012, 5220 B	46.2	mg/l
10.	Dissolved Oxygen	APHA 22 <sup>nd</sup> Edition 2012, 4500	6.9	mg/l
11.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	BDL(DL 0.2mg/l)	mg/l
12.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN <sup>-</sup> D	*BDL(**DL 0.02 mg/l)	mg/l
13.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	6.45	mg/l
14.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	220	mg/l
15.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	24.6	mg/l
16.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F D	0.32	mg/l
17.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	4.2	mg/l
18.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.24	mg/l
19.	Chromium as Cr <sup>6+</sup>	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l

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- Note:
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  - This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law



# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoFF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

Sample No.:		VEL/REGL/W/02	Report No.:	
S. No	Parameter	Test-Method	Result	Unit
20.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l
21.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l
22.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	0.16	mg/l
23.	Oil & Grease	APHA 22 <sup>nd</sup> Edition, 5220 E	*BDL(**DL 0.2 mg/l)	mg/l
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l
31.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
32.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l

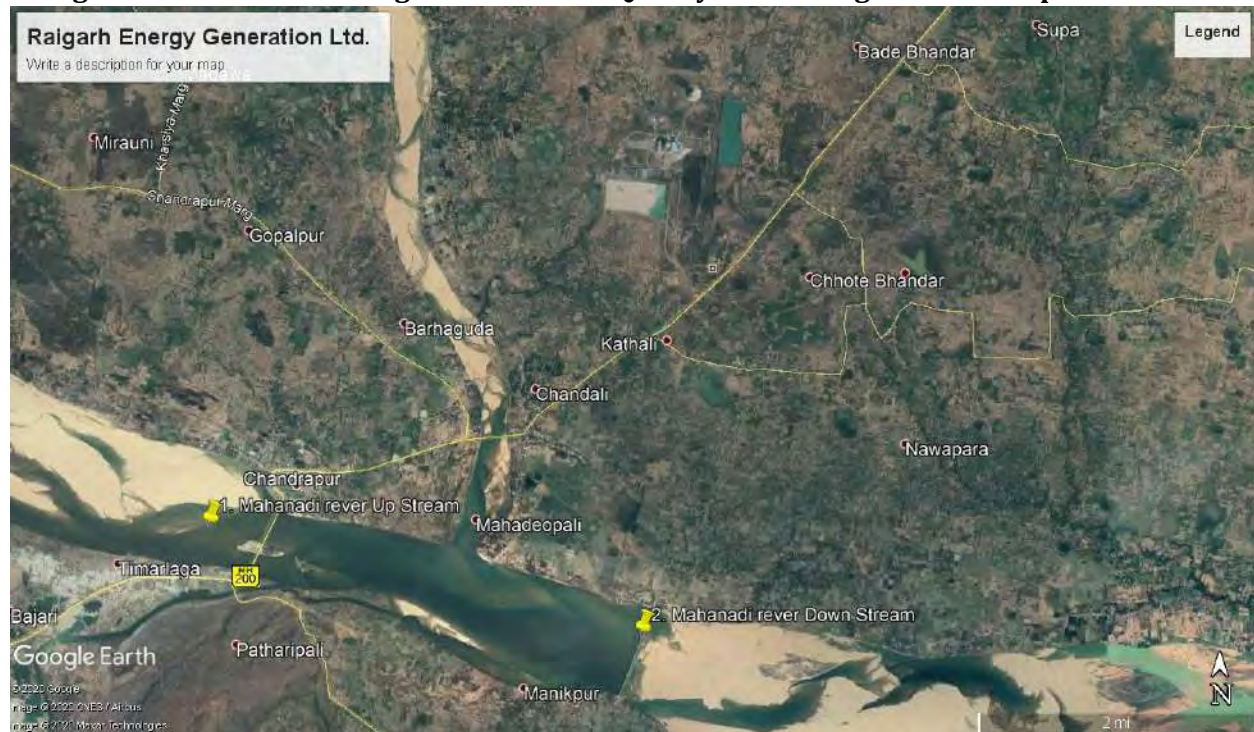
Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

  
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**Figure. No. 7. Plan Showing Surface Water Quality Monitoring Location Map**



Location Code: - 1 Mahanadi River Up Stream

2 Mahanadi River down Stream



# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoFF & CC Recognised IISO 9001 | OHSAS 45001

## Test Certificate

Sample Number:	VEL/REGLAW/03	Report No.:	VELAW/2002260003
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village ChhoteBhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	SURFACE WATER SAMPLING	Party Reference No.:	NIL
Sample Location:	Mahanadi (Down Stream)	Reporting Date:	03/03/2020
Sample Collected by:	VardanEnviroLab Representative	Period of Analysis:	26/02/2020 to 03/03/2020
Preservation:	Refrigerated	Receipt Date:	26/02/2020
Parameter Required:	As per IS 10500-2012	Sampling Date:	23/02/2020
Sampling and Analysis Protocol:	IS-10500-2012, APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.35	--
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	4	Hazen
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	4	NTU
4.	Chloride as Cl	APHA 22nd Edition, 4500-Cl <sup>-</sup> B	54.6	mg/l
5.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	125.3	mg/l
6.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	46.6	mg/l
7.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	145	mg/l
8.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	24.5	mg/l
9.	COD	APHA 22nd Edition 2012, 5220 B	46.9	mg/l
10.	Dissolved Oxygen	APHA 22nd Edition 2012, 4500	6.3	mg/l
11.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl <sup>-</sup> B	BDL(DL 0.2mg/l)	mg/l
12.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN <sup>-</sup> D	*BDL(**DL 0.02 mg/l)	mg/l
13.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	2.19	mg/l
14.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	305	mg/l
15.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	25.9	mg/l
16.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F <sup>-</sup> D	0.35	mg/l
17.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	16.8	mg/l
18.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.31	mg/l
19.	Chromium as Cr <sup>6+</sup>	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l

  
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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

Sample No.:		VEL/REGL/W/03	Report No.:	
			VEL/2002260003	
S. No	Parameter	Test-Method	Result	Unit
20.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l
21.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l
22.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	0.33	mg/l
23.	Oil & Grease	APHA 22 <sup>nd</sup> Edition, 5220 E	*BDL(**DL 0.2 mg/l)	mg/l
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.13mg/l)	mg/l
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l
31.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
32.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

  
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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number:	VEL/REG1/W/04	Report No.:	VEL/W/2002260004
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	SURFACE WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	Mahanadi (Up Stream)	Reporting Date:	03/03/2020
Sample Collected by:	VardanEnviroLab Representative	Period of Analysis:	26/02/2020 to 03/03/2020
Preservation:	Refrigerated	Receipt Date:	26/02/2020
Parameter Required:	As per IS 10500-2012	Sampling Date:	23/02/2020
Sampling and Analysis Protocol:	IS-10500-2012, APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr
		Sampling Type:	Grab

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.3	--
2.	Colour	APHA (22 <sup>nd</sup> Edition)2012, 2120 B	4	Hazen
3.	Turbidity	APHA (22 <sup>nd</sup> Edition)2012, 2130 B	3	NTU
4.	Chloride as Cl	APHA 22 <sup>nd</sup> Edition, 4500-Cl- B	42.1	mg/l
5.	Total Hardness as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2340 C	116.9	mg/l
6.	Calcium as Ca	APHA (22 <sup>nd</sup> Edition)2012, 3500 Ca B	39.7	mg/l
7.	Alkalinity as CaCO <sub>3</sub>	APHA (22 <sup>nd</sup> Edition)2012, 2320 B	126	mg/l
8.	BOD (3 Days at 27 °C)	IS 3025, P-44, 1999 (Reaffirmed 2003)	16.8	mg/l
9.	COD	APHA 22 <sup>nd</sup> Edition 2012, 5220 B	36.7	mg/l
10.	Dissolved Oxygen	APHA 22 <sup>nd</sup> Edition 2012, 4500	6.6	mg/l
11.	Residual free Chlorine	APHA 22 <sup>nd</sup> Edition, 4500 Cl- B	BDL(DL 0.2mg/l)	mg/l
12.	Cyanide as CN	APHA (22 <sup>nd</sup> Edition)2012, 4500 CN <sup>-</sup> D	*BDL(**DL 0.02 mg/l)	mg/l
13.	Magnesium as Mg	APHA (22 <sup>nd</sup> Edition)2012, 3500 Mg B	4.34	mg/l
14.	Total Dissolved Solids	APHA (22 <sup>nd</sup> Edition)2012, 2540 C	245	mg/l
15.	Sulphate as SO <sub>4</sub>	APHA (22 <sup>nd</sup> Edition)2012, 4500 E	19.5	mg/l
16.	Fluoride as F	APHA (22 <sup>nd</sup> Edition)2012, 4500-F <sup>-</sup> D	0.29	mg/l
17.	Nitrate as NO <sub>3</sub>	IS 3025 (P-34) 2003	9.5	mg/l
18.	Iron as Fe	APHA (22 <sup>nd</sup> Edition)2012, 3500-Fe B	0.28	mg/l
19.	Chromium as Cr <sup>6+</sup>	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Certificate

Sample No.:		VEL/REGL/W/04	Report No.:	
S.No	Parameter	Test-Method	Result	Unit
20.	Phenolic Compounds	APHA (22 <sup>nd</sup> Edition)2012, 5530 C	*BDL(**DL 0.001 mg/l)	mg/l
21.	Anionic Detergents as MBAS	APHA (22 <sup>nd</sup> Edition)2012, 5540 C	*BDL(**DL 0.02 mg/l)	mg/l
22.	Zinc as Zn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	0.26	mg/l
23.	Oil & Grease	APHA 22 <sup>nd</sup> Edition, 5220 F	*BDL(**DL 0.2 mg/l)	mg/l
24.	Copper as Cu	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
25.	Manganese as Mn	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
26.	Cadmium as Cd	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.06 mg/l)	mg/l
27.	Lead as Pb	APHA (22 <sup>nd</sup> Edition)2012, 3111 D	*BDL(**DL 0.15 mg/l)	mg/l
28.	Selenium as Se	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
29.	Arsenic as As	APHA (22 <sup>nd</sup> Edition)2012, 3114 B	*BDL(**DL 0.01 mg/l)	mg/l
30.	Mercury as Hg	APHA (22 <sup>nd</sup> Edition)2012, 3112 B	*BDL (**DL 0.001 mg/l)	mg/l
31.	Aluminium as Al	APHA (22 <sup>nd</sup> Edition)2012, 3111 B	*BDL(**DL 0.03 mg/l)	mg/l
32.	Boron	APHA (22 <sup>nd</sup> Edition)2012, 4500B C	*BDL(**DL 0.1 mg/l)	mg/l

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

  
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**Figure No. 8. Plan Showing Soil Sample Monitoring Location Map**

Location Code: -

- S1- PalsadaVillage
- S2- Kthali Village
- S3- Chote Bhandar Village
- S4- Bade Bhandar Village
- S5- Nursery



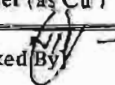
# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MnFE & CC Recognised ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number:	VEI / REGL/SO/01	Report No.:	VEL/SO/ 2002260001
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post Office Bade Bhandar, Tehsil Pussore, Dist- Raigarh - 496100(Chhattisgarh)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Reporting Date:	03/03/2020
Sample location:	Village-Palsada	Receipt Date:	26/02/2020
Packing Status:	Temp. Seal	Date of Monitoring:	23/02/2020
Sample Collected By:	Vardan EnviroLab Team	Sampling Quantity:	2 kg.
Sample Description:	SOIL SAMPLE	Sampling Type:	Composite
Sampling and Analysis Protocol:	IS 2720, USEPA 3050B & USDA	Period Of Analysis:	26/02/20 to 03/03/20

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	IS : 2720 (P-26, RA2011)	7.50	--
2.	Conductivity	IS:14767-2000 Reaffirmed 2006	0.341	mS/cm
3.	Soil Texture	IS : 2720 (P 4, RA1995)	Silty Loam	--
4.	Color	USDA Method, 1968	Yellowish Red	--
5.	Water holding capacity	USDA Method, 1968	35.1	%
6.	Bulk density	USDA Method, 1968	1.28	gm/cc
7.	Chloride as Cl	USDA Method, 1968	85.2	mg/kg
8.	Calcium as Ca	USDA Method, 1968	371.5	mg/kg
9.	Sodium as Na	USDA Method, 1968	77.1	mg/kg
10.	Potassium as K	USDA Method, 1968	93.9	kg/hect.
11.	Organic Matter	IS:2720 (P-22, RA2009)	0.50	%
12.	Magnesium as Mg	USDA Method, 1968	92.8	mg/kg
13.	Available Nitrogen as N	IS:14684, RA2006	211.3	kg/hect.
14.	Available Phosphorus	USDA Method, 1968	21.2	kg/hect.
15.	Zinc (as Zn)	USEPA 3050B	13.4	mg/kg
16.	Manganese (as Mn)	USEPA 3050B	141.0	mg/kg
17.	Lead (as Pb)	USEPA 3050B	4.8	mg/kg
18.	Cadmium (as Cd)	USEPA 3050B	0.82	mg/kg
19.	Chromium (as Cr)	USEPA 3050B	0.85	mg/kg
20.	Copper (as Cu)	USEPA 3050B	12.3	mg/kg

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised | ISO 9001 | OHSAS 45001

## Test Certificate

Sample Number: VEL/ REGL/S0/02 Report No.: VEL/S0/ 2002260002  
Name & Address of the Party: M/s Raigarh Energy Generation Ltd. Format No.: 5.10 F-01  
Village Chhote Bhandar, Post Office Party Reference No.: NIL  
Bade Bhandar, Tehsil Pussore, Dist.- Raigarh - 496100(Chhattisgarh) Reporting Date: 03/03/2020  
Sample location: Village-Kathli Receipt Date: 26/02/2020  
Packing Status: Temp. Seal Date of Monitoring: 23/02/2020  
Sample Collected By: Vardan EnviroLab Team Sampling Quantity: 2 kg.  
Sample Description: SOIL SAMPLE Sampling Type: Composite  
Sampling and Analysis Protocol: IS 2720, USEPA 3050B & USDA Period Of Analysis: 26/02/20 to 03/03/20

S. No.	Parameter	Test-Method	Result	Unit
1	pH (at 25 °C)	IS : 2720 (P-26, RA2011)	7.56	--
2	Conductivity	IS:14767-2000 Reaffirmed 2006	0.321	mS/cm
3	Soil Texture	IS : 2720 (P-4, RA1995)	Silty Loam	--
4	Color	USDA Method, 1968	Yellowish Red	--
5	Water holding capacity	USDA Method, 1968	31.9	%
6	Bulk density	USDA Method, 1968	1.22	gm/cc
7	Chloride as Cl	USDA Method, 1968	70.1	mg/kg
8	Calcium as Ca	USDA Method, 1968	344.2	mg/kg
9	Sodium as Na	USDA Method, 1968	82.9	mg/kg
10	Potassium as K	USDA Method, 1968	156.8	kg/hect.
11	Organic Matter	IS:2720 (P-22, RA2009)	0.92	%
12	Magnesium as Mg	USDA Method, 1968	86.3	mg/kg
13	Available Nitrogen as N	IS:14684, RA2006	287.4	kg/hect.
14	Available Phosphorus	USDA Method, 1968	37.2	kg/hect.
15	Zinc (as Zn)	USEPA 3050B	13.7	mg/kg
16	Manganese (as Mn)	USEPA 3050B	157.3	mg/kg
17	Lead (as Pb)	USEPA 3050B	3.21	mg/kg
18	Cadmium (as Cd)	USEPA 3050B	0.63	mg/kg
19	Chromium (as Cr)	USEPA 3050B	1.6	mg/kg
20	Copper (as Cu)	USEPA 3050B	12.9	mg/kg

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

Sample Number:	VEL/ REGL/S0/03	Report No.:	VEL/S0/ 2002260003
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post Office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh - 496100 (Chhattisgarh)	Format No.:	5.10 F-01
		Party Reference No.:	NIL
		Reporting Date:	03/03/2020
Sample location	Village-Chhote Bhandar	Receipt Date:	26/02/2020
Packing Status	Temp. Seal	Date of Monitoring	23/02/2020
Sample Collected By	Vardan EnviroLab Team	Sampling Quantity	2 kg.
Sample Description:	SOIL SAMPLE	Sampling Type	Composite
Sampling and Analysis Protocol	IS 2720, USEPA 3050B & USDA	Period Of Analysis	26/02/20 to 03/03/20

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	IS : 2720 (P-26, RA2011)	7.52	--
2.	Conductivity	IS:14767-2000 Reaffirmed 2006	0.327	mS/cm
3.	Soil Texture	IS : 2720 (P-4, RA1995)	Silty Loam	--
4.	Color	USDA Method, 1968	Yellowish Red	--
5.	Water holding capacity	USDA Method, 1968	32.8	%
6.	Bulk density	USDA Method, 1968	1.51	gm/cc
7.	Chloride as Cl	USDA Method, 1968	84.3	mg/kg
8.	Calcium as Ca	USDA Method, 1968	346.1	mg/kg
9.	Sodium as Na	USDA Method, 1968	68.7	mg/kg
10.	Potassium as K	USDA Method, 1968	99.4	kg/hect.
11.	Organic Matter	IS:2720 (P-22, RA2009)	0.57	%
12.	Magnesium as Mg	USDA Method, 1968	77.2	mg/kg
13.	Available Nitrogen as N	IS:14684, RA2006	238.7	kg./hect.
14.	Available Phosphorus	USDA Method, 1968	19.1	kg./hect.
15.	Zinc (as Zn)	USEPA 3050B	13.9	mg/kg
16.	Manganese (as Mn)	USEPA 3050B	143.6	mg/kg
17.	Lead (as Pb)	USEPA 3050B	4.4	mg/kg
18.	Cadmium (as Cd)	USEPA 3050B	0.70	mg/kg
19.	Chromium (as Cr)	USEPA 3050B	1.4	mg/kg
20.	Copper (as Cu)	USEPA 3050B	16.8	mg/kg

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

Sample Number: **VEL/ REGL/S0/04** Report No.: **VEL/S0/ 200226000-1**  
Name & Address of the Party: **M/s Raigarh Energy Generation Ltd.** Format No.: **5.10 F-01**  
**Village Chhote Bhandar, Post Office** Party Reference No.: **NIL**  
**Bade Bhandar, Tehsil Pussore, Dist.-** Reporting Date: **03/03/2020**  
**Raigarh - 426100(Chhattisgarh)**  
Sample location: **Village-Bade Bhandar** Receipt Date: **26/02/2020**  
Packing Status: **Temp. Seal** Date of Monitoring: **23/02/2020**  
Sample Collected By: **Vardan EnviroLab Team** Sampling Quantity: **2 kg.**  
Sample Description: **SOIL SAMPLE** Sampling Type: **Composite**  
Sampling and Analysis Protocol: **IS 2720,USEPA 3050B &USDA** Period Of Analysis: **26/02/2020 to 03/03/2020**

S. No.	Parameter	Test-Method	Result	Unit
1.	pH (at 25 °C)	IS : 2720 (P-26,RA2011)	7.68	--
2.	Conductivity	IS:14767-2000 Reaffirmed 2006	0.337	mS/cm
3.	Soil Texture	IS : 2720 (P-4, RA1995)	Silty Loam	--
4.	Color	USDA Method, 1968	Yellowish Red	--
5.	Water holding capacity	USDA Method, 1968	35.6	%
6.	Bulk density	USDA Method, 1968	1.32	gm/cc
7.	Chloride as Cl	USDA Method, 1968	72.3	mg/kg
8.	Calcium as Ca	USDA Method, 1968	415.6	mg/kg
9.	Sodium as Na	USDA Method, 1968	64.5	mg/kg
10.	Potassium as K	USDA Method, 1968	129.6	kg/hect.
11.	Organic Matter	IS:2720 (P-22, RA2009)	0.79	%
12.	Magnesium as Mg	USDA Method, 1968	18.6	mg/kg
13.	Available Nitrogen as N	IS:14684, RA.2006	318.9	kg/hect.
14.	Available Phosphorus	USDA Method, 1968	28.4	kg/hect.
15.	Zinc (as Zn)	USEPA 3050B	17.3	mg/kg
16.	Manganese (as Mn)	USEPA 3050B	129.6	mg/kg
17.	Lead (as Pb)	USEPA 3050B	3.5	mg/kg
18.	Cadmium (as Cd)	USEPA 3050B	0.64	mg/kg
19.	Chromium (as Cr)	USEPA 3050B	1.35	mg/kg
20.	Copper (as Cu)	USEPA 3050B	12.1	mg/kg

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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MnFF & CC Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

Sample Number:	VEL/ RECL/50/05	Report No.:	VEL/50/ 2002260005
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village Chhote Bhandar, Post Office Bade Bhandar, Tehsil Pussore, Dist.- Raigarh - 496100(Chhattisgarh)	Format No.:	5.10 F-01
Sample location	Nursery	Party Reference No.:	NIL
Packing Status	Temp. Seal	Reporting Date:	03/03/2020
Sample Collected By	Vardan EnviroLab Team	Receipt Date:	26/02/2020
Sample Description:	SOIL SAMPLE	Date of Monitoring	23/02/2020
Sampling and Analysis Protocol	IS 2720, USEPA 3050B & USDA	Sampling Quantity	2 kg.
		Sampling Type	Composite
		Period Of Analysis	26/02/2020 to 03/03/2020

S. No.	Parameter	Test-Method	Result	Unit
1	pH (at 25 °C)	IS : 2720 (P-26, RA2011)	7.62	--
2	Conductivity	IS:14767-2000 Reaffirmed 2006	0.313	mS/cm
3	Soil Texture	IS : 2720 (P-4, RA1995)	Silty Loam	--
4	Color	USDA Method, 1968	Yellowish Red	--
5	Water holding capacity	USDA Method, 1968	35.4	%
6	Bulk density	USDA Method, 1968	1.38	gm/cc
7	Chloride as Cl	USDA Method, 1968	76.3	mg/kg
8	Calcium as Ca	USDA Method, 1968	354.5	mg/kg
9	Sodium as Na	USDA Method, 1968	72.6	mg/kg
10	Potassium as K	USDA Method, 1968	125.7	kg/hect.
11	Organic Matter	IS:2720 (P-22, RA2009)	0.61	%
12	Magnesium as Mg	USDA Method, 1968	72.3	mg/kg
13	Available Nitrogen as N	IS:14684, RA2006	267.4	kg/hect.
14	Available Phosphorus	USDA Method, 1968	26.2	kg/hect.
15	Zinc (as Zn)	USEPA 3050B	21.7	mg/kg
16	Manganese (as Mn)	USEPA 3050B	136.3	mg/kg
17	Lead (as Pb)	USEPA 3050B	3.89	mg/kg
18	Cadmium (as Cd)	USEPA 3050B	0.57	mg/kg
19	Chromium (as Cr)	USEPA 3050B	3.6	mg/kg
20	Copper (as Cu)	USEPA 3050B	16.2	mg/kg

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## **4.6 Effluent Sample Analysis Report**

### Locations

1. STP Outlet
2. ETP Outlet



# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
 Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
 MoFF & CI Recognised [ISO 9001 | OHSAS 45001]

## Test Certificate

<b>Sample Number:</b>	VEL/REGL/WW/01	<b>Report No.:</b>	VEL/VW/2002260001
<b>Name &amp; Address of the Party:</b>	M/s Raigarh Energy Generation Ltd. Village Chhoti Bhandar, Post office Bada Bhandar, Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)	<b>Format No.:</b>	SLP F-01
<b>Sample Description:</b>	WASTE WATER SAMPLE	<b>Party Reference No.:</b>	NIL
<b>Sample Location:</b>	STP Outlet	<b>Reporting Date:</b>	03/03/2020
<b>Sample Collected by:</b>	VardanEnviroLab Representative	<b>Period of Analysis:</b>	26/02/2020 to 03/03/2020
<b>Preservation:</b>	Refrigerated	<b>Receipt Date:</b>	26/02/2020
<b>Parameter Required:</b>	As per IS 10500-2012	<b>Sampling Date:</b>	23/02/2020
<b>Sampling and Analysis Protocol:</b>	APHA 22nd Edition 2012	<b>Sampling Quantity:</b>	2.0 Ltr

S. No.	Parameter	Test-Method	Result	Unit	*Standards		
					In-Land Surface Water	Public Sewers	Land for Irrigation
1.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H <sup>+</sup> B	7.39	--	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
2.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	23.3	mg/l	30	350	100
3.	COD	APHA 22nd Edition 2012, 5220 B	118	mg/l	250	--	--
4.	Total Suspended Solids	APHA 22nd Edition 2012, 2540 D	21.5	mg/l	100	600	200
5.	Oil & Grease	APHA 22 <sup>nd</sup> Edition 2012, 5520 B	0.78	mg/l	10	20	10

Note: - \*DDL-Below Detection Limit, \*\*DL- Detection Limit

  
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# Vardan EnviroLab

Laboratory: Plot No. 24, 25, Narayan Vihar B Block, Jaipur (Raj.) 302035  
Corp. Off.: Plot No. 82A, Sector- 5, IMT Manesar, Gurugram- 122051  
MoEF & CC Recognised (ISO 9001 | OHSAS 45001)

## Test Certificate

Sample Number:	VEL/REGL/WW/02	Report No.:	VEL/WW/2002260002
Name & Address of the Party:	M/s Raigarh Energy Generation Ltd. Village ChhoteBhandar, Post office Bade Bhandar, Tehsil Pussore, Dist.-Raigarh -496100 (Chhattisgarh)	Format No.:	5.10 F-01
Sample Description:	WASTE WATER SAMPLE	Party Reference No.:	NIL
Sample Location:	ETP Outlet	Reporting Date:	03/03/2020
Sample Collected by:	VardanEnviroLab Representative	Period of Analysis:	26/02/2020 to 03/03/2020
Preservation:	Refrigerated	Receipt Date:	26/02/2020
Parameter Required:	As per IS 10500-2012	Sampling Date:	23/02/2020
Sampling and Analysis Protocol:	APHA 22nd Edition 2012	Sampling Quantity:	2.0 Ltr

S. No.	Parameter	Test-Method	Result	Unit	*Standards		
					In-Land Surface Water	Public Sewers	Land for Irrigation
6.	pH (at 25 °C)	APHA (22 <sup>nd</sup> Edition)2012, 4500-H B	7.60	--	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
7.	BOD (3 Days at 27 °C)	IS 3025,P-44,1999 (Reaffirmed 2003)	19.5	mg/l	30	350	100
8.	COD	APHA 22 <sup>nd</sup> Edition 2012, 5220 D	91.7	mg/l	250	--	--
9.	Total Suspended Solids	APHA 22 <sup>nd</sup> Edition 2012, 2540 D	19.0	mg/l	100	600	200
10.	Oil & Grease	APHA 22 <sup>nd</sup> Edition 2012, 5520 B	0.74	mg/l	10	20	10

Note: - \*BDL-Below Detection Limit, \*\*DL- Detection Limit

  
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## **Chapter – 5.0 CONCLUSION**

RAIGARH ENERGY GENERATION LTD., authorities have been taken successful steps in controlling environmental pollution in and around the project. This fact is clear from analytical results of different environmental parameters. A brief conclusion is as follows.

<b>Sr. No.</b>	<b>Environmental Parameters</b>	<b>Conclusion</b>
5.1	Air Environment	After analysis of the samples from five different locations it is observed that both the individuals and average concentration of air pollutants in respect of SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> , CO and Mercury are well within the prescribed limits of NAAQM standards. People of township and of surrounding villages do not have any problems regarding the air quality and have no grievances because of Thermal Power Plant activities.
5.2	Water Environment	The analytical result of the samples from the ground water of villages, surface water from river, and domestic & industrial effluent after treatment shows that the concentrations of different water parameters are well within prescribed limits and will not cause any adverse impact on human health and on surrounding area. People of surrounding areas express satisfaction about the water quality of That area.
5.3	Noise Environment	The observations taken at four village location during day and night time shows that the noise level are well within prescribed limits of CPCB. Hence there is no possibility of any adverse effect of noise generated due to Thermal Power Plant activities on peoples of Surrounding areas.

All the above details show that Thermal Power Plant of RAIGARH ENERGY GENERATION LTD. is not causing any adverse impact on the human health and ecological balance.


**Raigarh Energy Generation Limited 1×600 MW TPP at Village - Chhote Bhandar, Tehsil- Pussore, Distt - Raigarh, (C.G.)**
**FLY ASH UTILIZATION REPORT Month-Apr'19-Mar'20**

Month	Fly ash generation in the month (MT)	Fly ash utilization for the month of Apr'19 - Mar'20								Cumulative fly ash generation from Apr'19-Mar'20 (MT)	Cumulative fly ash utilization from Apr'19-Mar'20 (MT)	Required utilization as per notification for the year (as per action plan schedule)
		Supply to Cement Plant (MT)	Supply to brick plant	Land/ Mine filling(MT)	Ash dyke raising/construction (MT)	Agriculture (MT)	Road Making/other (MT)	Total utilization in (MT)	% age utilization in (MT)			
Apr-19	0	0	0	0	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0	0	0	0	0
Jun-19	0	0	0	0	0	0	0	0	0	0	0	0
Jul-19	0	0	0	0	0	0	0	0	0	0	0	0
Aug-19	0	0	0	0	0	0	0	0	0	0	0	0
Sep-19	0	0	0	0	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0	0	0	0	0
Nov-19	0	0	0	22	0	0	0	22	0	0	22	0
Dec-19	19745	0	0	20168	0	0	0	20168	102.1%	19745	20190	19745
Jan-20	21652	0	0	21	0	0	0	21	0.1%	41397	20211	21652
Feb-20	29592			25012				25012	84.5%	70989	45223	29592
Mar-20	68312	0	0	94387	0	0	0	94387	138.2%	139301	139610	68312

\*Plant was not in continuous operation throughout the year.

# Green Belt Development

Annexure III

Plantation on 33% land of 487 acres	163 acres
Density of plantation	2500 plants/Hectare
Area required per plant	4.0 SQM
<b>Total No. of plantation completed</b>	<b>202048 No's</b>
2011-12	30,000
2012-13	20,571
2013-14	37,139
2014-15	43,107
2015-16	40,278
2016-17	17,517
2017-18	7,348
2018-19	3,450
2019-20	2,600
Survival rate maintained	>70%