

EOGEPL/CBM-RG(E)/E&F/2018/488

Date: 30<sup>th</sup> May, 2018



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To  
The Director  
Ministry of Environment and Forests  
Eastern Regional Office  
A/3 Chandrasekharapur  
Bhubaneswar-751 023  
Orissa

**Sub:** Submission Half-yearly Compliance Report of the Environmental Clearance (Phase-III) by Essar Oil and Gas Exploration and Production Limited reg.

**Ref:** Environmental Clearance of Phase-III granted by MoEF vide letter no.J-11011/491/2011-IA II(I) dated 26<sup>th</sup> February, 2013; Transfer of EC from EOL to EOGEP L dated 27.11.2017

Dear Sir

We are enclosing herewith the half-yearly compliance report in respect of the stipulated prior environmental clearance terms and conditions for the Phase-III CBM project activities for the period of October, 2017- March, 2018.

Thanking you.

Yours faithfully  
For Essar Oil and Gas Exploration and Production Limited

  
Authorized Signatory  
(Ashutosh Dash  
Vice President & Head - Production)



**Encl:** Phase-III Compliance Report

**Copy to:**

1. Member Secretary (Industry), MoEF, CGO Complex, Paryavan Bhavan, New Delhi-110003
2. The Environmental Engineer, Durgapur Regional Office, WBPCB, Durgapur-713216

**Essar Oil and Gas Exploration and Production Limited**

**RG (East)-CBM-2001/1 (Phase-III) Half Yearly Environment Clearance Compliance Report  
(October'17- March'18)**

**Ref: Environmental Clearance F.No.J-11011/491/2011-IA II (I), dated 26<sup>th</sup> February, 2013**

<b>S. No</b>	<b>Condition</b>	<b>Compliance Status</b>
<b>A</b>	<b>Specific Conditions</b>	
i.	Compliance to all the environmental conditions stipulated in the environmental clearance letter nos.J-11011/660/2007-IA-II(I) dated 6 <sup>th</sup> May, 2008, J-11011/351/2009-IA-II(I) dated 23.09.2011 and its subsequent amendment shall be satisfactorily implemented	Compliance to the environmental conditions of Phase-I, II & II(A) are being satisfactorily implemented and the compliance reports are regularly submitted to the Regional office of the MoEF.
ii.	Compensation for the land acquisition to the land oustees, if any, and also for standing crop shall be paid as per the National Resettlement and Rehabilitation Policy (NRRP) 2007 or State Government norms. It may be ensured that compensation provided shall not be less than the norms of the NRRP, 2007	Land acquisition is in progress. The acquisition is directly being done with the concerned land owners and compensation is paid above the prevailing market rates. There is no involvement of Rehabilitation and Resettlement.
iii.	Prior permission from the Ministry of Defence shall be obtained regarding impact of proposed plant on Panagarh, if any	Total four (4) nos. of GGS and One (1) no MCS constructed as per the NOC obtained MoD.
iv.	As proposed, no forest land shall be used for the proposed facilities	Forest land is not being used for construction of well pads or and surface facilities of the project.
v.	Ambient Air Quality shall be monitored near the closest human settlements as per the National Ambient Air Quality Emission Standards (NAAQES) issued by the Ministry vide G.S.R No. 826(E) dated 16 <sup>th</sup> November, 2009 for PM10, PM2.5, SO2, NOx, CO, CH4, VOCs, HC, Non-Methane HC etc. Efforts sh be made to improve the ambient air quality of the area	Ambient Air Quality Monitoring has been carried out near to the closest human settlements as per the Ambient Air Quality Emission Standards (NAAQES) issued by the Ministry vide G.S.R No. 826(E) dated 16 <sup>th</sup> November, 2009. Periodic & Preventive maintenance is carried out for all the equipment. However CBM gas production does not generate significant air pollutant.  The monitoring results have been attached as <b><i>Annexure-I.</i></b>
vi.	Mercury shall also be analysed in air, water and drill cuttings twice during drilling period	The Drilling was temporarily suspended from April 2017 till date.
vii.	The flare system shall be designed as per good oil field practices and Oil Industry Safety Directorate (OISD) guidelines. The company shall take necessary measures to prevent fire hazards and soil remediation as	Elevated flare system was designed as per OISD guidelines. Measures delineated in the EIA/EMP have been taken to prevent fire hazards. The overhead flaring was installed with height of 30 m. The following

S. No	Condition	Compliance Status
	needed. At the place of ground flaring, the flare pit shall be lined with refractory bricks and efficient burning system. In case of overhead flare stacks, the stack height shall be provided as per the regulatory requirements and emission from stacks shall meet the MoEF/CPCB guidelines.	measures have been implemented to prevent fire hazard. <ul style="list-style-type: none"> <li>▪ Installation of electrical equipment as per approved hazardous zone classification as communicated to DGMS</li> <li>▪ Provided dry chemical fire extinguishers</li> <li>▪ Portable methane gas analyzers (CH4)</li> <li>▪ Use of flame proof type lighting fixtures, push buttons and switches in the drill site facilities</li> </ul>
viii.	The company shall make the arrangement for control of noise from the drilling activity, compressor station and DG sets by providing necessary mitigation measures such as proper acoustic enclosures to DG sets and meet the norms notified by the MoEF. Height of all the stacks/vents shall be as per the CPCB guidelines.	Only CPCB approved models of Silent DG sets has been installed with acoustic enclosures. Once the gas production starts at the well site, these DG sets will be replaced by Gas based Generator Sets. In operational wells gas generator sets are running.  Noise monitoring has been carried out in the surrounding habitats and major activity area.  A copy of the report is attached as <b>Annexure-II</b> .
ix.	The company shall comply with the guidelines for disposal of solid waste, drill cutting and drilling fluids for onshore drilling operation notified vide GSR.546€ dated 30 <sup>th</sup> August, 2005	The drilling was temporarily suspended from April 2007 to till date.
x.	Total fresh water requirement should not exceed 125m3 for each well during drilling phase 1 m3/day for GGS/MCS. Prior permission shall be obtained from the Competent Authority and a copy submitted to the Ministry's Regional Office at Bhubaneswar	The drilling was temporarily suspended from April 2007 to till date.
xi.	During well drilling, wastewater should be segregated into waste drilling fluid and drill cuttings. Drill cutting should be stored onsite impervious HDPE lined pit for solar evaporation and drying. Effluent should be properly treated and treated effluent should conform to CPCB standards. As proposed, produced water should be treated by reverse osmosis and reuse in drilling of new wells, fire hydrant system and other beneficial purposes. Domestic effluent should be disposed-off through septic tank followed by soak pit.	The drilling was temporarily suspended from April 17 to till date.  Produced water is treated through Reverse Osmosis System. The treated produced water is reused in other operations. The RO water Analysis Report is attached as <b>Annexure III</b> .  Domestic effluent is disposed of through septic tank by soak pit.

S. No	Condition	Compliance Status
xii.	Ground water quality monitoring should be done to assess if produced water storage or disposal has any effect	The copy of the ground water level reports are attached as <b>Annexure-IV</b> and analysis reports of ground water monitoring is attached in <b>Annexure IV A</b> .
xiii.	Drilling wastewater including drill cuttings, wash water shall be collected in disposal pit lined with HDPE lining, evaporated or treated and shall comply with the notified standards for on-shore disposal on land. Proper toxicological analysis shall be done to ensure there is no hazardous material. Copy of toxicological analysis shall be submitted to Ministry's Regional Office at Bhubaneswar	The drilling was temporarily suspended from April 17 to till date.
xiv.	Water base drilling mud or synthetic based mud shall be used	Water based mud was used in the drilling.
xv.	The company shall take necessary measures to prevent fire hazards, containing oil spill and soil remediation as needed. At place of ground flaring, the overhead flaring stack with knockout drums shall be installed to minimize gaseous emissions during operation.	All the precautionary measures is implemented to prevent fire hazards & Oil Spills. Elevated flaring is carried out. No ground flaring is done.
xvi.	The company shall take necessary measures to prevent fire hazards and soil remediation as needed. The stacks of adequate height shall be provided to flare the gas, if required, to minimize gaseous emissions and heat load during flaring	Gas detectors & sensors available to prevent the fire hazards. Flare stack height of 30m is maintained at Gas Gathering Stations and 50 m at Main Compressor Stations.
xvii.	To prevent underground coal fire, preventive measures shall be taken for ingress of ambient air during withdrawal inside the coal seams by adopting technologies including vacuum suction. Gas detectors for the detection of CH <sub>4</sub> and H <sub>2</sub> S shall be provided.	Gas detectors for Methane, H <sub>2</sub> S and other gases are provided at the Gas Gathering Station and production sites. There is not any ingress of ambient air since the well is arrested at the head with drive head and progressive cavity pump.
xviii.	The design, material of construction, assembly, inspection, testing and safety aspects of operations and maintenance of pipeline and transporting the natural gas/oil shall be governed by ASME/ANSI B 31.8/B31.4 and OISD standard 141. Pipeline wall thickness and minimum depth of burial at river crossing and casings at rails, major road crossings should be in conformity with ANSI/ASME requirements.	All the surface facilities are installed as per the ASME/ANSI B 31.8 standards. Pipelines design and laying are confirmed to the ANSI/ASME standards and OISD 141 Guideline.

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xix.	The company shall develop a contingency plan for H <sub>2</sub> S release including all necessary aspects from evacuation to resumption of normal operations. The workers shall be provided with personal H <sub>2</sub> S detectors in locations of high risk of exposure along with self-containing breathing apparatus.	H <sub>2</sub> S is not present as per the analysis of gas tapped from the test wells & pilot wells. However all the necessary safety measures are taken as per the Emergency Response Plan. Gas detectors are kept at the Gas Gathering Station and production sites to check any presence of gases which are beyond threshold values. All workers are provided with standard PPEs according to job requirement.
xx.	Adequate well protection system shall be provided like Blow Out Preventor (BOP) or diverter systems as required based on the geological formation of the blocks.	CBM well hydrostatic pressures are found to be less than 2psi. However considering the hydrostatic pressures and sensitivity of well, Blow Out Preventers or diverter systems are provided at the well head during drilling along with other well control measures such as proper pre-well planning and drilling fluid logging to maintain the hydrostatic pressure.
xxi.	The top soil removed shall be stacked separately for reuse during restoration process	The top soil being spread in the designated Green Belt area of the major facility.
xxii.	Emergency Response Plan shall be based on the guidelines prepared by OISD, DGMS and Govt. of India. Recommendations mentioned in the Risk Assessment & Consequence Analysis and Disaster Management Plan shall be strictly followed.	Emergency Response plan has been prepared as per the OISD & DGMS guidelines and sent for the DGMS approval and has been certified. The certificate has already attached with previous compliance report.
xxiii.	Project proponent shall comply with the environment protection measures and safeguards recommended in the EIA/EMP/risk analysis report/disaster management plan	Environmental protection measures and safeguards recommended in EMP/risk analysis report/disaster management plan are implemented.
xxiv.	The company shall take measures after completion of drilling process by well plugging and secured enclosures, decommissioning of rig upon abandonment of the well and drilling site shall be restored in original condition. In the event that no economic quantity of hydrocarbon is found a full abandonment shall be implemented for the drilling site in accordance with the applicable Indian Petroleum Regulations.	Wells will be abandoned and restored to natural position if found not suitable for hydrocarbon extraction.  Wells will be fully abandoned in compliance with Indian Petroleum Regulations in the event of no economic quality of hydrocarbon is found.
xxv.	Occupational health surveillance of the workers shall be carried out as per the prevailing Acts and Rules.	Occupational health surveillance of the workers has been carried out as per the Mines Act 1952. Periodical Occupational Health Surveillance records are being maintained.

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xxvi.	Company shall adopt Corporate Environment Policy as per the Ministry's O.M.No.J-11013/41/2006-IA.II(I) dated 26 <sup>th</sup> April, 2011 and implemented.	Company has framed Corporate Environment Policy which is duly implemented.
xxvii.	All the commitments made to the public during the Public Hearing/Public Consultation meeting held on 24 <sup>th</sup> May, 2012 shall be satisfactorily implemented and a separate budget for implementing the same shall be allocated and information submitted to the Ministry's Regional Office at Bhubaneswar.	Commitments given in the public hearing are strictly implemented. A separate budget has already been provided for the FY 2017-2018 as part of previous phases of the project for the welfare of surrounding villages in thrust areas like Health, Education & Empowerment etc. under CSR budget.
xxviii.	At least 5% of the total cost of the project should be earmarked towards the enterprise social commitment and item-wise details along with time bound action plan shall be prepared and submitted to the Ministry's Regional Office at Bhubaneswar. Implementation of such program shall be ensured after the completion of the project.	<p>The budget for enterprise social commitment has been allocated for the CBM Project as a whole (Ph-I, II, IIA, III). The expenditure towards enterprise social commitment activities for the period Oct'17-Mar'18 is INR 0.22 Crore. The details of activities done in various areas like health, education and empowerment, community infrastructure development and it's beneficiaries are attached in the <b>Annexure-V</b></p> <p>The revised budgetary allocation has been made for the FY 2017-18 for the CBM Project which is about Rs. 1.03 Crore. These funds has be judicially utilised for the development of villages and people in the vicinity of the project area.</p>
<b>B</b>	<b>General Conditions</b>	
i.	The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board (SPCB), State Government and any other statutory authority.	We comply with the stipulations made by the State Pollution Control Board (SPCB), State Government and all other statutory bodies.
ii.	No further expansion or modification in the project shall be carried out without prior approval of the Ministry of Environment & Forests. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.	<p>We restrict to the project configuration that is described in the Environmental Clearance.</p> <p>For any further expansion and modification in project configuration, we would approach MoEF for the prior Environmental Clearance.</p>
iii.	The project authorities must strictly comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 2000 as	We comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 2000 as amended subsequently.

S. No	Condition	Compliance Status
	amended subsequently. Prior approvals from Chief Inspectorate of Factories, Chief Controller of Explosives, Fire Safety Inspectorate etc. must be obtained, wherever applicable	Prior approvals will be obtained from appropriate authority.
iv.	The project authorities must strictly comply with the rules and regulation with regarding to handling and disposal of Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 wherever applicable. Authorization from the State Pollution Control Board must be obtained for collections/treatment/storage/disposal of hazardous wastes.	We comply with the rules and regulations with regard to handling and disposal of Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008.  Authorization from the West Bengal Pollution Control Board has been obtained with regard to storage, treatment and disposal of hazardous waste, valid till October, 2018.
v.	The overall noise levels in and around the plant area shall be kept within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under EPA Rules, 1989 viz. 75dBA (daytime) and 70 dBA (night time)	Acoustic hoods, silencers, enclosures are provided to high noise generating equipment. Noise levels will be restricted to the standards prescribed under EPA Rules, 1989.  Personal Protective Equipment (earmuffs and plugs) have been provided to the working personnel.
vi.	A separate Environmental Management Cell equipped with full-fledged laboratory facilities must be set up to carry out the environmental management and monitoring functions.	A dedicated environment management Cell is currently in operation and functioning for implementation of environment management plan at large.  The sampling and analysis of environmental parameters iss been carried out by Scientific Research laboratory (MoEF recognized).
vii.	As proposed, Rs.2.80 Crores earmarked for environment pollution control measures shall be used to implement the conditions	Rs.2.80 Crores earmarked for environment pollution control measures has been judicially utilised. The former expenditure towards environmental protection has been submitted with previous compliance reports of EC Phase I (EC no. F. No. J-11011/660/2007- IA II (I) dated 06.05.2008) & EC Phase II (EC no. F. No. J-11011/351/2009- IA II (I) dated 23.09.2011)  The environmental protection expenditure from October'17 till March'18 is attached with this report as <b>Annexure VI</b> .
viii.	The Regional Office of this Ministry/Central Pollution Control Board/State Pollution Control Board will monitor the stipulated conditions. A six monthly compliance report and the monitored data along with statistical interpretation shall be submitted to them regularly.	Support is being extended to the Regional office of this Ministry/Central Pollution Control Board/State Pollution Control Board for monitoring the stipulated conditions. Six Monthly Compliance Reports will be regularly be submitted to MoEF Regional Office.

S. No	Condition	Compliance Status
ix.	A copy of clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/ Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the web site of the company by the proponent.	A copy of Clearance letter has been uploaded on the company's website. The notice of obtaining environmental clearance has been published two new papers. Also a copy of clearance has been circulated to major administrative offices.
x.	The project proponent shall upload the status of compliance for the stipulated environment clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MoEF, the respective Zonal Office of CPCB and the WBPCB. The criteria pollutant levels namely; PM10, PM2.5, SO2, NOx, HC (Methane & Non-methane), VOCs (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.	Compliance reports have been uploaded on company's website & sent to Regional Office of the MOEF, the respective Zonal Office of CPCB and the WBPCB.  The Ambient air quality monitoring is already being carried out in the nearest settlements as per revised NAAQM criteria. The criteria pollutant levels namely; SPM, RSPM, SO2, NOx, HC (Methane & Non-methane), VOCs are being monitored periodically and displayed at the main entrance of the existing Gas Gathering Stations.
xi.	The project proponent shall also submit six monthly reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MoEF, the respective Zonal Office of CPCB and the WBPCB. The Regional Office of this Ministry/CPCB/WBPCB shall monitor the stipulated conditions.	We are submitting the six monthly compliance reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and the WBPCB.
xii.	The environmental 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 conditions and shall also be sent to the respective Regional Offices of the MoEF by e-mail	The environmental statement for each financial year ending 31 <sup>st</sup> March in Form-V as is being regularly submitted to West Bengal Pollution Control Board and the same will be uploaded on the company's website along with the status of compliance report.



S. No	Condition	Compliance Status
xiii.	<p>The Project Proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the WBPCB 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>. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the Regional Office.</p>	<p>The advertisement regarding the grant of environmental clearance has been published in two newspapers viz The Statesman (English) and Anand Bazaar Pathrika (Bengali/Vernacular) on 28<sup>th</sup> February, 2013. A copy of the advertisement is already submitted with Half yearly compliance of Oct 12 – Mar 13 period</p>
xiv.	<p>Project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.</p>	<p>We are currently working with financial institutions regarding funding for the phase-III project activities. The date of financial closure will be informed to the MoEF (Eastern Regional Office) as and when achieved. The approval from concerned authorities and the commencement of the activities will also be informed to your kind office.</p>

**Ambient Air Quality of Surrounding Villages of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE I**

S. NO.	Parameter	Unit	NAAQS Limit	GGs 1					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	33.04	37.35	43.18	36.42	37.28	41.08
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	64.73	74.04	75.68	72.64	69.38	74.65
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	44.35	41.72	41.19	42.65	42.84	43.58
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	6.35	6.94	6.41	6.04	6.76	6.22
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.398	0.386	0.429	0.416	0.412	0.463
6	THC as Methane	mg/m <sup>3</sup>	-	2.09	1.78	1.78	2.09	2.18	2.42
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	3.02			2.92		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.75			0.63		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	22.47			26.14		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	46.12			39.86		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.15			0.18		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	14.84			15.02		
15	Arsenic	ng/m <sup>3</sup>	6	1.62			1.31		
16	Benzene	mg/m <sup>3</sup>	5	1.84			1.75		

S. NO.	Parameter	Unit	NAAQS Limit	JATGORIA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	34.94	35.98	46.62	30.22	40.34	33.46
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	69.08	75.42	82.50	58.64	68.22	72.64
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	36.93	45.47	42.00	39.62	46.24	44.58
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	5.66	7.08	6.75	5.84	6.18	6.70
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.348	0.364	0.464	0.40	0.438	0.446
6	THC as Methane	mg/m <sup>3</sup>	-	2.64	1.8	1.72	1.80	2.230	2.36
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	5.38	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	0.362	1.56	1.56
9	VOCs	µg/m <sup>3</sup>	-	4.25			3.02		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.95			0.39		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	30.14			19.04		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	49.71			31.97		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.25			0.14		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	16.84			13.67		
15	Arsenic	ng/m <sup>3</sup>	6	1.95			1.53		
16	Benzene	mg/m <sup>3</sup>	5	2.49			1.46		

S. NO.	Parameter	Unit	NAAQS Limit	MCS (MALANDIGHI)					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	34.76	36.80	46.83	39.42	36.28	39.66
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	68.18	68.31	76.20	74.58	64.33	75.22
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	42.29	44.20	41.34	43.21	43.52	47.28
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	6.06	6.93	6.73	5.82	7.04	7.46
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.344	0.364	0.422	0.368	0.402	0.438
6	THC as Methane	mg/m <sup>3</sup>	-	2.41	1.39	1.46	2.41	2.01	1.98
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	3.89			2.96		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.82			0.76		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	25.12			27.53		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	48.23			44.51		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.19			0.24		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	15.63			16.05		
15	Arsenic	ng/m <sup>3</sup>	6	1.79			1.78		
16	Benzene	mg/m <sup>3</sup>	5	2.21			1.95		

S. NO.	Parameter	Unit	NAAQS Limit	KULDIHA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	34.78	41.41	42.98	35.22	41.68	34.28
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	65.31	70.57	82.55	68.42	77.28	68.54
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	37.46	40.34	40.90	40.28	42.36	46.28
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	5.80	6.85	6.39	6.22	3.78	5.84
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.408	0.382	0.438	0.402	0.456	0.524
6	THC as Methane	mg/m <sup>3</sup>	-	2.18	1.64	0.17	2.09	2.51	2.32
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	3.73			2.68		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.79			0.54		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	24.57			21.42		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	44.18			35.83		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.21			0.17		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	13.39			11.59		
15	Arsenic	ng/m <sup>3</sup>	6	1.54			1.81		
16	Benzene	mg/m <sup>3</sup>	5	2.12			1.62		

S. NO.	Parameter	Unit	NAAQS Limit	GOPALPUR					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	24.39	41.97	44.06	35.24	36.08	47.54
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	58.71	83.29	76.16	76.32	72.04	84.36
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	38.60	44.34	39.86	40.35	43.84	46.28
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	5.38	7.05	6.53	6.02	5.38	6.64
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.362	0.398	0.438	0.368	0.386	0.402
6	THC as Methane	mg/m <sup>3</sup>	-	1.83	1.95	1.88	1.83	2.58	2.32
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	2.94			3.02		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.64			0.77		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	20.39			24.89		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	40.24			45.64		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.15			0.20		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	13.68			13.41		
15	Arsenic	ng/m <sup>3</sup>	6	1.56			1.47		
16	Benzene	mg/m <sup>3</sup>	5	1.62			1.81		

S. NO.	Parameter	Unit	NAAQS Limit	GGs 2 ( AKANDARA)					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	31.17	45.41	36.66	34.60	37.62	36.44
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	59.10	87.04	67.35	66.84	71.08	78.34
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	40.13	42.04	40.03	42.82	44.25	46.82
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	6.11	6.26	6.37	6.24	6.24	6.58
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.346	0.402	0.426	0.388	0.386	0.408
6	THC as Methane	mg/m <sup>3</sup>	-	1.98	1.93	1.81	1.98	2.07	2.21
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	3.24			2.98		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.71			0.47		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	21.83			22.16		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	42.92			37.46		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.14			0.16		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	9.79			12.55		
15	Arsenic	ng/m <sup>3</sup>	6	1.41			1.44		
16	Benzene	mg/m <sup>3</sup>	5	1.91			1.73		

S. NO.	Parameter	Unit	NAAQS Limit	SARENGA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	30.79	42.79	46.62	32.22	44.58	35.84
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	56.72	88.78	79.76	67.54	83.24	72.54
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	37.68	43.97	45.46	41.62	40.06	45.28
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	5.49	6.97	7.22	5.88	6.04	7.18
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.354	0.402	0.422	0.384	0.428	0.454
6	THC as Methane	mg/m <sup>3</sup>	-	1.75	1.97	1.68	1.75	2.74	2.54
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	2.65			3.34		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.58			0.75		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	19.75			25.14		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	37.26			47.59		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.11			0.21		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	11.89			14.74		
15	Arsenic	ng/m <sup>3</sup>	6	1.43			1.89		
16	Benzene	mg/m <sup>3</sup>	5	1.58			1.88		



S. NO.	Parameter	Unit	NAAQS Limit	DHABANI		BANSIA			
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	32.09	34.33	42.62	33.87	32.58	34.20
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	65.74	64.28	71.55	66.78	66.29	64.56
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	37.69	41.46	39.98	40.38	42.68	40.38
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	5.77	6.13	6.55	5.94	6.12	6.70
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.336	0.394	0.463	0.407	0.432	0.502
6	THC as Methane	mg/m <sup>3</sup>	-	2.37	1.58	1.82	1.57	1.79	1.98
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	4.11			2.86		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.92			0.58		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	25.27			25.95		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	48.55			33.18		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.22			0.16		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	16.12			12.21		
15	Arsenic	ng/m <sup>3</sup>	6	1.72			1.45		
16	Benzene	mg/m <sup>3</sup>	5	20.50			1.69		

S. NO.	Parameter	Unit	NAAQS Limit	NACHAN					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	27.62	40.60	44.17	38.29	33.58	37.52
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	61.88	76.43	78.37	78.64	67.24	70.48
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	39.11	40.73	48.37	35.22	42.64	42.64
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	5.73	6.17	7.04	6.28	6.54	6.58
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.354	0.402	0.428	0.368	0.422	0.462
6	THC as Methane	mg/m <sup>3</sup>	-	1.88	1.91	1.84	1.88	1.97	2.32
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	3.07			3.12		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.61			0.84		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	22.17			28.36		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	39.72			46.17		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.20			0.23		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	14.07			16.41		
15	Arsenic	ng/m <sup>3</sup>	6	1.67			1.92		
16	Benzene	mg/m <sup>3</sup>	5	1.75			2.14		

S. NO.	Parameter	Unit	NAAQS Limit	GHATAKDANGA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	24.88	37.65	41.18	36.82	31.42	41.84
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	55.95	68.19	70.49	60.78	60.08	76.24
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	36.78	41.60	46.43	43.54	40.58	46.50
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	5.87	6.41	6.82	5.98	6.32	7.12
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.372	0.355	0.378	0.394	0.398	0.438
6	THC as Methane	mg/m <sup>3</sup>	-	1.64	1.54	1.39	1.64	1.71	2.12
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	2.63			2.42		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.44			0.37		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	17.78			19.92		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	46.17			32.54		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.10			0.13		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	13.54			10.68		
15	Arsenic	ng/m <sup>3</sup>	6	1.38			1.36		
16	Benzene	mg/m <sup>3</sup>	5	1.48			1.55		

S. NO.	Parameter	Unit	NAAQS Limit	KANTABERIA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	36.34	38.39	44.40	32.66	47.81	34.28
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	68.24	67.70	70.07	70.46	74.62	68.38
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	43.04	46.89	41.66	46.30	44.12	48.25
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	5.85	7.26	6.92	6.32	6.06	7.84
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.378	0.384	0.384	0.384	0.464	0.476
6	THC as Methane	mg/m <sup>3</sup>	-	2.56	1.44	1.65	2.41	2.38	2.56
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	4.05			3.04		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.59			0.71		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	28.11			24.13		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	45.91			39.88		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.24			0.19		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	15.78			15.22		
15	Arsenic	ng/m <sup>3</sup>	6	1.83			1.75		
16	Benzene	mg/m <sup>3</sup>	5	2.26			1.87		

S. NO.	Parameter	Unit	NAAQS Limit	PRATAPPUR					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	27.16	43.61	46.94	36.21	34.57	39.72
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	51.08	79.65	75.11	66.82	70.11	74.52
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	39.56	40.42	40.22	40.65	41.64	44.24
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	5.79	6.42	6.15	6.33	5.98	6.12
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.356	0.374	0.418	0.402	0.436	0.498
6	THC as Methane	mg/m <sup>3</sup>	-	1.57	1.85	1.64	1.57	2.34	2.34
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	2.92			2.82		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.55			0.49		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	19.84			26.07		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	32.75			38.56		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.12			0.15		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	12.75			12.96		
15	Arsenic	ng/m <sup>3</sup>	6	1.33			1.24		
16	Benzene	mg/m <sup>3</sup>	5	1.65			1.59		

S. NO.	Parameter	Unit	NAAQS Limit	PARULIA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m <sup>3</sup>	60 (24 hrs)	26.89	38.64	43.46	40.10	36.27	45.28
2	Particulate Matter 10 (PM10)	µg/m <sup>3</sup>	100 (24 hrs)	57.97	74.61	87.34	76.22	67.24	81.44
3	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	37.62	43.08	40.25	40.28	44.62	42.36
4	Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	80 (24 hrs)	5.60	7.44	6.59	5.64	6.22	6.38
5	Carbon Monoxide (CO)	mg/m <sup>3</sup>	2 (8 hrs)	0.364	0.362	0.428	0.398	0.420	0.458
6	THC as Methane	mg/m <sup>3</sup>	-	1.84	1.81	0.16	1.84	1.85	2.28
7	Mercury	µg/m <sup>3</sup>	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m <sup>3</sup>	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m <sup>3</sup>	-	2.79			3.04		
10	Benzo(a)Pyrene	ng/m <sup>3</sup>	1	0.47			0.66		
11	Ammonia (NH <sub>3</sub> )	mg/m <sup>3</sup>	400	23.39			23.41		
12	Ozone (O <sub>3</sub> )	mg/m <sup>3</sup>	100	39.29			43.78		
13	Lead (Pb)	mg/m <sup>3</sup>	1	0.16			0.11		
14	Nickel (Ni)	ng/m <sup>3</sup>	20	14.88			15.81		
15	Arsenic	ng/m <sup>3</sup>	6	1.61			1.69		
16	Benzene	mg/m <sup>3</sup>	5	1.81			1.76		

Noise in Surrounding Villages (Leq dB (A))							
Permissible Limit as per CPCB	Location	Bansia	Kantabaria Crossing	Saraswatigunj	Kuldiha	Nachan	Pratappur
	Sampling Date	11.01.2018	09.01.2018	13.12.2017	04.01.2018	12.12.2017	16.12.2017
75	Day time	62.37	67.03	53.60	65.26	52.27	47.31
70	Night Time	56.15	58.36	53.01	61.25	52.22	59.32

Noise in Surrounding Villages (Leq dB (A))				
Permissible Limit as per CPCB	Location	Jatgoria	Saranga	Parulia
	Sampling Date	05.01.2018	15.12.2017	15.01.2018
75	Day time	61.36	50.88	66.38
70	Night Time	59.95	50.27	67.80

Noise in Operational Areas (Leq dB (A))					
Permissible Limit as per CPCB	Location	GGs-1 at Khatgoria	GGs-2 at Akandara	MCS at Malandighi	Warehous at Gopalpur
	Sampling Date	20.12.2017	10.01.2018	16.01.2018	14.12.2017
75	Day time	53.75	57.46	57.09	52.58
70	Night Time	52.24	55.35	57.73	50.08

**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	GGs-1(R.O-Inlet)	GGs-1(R.O-Outlet)	GGs-1(R.O-Reject)	EDD-50(R.O-Inlet)	EDD-50(R.O-outlet)	EDD-50(R.O-Reject)	EDH-44(R.O Inlet)
<b>Date</b>					<b>12.10.2017</b>	<b>12.10.2017</b>	<b>12.10.2017</b>	<b>12.10.2017</b>	<b>12.10.2017</b>	<b>12.10.2017</b>	<b>12.10.2017</b>
1	pH		5.5 to 9.0	5.5-9.0	9.33	9.45	9.51	9.25	9.37	9.17	8.82
2	Total Suspended Solids	mg/l	100	100	<2	<2	3	<2	<2	<2	<2
3	Total Dissolved Solids	mg/l	---	2100	2196	224	5712	2248	1264	2294	3028
4	Turbidity	NTU	---	---	1.8	1.1	10.8	4.2	<1	6.7	4.8
5	Acidity as CaCO <sub>3</sub>	mg/l	---	---	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	---	1514.8	115.8	4078.8	1247.4	772.2	1376.1	871.2
7	Chloride	mg/l	---	600	202.5	19.3	655.7	376.1	231.4	395.3	1301.7
8	Total Hardness	mg/l	---	---	54.9	23.5	78.4	58.8	31.4	58.8	94.1
9	Sulphate	mg/l	---	1000	<2.5	<2.5	5.9	6.3	5.1	7.3	8.9
10	Calcium	mg/l			12.6	6.3	26.8	14.1	7.9	12.6	20.4
11	Magnesium	mg/l	---	---	5.7	1.9	2.9	5.7	2.9	6.7	10.5
12	Biological Oxygen Demand, 3 Days at 27°C	mg/l	250	100	<2	<2	<2	<2	<2	<2	3
13	Chemical Oxygen Demand	mg/l	10	10	<8	<8	<8	<8	<8	<8	10
14	Oil & Grease (Hexane Extract)	mg/l	1	1.2	<5	<5	<5	<5	<5	<5	<5
15	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H <sub>2</sub> S)	mg/l	2	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
17	Fluoride	mg/l	---	---	0.92	0.5	1.19	1.11	0.85	1.15	0.65
18	Ammoniacal Nitrogen	mg/l	---	---	1.96	1.55	2.45	2.55	2.1	2.75	2.49
19	Iron	mg/l	2	1	0.29	<0.1	0.59	0.51	0.26	1.39	0.66
20	Total Chromium	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	---	---	<0.01	<0.01	0.011	0.012	0.016	0.24	<0.01
22	Copper	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05



**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	GGs-1(R.O-Inlet)	GGs-1(R.O-Outlet)	GGs-1(R.O-Reject)	EDD-50(R.O-Inlet)	EDD-50(R.O-outlet)	EDD-50(R.O-Reject)	EDH-44(R.O Inlet)
Date					12.10.2017	12.10.2017	12.10.2017	12.10.2017	12.10.2017	12.10.2017	12.10.2017
24	Total Arsenic	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Boron	mg/l	---	---	<1	<1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	0.16	0.1	0.27	0.21	0.15	0.26	0.22
29	Aluminium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31	Manganese	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Molybdenum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Palladium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
34	Selenium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Vanadium	mg/l			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
36	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
37	Cobalt	mg/l	---	---	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
38	Bicarbonate	mg/l	---	---	1122.4	43.9	2976.8	780.8	502.6	927.2	502.6
39	Conductivity	µmhos/cm	---	---	3126	330	7988	3422	1697	3394	4210
40	Sodium	mg/l	---	---	830	52	2507	824	532	927	1152

Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited  
Compliance Period: Oct'17 to Mar'18

ANNEXURE III

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDH-44(R.O Outlet)	EDH-44(R.O Reject)	EDN-99(R.O Inlet)	EDN-99(R.O Outlet)	GG-1(R.O-Inlet)	GG-1(R.O-Outlet)	GG-1(R.O-Reject)
Date					12.10.2017	12.10.2017	12.10.2017	12.10.2017	13.11.2017	13.11.2017	13.11.2017
1	pH		5.5 to 9.0	5.5-9.0	9.15	8.65	8.25	8.98	9.17	9.23	9.58
2	Total Suspended Solids	mg/l	100	100	<2	<2	<2	<2	3	<2	72
3	Total Dissolved Solids	mg/l	---	2100	152	4896	5274	826	2186	248	4358
4	Turbidity	NTU	---	---	2.4	1.4	<1	<1	14.9	2.2	146
5	Acidity as CaCO <sub>3</sub>	mg/l	---	---	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	---	128.7	1405.8	663.3	188.1	1584	176.2	3425.4
7	Chloride	mg/l	---	600	25.1	2159.9	2606.3	395.3	219.8	28.9	520.7
8	Total Hardness	mg/l	---	---	27.4	129.4	458.6	62.7	57.6	34.6	69.1
9	Sulphate	mg/l	---	1000	<2.5	9.2	11.3	<2.5	5.3	<2.5	7.1
10	Calcium	mg/l			7.9	29.8	70.7	12.6	12.3	7.7	15.4
11	Magnesium	mg/l	---	---	1.9	13.3	42.9	7.6	6.5	3.7	7.5
12	Biological Oxygen Demand, 3 Days at 27°C	mg/l	250	100	<2	2	<2	<2	<2	<2	4.4
13	Chemical Oxygen Demand	mg/l	10	10	<8	8	<8	<8	9	<8	22
14	Oil & Grease (Hexane Extract)	mg/l	1	1.2	<5	<5	<5	<5	<5	<5	<5
15	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H <sub>2</sub> S)	mg/l	2	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
17	Fluoride	mg/l	---	---	0.33	0.85	0.47	0.75	0.97	0.55	2.17
18	Ammoniacal Nitrogen	mg/l	---	---	1.05	3.1	1.85	1.25	4.2	2.3	6.05
19	Iron	mg/l	2	1	<0.1	<0.1	<0.1	<0.1	0.8	0.11	1.17
20	Total Chromium	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	---	---	<0.01	0.023	0.019	<0.01	0.033	<0.01	0.042
22	Copper	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDH-44(R.O Outlet)	EDH-44(R.O Reject)	EDN-99(R.O Inlet)	EDN-99(R.O Outlet)	GGG-1(R.O-Inlet)	GGG-1(R.O-Outlet)	GGG-1(R.O-Reject)
Date					12.10.2017	12.10.2017	12.10.2017	12.10.2017	13.11.2017	13.11.2017	13.11.2017
24	Total Arsenic	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Boron	mg/l	---	---	<1	<1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	0.14	0.19	0.27	0.17	0.12	0.07	0.42
29	Aluminium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31	Manganese	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Molybdenum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Palladium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
34	Selenium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Vanadium	mg/l			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
36	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
37	Cobalt	mg/l	---	---	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
38	Bicarbonate	mg/l	---	---	58.5	976	809.2	131.8	956	78	2196
39	Conductivity	µmhos/cm	---	---	240	6920	7590	1170	3260	362	5812
40	Sodium	mg/l	---	---	39	1792	2107	285	940	86	340

**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDD-50(R.O-Inlet)	EDD-50(R.O-outlet)	EDD-50(R.O-Reject)	EDH-44(R.O Inlet)	EDH-44(R.O Outlet)	EDH-44(R.O Reject)	EDN-99(R.O Inlet)
<b>Date</b>					<b>13.11.2017</b>	<b>13.11.2017</b>	<b>13.11.2017</b>	<b>13.11.2017</b>	<b>13.11.2017</b>	<b>13.11.2017</b>	<b>13.11.2017</b>
1	pH		5.5 to 9.0	5.5-9.0	9.24	9.41	8.86	9.17	9.63	9.28	8.66
2	Total Suspended Solids	mg/l	100	100	4	<2	3	2	<2	2	5
3	Total Dissolved Solids	mg/l	---	2100	2286	1022	2672	4594	258	5848	4618
4	Turbidity	NTU	---	---	8.1	1.8	11.0	6.6	1.2	5.3	16.4
5	Acidity as CaCO <sub>3</sub>	mg/l	---	---	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	---	1465.2	594	1663.2	1445.4	178.2	1881	435.6
7	Chloride	mg/l	---	600	371.2	241.1	482.1	1976.7	44.4	2037.4	2664.1
8	Total Hardness	mg/l	---	---	119	34.6	69.1	126.7	46.1	157.4	430.1
9	Sulphate	mg/l	---	1000	17	<2.5	7.5	11	<2.5	17.5	8.2
10	Calcium	mg/l			26.2	77	16.9	29.2	13.8	32.3	109.3
11	Magnesium	mg/l	---	---	13.1	3.7	6.5	13.1	2.8	18.7	38.3
12	Biological Oxygen Demand, 3 Days at 27°C	mg/l	250	100	2.5	<2	2	2.5	<2	3	3.8
13	Chemical Oxygen Demand	mg/l	10	10	14	<8	10	14	<8	17	22
14	Oil & Grease (Hexane Extract)	mg/l	1	1.2	<5	<5	<5	<5	<5	<5	<5
15	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H <sub>2</sub> S)	mg/l	2	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
17	Fluoride	mg/l	---	---	1.86	0.67	1.9	2.75	0.48	3.3	3.1
18	Ammoniacal Nitrogen	mg/l	---	---	3.4	1.8	4.2	4.66	1.1	5.2	5.2
19	Iron	mg/l	2	1	0.93	<0.1	0.27	0.97	<0.1	0.57	1.79
20	Total Chromium	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	---	---	0.019	<0.01	0.025	0.019	<0.01	0.026	0.033
22	Copper	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDD-50(R.O-Inlet)	EDD-50(R.O-outlet)	EDD-50(R.O-Reject)	EDH-44(R.O Inlet)	EDH-44(R.O Outlet)	EDH-44(R.O Reject)	EDN-99(R.O Inlet)
<b>Date</b>					<b>13.11.2017</b>	<b>13.11.2017</b>	<b>13.11.2017</b>	<b>13.11.2017</b>	<b>13.11.2017</b>	<b>13.11.2017</b>	<b>13.11.2017</b>
24	Total Arsenic	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Boron	mg/l	---	---	<1	<1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	0.24	0.18	0.39	0.22	0.07	0.29	0.39
29	Aluminium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31	Manganese	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Molybdenum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Palladium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
34	Selenium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Vanadium	mg/l			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
36	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
37	Cobalt	mg/l	---	---	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
38	Bicarbonate	mg/l	---	---	887	390	1087	812	86	1040	531
39	Conductivity	µmhos/cm	---	---	3248	1428	3752	5849	303	7912	5586
40	Sodium	mg/l	---	---	842	418	1082	1712	91	1970	1632

Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited  
Compliance Period: Oct'17 to Mar'18

ANNEXURE III

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDN-99(R.O Outlet)	GGs-1(R.O-Inlet)	GGs-1(R.O-Outlet)	GGs-1(R.O-Reject)	EDD-50(R.O-Inlet)	EDD-50(R.O-outlet)	EDD-50(R.O-Reject)
Date					13.11.2017	14.12.2017	14.12.2017	14.12.2017	14.12.2017	14.12.2017	14.12.2017
1	pH		5.5 to 9.0	5.5-9.0	9.14	9.75	10.11	9.31	9.09	9.11	9.51
2	Total Suspended Solids	mg/l	100	100	<2	5	<2	<2	6	<2	<2
3	Total Dissolved Solids	mg/l	---	2100	842	2188	194	4248	2634	896	2562
4	Turbidity	NTU	---	---	3.2	16.7	4.4	3.6	14.1	2.1	3.5
5	Acidity as CaCO <sub>3</sub>	mg/l	---	---	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	---	99	1729	152	2831	1463	551	1463
7	Chloride	mg/l	---	600	400.2	326	40.1	812	622	248	572
8	Total Hardness	mg/l	---	---	30.7	30.4	11.4	49.4	38	22.8	53.2
9	Sulphate	mg/l	---	1000	<2.5	9.5	3.5	10.3	7.8	<2.5	6.8
10	Calcium	mg/l			7.7	7.6	3.1	10.7	10.7	6.1	12.2
11	Magnesium	mg/l	---	---	2.8	2.8	1	5.5	2.8	1.9	5.5
12	Biological Oxygen Demand, 3 Days at 27°C	mg/l	250	100	<2	2	<2	<2	3	<2	<2
13	Chemical Oxygen Demand	mg/l	10	10	<8	10	<8	9	12	<8	8
14	Oil & Grease (Hexane Extract)	mg/l	1	1.2	<5	<5	<5	<5	<5	<5	<5
15	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H <sub>2</sub> S)	mg/l	2	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
17	Fluoride	mg/l	---	---	0.86	2.55	0.79	2.65	1.95	0.82	2.15
18	Ammoniacal Nitrogen	mg/l	---	---	2.9	4.9	2.2	5.1	3.45	2.6	4.11
19	Iron	mg/l	2	1	<0.1	1.62	0.41	0.77	1.2	0.92	1.85
20	Total Chromium	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	---	---	<0.01	0.012	<0.01	0.022	0.017	0.021	0.015
22	Copper	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDN-99(R.O Outlet)	GGs-1(R.O-Inlet)	GGs-1(R.O-Outlet)	GGs-1(R.O-Reject)	EDD-50(R.O-Inlet)	EDD-50(R.O-outlet)	EDD-50(R.O-Reject)
Date					13.11.2017	14.12.2017	14.12.2017	14.12.2017	14.12.2017	14.12.2017	14.12.2017
24	Total Arsenic	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Boron	mg/l	---	---	<1	<1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	0.1	0.32	0.12	0.27	0.12	0.08	0.18
29	Aluminium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31	Manganese	mg/l	---	---	<0.05	0.058	<0.05	<0.05	<0.05	<0.05	<0.05
32	Molybdenum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Palladium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
34	Selenium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Vanadium	mg/l			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
36	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
37	Cobalt	mg/l	---	---	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
38	Bicarbonate	mg/l	---	---	19.5	1122	87.8	1970	927	321	1012
39	Conductivity	µmhos/cm	---	---	1240	3210	294	5102	3472	1270	3341
40	Sodium	mg/l	---	---	248	712	37	1712	1102	308	1050

Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited  
Compliance Period: Oct'17 to Mar'18

ANNEXURE III

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	GGs-1(R.O-Inlet)	GGs-1(R.O-Reject)	GGs-1(R.O-Outlet)	EDD-50(R.O-outlet)	EDD-50(R.O-Reject)	EDH-44(R.O Outlet)	EDH-44(R.O Inlet)
Date					09.01.2018	09.01.2018	09.01.2018	09.01.2018	09.01.2018	09.01.2018	09.01.2018
1	pH		5.5 to 9.0	5.5-9.0	9.21	8.82	9.71	9.18	9.71	9.52	8.63
2	Total Suspended Solids	mg/l	100	100	3	<2	<2	<2	<2	<2	<2
3	Total Dissolved Solids	mg/l	---	2100	1574	2482	198	922	2994	108	2942
4	Turbidity	NTU	---	---	6.4	3.8	1.5	2.4	1.3	<1	2.1
5	Acidity as CaCO <sub>3</sub>	mg/l	---	---	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	---	1074.8	1744.2	122.4	489.6	1778.8	48.9	1407.6
7	Chloride	mg/l	---	600	201.4	352.4	57	196.3	704.7	40.2	1057.8
8	Total Hardness	mg/l	---	---	38.4	38.4	7.7	30.7	30.7	11.5	73
9	Sulphate	mg/l	---	1000	4.5	5.2	<2.5	<2.5	7.8	<2.5	6.5
10	Calcium	mg/l			10.8	9.2	1.5	9.2	10.8	3.1	18.5
11	Magnesium	mg/l	---	---	2.8	3.7	1	1.9	1.9	1	6.5
12	Biological Oxygen Demand, 3 Days at 27°C	mg/l	250	100	<2	<2	<2	<2	3	<2	<2
13	Chemical Oxygen Demand	mg/l	10	10	<8	<8	<8	<8	11	<8	<8
14	Oil & Grease (Hexane Extract)	mg/l	1	1.2	<5	<5	<5	<5	<5	<5	<5
15	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H <sub>2</sub> S)	mg/l	2	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
17	Fluoride	mg/l	---	---	0.95	1.25	0.33	0.65	1.35	0.25	2.85
18	Ammoniacal Nitrogen	mg/l	---	---	3.75	4.2	1.45	2.18	3.45	1.85	3.29
19	Iron	mg/l	2	1	0.81	0.73	0.42	0.36	0.24	0.22	0.39
20	Total Chromium	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	---	---	0.012	0.019	<0.01	<0.01	0.037	<0.01	<0.01
22	Copper	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05



**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	GGs-1(R.O-Inlet)	GGs-1(R.O-Reject)	GGs-1(R.O-Outlet)	EDD-50(R.O-outlet)	EDD-50(R.O-Reject)	EDH-44(R.O Outlet)	EDH-44(R.O Inlet)
					Date	09.01.2018	09.01.2018	09.01.2018	09.01.2018	09.01.2018	09.01.2018
24	Total Arsenic	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Boron	mg/l	---	---	<1	<1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	0.12	0.16	0.08	0.11	<0.01	0.08	0.19
29	Aluminium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31	Manganese	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Molybdenum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Palladium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
34	Selenium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Vanadium	mg/l			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
36	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
37	Cobalt	mg/l	---	---	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
38	Bicarbonate	mg/l	---	---	976.4	1322.3	89.3	392.4	1571.5	31.1	1280
39	Conductivity	µmhos/cm	---	---	2462	3711	295	1780	3511	202	3342
40	Sodium	mg/l	---	---	610	920	64	303	1210	32	1006

Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited  
Compliance Period: Oct'17 to Mar'18

ANNEXURE III

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDH-44(R.O Reject)	EDN-99(R.O Outlet)	EDN-99(R.O Inlet)	EDN-99(R.O Reject)	GGs-1(R.O-Inlet)	GGs-1(R.O-Reject)	GGs-1(R.O-Outlet)
Date					09.01.2018	09.01.2018	09.01.2018	09.01.2018	13.02.2018	13.02.2018	13.02.2018
1	pH		5.5 to 9.0	5.5-9.0	9.16	9.58	8.51	9.05	9.36	9.22	9.72
2	Total Suspended Solids	mg/l	100	100	<2	<2	2	<2	<2	<2	<2
3	Total Dissolved Solids	mg/l	---	2100	4212	696	3782	4018	1286	2244	214
4	Turbidity	NTU	---	---	<1	<1	5.2	2.1	3.3	2.5	3.5
5	Acidity as CaCO <sub>3</sub>	mg/l	---	---	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	---	2003.2	183.6	652.8	673.2	662	1070	172
7	Chloride	mg/l	---	600	1260.5	251.7	2074.4	2162.2	286	544	40.2
8	Total Hardness	mg/l	---	---	92.2	23	337.9	376.3	34.6	38.4	7.7
9	Sulphate	mg/l	---	1000	7.5	<2.5	7.5	8.2	5.6	6.1	<2.5
10	Calcium	mg/l			32.3	6.2	123.1	137	12.3	10.8	1.5
11	Magnesium	mg/l	---	---	2.8	1.9	7.5	8.4	1	2.8	1
12	Biological Oxygen Demand, 3 Days at 27°C	mg/l	250	100	<2	<2	<2	<2	<2	<2	<2
13	Chemical Oxygen Demand	mg/l	10	10	<8	<8	<8	<8	<8	<8	<8
14	Oil & Grease (Hexane Extract)	mg/l	1	1.2	<5	<5	<5	<5	<5	<5	<5
15	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H <sub>2</sub> S)	mg/l	2	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
17	Fluoride	mg/l	---	---	2.35	0.81	1.45	1.85	2.1	2.35	1.1
18	Ammoniacal Nitrogen	mg/l	---	---	4.6	1.06	2.43	3.85	2.85	3.15	1.9
19	Iron	mg/l	2	1	0.31	0.18	0.45	0.38	0.27	0.2	0.26
20	Total Chromium	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	0.026	0.039	<0.01
22	Copper	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDH-44(R.O Reject)	EDN-99(R.O Outlet)	EDN-99(R.O Inlet)	EDN-99(R.O Reject)	GGs-1(R.O-Inlet)	GGs-1(R.O-Reject)	GGs-1(R.O-Outlet)
Date					09.01.2018	09.01.2018	09.01.2018	09.01.2018	13.02.2018	13.02.2018	13.02.2018
24	Total Arsenic	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Boron	mg/l	---	---	<1	<1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	0.21	0.22	0.28	0.31	0.15	0.22	0.1
29	Aluminium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31	Manganese	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.188
32	Molybdenum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Palladium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
34	Selenium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Vanadium	mg/l			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
36	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
37	Cobalt	mg/l	---	---	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
38	Bicarbonate	mg/l	---	---	1870.3	162	583	612	488	927	63.4
39	Conductivity	µmhos/cm	---	---	4736	1162	4298	4832	2246	3812	378
40	Sodium	mg/l	---	---	1712	257	1070	1219	304	780	31

Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited  
Compliance Period: Oct'17 to Mar'18

ANNEXURE III

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDD-50(R.O-Inlet)	EDD-50(R.O-outlet)	EDD-50(R.O-Reject)	EDH-44(R.O Inlet)	EDH-44(R.O Outlet)	EDH-44(R.O Reject)	EDN-99(R.O Inlet)
Date					13.02.2018	13.02.2018	13.02.2018	13.02.2018	13.02.2018	13.02.2018	13.02.2018
1	pH		5.5 to 9.0	5.5-9.0	8.92	9.43	9.53	8.81	10.3	8.9	8.45
2	Total Suspended Solids	mg/l	100	100	<2	3	<2	<2	<2	<2	<2
3	Total Dissolved Solids	mg/l	---	2100	1688	1036	2498	2410	174	3692	2088
4	Turbidity	NTU	---	---	2.6	7.8	2.0	<1	1.9	<1	4.3
5	Acidity as CaCO <sub>3</sub>	mg/l	---	---	Nil	Nil	Nil	Nil	Nil	10.6	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	---	712	503	1024	286	94	572	317
7	Chloride	mg/l	---	600	522	302	814	1241	30.2	2248	1062
8	Total Hardness	mg/l	---	---	30.7	19.2	42.2	53.8	11.5	92.2	238.1
9	Sulphate	mg/l	---	1000	6.3	5.8	7.1	8.3	3.5	8.8	5.2
10	Calcium	mg/l			9.2	4.6	12.3	15.4	3.1	29.2	89.3
11	Magnesium	mg/l	---	---	1.9	1.9	2.8	3.7	1	4.7	3.7
12	Biological Oxygen Demand, 3 Days at 27°C	mg/l	250	100	2	<2	2	<2	<2	<2	<2
13	Chemical Oxygen Demand	mg/l	10	10	10	<8	11	<8	<8	<8	<8
14	Oil & Grease (Hexane Extract)	mg/l	1	1.2	<5	<5	<5	<5	<5	<5	<5
15	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H <sub>2</sub> S)	mg/l	2	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
17	Fluoride	mg/l	---	---	1.86	1.5	2.1	1.95	0.76	2.3	2.05
18	Ammoniacal Nitrogen	mg/l	---	---	3.5	2.81	4.1	2.85	1.75	3.3	3.25
19	Iron	mg/l	2	1	0.39	0.87	0.26	0.15	0.19	0.11	0.55
20	Total Chromium	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	---	---	0.019	0.012	0.024	0.023	0.017	0.036	0.022
22	Copper	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDD-50(R.O-Inlet)	EDD-50(R.O-outlet)	EDD-50(R.O-Reject)	EDH-44(R.O Inlet)	EDH-44(R.O Outlet)	EDH-44(R.O Reject)	EDN-99(R.O Inlet)
Date					13.02.2018	13.02.2018	13.02.2018	13.02.2018	13.02.2018	13.02.2018	13.02.2018
24	Total Arsenic	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Boron	mg/l	---	---	<1	<1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	0.24	0.18	0.29	0.26	0.19	0.3	0.24
29	Aluminium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31	Manganese	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	0.128	<0.05
32	Molybdenum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Palladium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
34	Selenium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Vanadium	mg/l			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
36	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
37	Cobalt	mg/l	---	---	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
38	Bicarbonate	mg/l	---	---	624	370	946	197	48.8	488	386.7
39	Conductivity	µmhos/cm	---	---	2550	1180	3280	3010	272	4620	2480
40	Sodium	mg/l	---	---	717	412	1040	982	31	1080	740

Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited  
Compliance Period: Oct'17 to Mar'18

ANNEXURE III

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDN-99(R.O Reject)	EDN-99(R.O Outlet)	GGs-1(R.O-Inlet)	GGs-1(R.O-Outlet)	GGs-1(R.O-Reject)	EDD-50(R.O-Inlet)	EDD-50(R.O-outlet)
Date					13.02.2018	13.02.2018	13.03.2018	13.03.2018	13.03.2018	13.03.2018	13.03.2018
1	pH		5.5 to 9.0	5.5-9.0	7.92	9.41	9.28	10.16	9.55	9.22	9.45
2	Total Suspended Solids	mg/l	100	100	<2	<2	2	<2	2	<2	<2
3	Total Dissolved Solids	mg/l	---	2100	2478	342	1436	478	1744	1470	724
4	Turbidity	NTU	---	---	1.5	4.7	5.1	1.2	4.1	3.9	1.4
5	Acidity as CaCO <sub>3</sub>	mg/l	---	---	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	---	428	202	1032	302.1	1280	928	463
7	Chloride	mg/l	---	600	1170	106	55.3	112	96.3	251	94
8	Total Hardness	mg/l	---	---	391.7	26.9	34.2	22.8	41.8	45.6	38
9	Sulphate	mg/l	---	1000	5.9	4.2	5.7	<2.5	6.3	3.5	<2.5
10	Calcium	mg/l			137	7.7	7.6	6.1	12.2	10.7	12.2
11	Magnesium	mg/l	---	---	12.1	1.9	3.7	1.8	2.8	4.6	1.8
12	Biological Oxygen Demand, 3 Days at 27°C	mg/l	250	100	<2	<2	2	<2	3	<2	<2
13	Chemical Oxygen Demand	mg/l	10	10	<8	<8	8	<8	9	<8	<8
14	Oil & Grease (Hexane Extract)	mg/l	1	1.2	<5	<5	<5	<5	<5	<5	<5
15	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H <sub>2</sub> S)	mg/l	2	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
17	Fluoride	mg/l	---	---	2.6	0.81	2.35	1.8	2.6	1.95	1.2
18	Ammoniacal Nitrogen	mg/l	---	---	3.65	1.98	4.3	2.45	4.75	3.95	3.15
19	Iron	mg/l	2	1	0.25	0.42	0.89	0.37	0.72	1.62	0.61
20	Total Chromium	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	---	---	0.031	0.015	0.029	0.017	0.036	0.019	0.013
22	Copper	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDN-99(R.O Reject)	EDN-99(R.O Outlet)	GGG-1(R.O-Inlet)	GGG-1(R.O-Outlet)	GGG-1(R.O-Reject)	EDD-50(R.O-Inlet)	EDD-50(R.O-outlet)
Date					13.02.2018	13.02.2018	13.03.2018	13.03.2018	13.03.2018	13.03.2018	13.03.2018
24	Total Arsenic	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Boron	mg/l	---	---	<1	<1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	0.17	0.08	0.21	0.17	0.26	0.14	0.11
29	Aluminium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31	Manganese	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	0.188	<0.05	<0.05
32	Molybdenum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Palladium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
34	Selenium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Vanadium	mg/l			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
36	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
37	Cobalt	mg/l	---	---	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
38	Bicarbonate	mg/l	---	---	522.2	122	771	Nil	341.6	402.6	195.2
39	Conductivity	µmhos/cm	---	---	3510	612	2044	610	2862	1626	960
40	Sodium	mg/l	---	---	882	92	540	165	810	643	352

Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited  
Compliance Period: Oct'17 to Mar'18

ANNEXURE III

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDD-50(R.O-Reject)	EDH-44(R.O Inlet)	EDH-44(R.O Reject)	EDH-44(R.O Outlet)	EDN-99(R.O Inlet)	EDN-99(R.O Outlet)	EDN-99(R.O Reject)
Date					13.03.2018	13.03.2018	13.03.2018	13.03.2018	13.03.2018	13.03.2018	13.03.2018
1	pH		5.5 to 9.0	5.5-9.0	9.6	9.42	9.05	9.75	9.36	9.15	8.33
2	Total Suspended Solids	mg/l	100	100	<2	<2	<2	<2	<2	<2	<2
3	Total Dissolved Solids	mg/l	---	2100	1374	1162	1942	132	1836	616	1318
4	Turbidity	NTU	---	---	2.1	<1	<1	<1	4.2	1.6	1.4
5	Acidity as CaCO <sub>3</sub>	mg/l	---	---	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	---	927	818	1108	93	927	301	422.2
7	Chloride	mg/l	---	600	380	251.7	507	24	503.4	197	554.4
8	Total Hardness	mg/l	---	---	53.2	53.2	102.6	26.6	250.8	38	235.6
9	Sulphate	mg/l	---	1000	4.5	3.2	5.2	<2.5	7.3	4.9	5.7
10	Calcium	mg/l			16.7	13.7	32	7.6	88.3	10.7	89.8
11	Magnesium	mg/l	---	---	2.8	4.6	5.5	1.8	7.4	2.8	2.8
12	Biological Oxygen Demand, 3 Days at 27°C	mg/l	250	100	<2	<2	<2	<2	<2	<2	<2
13	Chemical Oxygen Demand	mg/l	10	10	8	<8	8	<8	8	<8	<8
14	Oil & Grease (Hexane Extract)	mg/l	1	1.2	<5	<5	<5	<5	<5	<5	<5
15	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H <sub>2</sub> S)	mg/l	2	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
17	Fluoride	mg/l	---	---	1.95	1.5	2.05	0.31	1.25	0.79	0.89
18	Ammoniacal Nitrogen	mg/l	---	---	3.1	2.85	4.3	1.1	3.9	1.82	2.9
19	Iron	mg/l	2	1	0.39	<0.1	<0.1	0.11	0.48	0.21	0.31
20	Total Chromium	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	0.019	<0.01	0.025
22	Copper	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05



**Analysis of R.O. Water of CBM Raniganj Project by Essar Oil and gas Exploration and Production Limited**  
**Compliance Period: Oct'17 to Mar'18**

**ANNEXURE III**

S. No.	Parameter	Unit	General Discharge Standards	O & G Discharge Standards	EDD-50(R.O-Reject)	EDH-44(R.O Inlet)	EDH-44(R.O Reject)	EDH-44(R.O Outlet)	EDN-99(R.O Inlet)	EDN-99(R.O Outlet)	EDN-99(R.O Reject)
<b>Date</b>					<b>13.03.2018</b>	<b>13.03.2018</b>	<b>13.03.2018</b>	<b>13.03.2018</b>	<b>13.03.2018</b>	<b>13.03.2018</b>	<b>13.03.2018</b>
24	Total Arsenic	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Boron	mg/l	---	---	<1	<1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	0.23	0.19	0.27	0.07	0.29	0.17	0.28
29	Aluminium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
31	Manganese	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Molybdenum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Palladium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
34	Selenium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Vanadium	mg/l			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
36	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
37	Cobalt	mg/l	---	---	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
38	Bicarbonate	mg/l	---	---	585.6	496	690.4	24.4	488	123.2	515.1
39	Conductivity	µmhos/cm	---	---	1980	1780	2432	196	2160	770	1690
40	Sodium	mg/l	---	---	409	375	512	37	670	214	407

Ground Water Analysis of Surrounding Areas of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited  
Compliance Period: Oct'17 to Mar'17

ANNEXURE IV

S. No.	Parameter	Unit	S:10500 -1991		Nachan Village	Kalikapur Village	Khatgoria Village	Bargoria Village	Jatgoria Village	Kantaberia Village	Dhabani Village	Labnapara Village
			Desirable limit	Permissible limit								
Date :					15.12.2017	15.12.2017	15.12.2017	15.12.2017	15.12.2017	15.12.2017	15.12.2017	15.12.2017
1	pH at 27°C		6.5 to 8.5	No Relaxation	8.17	8.02	8.12	7.81	7.92	8.1	7.91	8.1
2	Colour in Hazen unit		5	15	<5	<5	<5	<5	<5	<5	<5	<5
3	Odour		Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Total Suspended Solids	mg/l	---	---	23	428	<2	5	<2	<2	3	<2
5	Total Dissolved Solids	mg/l	500	2000	368	1048	196	118	176	108	68	62
6	Turbidity	NTU	1	5	65.1	1805	4.4	14	5.2	4.7	6.9	3.3
7	Nitrate	mg/l	45	No Relaxation	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
8	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	200	600	370.5	228	114	80.5	6	83	45	47
9	Chloride	mg/l	250	1000	32	372	51	28	48	18	18	12
10	Total Hardness (as CaCO <sub>3</sub> )	mg/l	200	600	258.4	1018.4	110.2	9.4	53.2	53.2	34.2	38
11	Sulphate	mg/l	200	400	<2.5	9.6	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
12	Calcium	mg/l	75	200	74.6	239.1	28.9	15.2	15.2	13.7	7.6	9.4
13	Magnesium	mg/l	30	100	17.5	102.5	9.2	2.8	3.7	4.6	3.7	3.7
14	Anionic Detergents (as MBAS)	mg/l	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
15	Mineral Oil	mg/l	0.5	No Relaxation	<1	<1	<1	<1	<1	<1	<1	<1
16	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	0.001	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Fluoride	mg/l	1	1.5	0.55	0.61	0.39	0.21	0.35	0.19	0.22	0.2
18	Residual Free Chlorine	mg/l	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
19	Iron	mg/l	0.3	No Relaxation	2.45	28.3	0.82	1.42	0.36	0.29	0.44	<0.1
20	Sodium	mg/l	---	---	22	180	38	21	32	23	12	8
21	Total Chromium	mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	5	15	<0.01	0.042	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
23	Copper	mg/l	0.05	1.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Nickel	mg/l	0.02	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
25	Arsenic	mg/l	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l	0.01	No Relaxation	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l	0.5	1	<1	<1	<1	<1	<1	<1	<1	<1
29	Phosphorus	mg/l	---	---	0.19	0.33	0.12	<0.05	<0.05	<0.05	<0.05	<0.05
30	Potassium	mg/l	---	---	2	7	3	2	2	<1	<1	<1
31	Aluminium	mg/l	0.03	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Manganese	mg/l	0.1	0.3	0.145	0.249	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
33	Selenium	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
34	Cadmium	mg/l	0.003	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
35	Cyanide	mg/l	0.05	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	Electrical Conductivity at 25° C	us/cm	---	---	487	1582	275	158	256	148	101	92
37	Hexavalent Chromium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
38	Total Coliform	MPN/10 0ml	---	---	2.2	<1	9	<1	3.6	<1	<1	<1

S. No.	Parameter	Unit	S:10500 -1991		Akandara Village	Ghatakhdanga Village	Saraswatiganj Village	Gopalpur Village	Saranga Village
			Desirable limit	Permissible limit					
Date :					15.12.2017	15.12.2017	15.12.2017	15.12.2017	15.12.2017
1	pH at 27°C		6.5 to 8.5	No Relaxation	7.55	6.82	6.92	6.84	7.31
2	Colour in Hazen unit		5	15	<5	<5	<5	<5	<5
3	Odour		Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Total Suspended Solids	mg/l	---	---	<2	<2	<2	<2	2
5	Total Dissolved Solids	mg/l	500	2000	82	48	142	136	164
6	Turbidity	NTU	1	5	2.9	5.4	4.7	3	5.3
7	Nitrate	mg/l	45	No Relaxation	<0.5	<0.5	<0.5	<0.5	<0.5
8	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	200	600	54	14.2	45	57	76
9	Chloride	mg/l	250	1000	17	11	32	24	34
10	Total Hardness (as CaCO <sub>3</sub> )	mg/l	200	600	49.4	26.6	117.8	98.8	155.8
11	Sulphate	mg/l	200	400	<2.5	<2.5	<2.5	<2.5	<2.5
12	Calcium	mg/l	75	200	13.7	6.1	33.5	28.9	56.3
13	Magnesium	mg/l	30	100	3.7	2.8	8.3	6.5	3.7
14	Anionic Detergents (as MBAS)	mg/l	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1
15	Mineral Oil	mg/l	0.5	No Relaxation	<1	<1	<1	<1	<1
16	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	0.001	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Fluoride	mg/l	1	1.5	0.26	0.19	0.21	0.34	0.27
18	Residual Free Chlorine	mg/l	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1
19	Iron	mg/l	0.3	No Relaxation	<0.1	<0.1	<0.1	<0.1	0.2
20	Sodium	mg/l	---	---	14	7	18	21	23
21	Total Chromium	mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	5	15	<0.01	<0.01	<0.01	<0.01	<0.01
23	Copper	mg/l	0.05	1.5	<0.05	<0.05	<0.05	<0.05	<0.05
24	Nickel	mg/l	0.02	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05
25	Arsenic	mg/l	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l	0.01	No Relaxation	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l	0.5	1	<1	<1	<1	<1	<1
29	Phosphorus	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05
30	Potassium	mg/l	---	---	<1	<1	2	2	2
31	Aluminium	mg/l	0.03	0.2	<0.01	<0.01	<0.01	<0.01	<0.01
32	Manganese	mg/l	0.1	0.3	<0.05	<0.05	<0.05	<0.05	<0.05
33	Selenium	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
34	Cadmium	mg/l	0.003	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02
35	Cyanide	mg/l	0.05	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02
36	Electrical Conductivity at 25° C	us/cm	---	---	122	79	172	195	235
37	Hexavalent Chromium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
38	Total Coliform	MPN/10 0ml	---	---	<1	2.2	<1	<1	<1



# SCIENTIFIC RESEARCH LABORATORY

(Analytical & Environmental Engineering Laboratory)

Laboratory Recognised By West Bengal Pollution Control Board  
An ISO 14001 : 2004, ISO 9001 : 2008 & OHSAS 18001 : 2007 Certified  
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## DETAILS OF GROUND WATER LEVEL MEASUREMENT

[Format No. SRL/FRM/17]

Name & Address of the Customer : M/s. Essar Oil and Gas Exploration and Production Limited  
Village +P.O. – Gopalpur , Gopalpur Sarengan Road,  
Near Rajendra Nath Polytechnic College , P.S. – Kanksha,  
Durgapur – 713 212, District – Burdwan, West Bengal, INDIA

Sample Identification No. : GWLM-01-2017 to GWLM-07-2017

Instrument Used : PIEZOMETER

Environmental Condition : Dry

Sampling Date : 15.12.2017

## REPORT OF GROUND WATER LEVEL MEASUREMENT

[Report No. SRL / EOL / GWLM-01-2017 to GWLM-07-2017 Dated: 26.12.2017]

SL No.	Location Details	Land Mark	Latitude	Longitude	Measurement Result (In Meters)			
					Parapet Height	Diameter of Well	DTW from Parapet top	DTW bgl
1.	GWLM-01-2017 : Nachon Village	House of Arup Ghatak	23°36'42.4"N	87°19'58.9"E	0.68	1	2.16	1.48
2.	GWLM-02-2017 : Kalikapur Village	Behind Durga Mandir	23°37.464"N	87°20.151"E	0.8	1.85	1.88	1.08
3.	GWLM-03-2017 : Dhabani (Bauripara)	Bauripara	23°35'519"N	87°22.085"E	0.95	1.8	2.1	1.15
4.	GWLM-04-2017 : Dhabani (Rana)	Rana Bari	23°35'31.2"N	87°22'00.9"E	0.7	0.68	1.43	0.73
5.	GWLM-05-2017 : Labnapara	Near High School	23°35'05.36N	87°22'15.8"E	1.2	1.5	3.15	1.95
6.	GWLM-06-2017 : Akandara	Adhibasi Para(Choto)	23°34'461"N	87°23'013"E	0.65	1.85	3.37	2.72
7.	GWLM-07-2017 : Saraswatiganj	House of Sibhu Saha	23°35'226"N	87°24'784"E	0.6	1.75	2.55	1.95

For Scientific Research Laboratory

*Shivendu Day*

(Senior Chemist)



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- Results relate only to the parameters tested.
- No Repeat Analysis will be entertained after 15 days from the date of sampling.



# SCIENTIFIC RESEARCH LABORATORY

(Analytical & Environmental Engineering Laboratory)

Laboratory Recognised By West Bengal Pollution Control Board  
An ISO 14001 : 2004, ISO 9001 : 2008 & OHSAS 18001 : 2007 Certified  
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## DETAILS OF GROUND WATER LEVEL MEASUREMENT

[Format No. SRL/FM/48]

Name & Address of the Customer : M/s. Essar Oil and Gas Exploration and Production Limited  
Village +P.O. - Gopalpur, Gopalpur Sarengan Road,  
Near Rajendra Nath Polytechnic College, P.S. - Kanksha,  
Durgapur - 713 212, District - Burdwan, West Bengal, INDIA

Sample Identification No. : GWLM-08-2017 to GWLM-14-2017

Instrument Used : PIEZOMETER

Environmental Condition : Dry

Sampling Date : 15.12.2017

## REPORT OF GROUND WATER LEVEL MEASUREMENT

[Report No. SRL / EOL / GWLM-08-2017 to GWLM-14-2017 Dated: 26.12.2017]

SL No.	Location Details	Land Mark	Latitude	Longitude	Measurement Result (In Meters)			
					Parapet Height	Diameter of Well	DTW from Parapet top	DTW bgl
1.	GWLM-08-2017 : Ghatak Danga	New Atchala	23°34'147"N	87°24'308"E	1	2.4	3.75	2.75
2.	GWLM-09-2017 : Saranga (Kesabpur)	House of Damal Lohar	23°31'665"N	87°24'400"E	0	0.6	1.51	1.51
3.	GWLM-10-2017 : Gopalpur (Chatal Danga)	Near EDN 178	23°30'639"N	87°23'408"E	0.5	1.53	1.95	1.45
4.	GWLM-11-2017 : Jatgoria	Near Masjid	23°36'973"N	87°23'432"E	0.6	1.8	1.8	1.2
5.	GWLM-12-2017 : Kantaberia	Near Mandir	23°36'829"N	87°22'242"E	0.6	1.3	2.13	1.53
6.	GWLM-13-2017 : Bargoria	Near EDT-006	23°37'580"N	87°21'397"E	0.7	2.5	2.75	2.05
7.	GWLM-14-2017 : Khatgoria	Near Rabindra Sanga	23°37'52.5"N	87°21'08.3"E	0.8	0.8	2.7	1.9

For Scientific Research Laboratory

*Shisendu Das*

(Senior Chemist)



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CSR Expenditure of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited  
Compliance Period: Oct'17 to Mar'18

<b>CSR Expenditure from October 2017 to March 2018</b>			
<b>Thematic Area</b>	<b>Projects</b>	<b>Beneficiaries</b>	<b>Expenditure (INR)</b>
<b>HEALTH</b>	Community Health Care Services through Mobile Medical Van	10386	17,03,562.00
<b>EDUCATION</b>	Support to local schools	591	1,37,233.00
<b>SPORTS AND CULTURAL EVENT</b>	Support to sports	1417	76,790.00
<b>COMMUNITY INFRASTRUCTURE DEVELOPMENT</b>	Support to community	1200	3,35,964.00
<b>Total</b>		<b>13594</b>	<b>22,53,549.00</b>

**Annexure VI**

Environmental Expenditure of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited  
Compliance Period: Oct'17 to Mar'18

<b>Expenditure towards Environmental Protection Measures at Raniganj CBM Project (Period October,2017 - March, 2018)</b>		
<b>SI No</b>	<b>Particular</b>	<b>Expenses (in Rs)</b>
1	Installation of Reverse Osmosis Treatment System for Produced Water Treatment and METP unit for liquid waste treatment at Drill Site (Capital & Recurring)	1,67,11,000.00
2	Environmental Monitoring Activities (Recurring)	8,13,594.00
3	HDPE liners for drill cuttings storage & disposal (Capital)	1,33,570.00
4	Non Hazardous Waste Disposal (Recurring)	6,37,200.00
5	Hazardous Waste Disposal (Recurring)	1,95,427.00
6	CSR Activities (Recurring)	22,53,549.00
7	Third Party HSE inspection	27,000.00
<b>TOTAL</b>		<b>2,07,71,340.00</b>