EOGEPL/CBM-RG(E)/E&F/2018/489
Date: 29th May, 2018

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

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

Ref: Environmental Clearance of Phase-II granted by MoEF vide letter no. J-11011/351/2009- IA II (I) dated 23.09.2011; Amendment dated 18th June, 2012; Transfer of EC from EOL to EOGEPL dated 06.11.2017

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-II and II A CBM project activities for the period of October 2017- March, 2018.

Thanking you.

Yours faithfully
For Essar Oil and Gas Exploration and Production Limited

Essar Oil and Gas Exploration and Production Limited ★ Raniganj East CBM Project-Durgapur

Authorized Signatory
Ashutosh Dash
Vice President & Head – Production

Encl: Phase-II and Amendment 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-II) Half Yearly Environment Clearance Compliance Report

(October'17- March'18)

Ref: Environment Clearance no. F. No. J-11011/351/2009- IA II (I) dated 23.09.2011

Sr. No.	EC Conditions	Compliance Status
	A. Specific Conditions	
i.	As proposed, Only 58 pilot-cum-production wells shall be drilled upto a depth of 1000 m. No additional wells shall be drilled without prior permission from this Ministry.	Number of pilot-cum-production wells has been drilled as per the permission. Amendment in Environmental Clearance has been granted by MoEF&CC for drilling 4 additional supporting wells at each pilot cum production site to augment the production.
ii	As proposed, no drilling of well and any construction work shall be carried out in forest land. No forest land shall be used for installation of Group Gathering Stations (GGSs) and pipeline laying in the proposed location	All the facilities including well sites & Gas Gathering Stations are located outside the forest area.
iii	Recommendations of the State Forest Department shall be obtained regarding likely impact of the proposed plant on the surrounding protected forests viz. Durgapur PF & Ukhra PF and implemented.	The Conservator of Forests (South East Circle), Forest Department, West Bengal made site inspection on 19th Dec'12 to assess the probable impacts & suggest suitable recommendations. The Addl. PCCF, West Bengal with his recommendations forwarded to the Addl. PCCF, MoEF (Eastern Regional Office). (A copy of the letter is already submitted along with compliance report after that).
iv	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.	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.
v	Prior permission from the Ministry of Defence shall be obtained regarding impact of proposed plant on Panagarh air base, if any.	Four (4) nos of Gas Gathering Station and One Main Compressor Station was constructed as per the condition of the NOC of MoD.

Sr. No.	EC Conditions	Compliance Status
vi	The surface facilities shall be installed as per the applicable codes and standards, international practices and applicable local regulations.	Surface facilities have been designed as per OISD, DGMS and international standards viz. API.
vii	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 16th November, 2009 for PM_{1O}, $PM_{2.5}$, S02, NOx, CO, CH4, VOCs, HC, Non-methane HC etc. Efforts shall 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 16th November, 2009 for PM10, PM2.5, SO2, NOX, CO, CH4, VOCs, HC, Non-methane HC. The monitoring results have been attached in ***Annexure I.***
viii	The company shall monitor data on methane and non-methane hydrocarbon at the drilling site, GGS, CGS and at the SV station from where the gas is supplied to the customers.	Methane hydrocarbons are monitored as part of Ambient Air Quality Monitoring Plan at Major facilities (GGS) and villages. The monitoring results are provided in ***Annexure I***.
ix	Mercury shall also be analyzed in air, water and drill cuttings twice during drilling period.	The drilling operation was temporarily suspended since April 2017 till date.
x	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 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 emissions from stacks shall meet the MOEF/CPCB guidelines.	Elevated flare system has been designed as per OISD guidelines. Measures delineated in the EIA/EMP have been taken to prevent fire hazards. The overhead flaring has been installed with height of 30 m. The following measures have been implemented to prevent fire hazard. • Installation of electrical equipment as per approved hazardous zone classification as communicated to DGMS • Provided dry chemical fire extinguishers • Online methane gas analyzers (CH4) • Use of flame proof type lighting fixtures, push buttons and switches in the drill site facilities

Sr. No.	EC Conditions	Compliance Status
xi	The company shall make the arrangement for control of noise from the drilling activity 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.	CPCB approved models of Silent DG sets have been installed with acoustic enclosures. Noise monitoring has been carried out in the activity area and surrounding habitat. The results are attached in ***Annexure II***.
xii	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(E) dated 30'August, 2005.	The drilling operation was temporarily suspended since April 2017 till date.
xiii	Total fresh water requirement from local approved water suppliers shall not exceed 75 m3/day/well and prior permission shall be obtained from the concerned Authority and a copy submitted to the Ministry's Regional Office at Bhubaneswar. No ground water shall be used without permission of CGWA.	The drilling operation was temporarily suspended since April 2017 till date. However, The RO treat water is supply the water demand of Work over operation and other utilities. No ground water is withdrawal for water consumption.
xiv	The produced water during drilling operations shall be collected in HDPE lined waste pit to prevent ground water contamination. Effluent shall be properly treated and treated effluent shall conform to CPCB standards. As proposed, produced water may also be used in operational coal mines of Eastern Coal Fields for dust suppression, slurry activities and post-mining restoration efforts etc. Domestic effluent shall be disposed through septic tank followed by soak pit. No effluent shall be discharged outside the premises and 'zero' discharge shall be adopted	Produced water is collected & stored in HDPE lined pits & the water is treated by Reverse Osmosis Treatment System. Currently RO treatment plants of total capacity 5100 m3/day have been installed. The treated water is used for our own operations (Work over & site preparation activities). Excess treated water will be discharged to nearby streams only after meeting discharge standards. Domestic effluent is treated septic tank followed by soak pits. There is no discharge of effluent for the facilities.
xv	Water produced during drilling shall be reused in drilling of other core/test wells.	Produced water has been collected & stored in HDPE lined pits and water if not meeting the standards will be passed through suitable treatment system. Water meeting the standards set by CPCB will be reused in the construction activities & Work over of adjoining wells. Excess water is discharged only after meeting the

Sr. No.	EC Conditions	Compliance Status
		discharge standards.
xvi	Reverse Osmosis plant shall be installed for further treatment of the wastewater in case the TDS is > 2000 mg/l and treated wastewater shall be reused or discharge on the land after meeting the norms.	Currently, Reverse Osmosis plants with total capacity of 5100m3/day are installed to treat the produced water generated from production wells. The produced water quality of different wells are attached in ***Annexure III***. The analysis reports of water treated through Reverse Osmosis plant are attached in ***Annexure IV***. The treated water is reused in HF, Work over and other construction activities. Excess water is discharged to nearby streams only after meeting the discharges standards. Analysis reports of Surface water are attached in ***Annexure IV A***.
xvii	Ground water quality monitoring shall be done to assess if produced water storage or disposal has any effect.	The ground water monitoring has been carried out by collecting samples from Tube wells (use for drinking water) of surrounding habitats in the project area and the analysis results are attached in ***Annexure V.***
xviii	Drilling wastewater including drill cuttings wash water shall be collected in disposal pit lined with HDPE lining and evaporated or treated and shall comply with the notified standards for on-shore disposal. The treated waste water should be reused in other wells during drilling operations. The membership of common TSDF shall be obtained for the disposal of drill cuttings and hazardous waste. Otherwise secured land fill shall be created at the site as per the design of the secured shall be approved by the CPCB and obtain the authorization of the WBPCB. Copy of authorization or membership of TSDF shall be submitted to Ministry's Regional Office at Bhubaneswer.	The drilling operation was temporarily suspended from April 2017 to till date.
xix	Only water based drilling mud shall be used. The drilling mud shall be recycled. Hazardous waste shall be disposed of as per Hazardous Waste (Management, Handling and Transboudary Movement) Rules, 2008. The recyclable waste (oily sludge) and spent oil shall be disposed of to	The drilling operation was temporarily suspended from April 2017 to till date. Oil contaminated waste & waste filters have been sent to TSDF facility, Haldia. WBPCB approve storage time extension used filter upto 180 days. Used oil has been

Sr. No.	EC Conditions	Compliance Status
	the authorized recyclers/re-processors.	sent to authorize recycler. The copies of Form 10 for Used oil and Hazardous waste are attached as ***Annexure-VI***.
xx	The Company shall carry out long term subsidence study by collecting base line data before initiating drilling operation till the project lasts. The data so collected shall be submitted six monthly to the Ministry and its Regional Office at Bhubaneswar.	Subsidence monitoring was performed at all Monitoring Stations established by The National Institute of Technology (NIT), Durgapur in March'2017. There was no significant subsidence observed till date from study started from 2012. The Subsidence Study report of the same was submitted with previous compliance report. The yearly subsidence monitoring is in plan.
xxi	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.	The necessary measures have been taken to prevent fire hazards and for soil remediation as follows. • Installation of electrical equipment as per approved hazardous zone classification as communicated to DGMS • Dry chemical fire extinguishers • Portable methane gas analyzers (CH4) • Use of flame proof type lighting fixtures, push buttons and switches in the drill site facilities • Impervious surface, secondary containment and spill kit are provided whenever there is possibility of soil contamination
xxii	The project authorities shall install SCADA system with dedicated optical fiber based telecommunication link for safe operation of pipeline and Leak Detection System. Additional sectionalizing valves in the residential area and sensitive installations shall be provided to prevent the amount of gas going to the atmosphere in the event of pipeline failure. Intelligent pigging facility shall be provided for the entire pipeline system for internal corrosion monitoring. Coating and impressed current cathodic protection system shall be provided to prevent external corrosion.	Installation of SCADA system with dedicated optical fiber based telecommunication link for safe operation of pipeline and Leak Detection System is under process. Cathodic Ray Protection system has been installed along the length of pipeline to prevent the corrosion. The design and laying of surface facilities have been confirmed to the standards of OISD 141.
xxiii	All the surface facilities including GGS, CGS and	All the surface facilities including GGS, CGS and SV

Sr. No.	EC Conditions	Compliance Status
	SV station shall be as per applicable codes and standards, international practices and applicable local regulations.	stations have been laid as per OISD & API standards.
xxiv	The design, material of construction, assembly, inspection, testing and safety recommendations of operation 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 surface facilities have been installed as per the ASME/ANSI B 31.8 standards. Pipelines design and laying is also confirms to the ANSI/ASME standards.
xxv	Annual safety audit should be carried out for the initial three years by an independent agency and report submitted to this Ministry for ensuring the strict compliance of safety regulations on operations and maintenance.	Safety audits are conducted by third party to maintain the safety standards.
xxvi	The project authorities shall petrol and inspect the pipeline regularly for detection of faults as per OISD guidelines and continuous monitoring of pipeline operation by adopting non-destructive method (s) of testing as envisaged in the EMP. Pearson survey and continuous potential survey should be carried out at regular intervals to ensure the adequacy of cathodic protection system.	Regular patrolling and inspection of laid pipeline has been carried out for detection of faults as per OISD guidelines. Pipeline operations shall be continuously monitored by adopting non-destructive methods of testing as envisaged in the EIA/EMP. Pearson survey and continuous potential survey shall be carried out at regular intervals to ensure the adequacy of cathodic protection system.
xxvii	The company shall develop a contingency plan for H2S release including all necessary recommendations from evacuation to resumption of normal operations. The workers shall be provided with personal H2S detectors in locations of high risk of exposure along with self containing breathing apparatus.	H2S is not present as per the analysis of gas tapped from the test wells. However all the necessary safety measures shall be delineated in emergency response plan. Gas detectors are kept at the drilling and production sites to check any presence of gases which are beyond threshold values. All workers have been provided with standard PPEs according to job requirement.
xxviii	Adequate well protection system shall be	Adequate well control measures along with BOP have

Sr. No.	EC Conditions	Compliance Status
	provided like BoP or diverter systems as required based on the geological formation of the blocks.	been adopted to ensure necessary level of safety.
xxix	Blow Out Preventor (BOP) system shall be installed to prevent well blowouts during drilling operations. BOP measures during drilling shall focus on maintaining well bore hydrostatic pressure by proper pre-well planning and drilling fluid logging etc.	CBM well hydrostatic pressures are normally less than 2psi. However considering the hydrostatic pressures and sensitivity of well, Blow Out Preventers or diverter systems have been 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.
xxx	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.
xxxi	Emergency Response Plan shall be based on the guidelines prepared by OISO, 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. Recommendations mentioned in risk assessment and consequence analysis are being duly implemented.
xxxii	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 have been implemented.
xxxiii	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 plan 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 unsuitable 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.
xxxiv	Occupational health surveillance of the workers shall be carried out as per the prevailing Acts and Rules.	All employees have undergone Pre-employment Medical Examination. Periodical Occupational Health Surveillance will be conducted and records maintained.

Sr. No.	EC Conditions	Compliance Status
xxxv	In case the commercial viability of the project is established, the Company shall prepare a detailed plan for development of gas fields and obtain fresh environmental clearance from the Ministry.	MoEF granted amendment in phase II EC for drilling 4 nos. of additional supporting wells at each well site to meet the production capacity over and above 5 lakh m3 per day.
xxxvi	All the commitments made to the public during the Public Hearing / Public Consultation meeting held on 26th March, 2010 shall be satisfactorily implemented.	Commitments made during the Public Hearing are under implementation.
xxxvii	Company shall adopt Corporate Environment Policy as per the Ministry's O.M. No. J-11 013/41/2006-1A.II(1) dated 26th April, 2011 and implemented.	Corporate Environmental Policy is in place and being implemented. (A copy of the Policy is attached with previous compliance report)
xxxviii	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, Safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project	We do not intend to bring labor from outside; hence construction of colony is not envisaged. We have been hiring local labour for all construction work. Nonetheless, we are providing all the necessary infrastructure and facilities like porta cabins, mobile toilets, soak pit & septic tank, safe drinking water, medical health care, creche, etc.
General Condition		
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 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	For any further expansion and modification in project configuration, we would approach MoEF for the prior Environmental Clearance.

Sr. No.	EC Conditions	Compliance Status
	protection measures required, if any	
iii	The project authorities must strictly comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 2000 as amended subsequently. Prior approvals from Chief Inspectorate of Factories, Chief Controller of Explosives, Fire Safety Inspectorate etc. must be obtained, wherever applicable.	We comply with the rules and regulations under Manufacture, Storage and Import of Hazardous Chemicals Rules, 2000 as amended subsequently. 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.
v	The overall noise levels in and around the plant area shall be kept well 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. 75 dBA (daytime) and 70 dBA (nighttime).	Acoustic hoods, silencers, enclosures will be provided to high noise generating equipment. Noise levels will be restricted to the standards prescribed under EPA Rules, 1989. Regular noise monitoring has been carried out.
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 is currently in operation and functioning for implementation of environment management plan at large. The sampling and analysis of environmental parameters is been carried out by Scientific Research laboratory (MoEF recognized).
vii	As proposed, Rs. 7.80 Crores earmarked for environment protection and pollution control measures shall be used to implement the conditions stipulated by the Ministry of	The environment expenditure for the environment activities has been attached as ***Annexure VII***.

Sr. No.	EC Conditions	Compliance Status
	Environment and Forests as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so provided shall not be diverted for any other purposes.	
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 has been and will be 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 of environmental clearances are regularly submitted to Regional office of MoEF.
ix	A copy of clearance letter shall be sent by the proponent to concerned Panchayat, ZilaParishad / 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 Environmental Clearance (EC) has been circulated to the local administration and was uploaded on the Company's website.
x	The project proponent shall upload the status of compliance of 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; SPM, RSPM, S02, 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 has been carried out as per revised NAAQM criteria. The criteria pollutant levels namely; SPM, RSPM, S02, NOx, HC (Methane & Non-methane), VOCs has been monitored periodically and displayed at the main entrance of the Gas Gathering Station.
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	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

Sr. No.	EC Conditions	Compliance Status
	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	Regional Office of MOEF, the respective Zonal Office of CPCB and the WBPCB.
xii	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental 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 31st 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.
xiii	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 http:/envfor.nic.in. 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	The advertisement was published in The Telegraph Calcutta and Anand Bazaar Pathrika on 30th September, 2011. A copy of the same has been submitted in the compliance report during the period Apr'11-Sep'11.
xiv	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	Financial closure has been prepared in the year of 2010. The development work was commenced on 7th Dec, 2011 after obtaining consent to establish from WBPCB.

Ref: Environment Clearance no. F. No. J-11011/351/2009- IA II (I) dated 18.06.2012

Sr. No.	EC Conditions	Compliance Status
4(I)	As proposed, supporting wells (4 nos.) on each pilot-cum-production wells (58 nos.) shall be drilled upto a depth of 1000m. No additional wells/support well shall be drilled without prior permission of this Ministry.	4 supporting wells will be drilled at each pilot-cum-production wells (58x4=232 wells). No additional wells will be drilled without prior approval from MoEF.
4(ii)	Unit shall monitor ground water table within one Km radius of each well during pre-monsoon (i.e. May) and winter season (November). Trend analysis shall be carried out and report shall be submitted to the Ministry's regional office at Bhubaneswar	Monitoring of ground water table has been carried out in the month of December'2017 (post-monsoon). The ground water table data and the analysis of ground water report is attached as ***Annexure*- VIII.**
4(iii)	Permission from CGWA for dewatering shall be obtained and submitted to the Ministry's Regional Office at Bhubaneswar.	Dewatering is an inherent process of CBM extraction & carried at much deeper depths (>500m) which does not disturb the usable drinking water aquifers located at the shallow depths. "No Objections Certificate" regarding the same has been obtained from State Water Investigation Directorate (SWID), Water Resources Investigation & Development Department, Govt. of West Bengal. (A copy of the letter is attached with previous compliance report). In west Bengal SWID is the approved local authority of CGWA for given permission for water withdrawal
4(iv)	Smokeless flare shall be installed	Smokeless flares will be installed for complete combustion of CBM. Flaring will be carried out only during process upsets.
4(v)	All measures shall be taken to control noise pollution during drilling process. Acoustic enclosure/barrier shall be installed	Only silent DG sets meeting the specifications of CPCB are used. Acoustic enclosures have been provided to major noise generating equipment (Diesel Generators Sets). Earplugs have been provided to the working personnel at the site.
4(vi)	Any produced water shall be treated and recycled/reused within the project area. Any	Produced water is treated by Reverse Osmosis System. Treated water is being used for Workover &

Sr. No.	EC Conditions	Compliance Status
	excess water shall be discharged after treatment and meeting the standards prescribed by the CPCB/SPCB. Regular water quality monitoring shall be carried out and monitoring report shall be submitted to the respective Regional Office of the MoEF.	construction activities of other wells. Excess water will be discharged to the streams only after meeting the discharge standards. Treated Water quality monitoring reports are attached as ***Annexure-IV*** and discharged water quality monitoring reports are attached as ***Annexure IV A.***
4(vii)	Approach road shall be constructed prior to the drilling	Approach roads are being constructed wherever the access is not available.
4(viii)	Land subsidence shall be monitored regularly and monitoring report shall be submitted to CPCB, SPCB and respective Ministry's regional office	Subsidence monitoring was performed at all Monitoring Stations established by The National Institute of Technology (NIT), Durgapur in March'2017. There was no significant subsidence observed till date from study started from 2012. The Subsidence Study report of the same was submitted with previous compliance report. The yearly subsidence monitoring is in plan.
5	All the specific conditions and general conditions specified in the environmental clearance accorded vide Ministry's letter no.J-11011/351/2009-IA II (I) dated 23rd September, 2011 shall be implemented	All the specific and general conditions of the Phase-II Environmental Clearance are being implemented.
6	Consent to Establish & Operate for the revised proposal shall be obtained from the W.B. Pollution Control Board	Regular CTE & CTO will be obtained from Pollution Control Board and will be submitted to MoEF.
7	No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment and 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 if required, if any.	No further expansion or modification will be done in the project configuration without prior approval from the MoEF.

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/m3	60 (24 hrs)	33.04	37.35	43.18	36.42	37.28	41.08
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	64.73	74.04	75.68	72.64	69.38	74.65
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	44.35	41.72	41.19	42.65	42.84	43.58
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	6.35	6.94	6.41	6.04	6.76	6.22
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.398	0.386	0.429	0.416	0.412	0.463
6	THC as Methane	mg/m3	-	2.09	1.78	1.78	2.09	2.18	2.42
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	3.02			2.92		
10	Benzo(a)Pyrene	ng/m^3	1	0.75			0.63		
11	Ammonia (NH_3)	mg/m^3	400	22.47			26.14		
12	Ozone (O_3)	mg/m^3	100	46.12			39.86		
13	Lead (Pb)	mg/m^3	1	0.15			0.18		
14	Nickel (Ni)	ng/m^3	20	14.84			15.02		
15	Arsenic	ng/m^3	6	1.62			1.31		
16	Benzene	mg/m^3	5	1.84			1.75		

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	JATGORIA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	34.94	35.98	46.62	30.22	40.34	33.46
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	69.08	75.42	82.50	58.64	68.22	72.64
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	36.93	45.47	42.00	39.62	46.24	44.58
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	5.66	7.08	6.75	5.84	6.18	6.70
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.348	0.364	0.464	0.40	0.438	0.446
6	THC as Methane	mg/m3	-	2.64	1.8	1.72	1.80	2.230	2.36
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	5.38	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	0.362	1.56	1.56
9	VOCs	µg/m3	-	4.25			3.02		
10	Benzo(a)Pyrene	ng/m^3	1	0.95			0.39		
11	Ammonia (NH_3)	mg/m^3	400	30.14			19.04		
12	Ozone (O_3)	mg/m^3	100	49.71			31.97		
13	Lead (Pb)	mg/m^3	1	0.25			0.14		
14	Nickel (Ni)	ng/m^3	20	16.84			13.67		
15	Arsenic	ng/m^3	6	1.95			1.53		
16	Benzene	mg/m^3	5	2.49			1.46		

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	MCS (MALANDIGHI)					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	34.76	36.80	46.83	39.42	36.28	39.66
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	68.18	68.31	76.20	74.58	64.33	75.22
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	42.29	44.20	41.34	43.21	43.52	47.28
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	6.06	6.93	6.73	5.82	7.04	7.46
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.344	0.364	0.422	0.368	0.402	0.438
6	THC as Methane	mg/m3	-	2.41	1.39	1.46	2.41	2.01	1.98
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	3.89			2.96		
10	Benzo(a)Pyrene	ng/m^3	1	0.82			0.76		
11	Ammonia (NH_3)	mg/m^3	400	25.12			27.53		
12	Ozone (O_3)	mg/m^3	100	48.23			44.51		
13	Lead (Pb)	mg/m^3	1	0.19			0.24		
14	Nickel (Ni)	ng/m^3	20	15.63			16.05		
15	Arsenic	ng/m^3	6	1.79			1.78		
16	Benzene	mg/m^3	5	2.21			1.95		

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	KULDIHA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	34.78	41.41	42.98	35.22	41.68	34.28
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	65.31	70.57	82.55	68.42	77.28	68.54
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	37.46	40.34	40.90	40.28	42.36	46.28
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	5.80	6.85	6.39	6.22	3.78	5.84
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.408	0.382	0.438	0.402	0.456	0.524
6	THC as Methane	mg/m3	-	2.18	1.64	0.17	2.09	2.51	2.32
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	3.73			2.68		
10	Benzo(a)Pyrene	ng/m^3	1	0.79			0.54		
11	Ammonia (NH_3)	mg/m^3	400	24.57			21.42		
12	Ozone (O_3)	mg/m^3	100	44.18			35.83		
13	Lead (Pb)	mg/m^3	1	0.21			0.17		
14	Nickel (Ni)	ng/m^3	20	13.39			11.59		
15	Arsenic	ng/m^3	6	1.54			1.81		
16	Benzene	mg/m^3	5	2.12			1.62		

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	GOPALPUR					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	24.39	41.97	44.06	35.24	36.08	47.54
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	58.71	83.29	76.16	76.32	72.04	84.36
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	38.60	44.34	39.86	40.35	43.84	46.28
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	5.38	7.05	6.53	6.02	5.38	6.64
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.362	0.398	0.438	0.368	0.386	0.402
6	THC as Methane	mg/m3	-	1.83	1.95	1.88	1.83	2.58	2.32
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	2.94			3.02		
10	Benzo(a)Pyrene	ng/m^3	1	0.64			0.77		
11	Ammonia (NH_3)	mg/m^3	400	20.39			24.89		
12	Ozone (O_3)	mg/m^3	100	40.24			45.64		
13	Lead (Pb)	mg/m^3	1	0.15			0.20		
14	Nickel (Ni)	ng/m^3	20	13.68			13.41		
15	Arsenic	ng/m^3	6	1.56			1.47		
16	Benzene	mg/m^3	5	1.62			1.81		

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 2 (AKANDARA)					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	31.17	45.41	36.66	34.60	37.62	36.44
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	59.10	87.04	67.35	66.84	71.08	78.34
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	40.13	42.04	40.03	42.82	44.25	46.82
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	6.11	6.26	6.37	6.24	6.24	6.58
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.346	0.402	0.426	0.388	0.386	0.408
6	THC as Methane	mg/m3	-	1.98	1.93	1.81	1.98	2.07	2.21
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	3.24			2.98		
10	Benzo(a)Pyrene	ng/m^3	1	0.71			0.47		
11	Ammonia (NH_3)	mg/m^3	400	21.83			22.16		
12	Ozone (O_3)	mg/m^3	100	42.92			37.46		
13	Lead (Pb)	mg/m^3	1	0.14			0.16		
14	Nickel (Ni)	ng/m^3	20	9.79			12.55		
15	Arsenic	ng/m^3	6	1.41			1.44		
16	Benzene	mg/m^3	5	1.91			1.73		

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	SARENGA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	30.79	42.79	46.62	32.22	44.58	35.84
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	56.72	88.78	79.76	67.54	83.24	72.54
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	37.68	43.97	45.46	41.62	40.06	45.28
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	5.49	6.97	7.22	5.88	6.04	7.18
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.354	0.402	0.422	0.384	0.428	0.454
6	THC as Methane	mg/m3	-	1.75	1.97	1.68	1.75	2.74	2.54
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	2.65			3.34		
10	Benzo(a)Pyrene	ng/m^3	1	0.58			0.75		
11	Ammonia (NH_3)	mg/m^3	400	19.75			25.14		
12	Ozone (O_3)	mg/m^3	100	37.26			47.59		
13	Lead (Pb)	mg/m^3	1	0.11			0.21		
14	Nickel (Ni)	ng/m^3	20	11.89			14.74		
15	Arsenic	ng/m^3	6	1.43			1.89		
16	Benzene	mg/m^3	5	1.58			1.88		

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	DHABANI		BANSIA			
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	32.09	34.33	42.62	33.87	32.58	34.20
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	65.74	64.28	71.55	66.78	66.29	64.56
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	37.69	41.46	39.98	40.38	42.68	40.38
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	5.77	6.13	6.55	5.94	6.12	6.70
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.336	0.394	0.463	0.407	0.432	0.502
6	THC as Methane	mg/m3	-	2.37	1.58	1.82	1.57	1.79	1.98
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	4.11			2.86		
10	Benzo(a)Pyrene	ng/m^3	1	0.92			0.58		
11	Ammonia (NH_3)	mg/m^3	400	25.27			25.95		
12	Ozone (O_3)	mg/m^3	100	48.55			33.18		
13	Lead (Pb)	mg/m^3	1	0.22			0.16		
14	Nickel (Ni)	ng/m^3	20	16.12			12.21		
15	Arsenic	ng/m^3	6	1.72			1.45		
16	Benzene	mg/m^3	5	20.50			1.69		

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	NACHAN					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	27.62	40.60	44.17	38.29	33.58	37.52
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	61.88	76.43	78.37	78.64	67.24	70.48
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	39.11	40.73	48.37	35.22	42.64	42.64
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	5.73	6.17	7.04	6.28	6.54	6.58
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.354	0.402	0.428	0.368	0.422	0.462
6	THC as Methane	mg/m3	-	1.88	1.91	1.84	1.88	1.97	2.32
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	3.07			3.12		
10	Benzo(a)Pyrene	ng/m^3	1	0.61			0.84		
11	Ammonia (NH_3)	mg/m^3	400	22.17			28.36		
12	Ozone (O_3)	mg/m^3	100	39.72			46.17		
13	Lead (Pb)	mg/m^3	1	0.20			0.23		
14	Nickel (Ni)	ng/m^3	20	14.07			16.41		
15	Arsenic	ng/m^3	6	1.67			1.92		
16	Benzene	mg/m^3	5	1.75			2.14		

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	GHATAKDANGA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	24.88	37.65	41.18	36.82	31.42	41.84
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	55.95	68.19	70.49	60.78	60.08	76.24
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	36.78	41.60	46.43	43.54	40.58	46.50
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	5.87	6.41	6.82	5.98	6.32	7.12
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.372	0.355	0.378	0.394	0.398	0.438
6	THC as Methane	mg/m3	-	1.64	1.54	1.39	1.64	1.71	2.12
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	2.63			2.42		
10	Benzo(a)Pyrene	ng/m^3	1	0.44			0.37		
11	Ammonia (NH_3)	mg/m^3	400	17.78			19.92		
12	Ozone (O_3)	mg/m^3	100	46.17			32.54		
13	Lead (Pb)	mg/m^3	1	0.10			0.13		
14	Nickel (Ni)	ng/m^3	20	13.54			10.68		
15	Arsenic	ng/m^3	6	1.38			1.36		
16	Benzene	mg/m^3	5	1.48			1.55		

ANNEXURE I

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/m3	60 (24 hrs)	36.34	38.39	44.40	32.66	47.81	34.28
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	68.24	67.70	70.07	70.46	74.62	68.38
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	43.04	46.89	41.66	46.30	44.12	48.25
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	5.85	7.26	6.92	6.32	6.06	7.84
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.378	0.384	0.384	0.384	0.464	0.476
6	THC as Methane	mg/m3	-	2.56	1.44	1.65	2.41	2.38	2.56
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	4.05			3.04		
10	Benzo(a)Pyrene	ng/m^3	1	0.59			0.71		
11	Ammonia (NH_3)	mg/m^3	400	28.11			24.13		
12	Ozone (O_3)	mg/m^3	100	45.91			39.88		
13	Lead (Pb)	mg/m^3	1	0.24			0.19		
14	Nickel (Ni)	ng/m^3	20	15.78			15.22		
15	Arsenic	ng/m^3	6	1.83			1.75		
16	Benzene	mg/m^3	5	2.26			1.87		

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	PRATAPPUR					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	27.16	43.61	46.94	36.21	34.57	39.72
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	51.08	79.65	75.11	66.82	70.11	74.52
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	39.56	40.42	40.22	40.65	41.64	44.24
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	5.79	6.42	6.15	6.33	5.98	6.12
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.356	0.374	0.418	0.402	0.436	0.498
6	THC as Methane	mg/m3	-	1.57	1.85	1.64	1.57	2.34	2.34
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	2.92			2.82		
10	Benzo(a)Pyrene	ng/m^3	1	0.55			0.49		
11	Ammonia (NH_3)	mg/m^3	400	19.84			26.07		
12	Ozone (O_3)	mg/m^3	100	32.75			38.56		
13	Lead (Pb)	mg/m^3	1	0.12			0.15		
14	Nickel (Ni)	ng/m^3	20	12.75			12.96		
15	Arsenic	ng/m^3	6	1.33			1.24		
16	Benzene	mg/m^3	5	1.65			1.59		

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	PARULIA					
				Oct'17	Nov'18	Dec'19	Jan'18	Feb'18	Mar'18
1	Particulate Matter (PM2.5)	µg/m3	60 (24 hrs)	26.89	38.64	43.46	40.10	36.27	45.28
2	Particulate Matter 10 (PM10)	µg/m3	100 (24 hrs)	57.97	74.61	87.34	76.22	67.24	81.44
3	Nitrogen Dioxide (NO2)	µg/m3	80 (24 hrs)	37.62	43.08	40.25	40.28	44.62	42.36
4	Sulphur Dioxide (SO2)	µg/m3	80 (24 hrs)	5.60	7.44	6.59	5.64	6.22	6.38
5	Carbon Monoxide (CO)	mg/m3	2 (8 hrs)	0.364	0.362	0.428	0.398	0.420	0.458
6	THC as Methane	mg/m3	-	1.84	1.81	0.16	1.84	1.85	2.28
7	Mercury	µg/m3	-	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
8	Hydrocarbon as Non Methane	mg/m3	-	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
9	VOCs	µg/m3	-	2.79			3.04		
10	Benzo(a)Pyrene	ng/m^3	1	0.47			0.66		
11	Ammonia (NH_3)	mg/m^3	400	23.39			23.41		
12	Ozone (O_3)	mg/m^3	100	39.29			43.78		
13	Lead (Pb)	mg/m^3	1	0.16			0.11		
14	Nickel (Ni)	ng/m^3	20	14.88			15.81		
15	Arsenic	ng/m^3	6	1.61			1.69		
16	Benzene	mg/m^3	5	1.81			1.76		

Noise Monitoring Report of CBM Raniganj Project, Essar Oil and Gas Exploration and Production Limited

Compliance Period Oct'17 -Mar'18

ANNEXURE II

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

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'17 - Mar'18)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDN-171 D-1	EDN-170 V-1	EDN-169 V-1	EDN-162 V-1	EDI-123 D-6	EDI-42 V-1	EDI-41 D-3	EDD-008 D-2	EDD-20 V-1	EDD-21 D-2
Date				11.10.2017	11.10.2017	11.10.2017	11.10.2017	11.10.2017	11.10.2017	11.10.2017	11.10.2017	11.10.2017	11.10.2017
1	pH		5.5 to 9.0	9.17	7.45	7.82	8.11	7.91	8.3	8.72	8.93	9.32	9.22
2	Total Suspended Solids	mg/l	100	<2	117	89	107	115	26	<2	<2	<2	<2
3	Total Dissolved Solids	mg/l	---	452	5982	7846	4892	7012	7165	5428	3044	2962	3292
4	Turbidity	NTU	---	3.4	592.5	265	324.5	452	68	75.5	<1	5.9	5
5	Acidity as $CaCO_3$	mg/l	---	Nil	8.8	6.5	4.3	5.5	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	217.80	190.1	241.6	267.3	297	544.5	1078.1	1633.5	1643.4	1366.2
7	Chloride	mg/l	---	127.3	3184.8	4244.3	2628.4	4003.2	4042.5	2567.7	771.4	674.9	1241.1
8	Total Hardness	mg/l	---	98.00	2802.8	1085.8	733	737	62.7	105.8	47	345	78.4
9	Sulphate	mg/l	---	<2.5	5.5	8.9	4.5	8.9	10.3	6.5	4.3	5.8	9.5
10	Calcium	mg/l		23.6	432.1	262.4	177.5	174.4	15.7	22	11	102.1	23.6
11	Magnesium	mg/l	---	9.5	261.9	104.8	70.5	73.3	5.7	12.4	4.8	21.9	4.8
12	Dissolved Oxygen	mg/l	---	5.9	5.5	4.7	4.9	5.1	5.3	5.8	5.5	5.7	4.9
13	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	<2	<2	2	2.8	<2	<2	<2	<2	<2	2
14	Chemical Oxygen Demand	mg/l	250	<8	8	11	10	9	10	<8	<8	<8	8
15	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5	<5.0	<5	<5	<5.0	<5.0	<5.0	<5.0
16	Phenolic Compounds (as C_6H_5OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	2.18	3.11	3.46	1.9	2.15	2	0.88	0.93	0.56	2.3
19	Ammoniacal Nitrogen	mg/l	---	1.49	4.3	5.11	2.96	2.4	2.17	1.45	2.11	2.35	3.94
20	Iron	mg/l	---	0.67	50.1	22.1	16.7	41.5	1.11	22.1	0.11	11.5	1.01
21	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	---	0.017	0.024	0.033	0.025	0.031	0.037	0.041	0.011	0.013	0.019
23	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDN-171 D-1	EDN-170 V-1	EDN-169 V-1	EDN-162 V-1	EDI-123 D-6	EDI-42 V-1	EDI-41 D-3	EDD-008 D-2	EDD-20 V-1	EDD-21 D-2
25	Total Arsenic	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
29	SAR		---	3.6	16.2	38.2	28.8	42.2	146.2	93.2	79.8	27.3	49.5
30	Phosphorus	mg/l	---	0.22	0.27	0.24	0.1	0.13	0.19	0.12	0.19	0.11	0.19
31	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Manganese	mg/l		<0.05	0.167	0.082	0.069	0.091	<0.05	<0.05	<0.05	0.065	<0.05
34	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
35	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
36	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
39	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
40	Bicarbonate	mg/l	---	126.9	231.9	294.8	326.1	362.3	664.3	732	1015	976	1171.1
41	Electrical Conductivity	µmhos/c	---	790	8246	11200	6845	9422	9562	6872	3911	3649	5321
42	Sodium	mg/l	---	85.3	1972	2896	1793	2628	2712	2196	1258	1165	1020
43	Potassium	mg/l	---	5.3	9.2	11	10.5	11.9	12.3	8.8	6.9	7.2	7.5

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'17 - Mar'18)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDI-34 V-1	EDH-44 D-4	EDD-53 V-1	EDG-75 V-1	EDC-72 V-1	EDG-77 D-5	EDG-75 D-5	EDC-72 D-5	EDD-411 D-2	EDD-53 D-1
Date				11.10.2017	11.10.2017	11.10.2017	11.10.2017	11.10.2017	05.11.2017	05.11.2017	05.11.2017	05.11.2017	06.11.2017
1	pH		5.5 to 9.0	8.35	8.43	9.05	9.11	9.38	8.17	9.24	8.62	9.32	9.22
2	Total Suspended Solids	mg/l	100	35	62	7	<2	<2	<2	<2	<2	20	12
3	Total Dissolved Solids	mg/l	---	7248	3652	4098	1308	2536	2890	1820	2880	1814	2894
4	Turbidity	NTU	---	87.7	196	13.7	1.4	<1	6	6.3	9.9	64.1	39.3
5	Acidity as $CaCO_3$	mg/l	---	Nil	Nil	11.3	12.1	13.2	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	356.4	1021.6	2286.9	841.5	1234.5	1306.0	1009.8	861.3	1168.2	1080
7	Chloride	mg/l	---	4017.6	1832.1	1060.7	289.3	549.6	626.8	433.9	530.3	337.5	771.4
8	Total Hardness	mg/l	---	364.6	90.2	54.9	51	51	38.40	49.9	38.4	38.4	49.9
9	Sulphate	mg/l	---	11	10.3	6.2	<2.5	5.7	6.5	8.2	10.2	8.5	10.5
10	Calcium	mg/l		113.1	20.4	12.6	12.6	11	9.2	10.8	7.7	9.2	9.2
11	Magnesium	mg/l	---	20	9.5	5.7	4.8	5.7	3.7	5.6	4.7	3.7	6.5
12	Dissolved Oxygen	mg/l	---	4.5	5.7	6	6.2	5.9	5.2	4.8	5	5.4	4.7
13	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	3	<2	<2	<2	<2	2	3	2	4.6	4
14	Chemical Oxygen Demand	mg/l	250	10	<8	<8	<8	<8	12.0	14	14	22	18
15	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5	<5.0	<5
16	Phenolic Compounds (as C_6H_5OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	2.8	2.1	1.55	1.05	1.49	2.11	1.98	3.5	3.4	3.5
19	Ammoniacal Nitrogen	mg/l	---	4.96	4.11	2.89	2.25	3.1	6.30	3.9	4.8	5.2	4.5
20	Iron	mg/l	---	18.4	30.3	0.42	0.16	0.26	1.74	1.07	0.35	15.1	1.43
21	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	---	0.023	0.015	<0.01	<0.01	<0.01	0.025	0.019	0.043	0.082	0.041
23	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDI-34 V-1	EDH-44 D-4	EDD-53 V-1	EDG-75 V-1	EDC-72 V-1	EDG-77 D-5	EDG-75 D-5	EDC-72 D-5	EDD-411 D-2	EDD-53 D-1
25	Total Arsenic	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
29	SAR		---	60.1	51.7	90.7	27	62.9	64.9	32.8	49.8	52.7	86.9
30	Phosphorus	mg/l	---	0.31	0.25	0.15	0.09	0.17	0.24	0.17	0.29	0.33	0.34
31	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Manganese	mg/l		<0.05	0.059	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.079	<0.05
34	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
35	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
36	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
39	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
40	Bicarbonate	mg/l	---	434.8	1120.4	1805.6	536.8	1073.6	1690.0	1232	1050.4	1060	742
41	Electrical Conductivity	µmhos/c	---	10204	5398	5649	1997	3592	3892	2749	4011	2356	4286
42	Sodium	mg/l	---	2642	1128	1548	445	1032	928.0	534	710	753	1412
43	Potassium	mg/l	---	12.3	8.2	8.7	2.9	6.2	8.0	4	10	12	8

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'17 - Mar'18)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDD-54 D-4	EDH-29 D-6	EDH-33 V-1	EDH-44 D-1	EDI-36 D-1	EDI-34 V-1	EDI-32 D-2	EDI-115 V-1	EDN-172 V-1	EDH-33 D-8
Date				06.11.2017	06.11.2017	06.11.2017	06.11.2017	06.11.2017	06.11.2017	06.11.2017	06.11.2017	16.12.2017	16.12.2017
1	pH		5.5 to 9.0	9.16	8.3	8.98	9.23	8.56	7.82	7.76	8.72	7.41	9.12
2	Total Suspended Solids	mg/l	100	<2	10	9	24	62	21	<2	10	31	<2
3	Total Dissolved Solids	mg/l	---	2840	5986	5782	712	7037	8462	5482	2260	6482	4128
4	Turbidity	NTU	---	50	29	20.8	62.5	108.5	48.5	4.2	19.6	76.9	4
5	Acidity as $CaCO_3$	mg/l	---	Nil	Nil	Nil	Nil	Nil	4.9	5.8	Nil	9.6	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	1100.8	910.8	1831.5	178.2	1633.5	1188	1881	623.7	342.00	1691
7	Chloride	mg/l	---	530.3	3014	2458.8	115.7	483.7	4219.3	2092.7	771.4	2047	1022
8	Total Hardness	mg/l	---	38.4	149.8	61.4	53.8	126.7	180.5	92.2	61.4	1607.80	91.2
9	Sulphate	mg/l	---	8.9	14.3	10.9	<2.5	12.5	9.5	8.3	<2.5	10.5	5.9
10	Calcium	mg/l		9.2	38.5	13.8	12.3	33.8	50.8	29.2	12.3	364	30.5
11	Magnesium	mg/l	---	3.7	13.1	6.5	5.6	10.3	13.1	4.7	7.5	169.9	3.7
12	Dissolved Oxygen	mg/l	---	5.1	5.4	4.5	5.1	4.8	4.4	5.2	5.4	3.7	4.6
13	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	<2	2.6	2.3	2.6	3	2.5	<2	<2	4	<2
14	Chemical Oxygen Demand	mg/l	250	<8	12	14	17	22	15	<8	11	18.0	8
15	Oil & Grease(Hexane Extract)	mg/l	10	<5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
16	Phenolic Compounds (as C_6H_5OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	2.4	4.5	4.11	2.55	5.8	3.85	2.9	1.96	3.45	2.15
19	Ammoniacal Nitrogen	mg/l	---	5.3	6.9	3.2	1.9	7.3	5.9	4.2	3.1	6.20	3.1
20	Iron	mg/l	---	2.37	5.56	1.33	3.26	74.9	6.4	1.25	4.72	17.25	0.82
21	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	---	<0.01	0.062	0.028	<0.01	0.077	0.081	0.062	0.023	0.027	0.015
23	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDD-54 D-4	EDH-29 D-6	EDH-33 V-1	EDH-44 D-1	EDI-36 D-1	EDI-34 V-1	EDI-32 D-2	EDI-115 V-1	EDN-172 V-1	EDH-33 D-8
25	Total Arsenic	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
29	SAR		---	56.7	83.8	106.5	8.2	95.9	95.5	97.9	42.3	14	46.7
30	Phosphorus	mg/l	---	0.28	0.39	0.25	0.14	0.36	0.37	0.27	0.17	0.33	0.25
31	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Manganese	mg/l		<0.05	0.088	<0.05	0.075	0.108	<0.05	<0.05	<0.05	0.063	<0.05
34	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
35	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
36	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
39	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
40	Bicarbonate	mg/l	---	786	1111.4	1614	162	1680	1449.4	2294.8	760.9	417.2	1282
41	Electrical Conductivity	µmhos/c	---	3911	8762	7492	1032	9433	12482	7533	3106	9246	6511
42	Sodium	mg/l	---	810	2360	1920	110	2482	2950	2160	763	1287.0	1019
43	Potassium	mg/l	---	7	14	12	5	14	8	11	6	7.0	6

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDI-120 D-3	EDI-40 D-4	EDI-70 D-3	EDI-38 D-1	EDI-41 V-1	EDI-39 D-2	EDI-123 D-5	EDD-25 V-1	EDD-405 D-1	EDN-162V-1
Date				16.12.2017	16.12.2017	16.12.2017	16.12.2017	16.12.2017	16.12.2017	16.12.2017	16.12.2017	16.12.2017	08.01.2018
1	pH		5.5 to 9.0	8.85	8.61	7.61	8.72	8.96	9.02	8.55	9.32	9.61	7.81
2	Total Suspended Solids	mg/l	100	21	42	12	10	12	23	25	<2	3	98
3	Total Dissolved Solids	mg/l	---	9328	4712	7360	4068	5172	4596	7678	2036	2462	5076
4	Turbidity	NTU	---	58.2	86.4	43.6	34.7	35.5	46.1	57.2	5.7	9	222
5	Acidity as $CaCO_3$	mg/l	---	Nil	Nil	8.3	Nil	Nil	Nil	Nil	Nil	Nil	9.2
6	Total Alkalinity as Calcium Carbonate	mg/l	---	380	627	560.5	907	741	684	399	1691	1653	408.0
7	Chloride	mg/l	---	3822.5	2462	4011	1976	2312	2046	4261	304	512	3012
8	Total Hardness	mg/l	---	972.8	285	463.6	144.4	228	201.4	124	45.6	642.2	764.20
9	Sulphate	mg/l	---	11.8	6.8	12.3	5.9	11.5	10.2	14.5	6.2	7.3	11.5
10	Calcium	mg/l		246.7	86.8	152.3	41.1	79.2	68.5	32.1	12.2	193.4	187.8
11	Magnesium	mg/l	---	86.8	16.6	20.3	10.1	7.4	7.4	10.7	3.7	38.8	71.8
12	Dissolved Oxygen	mg/l	---	3.9	4.1	3.7	4.6	3.9	4	3.4	5.2	4.9	3.7
13	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	5	3	4	2	3	2	5	<2	<2	4
14	Chemical Oxygen Demand	mg/l	250	21	10	16	9	11	9	17	<8	8	12.0
15	Oil & Grease(Hexane Extract)	mg/l	10	<5	<5.0	<5	<5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
16	Phenolic Compounds (as C_6H_5OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	4.1	2.85	3.65	2.5	2.1	1.85	3.25	2.3	2.95	2.86
19	Ammoniacal Nitrogen	mg/l	---	5.2	4.15	6.2	3.15	4.12	3.3	5.2	4.15	4.62	5.30
20	Iron	mg/l	---	8.3	6.25	2.8	4.35	2.4	3.24	8.21	0.92	1.07	37.50
21	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	---	0.037	0.047	0.039	0.31	0.033	0.021	0.037	0.014	0.024	0.029
23	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

S. No.	Parameter	Unit	CPCB Standard	EDI-120 D-3	EDI-40 D-4	EDI-70 D-3	EDI-38 D-1	EDI-41 V-1	EDI-39 D-2	EDI-123 D-5	EDD-25 V-1	EDD-405 D-1	EDN-162V-1
25	Total Arsenic	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
29	SAR		---	35	42.5	54.7	46.8	44.2	45	109.1	44.9	10.8	23.8
30	Phosphorus	mg/l	---	0.41	0.27	0.43	0.22	0.31	0.26	0.39	0.23	0.29	0.32
31	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Manganese	mg/l		0.077	0.082	0.061	0.052	0.067	0.058	0.071	<0.05	<0.05	0.186
34	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
35	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
36	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
39	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
40	Bicarbonate	mg/l	---	436.6	765	683.8	1106.5	652	482	306	1024	982	497.8
41	Electrical Conductivity	µmhos/c	---	13826	7114	11022	5982	7528	6692	10122	2531	2984	6812
42	Sodium	mg/l	---	2511	1648	2714	1298	1542	1462	2806	692	627	1512.0
43	Potassium	mg/l	---	9	8	14	10	11	7	13	4	6	14.0

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'17 - Mar'18)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDN-184 V-1	EDI-123 D-6	EDI-042 V-1	EDI-070 V-1	EDH-03 D-6	EDI-041D-3	EDE-019 D-2	EDE-043 D-1	EDC-072 D-1	EDD-054 D-4
Date				08.01.2018	08.01.2018	08.01.2018	08.01.2018	08.01.2018	08.01.2018	08.01.2018	08.01.2018	10.01.2018	10.01.2018
1	pH		5.5 to 9.0	8.22	8.11	8.3	8.41	9.33	9.33	9.49	9.16	9.45	9.33
2	Total Suspended Solids	mg/l	100	212	4.6	37	41	5	29	5	8	<2	4
3	Total Dissolved Solids	mg/l	---	2142	5284	6042	6694	4152	3942	1618	1280	2764	2886
4	Turbidity	NTU	---	552	93.1	78.6	82.1	11.5	64.2	9	16	4.1	11.3
5	Acidity as $CaCO_3$	mg/l	---	2.8	3.6	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	244.8	244.8	510	612	693.2	1122	1032	572.2	1876.8	1856.4
7	Chloride	mg/l	---	1144	3261	3522	3918	2013.6	2172	402.7	386.2	503.4	503.4
8	Total Hardness	mg/l	---	249.6	829.4	384	349.4	38.4	188.2	46.1	65.3	42.2	38.4
9	Sulphate	mg/l	---	7.5	12.2	9.6	11.5	10.2	8.5	6.2	5.8	5.9	6.3
10	Calcium	mg/l		81.6	249.3	120	100	10.8	46.2	12.3	13.8	12.3	9.2
11	Magnesium	mg/l	---	11.2	50.4	20.5	24.3	2.8	17.7	3.7	7.5	2.8	3.7
12	Dissolved Oxygen	mg/l	---	4.1	3.2	3.3	3.2	3.9	4.1	4.9	5.3	5.1	4.9
13	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	3	4	2	2	<2	2	<2	<2	<2	<2
14	Chemical Oxygen Demand	mg/l	250	10	14	9	11	8	8	<8	<8	<8	<8
15	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5	<5.0	<5	<5	<5.0	<5.0	<5.0	<5.0	<5.0
16	Phenolic Compounds (as C_6H_5OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	1.95	3.12	3.1	3.6	4.15	2.86	1.8	1.55	1.5	1.75
19	Ammoniacal Nitrogen	mg/l	---	3.8	4.9	4.95	6.2	5.15	3.82	2.95	2.5	3.3	4.1
20	Iron	mg/l	---	51.8	11.6	21.5	23.3	2.17	9.6	2.4	3.55	0.96	1.11
21	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	---	0.019	0.037	0.019	0.025	0.015	0.024	0.021	0.017	0.019	0.024
23	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

S. No.	Parameter	Unit	CPCB Standard	EDN-184 V-1	EDI-123 D-6	EDI-042 V-1	EDI-070 V-1	EDH-03 D-6	EDI-041D-3	EDE-019 D-2	EDE-043 D-1	EDC-072 D-1	EDD-054 D-4
25	Total Arsenic	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
29	SAR		---	14.4	24.5	44.6	52.1	119.7	31.9	17.3	16.2	75.3	87.2
30	Phosphorus	mg/l	---	0.27	0.31	0.3	0.36	0.27	0.25	0.19	0.14	0.13	0.17
31	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Manganese	mg/l		0.208	0.078	0.092	0.084	<0.05	0.063	0.058	0.052	<0.05	<0.05
34	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
35	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
36	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
39	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
40	Bicarbonate	mg/l	---	298.7	298.7	622.2	446.6	520.2	986.2	882.4	351	1422.2	1530.5
41	Electrical Conductivity	µmhos/c	---	2984	6988	6892	8044	6211	4925	2782	2062	3248	3588
42	Sodium	mg/l	---	522	1622	2014	2243	1710	1012	270	301	1122	1244
43	Potassium	mg/l	---	10	11	10	12	8	8	6	4	8	7

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'17 - Mar'18)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDH-04 D-1	EDH-044 D-3	EDD-017 D-1	EDD-007 V-1	EDD-011 V-1	EDE-061 D-1	EDE-001 V-1	EDH-033 D-6	EDI-036 D-3	EDI-032 D-4
Date				10.01.2018	10.01.2018	12.02.2018	12.02.2018	12.02.2018	12.02.2018	12.02.2018	12.02.2018	12.02.2018	12.02.2018
1	pH		5.5 to 9.0	9.53	8.41	9.51	9.55	9.68	9.5	9.25	9.2	8.44	9.19
2	Total Suspended Solids	mg/l	100	9	182	16	<2	<2	<2	<2	<2	26	48
3	Total Dissolved Solids	mg/l	---	786	4332	2882	1822	1378	1870	2572	3768	6248	3712
4	Turbidity	NTU	---	23.6	458	35.9	1.3	1.8	3.9	1.2	3	59.1	102.1
5	Acidity as $CaCO_3$	mg/l	---	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	408	428.4	124.00	978	712	824	1082	1262	502	380.2
7	Chloride	mg/l	---	254	2718.3	1085	603	412	728	1104	1826	2962	1932
8	Total Hardness	mg/l	---	38.4	153.6	34.60	23	19.2	34.6	19.2	30.7	245.8	169
9	Sulphate	mg/l	---	<2.5	10.2	8.7	7.3	6.2	5.9	7.5	10.2	15.3	8.2
10	Calcium	mg/l		9.2	46.2	7.7	6.2	4.6	7.7	6.2	7.7	80	58.5
11	Magnesium	mg/l	---	3.7	9.3	3.7	1.9	1.9	3.7	1	2.8	11.2	5.6
12	Dissolved Oxygen	mg/l	---	5.4	3.9	4.3	5.1	5.3	5.4	5.6	5.5	4.1	4.7
13	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	<2	3	<2	<2	<2	<2	<2	<2	2	<2
14	Chemical Oxygen Demand	mg/l	250	<8	11	10.0	<8	<8	<8	<8	<8	13	<8
15	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5	<5.0	<5.0	<5.0	<5.0	<5.0
16	Phenolic Compounds (as C_6H_5OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	0.86	1.55	1.9	1.65	0.72	2.42	3.35	4.12	3.62	2.45
19	Ammoniacal Nitrogen	mg/l	---	2.8	3.8	3.50	2.6	1.6	3.5	3.75	4.2	6.1	4.15
20	Iron	mg/l	---	2.45	63.2	1.25	0.33	0.41	0.39	0.21	0.33	10.6	24.2
21	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	---	<0.01	0.033	0.023	0.015	0.011	0.014	0.022	0.031	0.041	0.029
23	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

S. No.	Parameter	Unit	CPCB Standard	EDH-04 D-1	EDH-044 D-3	EDD-017 D-1	EDD-007 V-1	EDD-011 V-1	EDE-061 D-1	EDE-001 V-1	EDH-033 D-6	EDI-036 D-3	EDI-032 D-4
25	Total Arsenic	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
29	SAR		---	7.9	44.7	76.4	55.5	34.3	45.8	80.1	86.9	50.2	49.2
30	Phosphorus	mg/l	---	0.11	0.27	0.22	0.17	0.15	0.17	0.21	0.25	0.35	0.26
31	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Manganese	mg/l		<0.05	0.134	0.065	<0.05	<0.05	<0.05	<0.05	<0.05	0.072	0.081
34	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
35	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
36	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
39	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
40	Bicarbonate	mg/l	---	273	2472	761.0	548	380.6	698	892	972	612.4	296
41	Electrical Conductivity	µmhos/c	---	1320	4966	3745	2246	1988	2648	3432	5421	8992	4733
42	Sodium	mg/l	---	112	1282	1032.0	612	508	618	802	1105	1810	1470
43	Potassium	mg/l	---	3	14	10.0	6	5	4	7	11	8	6

S. No.	Parameter	Unit	CPCB Standard	EDI-032 V-1	EDI-123 D-1	EDN-162 D-7	EDN-172 V-1	EDN-184 D-2	EDN-184 D-1	EDT-038 V-1	EDI-40 D-3	EDI-32 D-3	EDH-044 D-4
Date				12.02.2018	12.02.2018	12.02.2018	12.02.2018	12.02.2018	12.03.2018	12.03.2018	12.03.2018	12.03.2018	12.03.2018
1	pH		5.5 to 9.0	8.32	8.36	7.81	7.97	8.81	7.61	8.5	8.72	7.98	8.82
2	Total Suspended Solids	mg/l	100	<2	108	32	98	3	21	27	37	11	53
3	Total Dissolved Solids	mg/l	---	3830	5844	3218	4186	842	2562	3766	2648	1926	1882
4	Turbidity	NTU	---	1.3	395	77.5	317.5	9.6	38.2	43.6	84	21.9	107.3
5	Acidity as $CaCO_3$	mg/l	---	Nil	Nil	10.2	8.6	Nil	8.8	Nil	Nil	6.2	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	407	427	382	396.2	183.4	285.60	1295.4	663	903.6	734
7	Chloride	mg/l	---	2030	3162	1648	2066	407.2	1232	1813.6	1010	912	920
8	Total Hardness	mg/l	---	42.2	802.6	725.8	1405.4	88.3	216.60	114	193.8	95	83.6
9	Sulphate	mg/l	---	9.1	14.3	7.5	9.2	6.9	6.8	7.3	8.1	5.5	4.9
10	Calcium	mg/l		13.8	264.7	187.5	458.6	29.2	68.5	41.1	70	28.9	27.4
11	Magnesium	mg/l	---	1.9	34.5	62.5	63.4	3.7	11.1	2.8	4.6	5.5	3.7
12	Dissolved Oxygen	mg/l	---	4.3	3.9	4.7	4.5	5.1	5.4	5.3	4.7	5.7	5.8
13	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	<2	3	<2	<2	<2	<2	<2	3	<2	<2
14	Chemical Oxygen Demand	mg/l	250	8	12	<8	<8	<8	<8.0	<8	10	<8	<8
15	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5	<5.0	<5.0
16	Phenolic Compounds (as C_6H_5OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	2.9	3.45	2.11	2.35	1.5	1.96	1.73	2.1	1.55	1.1
19	Ammoniacal Nitrogen	mg/l	---	4.55	5.15	2.95	3.25	2.9	3.70	4.2	3.9	3.1	2.85
20	Iron	mg/l	---	0.33	39.6	12.4	32.1	2.15	10.60	13.2	21.4	4.8	23.5
21	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	---	0.037	0.042	0.019	0.015	0.017	0.017	0.023	0.021	0.015	0.012
23	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

S. No.	Parameter	Unit	CPCB Standard	EDI-032 V-1	EDI-123 D-1	EDN-162 D-7	EDN-172 V-1	EDN-184 D-2	EDN-184 D-1	EDT-038 V-1	EDI-40 D-3	EDI-32 D-3	EDH-044 D-4
25	Total Arsenic	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
29	SAR		---	101.5	32.3	17.3	15.6	12.4	31	46.1	34.2	27.8	24.8
30	Phosphorus	mg/l	---	0.31	0.36	0.29	0.31	0.23	0.31	0.34	0.29	0.19	0.15
31	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Manganese	mg/l		<0.05	0.089	0.062	0.083	<0.05	0.076	0.084	0.101	0.065	0.092
34	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
35	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
36	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
39	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
40	Bicarbonate	mg/l	---	496.5	520.9	466	483.4	170.8	348.4	1579.9	808.6	1102.4	895
41	Electrical Conductivity	µmhos/c	---	4961	7692	3992	5082	1220	3242	4063	3488	2648	2593
42	Sodium	mg/l	---	1514	2107	1070	1340	270	1048.0	1132	1095	624	522
43	Potassium	mg/l	---	10	11	6	8	4	6.0	8	4	11	8

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'17 - Mar'18)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDH-044 D-1	EDH-033 D-8	EDD-008 D-4	EDE-024 D-3	EDD-003 V-1	EDD-003 D-1	EDD-010 V-1	EDD-406 D-2
Date				12.03.2018	12.03.2018	12.03.2018	12.03.2018	12.03.2018	12.03.2018	12.03.2018	12.03.2018
1	pH		5.5 to 9.0	9.21	8.55	9.32	8.75	9.5	9.2	9.73	9.61
2	Total Suspended Solids	mg/l	100	<2	<2	<2	<2	4	<2	2	<2
3	Total Dissolved Solids	mg/l	---	636	2562	1956	1662	1820	1686	1336	624
4	Turbidity	NTU	---	3.5	2.5	1.4	1.6	10.3	1.5	5.1	2.1
5	Acidity as $CaCO_3$	mg/l	---	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity as Calcium Carbonate	mg/l	---	402	1434	1207	1095.2	1078	1014	908	310
7	Chloride	mg/l	---	107	618	402.7	255.8	230.5	222.7	197	190
8	Total Hardness	mg/l	---	72.5	53.2	38	41.8	34.2	38	34.2	41.8
9	Sulphate	mg/l	---	<2.5	5.9	4.5	4	3.5	<2.5	<2.5	<2.5
10	Calcium	mg/l		18.3	16.7	10.7	13.7	7.6	12.2	9.1	9.1
11	Magnesium	mg/l	---	6.5	2.8	2.8	1.8	3.7	1.8	2.8	4.6
12	Dissolved Oxygen	mg/l	---	46	4.7	4.9	5.1	5.3	5.5	5.7	5.7
13	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	<2	<2	<2	<2	<2	<2	<2	<2
14	Chemical Oxygen Demand	mg/l	250	<8	<8	<8	8	<8	<8	<8	<8
15	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
16	Phenolic Compounds (as C_6H_5OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	0.95	2.1	1.75	1.55	1.85	1.6	1.1	0.75
19	Ammoniacal Nitrogen	mg/l	---	1.6	4.25	3.6	2.95	2.19	1.96	1.7	1.8
20	Iron	mg/l	---	0.84	0.48	0.33	0.39	1.55	0.62	0.81	0.56
21	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	---	<0.01	0.019	0.022	0.011	0.015	0.012	<0.01	0.22
23	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'17 - Mar'18)

S. No.	Parameter	Unit	CPCB Standard	EDH-044 D-1	EDH-033 D-8	EDD-008 D-4	EDE-024 D-3	EDD-003 V-1	EDD-003 D-1	EDD-010 V-1	EDD-406 D-2
25	Total Arsenic	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
29	SAR		---	13.1	62	56.9	42.4	67.9	58.9	42.4	14.2
30	Phosphorus	mg/l	---	0.12	0.21	0.17	0.13	0.25	0.19	0.09	0.11
31	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
33	Manganese	mg/l		0.055	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
34	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
35	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
36	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
39	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
40	Bicarbonate	mg/l	---	376	1749.5	1026.4	1122.4	634.4	712.3	572	148
41	Electrical Conductivity	µmhos/c	---	910	2872	2346	2185	2146	2098	1921	870
42	Sodium	mg/l	---	255	1039	807	630	912	835	570.4	212
43	Potassium	mg/l	---	5	9	7	5	11	9	8	7

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 IV

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
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 $CaCO_3$	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	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_6H_5OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H_2S)	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 IV

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 IV

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)	GGS-1(R.O-Inlet)	GGS-1(R.O-Outlet)	GGS-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 $CaCO_3$	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	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_6H_5OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H_2S)	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 IV

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)	GGS-1(R.O-Inlet)	GGS-1(R.O-Outlet)	GGS-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 IV

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	13.11.2017	13.11.2017	13.11.2017	13.11.2017	13.11.2017	13.11.2017	13.11.2017
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 $CaCO_3$	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	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_6H_5OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H_2S)	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 IV

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	13.11.2017	13.11.2017	13.11.2017	13.11.2017	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	---	---	0.24	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 IV

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 $CaCO_3$	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	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_6H_5OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H_2S)	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 IV

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 IV

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 $CaCO_3$	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	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_6H_5OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H_2S)	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 IV

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
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 IV

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 $CaCO_3$	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	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_6H_5OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H_2S)	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 IV

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 IV

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 $CaCO_3$	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	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_6H_5OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H_2S)	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 IV

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 IV

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 $CaCO_3$	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	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_6H_5OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H_2S)	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 IV

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
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 IV

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 $CaCO_3$	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	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_6H_5OH)	mg/l	2	2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Sulphide (as H_2S)	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 IV

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
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

Surface water quality analysis of surrounding areas of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited **ANNEXURE IV A**

Compliance Period: Oct'17 to Mar'18

S. No.	Parameter	Unit	O & G Discharge Standards	GGS-1(R.O Discharge)	Kunur Nala Upstream Near GGS-1	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-58 & 63	EDH-44(R.O Discharge)	Kunur Nala Downstream Near Kuldiha Bridge	GGS-1(R.O Discharge)
			Date	12.10.2017	12.10.2017	12.10.2017	12.10.2017	12.10.2017	12.10.2017	13.11.2017
1	pH at 27^{o}C		5.5-9.0	9.14	7.42	9.28	9.86	9.07	8.95	9.31
2	Colour in hazen			<5	<5	<5	<5	<5	<5	<5
3	Total Suspended Solids	mg/l	100	<2	19	<2	21	<2	43	3
4	Total Dissolved Solids	mg/l	2100	768	142	844	144	1594	192	846
5	Turbidity	NTU		<1	47.9	2.4	61.1	5.5	112	5.6
6	Acidity as $CaCO_3$	mg/l		Nil	14.7	Nil	Nil	Nil	Nil	Nil
7	Total Alkalinity as $CaCO_3$	mg/l		495	107.9	445.5	89.1	495	69.3	574.2
8	Chloride as Chlorine	mg/l	600	106.1	11.6	144.6	17.4	636.4	57.9	125.4
9	Total Hardness	mg/l		43.1	70.6	39.2	74.5	129.4	90.2	42.2
10	Sulphate	mg/l	1000	3.9	<2.5	4.5	<2.5	<2.5	<2.5	5.7
11	Calcium	mg/l		9.4	15.7	9.4	20.4	18.8	14.1	9.2
12	Magnesium	mg/l		4.8	7.6	3.8	5.7	4.8	8.6	4.7
13	Dissolved Oxygen	mg/l		4.7	5.8	4.9	6.1	4.1	5.9	3.2
14	Biochemical Oxygen Demand	mg/l	30	<2	<2	<2	<2	2.9	<2	4
15	Chemical Oxygen Demand	mg/l	100	<8	<8	<8	<8	10	<8	22
16	Oil & Grease	mg/l	10	<5	<5	<5	<5	<5	<5	<5
17	Phenolic Compounds (as C_6H_5OH)	mg/l	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
18	Sulphides (as S_2)	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
19	Fluoride	mg/l	1.5	0.45	0.29	0.51	0.25	0.38	0.31	0.82
20	Residual free chlorine	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Iron	mg/l	3	0.19	1.85	0.39	3.29	0.72	4.89	0.09
22	Sodium	mg/l		242	38	277	41	512	58	327
23	Total Chromium	mg/l	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Zinc	mg/l	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Surface water quality analysis of surrounding areas of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited

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Compliance Period: Oct'17 to Mar'18

S. No.	Parameter	Unit	O & G Discharge Standards	GGS-1(R.O Discharge)	Kunur Nala Upstream Near GGS-1	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-58 & 63	EDH-44(R.O Discharge)	Kunur Nala Downstream Near Kuldiha Bridge	GGS-1(R.O Discharge)
			Date	12.10.2017	12.10.2017	12.10.2017	12.10.2017	12.10.2017	12.10.2017	13.11.2017
25	Copper	mg/l	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
26	Nickel	mg/l	3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Arsenic	mg/l	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead	mg/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
30	Boron	mg/l		<1	<1	<1	<1	<1	<1	<1
31	Phosphate	mg/l		0.11	0.1	0.14	0.17	0.24	0.2	0.19
32	Potassium	mg/l		3.2	2.1	3.9	1.9	2.8	2.3	7
33	Aluminium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
34	EC at 25° C	µmhos/cm		1220	270	1430	189	2240	280	1210
35	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
37	Vanadium	mg/l		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Palladium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
39	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
40	Manganese	mg/l		<0.05	<0.05	<0.05	0.092	<0.05	0.105	0.091
41	Molybednum	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
42	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
43	Berylium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
44	Cyanide	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
45	Bicarbonate (as HCO_3)	mg/l		307	131.6	336	73.2	414.8	48.8	293
46	Free Ammonia as Nitrogen	mg/l	5	1.8	0.46	2.5	2.98	2.3	1.75	0.42
47	Total coliform bacteria	MPN/100ml		60	54	42	65	52	48	58

Surface water quality analysis of surrounding areas of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited

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Compliance Period: Oct'17 to Mar'18

S. No.	Parameter	Unit	O & G Discharge Standards	Kunur Nala Upstream Near GGS-1	GGS-1 Surface Runoff Drain	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-58 & 63	Kunur Nala Downstream Near Kuldiha Bridge	GGS-1(R.O Discharge)	Kunur Nala Upstream Near GGS-1
			Date	13.11.2017	13.11.2017	13.11.2017	13.11.2017	13.11.2017	14.12.2017	14.12.2017
1	pH at 27^{o}C		5.5-9.0	8.29	7.34	8.41	9.16	9.11	9.74	8.71
2	Colour in hazen			<5	<5	<5	<5	<5	<5	<5
3	Total Suspended Solids	mg/l	100	7	32	<2	9	<2	<2	7
4	Total Dissolved Solids	mg/l	2100	278	412	914	498	412	914	312
5	Turbidity	NTU		17.8	72.8	4.9	18.5	6.1	5.7	14.2
6	Acidity as $CaCO_3$	mg/l		Nil	9.5	Nil	Nil	Nil	Nil	Nil
7	Total Alkalinity as $CaCO_3$	mg/l		178.2	165.9	425.7	297	217.8	665	185
8	Chloride as Chlorine	mg/l	600	25.1	144.6	231.4	73.3	55.9	122	83
9	Total Hardness	mg/l		88.3	69.1	42.2	96	111.4	34.2	72.2
10	Sulphate	mg/l	1000	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
11	Calcium	mg/l		26.2	16.9	12.3	29.2	29.2	7.6	18.3
12	Magnesium	mg/l		5.6	6.5	2.8	5.6	9.3	3.7	6.5
13	Dissolved Oxygen	mg/l		3.4	2.9	5.3	5.1	4.8	4.7	5.2
14	Biochemical Oxygen Demand	mg/l	30	5	8	<2	<2	<2	<2	<2
15	Chemical Oxygen Demand	mg/l	100	28	34	<8	<8	<8	<8	<8
16	Oil & Grease	mg/l	10	<5	<5	<5	<5	<5	<5	<5
17	Phenolic Compounds (as C_6H_5OH)	mg/l	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
18	Sulphides (as S_2)	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
19	Fluoride	mg/l	1.5	0.56	0.62	0.75	0.59	0.73	0.75	0.42
20	Residual free chlorine	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Iron	mg/l	3	0.92	4.53	0.12	1.17	1.08	1.4	1.55
22	Sodium	mg/l		96	142	392	185	132	374	89
23	Total Chromium	mg/l	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Zinc	mg/l	2	<0.01	<0.01	0.017	<0.01	<0.01	0.011	<0.01

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Compliance Period: Oct'17 to Mar'18

S. No.	Parameter	Unit	O & G Discharge Standards	Kunur Nala Upstream Near GGS-1	GGS-1 Surface Runoff Drain	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-58 & 63	Kunur Nala Downstream Near Kuldiha Bridge	GGS-1(R.O Discharge)	Kunur Nala Upstream Near GGS-1
			Date	13.11.2017	13.11.2017	13.11.2017	13.11.2017	13.11.2017	14.12.2017	14.12.2017
25	Copper	mg/l	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
26	Nickel	mg/l	3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Arsenic	mg/l	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead	mg/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
30	Boron	mg/l		<1	<1	<1	<1	<1	<1	<1
31	Phosphate	mg/l		0.12	0.15	0.19	0.15	0.14	0.32	0.19
32	Potassium	mg/l		3	4	10	8	4	7	4.2
33	Aluminium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
34	EC at 25° C	µmhos/cm		410	502	1462	714	472	1482	496
35	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
37	Vanadium	mg/l		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Palladium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
39	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
40	Manganese	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
41	Molybednum	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
42	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
43	Berylium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
44	Cyanide	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
45	Bicarbonate (as HCO_3)	mg/l		207	203	519	202	152	423	157
46	Free Ammonia as Nitrogen	mg/l	5	0.29	0.36	0.19	0.15	0.17	0.56	0.82
47	Total coliform bacteria	MPN/100ml		56	65	40	63	47	51	53

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S. No.	Parameter	Unit	O & G Discharge Standards	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-58 & 63	Kunur Nala Downstream Near Kuldiha Bridge	GGS-1(R.O Discharge)	Kunur Nala Upstream Near GGS-1	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-58 & 63
			Date	14.12.2017	14.12.2017	14.12.2017	09.01.2018	09.01.2018	09.01.2018	09.01.2018
1	pH at 27^{o}C		5.5-9.0	9.7	9.02	8.89	9.28	9.21	9.82	9.41
2	Colour in hazen			<5	<5	<5	<5	<5	<5	<5
3	Total Suspended Solids	mg/l	100	2	14	11	<2	8	<2	11
4	Total Dissolved Solids	mg/l	2100	992	672	398	1052	418	1036	1072
5	Turbidity	NTU		4.7	34.5	29.2	2.9	17.5	2.4	23.1
6	Acidity as $CaCO_3$	mg/l		Nil	Nil	Nil	Nil	Nil	Nil	Nil
7	Total Alkalinity as $CaCO_3$	mg/l		665	551	223	677.3	277.4	652.8	627.6
8	Chloride as Chlorine	mg/l	600	142	103	109	130.9	55.4	302	251.7
9	Total Hardness	mg/l		26.6	76	129.2	30.7	92.2	30.7	65.3
10	Sulphate	mg/l	1000	<2.5	<2.5	<2.5	5.5	<2.5	4.5	3.5
11	Calcium	mg/l		7.6	22.8	27.4	10.8	21.5	9.2	15.4
12	Magnesium	mg/l		1.9	4.6	14.8	1	9.3	1.9	6.5
13	Dissolved Oxygen	mg/l		4.9	4.9	4.8	4.2	5.1	4.7	4.9
14	Biochemical Oxygen Demand	mg/l	30	<2	<2	<2	<2	<2	<2	<2
15	Chemical Oxygen Demand	mg/l	100	<8	8	<8	<8	<8	<8	<8
16	Oil & Grease	mg/l	10	<5	<5	<5	<5	<5	<5	<5
17	Phenolic Compounds (as C_6H_5OH)	mg/l	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
18	Sulphides (as S_2)	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
19	Fluoride	mg/l	1.5	0.89	2.15	1.05	0.95	0.62	0.75	1.05
20	Residual free chlorine	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Iron	mg/l	3	1.3	3.15	2.95	0.18	0.25	0.21	3.85
22	Sodium	mg/l		328	228	102	490	162	318	414
23	Total Chromium	mg/l	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Zinc	mg/l	2	0.14	0.025	0.02	<0.01	<0.01	<0.01	0.017

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S. No.	Parameter	Unit	O & G Discharge Standards	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-58 & 63	Kunur Nala Downstream Near Kuldiha Bridge	GGS-1(R.O Discharge)	Kunur Nala Upstream Near GGS-1	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-58 & 63
			Date	14.12.2017	14.12.2017	14.12.2017	09.01.2018	09.01.2018	09.01.2018	09.01.2018
25	Copper	mg/l	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
26	Nickel	mg/l	3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Arsenic	mg/l	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead	mg/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
30	Boron	mg/l		<1	<1	<1	<1	<1	<1	<1
31	Phosphate	mg/l		0.34	0.18	0.21	0.41	0.33	0.39	0.29
32	Potassium	mg/l		6.8	5	4.3	38.6	7.3	25	7
33	Aluminium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
34	EC at 25° C	µmhos/cm		1612	912	547	2330	558	1562	1430
35	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
37	Vanadium	mg/l		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Palladium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
39	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
40	Manganese	mg/l		<0.05	0.082	<0.05	<0.05	<0.05	<0.05	<0.05
41	Molybednum	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
42	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
43	Berylium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
44	Cyanide	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
45	Bicarbonate (as HCO_3)	mg/l		451	472	197	428.5	194.3	478.3	417.2
46	Free Ammonia as Nitrogen	mg/l	5	0.55	0.32	0.28	0.35	0.29	0.4	0.4
47	Total coliform bacteria	MPN/100ml		45	59	41	49	52	42	54

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S. No.	Parameter	Unit	O & G Discharge Standards	Kunur Nala Downstream Near Kuldiha Bridge	GGS-1(R.O Discharge)	Kunur Nala Upstream Near GGS-1	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-59 & 63	Kunur Nala Downstream Near Kuldiha Bridge	GGS-1(R.O Discharge)
			Date	09.01.2018	13.02.2018	13.02.2018	13.02.2018	13.02.2018	13.02.2018	13.03.2018
1	pH at 27^{o}C		5.5-9.0	9.3	8.41	9.5	9.11	9.45	8.91	9.65
2	Colour in hazen			<5	<5	<5	<5	<5	<5	<5
3	Total Suspended Solids	mg/l	100	2	<2	2	<2	12	4	<2
4	Total Dissolved Solids	mg/l	2100	392	284	172	826	1228	332	592
5	Turbidity	NTU		5.7	1.6	6.2	1.1	24.2	8.3	1.8
6	Acidity as $CaCO_3$	mg/l		Nil	Nil	Nil	Nil	Nil	Nil	Nil
7	Total Alkalinity as $CaCO_3$	mg/l		306	56	147	304	642	107	340.6
8	Chloride as Chlorine	mg/l	600	40.3	136	20.2	412	314	148	79.6
9	Total Hardness	mg/l		119	42.2	46.1	23	53.8	123	30.4
10	Sulphate	mg/l	1000	<2.5	<2.5	<2.5	4.7	6.9	3.1	<2.5
11	Calcium	mg/l		43.1	12.3	15.4	6.2	15.4	43.1	6.1
12	Magnesium	mg/l		2.8	2.8	1.9	1.9	3.7	3.7	3.7
13	Dissolved Oxygen	mg/l		4.7	5	5.3	4.9	4.2	5.1	5.1
14	Biochemical Oxygen Demand	mg/l	30	<2	<2	<2	<2	2	<2	<2
15	Chemical Oxygen Demand	mg/l	100	8	<8	<8	<8	11	<8	<8
16	Oil & Grease	mg/l	10	<5	<5	<5	<5	<5	<5	<5
17	Phenolic Compounds (as C_6H_5OH)	mg/l	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
18	Sulphides (as S_2)	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
19	Fluoride	mg/l	1.5	0.73	0.93	0.62	1.5	1.75	1.05	1.05
20	Residual free chlorine	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Iron	mg/l	3	0.48	0.3	0.72	0.28	1.35	0.85	0.75
22	Sodium	mg/l		151	74	41	232	510	63	192
23	Total Chromium	mg/l	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
24	Zinc	mg/l	2	<0.01	0.018	0.012	0.024	0.018	0.015	<0.01

Surface water quality analysis of surrounding areas of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited

ANNEXURE IV A

Compliance Period: Oct'17 to Mar'18

S. No.	Parameter	Unit	O & G Discharge Standards	Kunur Nala Downstream Near Kuldiha Bridge	GGS-1(R.O Discharge)	Kunur Nala Upstream Near GGS-1	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-59 & 63	Kunur Nala Downstream Near Kuldiha Bridge	GGS-1(R.O Discharge)
			Date	09.01.2018	13.02.2018	13.02.2018	13.02.2018	13.02.2018	13.02.2018	13.03.2018
25	Copper	mg/l	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
26	Nickel	mg/l	3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Arsenic	mg/l	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead	mg/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
30	Boron	mg/l		<1	<1	<1	<1	<1	<1	<1
31	Phosphate	mg/l		0.21	0.37	0.29	0.41	0.27	0.22	0.08
32	Potassium	mg/l		4	6	3	9	7	4	8
33	Aluminium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
34	EC at 25° C	µmhos/cm		542	468	201	1340	1680	510	865
35	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
37	Vanadium	mg/l		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
38	Palladium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
39	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
40	Manganese	mg/l		<0.05	<0.05	<0.05	<0.05	0.068	<0.05	<0.05
41	Molybednum	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
42	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
43	Berylium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
44	Cyanide	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
45	Bicarbonate (as HCO_3)	mg/l		278.3	68.3	106	214.7	567.5	82	73.2
46	Free Ammonia as Nitrogen	mg/l	5	0.38	0.24	0.46	0.32	0.39	0.27	0.63
47	Total coliform bacteria	MPN/100ml		41	51	45	49	53	41	52

Surface water quality analysis of surrounding areas of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited

ANNEXURE IV A

Compliance Period: Oct'17 to Mar'18

S. No.	Parameter	Unit	O & G Discharge Standards	Kunur Nala Upstream Near GGS-1	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-59 & 63	EDH-44(R.O Discharge)	Kunur Nala Downstream Near Kuldiha Bridge
			Date	13.03.2018	13.03.2018	13.03.2018	13.03.2018	13.03.2018
1	pH at 27^{o}C		5.5-9.0	9.49	9.57	9.41	9.28	8.71
2	Colour in hazen			<5	<5	<5	<5	<5
3	Total Suspended Solids	mg/l	100	4	<2	19	<2	<2
4	Total Dissolved Solids	mg/l	2100	274	842	998	1260	450
5	Turbidity	NTU		8.6	<1	42.7	<1	5.6
6	Acidity as $CaCO_3$	mg/l		Nil	Nil	Nil	Nil	Nil
7	Total Alkalinity as $CaCO_3$	mg/l		134.6	463	412	842	182
8	Chloride as Chlorine	mg/l	600	82	240.2	360	302.2	104.3
9	Total Hardness	mg/l		91.2	34.2	45.6	60.8	114
10	Sulphate	mg/l	1000	<2.5	6.1	7.5	6.9	<2.5
11	Calcium	mg/l		25.9	9.1	13.7	18.3	33.5
12	Magnesium	mg/l		6.5	2.8	2.8	3.7	7.4
13	Dissolved Oxygen	mg/l		5.1	4.9	4.7	4.3	5.8
14	Biochemical Oxygen Demand	mg/l	30	<2	<2	<2	2	<2
15	Chemical Oxygen Demand	mg/l	100	<8	<8	<8	10	<8
16	Oil & Grease	mg/l	10	<5	<5	<5	<5	<5
17	Phenolic Compounds (as C_6H_5OH)	mg/l	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
18	Sulphides (as S_2)	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5
19	Fluoride	mg/l	1.5	0.65	0.91	1.15	1.3	0.9
20	Residual free chlorine	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1
21	Iron	mg/l	3	0.9	0.21	10.6	0.24	0.61
22	Sodium	mg/l		69	310	394	415	176
23	Total Chromium	mg/l	1	<0.05	<0.05	<0.05	<0.05	<0.05
24	Zinc	mg/l	2	<0.01	0.023	0.034	0.021	0.017

Surface water quality analysis of surrounding areas of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited

ANNEXURE IV A

Compliance Period: Oct'17 to Mar'18

S. No.	Parameter	Unit	O & G Discharge Standards	Kunur Nala Upstream Near GGS-1	EDD-50 (R.O-Discharge)	Kunur Nala Downstream Between EDH-59 & 63	EDH-44(R.O Discharge)	Kunur Nala Downstream Near Kuldiha Bridge
			Date	13.03.2018	13.03.2018	13.03.2018	13.03.2018	13.03.2018
25	Copper	mg/l	0.2	<0.05	<0.05	<0.05	<0.05	<0.05
26	Nickel	mg/l	3	<0.05	<0.05	<0.05	<0.05	<0.05
27	Arsenic	mg/l	0.2	<0.01	<0.01	<0.01	<0.01	<0.01
28	Lead	mg/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
29	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
30	Boron	mg/l		<1	<1	<1	<1	<1
31	Phosphate	mg/l		0.21	0.33	0.37	0.29	0.27
32	Potassium	mg/l		4	7	11	7	5
33	Aluminium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01
34	EC at 25° C	µmhos/cm		395	1145	1240	1655	572
35	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02
36	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1
37	Vanadium	mg/l		<0.2	<0.2	<0.2	<0.2	<0.2
38	Palladium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5
39	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01
40	Manganese	mg/l		<0.05	<0.05	0.068	<0.05	<0.05
41	Molybednum	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5
42	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5
43	Berylium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5
44	Cyanide	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02
45	Bicarbonate (as HCO_3)	mg/l		29.3	174.5	122	536.8	184
46	Free Ammonia as Nitrogen	mg/l	5	0.62	0.71	0.55	0.48	0.31
47	Total coliform bacteria	MPN/100ml		41	46	49	55	48

Ground Water Analysis of Surrounding Areas of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited **ANNEXURE V**

Compliance Period: Oct'17 to Mar'17

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^{0}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 $CaCO_3$)	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 $CaCO_3$)	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_6H_5OH)	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/100ml	---	---	2.2	<1	9	<1	3.6	<1	<1	<1

Ground Water Analysis of Surrounding Areas of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited **ANNEXURE V**

Compliance Period: Oct'17 to Mar'17

S. No.	Parameter	Unit	S:10500 -1991		Akandara Village	Ghatakdanga 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^{0}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 $CaCO_3$)	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 $CaCO_3$)	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_6H_5OH)	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/100ml	---	---	<1	2.2	<1	<1	<1

Annexure VI

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FORM 10

WEST BENGAL WASTE MANAGEMENT LIMITED

J.L No. 103, Mouza Purba Srikrishnapur, P.O. & P.S. Sutahata, Haldia 721635, Dist. Purba Medinipur, West Bengal

MANIFEST FOR HAZARDOUS AND OTHER WASTE

1	Sender's name and mailing address (including Phone No. and e-mail) :	ESSAR OIL AND GAS EXPLORATION AND PRODUCTION LTD. Gopalpur (Near Rajendra nath College) Durgapur – 713212, ph-No. 0343-6603000
2	Sender's authorization No. :	110/25(HW) 2449/2008
3	Manifest Document No. :	3593
4	Transporter's name and address (including Phone No. and e-mail) :	**West Bengal Waste Management Limited** J.L No. 103, Mouza Purba Srikrishnapur, P.O. & P.S. Sutahata,Haldia 721635 Dist. Purba Medinipur, West Bengal, Ph. No.- 03224-278238 / 39 E-mail : wbwml_haldia@ramky.com
5	Type of vehicle :	(Truck/Tanker/Special Vehicle)
6	Transporter's registration No. :	1-MD(E)/X/06
7	Vehicle registration No. :	WB-29-8073
8	Receiver' s name and mailing address (including Phone No. and e-mail) :	**West Bengal Waste Management Limited** J.L No. 103, Mouza Purba Srikrishnapur, P.O. & P.S. Sutahata, Haldia 721635 Dist. Purba Medinipur, West Bengal, Ph. No.- 03224-278238 / 39 E-mail : wbwml_haldia@ramky.com
9	Receiver's authorization No. :	Oil Contaminated Material, Oily Filter, RO Filter.
10	Waste description :	
11	Total quantity No. of Containers :	1.730 .....m3 or MT .....Nos.
12	Physical form :	**(Solid/Semi-Solid/Sludge/Oily/Tarry/Slurry/Liquid)**
13	Special handling instructions and additional information :	Use gloves, Safety Helmet, gaggles, full PPE.
14	Sender's Certificate	I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping categorized, packed, marked, and name and are labeled, and are in all respects in proper conditions for transport by road according to applicable national government regulations.
	Name and stamp: SUKANTA RAY	Signature: Sukanta Ray — Day 30 Month 11 Year 2017
15	Transporter acknowledgement of receipt of Wastes:	
	Name and stamp:	Signature: — Day 30 Month 11 Year 2017
16	Receiver' s certification for receipt of hazardous and other waste:	
	Name and stamp:	Signature: — Day Month Year

1. White Colour forwarded to WBPCB by HzW Sender.
2. Yellow Colour retained by HzW Sender.
3. Pink Colour retained by HzW Receiver.
4. Orange Colour retained by Transporter.
5. Green Colour forwarded to WBPCP after disposal by HzW Receiver.
6. Blue Colour returned to Sender after disposal by HzW Receiver.
7. Grey Colour returned to SPCB of the HzW Sender (in case the Sender is in another State) by HzW Receiver.

FORM 10

[See rule 19 (1)]

MANIFEST FOR HAZARDOUS AND OTHER WASTE

13

1.	Sender's Name and mailing address : (Including Phone No. and e-mail)	Essar Oil and Gas Exploration and Production Limited Luther king Path, Bidhannagar DURGAPUR (W.B)
2.	Sender's authorisation No. :	110/25(HW)2449/2008
3.	Manifest Document No. :	OM/13
4.	Transporter's Name and Address : (Including Phone No. and e-mail)	OM Industries, 7 KM Stone, VPO Titoli, Jind Road, ROHTAK (HR)
5.	Type of Vehicle :	(Truck/Tanker/Special Vehicle)
6.	Transporter's Registration No. :	
7.	Vehicle Registration No. :	HR 55 H 1532
8.	Receiver's Name and mailing address : (Including Phone No. and e-mail)	TIN 06372825092 OM INDUSTRIES 7 K.M. Stone, VPO Titoli Jind Road, ROHTAK (Hr.)
9.	Receiver's authorisation No. :	137/2016/RC RR/HW/HS PCB
10.	Waste description	Used oil in Drums
11.	Total quantity : 18.900 m^3 or MT Ltr No. Containers : 90 Nos	
12.	Physical Form	(Solid/Semi-Solid/Sludge/Oily/Tarry/Slurry/Liquid)
13.	Special handling instructions and additional information	use hand gloves & Musk.
14.	Sender's Certificate	I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorised, packed, marked, and labelled, and are in all respects in proper conditions for transport by road according to applicable national government regulations.
	Name and Stamp : S. RAY (OIL AND GAS EXPLORATION AND PRODUCTION LIMITED, DURGAPUR COM PROJECTS) Signature : Sukanta Month 01 Day 08 Year 2018	
15.	Transporter acknowledgment of receipt of Wasters	
	Name and Stamp : Signature : Month 01 Day 08 Year 2018	
16.	Receiver's Certification for receipt of hazardous and other waste	
	Name and Stamp : For Om Industries Auth. Signatory (H-K-KAMRA) Signature : Month 01 Day 08 Year 2018	

Annexure VII

Environmental Expenditure of CBM Raniganj Project by Essar Oil and Gas Exploration and Production Limited

Compliance Period: Oct'17 to Mar'18

Expenditure towards Environmental Protection Measures at Raniganj CBM Project (Period October,2017 - March, 2018)		
Sl No	**Particular**	**Expenses (in Rs)**
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
TOTAL		**2,07,71,340.00**

SCIENTIFIC RESEARCH LABORATORY

(Analytical & Environmental Engineering Laboratory)

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90, Lake East (4th Road) Santoshpur, Jadavpur, Kolkata - 700 075
Tele Fax : (033) 2416 2267, Tel. : (033) 2416 1311, E-mail : jyotirmoysrl@gmail.com
Website : www.scientificlab.org

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**

Shirsendu Day

(Senior Chemist)

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Website : www.scientificlab.org

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 Mosjid	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**

Shirsendu Das

(Senior Chemist)

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