Ref No. EOGEPL/CBM-RG (E)/ MoEF&CC/2020/3004

Date: 27th May, 2020

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

Sub: Submission Half-yearly Compliance Report of the Environmental Clearance (Phase-II and Amendment) 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 18.06.2012; 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 Pilot cum Production Phase (Phase-II) and its amendment of CBM project activities for the period of October, 2019 to March, 2020.

Thanking you for your continued support,

With Best Regards,

For Essar Oil and Gas Exploration and Production Limited

Kannan Rajendran
Chief Operating Officer
Raniganj East, CBM Project Durgapur

Enclosed: Phase-II and Amendment Compliance Report

Copy to:

1. Member Secretary (Industry), MoEF&CC, 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' 19 to March' 20)

Essar Oil and Gas Exploration and Production Limited
RG (East)-CBM-2001/1 (Phase-II) Half Yearly Environment Clearance Compliance Report
(October'19 to March'20)
Ref: Environment Clearance no. F. No. J-11011/351/2009- IA II (I) dated 23.09.2011

S. No.	EC Conditions	Compliance Status
	A. Specific Conditions	
i.	As proposed, Only 58 pilot-cum-production wells shall be drilled up to 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 are 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 has carried out site inspection on 19th Dec'12 to assess the probable impacts & suggested suitable recommendations. The Additional PCCF, West Bengal forwarded his recommendations to the Additional PCCF, MoEF (Eastern Regional Office). (A copy of the letter has already been 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.	Land acquisition is being directly done with the land owners and the compensation is paid as per the prevailing market rate. There is no involvement of Rehabilitation and Resettlement.
v	Prior permission from the Ministry of Defense shall	Four (4) nos. of Gas Gathering Station (GGS) and

S. No.	EC Conditions	Compliance Status
	be obtained regarding impact of proposed plant on Panagarh air base, if any.	One Main Compressor Station (MCS) was constructed as per the condition of the NOC of Ministry of Defense (MoD).
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 applicable Code and Standard.
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 at well sites 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. Monitoring activity has been carried out from Oct'19 to Mar'20 through a recognized laboratory based in Kolkata. However, due to ongoing COVID-19 pandemic, the laboratory was closed and the Mar' 20 reports are pending. Please find the ambient air quality monitoring results from Oct'19 to Feb' 20 attached with this report as **Annexure I.** We will submit the Mar'20 monitoring report as soon as we receive it.
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, MCS) and villages. Monitoring activity has been carried out from Oct'19 to Mar'20 through a recognized laboratory based in Kolkata. However, due to ongoing COVID-19 pandemic, the laboratory was closed and the Mar' 20 reports are pending. Please find the ambient air quality monitoring results from Oct'19 to Feb' 20 attached with this report as **Annexure I.** We will submit the Mar'20 monitoring report as soon as we receive it.
ix	Mercury shall also be analyzed in air, water and	The drilling operation has been temporarily suspended

S. No.	EC Conditions	Compliance Status
	drill cuttings twice during drilling period.	from 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 at a height of 30 m. The following measures have been implemented to prevent fire hazards: • Installation of electrical equipment as per approved hazardous zone classification as communicated to DGMS. • Dry chemical fire extinguishers are available at site. • Online methane gas analyzers (CH4) are available. • Flame proof type lighting fixtures, push buttons and switches at the drill site facilities are used.
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 generator sets have been installed with acoustic enclosures. Noise monitoring has been carried out in the activity area and surrounding habitat. Please find the results of noise monitoring attached with this report as **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 has been temporarily suspended from 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	The drilling operation has been temporarily suspended from April, 2017 till date. However, The treated RO water is reused in work over operations and other utilities. Ground water is not used & withdrawn for Industrial

S. No.	EC Conditions	Compliance Status
	ground water shall be used without permission of CGWA.	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 over surface Zn-Al tanks installed at all sites. In case of excess water volume, the extra water is stored HDPE lined pits. Produced water is then transported by pipelines to Reverse Osmosis (RO) plant for treatment. Currently RO treatment plants of total capacity 5100 m3/ day have been installed. The treated water is used for the projects internal operations (work over & site preparation activities). Excess treated water is discharged to nearby stream only after complying with the discharge standards. Domestic effluent is treated in septic tank followed by soak pits. There is no discharge of effluent from the facilities.
xv	Water produced during drilling shall be reused in drilling of other core/test wells.	Produced water has been collected & stored in over surface Zn-Al tanks installed at all sites. In case of excess water volume, the extra water is stored HDPE lined pits. If water does not meet the standards then it is passed through suitable treatment system. Water meeting the standards set by CPCB is reused in the construction & work over activities of adjoining wells. Excess water is discharged only after meeting the 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 (RO) plants with total capacity of 5100 m3/ day are installed to treat the produced water generated from production wells. Please find the produced water analysis result attached with this report as **Annexure III**. Please find the RO water quality monitoring results attached with this report as **Annexure IV.** The treated water is reused in HF, work over and other

S. No.	EC Conditions	Compliance Status
		construction activities. Excess water is discharged to nearby streams only after meeting the discharges standards. Please find the analysis results of surface water monitoring attached with this report as **Annexure IV A**. Monitoring activity has been carried out from Oct'19 to Mar'20 through a recognized laboratory based in Kolkata. However, due to ongoing COVID-19 pandemic, the laboratory was closed and the Mar' 20 reports are pending. Reports from Oct' 19 to Feb' 20 are attached. We will submit the Mar' 20 analysis results as soon as we receive it.
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 (used for drinking water) from surrounding habitat of the project area Please find the analysis results of ground water monitoring attached with this report as **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 Bhubaneswar.	The drilling operation has been temporarily suspended from April 2017 till date.
xix	Only water based drilling mud shall be used. The drilling mud shall be recycled. Hazardous waste	The drilling operation has been temporarily suspended from April 2017 till date.

S. No.	EC Conditions	Compliance Status
	shall be disposed of as per Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules, 2008. The recyclable waste (oily sludge) and spent oil shall be disposed of to the authorized recyclers/re-processors.	Oil contaminated waste & waste filters are sent to TSDF facility, Haldia. We had arranged disposal of hazardous waste by March' 20 end (24.03.2020). However, due to ongoing COVID-19 pandemic, the TSDF facility in Haldia was declared Red Zone. Due to this, transportation or disposal hasn't been possible. We will submit the FORM 10 as soon as we are able to dispose the hazardous waste.
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.	Land Subsidence Study is carried has been started from year 2012 and has been carried out regularly as condition Amendment 4 (viii). In the last 7 years, no significant land subsidence have been observed. The last report of July' 2019 is attached with this report as **Annexure VI**. Based on the same, henceforth, Land Subsidence Study will be carried out annually.
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 soil remediation as follows. • Installation of electrical equipment as per approved hazardous zone classification as communicated to DGMS • Dry chemical fire extinguishers are available at all well site. • Portable methane gas analyzers (CH4) are available. • Flame proof type lighting fixtures, push buttons and switches in the drill site facilities are used. • Impervious surface, secondary containment and spill kits are provided whenever there is a possibility of soil contamination.
xxii	The project authorities shall install SCADA system with dedicated optical fiber based	SCADA System is installed for monitoring of wells and Gas Gathering Station. Safe Operation of the pipeline

S. No.	EC Conditions	Compliance Status
	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.	is ensured through continuous motoring of parameter at the Control Room and through regular patrolling. Sectionalizing valves are in Place. 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 SV station shall be as per applicable codes and standards, international practices and applicable local regulations.	All the surface facilities including GGS, CGS and SV stations have been laid as per applicable code and 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 patrol 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.	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

S. No.	EC Conditions	Compliance Status
	Pearson survey and continuous potential survey should be carried out at regular intervals to ensure the adequacy of cathodic protection system.	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 H_2S release including all necessary recommendations from evacuation to resumption of normal operations. The workers shall be provided with personal H_2S detectors in locations of high risk of exposure along with self-containing breathing apparatus.	H_2S is not present as per the analysis of gas tapped from the test wells. However all the necessary safety measures are delineated as per the 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 the job requirement.
xxviii	Adequate well protection system shall be provided like BoP or diverter systems as required based on the geological formation of the blocks.	Adequate well control measures along with BOP have 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 is being spread at the designated area for green belt development at the project's facilities.
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	Environmental protection measures and safeguards recommended in EMP/risk analysis report/disaster management plan have been implemented.

S. No.	EC Conditions	Compliance Status
	report/disaster management plan.	
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 is conducted and records are maintained.
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 being implemented.
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. Please find the corporate Environment Policy attached with this report as **Annexure VII**.
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	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 etc.

S. No.	EC Conditions	Compliance Status
	the project	
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 protection measures required, if any	For any further expansion and modification in project configuration, we would approach MoEF for the prior Environmental Clearance.
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. Also an amendment has been obtained for extension of waste storage duration up to 180 days. Please find the hazardous waste authorization & its amendment

S. No.	EC Conditions	Compliance Status
		attached with this report as **Annexure VIII.**
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. Please find the noise monitoring results attached with this report as **Annexure II**.
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, Kolkata (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 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.	The environment expenditure for the environment activities is attached as **Annexure IX**.
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 /	A copy of Environmental Clearance (EC) has been circulated to the local administration and was

S. No.	EC Conditions	Compliance Status
	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	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, SO_2, 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 copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and the WBPCB. The Regional Office of this Ministry /CPCB / WBPCB shall monitor the stipulated conditions.	We are submitting the six monthly compliance reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and the WBPCB.
xii	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as	The environmental statement for each financial year ending 31st March as Form-V is being regularly submitted to West Bengal Pollution Control Board and the same is uploaded on the company's website along

S. No.	EC Conditions	Compliance Status
	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.	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.

Essar Oil and Gas Exploration and Production Limited

RG (East)-CBM-2001/1 (Phase-II A) Half Yearly Environment Clearance Compliance Report

(October' 19 to March' 20)

Essar Oil and Gas Exploration and Production Limited
RG (East)-CBM-2001/1 (Phase-IIA) Half Yearly Environment Clearance Compliance Report
(October' 19 to March' 20)
Ref: Environment Clearance no. F. No. J-11011/351/2009- IA II (I) dated 18.06.2012

S. 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. Please find the ground water level report attached with this report as **Annexure X**.
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 (>500 m) which does not disturb the usable drinking water aquifers located at the shallow depths. "No Objection 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 giving 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.

S. No.	EC Conditions	Compliance Status
4(v)	All measures shall be taken to control noise pollution during drilling process. Acoustic enclosure/barrier shall be installed.	Only silent generator sets that meets the specifications of CPCB are used. Acoustic enclosures have been provided to major noise generating equipment. 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 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.	Produced water is treated by Reverse Osmosis (RO) system. Treated water is being reused for work-over & construction activities of other wells. Excess water is discharged to the nearby streams only after complying with the discharge standards. Please find the RO treated water monitoring results attached with this report as **Annexure IV**. Also, please find the surface water monitoring results attached with this report as **Annexure IV A**. Monitoring activity has been carried out from Oct'19 to Mar'20 through a recognized laboratory based in Kolkata. However, due to ongoing COVID-19 pandemic, the laboratory was closed and the Mar' 20 reports are pending. Reports from Oct' 19 to Feb' 20 are attached. We will submit the Mar' 20 analysis results as soon as we receive it.
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	Land Subsidence Study is carried has been started from year 2012 and has been carried out regularly as condition Amendment 4 (viii). In the last 7 years, no significant land subsidence have been observed. The last report of July' 2019 is attached with this report as **Annexure VI**. Based on the same, henceforth, Land Subsidence Study will be carried out annually.
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)	All the specific and general conditions of the Phase-II Environmental Clearance are being implemented.

S. No.	EC Conditions	Compliance Status
	dated 23rd September, 2011 shall be 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.

ANNEXURE I: Ambient Air Analysis Report

(Compliance Period: Oct’ 19 to Feb’ 20)

Ambient Air Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration 1roduction Liited

(Compliance Period: Oct' 19 - Feb'20)

ANNEXURE I

Name of Location			MCS					GGS- 01					GGS- 02	
Date			Oct' 19	Nov' 19	Dec' 19	Jan' 20	Feb' 20	Oct' 19	Nov' 19	Dec' 19	Jan' 20	Feb' 20	Oct' 19	Nov' 19
Parameter	UoM	NAAQS LIMIT												
PM 2.5	$\mu g/m^3$	60	33.76	38.54	46.87	39.83	34.62	36.02	40.25	42.27	38.44	46.87	34.12	42.31
PM 10	$\mu g/m^3$	100	69.37	74.30	85.46	72.46	85.94	70.34	73.96	74.20	70.86	82.51	73.88	71.65
Nitrogen Dioxide	$\mu g/m^3$	80	36.99	40.92	39.13	41.59	40.17	38.29	39.70	38.08	38.77	40.91	39.05	39.44
Sulphur Dioxide	$\mu g/m^3$	80	4.85	6.12	6.53	6.07	7.14	5.12	5.86	6.27	6.33	7.36	4.77	6.20
Carbon Monoxide	mg/m^3	2	0.408	0.426	0.470	0.406	0.438	0.408	0.452	0.472	0.442	0.438	0.388	0.438
Hydrocarbon	mg/m^3	NIL	1.62	1.62	1.98	1.64	1.88	1.68	1.80	1.82	1.80	1.88	1.72	1.80
Mercury	mg/m^3		---	---	< 0.002	---	---	---	---	< 0.002	---	---	---	---
Hydrocarbon as Non Methane	mg/m^3	NIL	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
VOC's	$\mu g/m^3$		---	---	3.29	---	---	---	---	2.93	---	---	---	---
Benzo(a)Pyrene	ng/m^3	1	---	---	0.61	---	---	---	---	0.47	---	---	---	---
Ammonia	$\mu g/m^3$	400	---	---	29.07	---	---	---	---	25.83	---	---	---	---
Ozone	$\mu g/m^3$	180	---	---	43.57	---	---	---	---	38.29	---	---	---	---
Lead	$\mu g/m^3$	1	---	---	0.22	---	---	---	---	0.18	---	---	---	---
Nickel	ng/m^3	20	---	---	17.04	---	---	---	---	14.96	---	---	---	---
Arsenic	ng/m^3	6	---	---	1.99	---	---	---	---	1.75	---	---	---	---
Benzene	$\mu g/m^3$	5	---	---	1.98	---	---	---	---	1.71	---	---	---	---

Ambient Air Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration 2roduction Liited

(Compliance Period: Oct' 19 - Feb'20)

ANNEXURE I

Name of Location			GGS- 02			Gopalpur Warehouse					PARULIA			
Date			Dec' 19	Jan' 20	Feb' 20	Oct' 19	Nov' 19	Dec' 19	Jan' 20	Feb' 20	Oct' 19	Nov' 19	Dec' 19	Jan' 20
Parameter	UoM	NAAQS LIMIT												
PM 2.5	µg/m^3	60	42.24	50.83	50.40	34.26	34.12	42.57	34.42	39.48	32.55	41.11	49.58	41.49
PM 10	µg/m^3	100	79.66	93.48	90.58	71.49	72.76	79.09	82.98	72.80	60.69	61.95	83.85	76.49
Nitrogen Dioxide	µg/m^3	80	40.67	40.64	40.30	39.27	39.75	39.49	40.57	41.24	41.31	40.90	39.62	40.08
Sulphur Dioxide	µg/m^3	80	6.32	6.24	6.72	4.87	6.03	6.21	6.38	6.02	5.31	6.19	6.78	6.42
Carbon Monoxide	mg/m^3	2	0.448	0.412	0.438	0.402	0.430	0.465	0.438	0.442	0.398	0.442	0.474	0.419
Hydrocarbon	mg/m^3	NIL	1.89	1.92	1.95	1.88	1.78	1.86	1.76	1.72	1.78	1.68	1.92	1.78
Mercury	mg/m^3		< 0.002	---	---	---	---	< 0.002	---	---	---	---	< 0.002	---
Hydrocarbon as Non Methane	mg/m^3	NIL	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
VOC's	µg/m^3		2.87	---	---	---	---	3.16	---	---	---	---	3.27	---
Benzo(a)Pyrene	ng/m^3	1	0.48	---	---	---	---	0.52	---	---	---	---	0.58	---
Ammonia	µg/m^3	400	27.05	---	---	---	---	28.53	---	---	---	---	28.92	---
Ozone	µg/m^3	180	39.77	---	---	---	---	42.91	---	---	---	---	42.37	---
Lead	µg/m^3	1	0.19	---	---	---	---	0.20	---	---	---	---	0.18	---
Nickel	ng/m^3	20	15.73	---	---	---	---	16.88	---	---	---	---	15.21	---
Arsenic	ng/m^3	6	1.85	---	---	---	---	1.95	---	---	---	---	1.84	---
Benzene	µg/m^3	5	1.81	---	---	---	---	1.85	---	---	---	---	1.89	---

Ambient Air Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration 3roduction Liited

(Compliance Period: Oct' 19 - Feb'20)

ANNEXURE I

Name of Location			PARULIA	SARENGA					SARASWATIGUNJ					NACHAN
Date			Feb' 20	Oct' 19	Nov' 19	Dec' 19	Jan' 20	Feb' 20	Oct' 19	Nov' 19	Dec' 19	Jan' 20	Feb' 20	Oct' 19
Parameter	UoM	NAAQS LIMIT												
PM 2.5	µg/m^3	60	45.93	35.42	44.06	43.96	44.42	44.93	33.86	41.16	36.27	48.55	44.90	34.04
PM 10	µg/m^3	100	87.02	73.55	76.85	83.07	72.85	76.36	65.77	71.07	72.86	82.25	87.17	69.81
Nitrogen Dioxide	µg/m^3	80	41.80	40.37	38.79	39.70	41.82	40.05	39.94	38.75	37.95	38.43	41.15	39.85
Sulphur Dioxide	µg/m^3	80	7.57	4.12	5.33	6.45	6.52	6.22	5.09	6.09	6.44	6.24	7.03	5.01
Carbon Monoxide	mg/m^3	2	0.452	0.384	0.415	0.438	0.422	0.436	0.398	0.432	0.468	0.412	0.432	0.396
Hydrocarbon	mg/m^3	NIL	1.78	1.68	1.78	1.95	1.74	1.76	1.84	1.76	1.79	1.78	1.86	1.50
Mercury	mg/m^3		---	---	---	< 0.002	---	---	---	---	< 0.002	---	---	---
Hydrocarbon as Non Methane	mg/m^3	NIL	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
VOC's	µg/m^3		---	---	---	3.57	---	---	---	---	2.99	---	---	---
Benzo(a)Pyrene	ng/m^3	1	---	---	---	0.69	---	---	---	---	0.37	---	---	---
Ammonia	µg/m^3	400	---	---	---	30.18	---	---	---	---	25.06	---	---	---
Ozone	µg/m^3	180	---	---	---	44.67	---	---	---	---	39.18	---	---	---
Lead	µg/m^3	1	---	---	---	0.24	---	---	---	---	0.15	---	---	---
Nickel	ng/m^3	20	---	---	---	18.51	---	---	---	---	14.23	---	---	---
Arsenic	ng/m^3	6	---	---	---	2.13	---	---	---	---	1.81	---	---	---
Benzene	µg/m^3	5	---	---	---	2.05	---	---	---	---	1.68	---	---	---

Ambient Air Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration 4roduction Liited

(Compliance Period: Oct' 19 - Feb'20)

ANNEXURE I

Name of Location			NACHAN				PRATPPUR					BANSIA		
Date			Nov' 19	Dec' 19	Jan' 20	Feb' 20	Oct' 19	Nov' 19	Dec' 19	Jan' 20	Feb' 20	Oct' 19	Nov' 19	Dec' 19
Parameter	UoM	NAAQS LIMIT												
PM 2.5	µg/m^3	60	43.83	48.63	44.76	42.30	30.97	44.25	43.42	35.94	42.86	30.84	39.40	43.86
PM 10	µg/m^3	100	73.48	87.91	82.91	71.57	64.46	88.43	81.69	73.05	82.61	63.79	64.65	75.54
Nitrogen Dioxide	µg/m^3	80	42.25	39.17	40.70	39.32	43.50	40.93	40.43	41.63	39.69	40.11	39.76	39.58
Sulphur Dioxide	µg/m^3	80	6.58	6.24	6.54	6.32	5.23	5.99	6.50	6.59	7.10	5.18	5.95	6.42
Carbon Monoxide	mg/m^3	2	0.444	0.464	0.424	0.436	0.384	0.428	0.474	0.422	0.422	0.402	0.426	0.468
Hydrocarbon	mg/m^3	NIL	1.74	1.97	1.72	1.73	1.66	1.72	1.88	1.70	1.84	1.64	1.82	1.76
Mercury	mg/m^3		---	< 0.002	---	---	---	---	< 0.002	---	---	---	---	< 0.002
Hydrocarbon as Non Methane	mg/m^3	NIL	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
VOC's	µg/m^3		---	3.23	---	---	---	---	3.15	---	---	---	---	2.83
Benzo(a)Pyrene	ng/m^3	1	---	0.59	---	---	---	---	0.50	---	---	---	---	0.45
Ammonia	µg/m^3	400	---	30.14	---	---	---	---	27.44	---	---	---	---	25.58
Ozone	µg/m^3	180	---	42.19	---	---	---	---	41.49	---	---	---	---	40.53
Lead	µg/m^3	1	---	0.21	---	---	---	---	0.17	---	---	---	---	0.15
Nickel	ng/m^3	20	---	17.28	---	---	---	---	15.02	---	---	---	---	14.74
Arsenic	ng/m^3	6	---	1.85	---	---	---	---	1.63	---	---	---	---	1.72
Benzene	µg/m^3	5	---	1.93	---	---	---	---	1.83	---	---	---	---	1.69

Ambient Air Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration 5roduction Liited

(Compliance Period: Oct' 19 - Feb'20)

ANNEXURE I

Name of Location			BANSIA		GGS-04					KANTABERIA		
Date			Jan' 20	Feb' 20	Oct' 19	Nov' 19	Dec' 19	Jan' 20	Feb' 20	Oct' 19	Nov' 19	Dec' 19
Parameter	UoM	NAAQS LIMIT										
PM 2.5	$\mu g/m^3$	60	40.27	42.86	31.06	42.55	49.81	45.59	43.11	34.16	43.89	42.77
PM 10	$\mu g/m^3$	100	75.40	78.48	67.24	76.05	80.38	73.56	73.13	72.61	77.50	79.25
Nitrogen Dioxide	$\mu g/m^3$	80	41.68	40.90	40.96	42.65	40.76	39.70	40.85	39.83	41.26	40.25
Sulphur Dioxide	$\mu g/m^3$	80	6.78	6.55	5.22	6.01	6.06	6.12	6.37	4.74	5.61	6.57
Carbon Monoxide	mg/m^3	2	0.408	0.447	0.398	0.432	0.452	0.402	0.442	0.388	0.448	0.452
Hydrocarbon	mg/m^3	NIL	1.72	1.80	1.52	1.64	1.90	1.70	1.75	1.66	1.74	1.88
Mercury	mg/m^3		---	---	---	---	< 0.002	---	---	---	---	< 0.002
Hydrocarbon as Non Methane	mg/m^3	NIL	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
VOC's	$\mu g/m^3$		---	---	---	---	3.34	---	---	---	---	3.02
Benzo(a)Pyrene	ng/m^3	1	---	---	---	---	0.66	---	---	---	---	0.44
Ammonia	$\mu g/m^3$	400	---	---	---	---	29.55	---	---	---	---	26.17
Ozone	$\mu g/m^3$	180	---	---	---	---	44.09	---	---	---	---	39.76
Lead	$\mu g/m^3$	1	---	---	---	---	0.23	---	---	---	---	0.16
Nickel	ng/m^3	20	---	---	---	---	17.49	---	---	---	---	15.18
Arsenic	ng/m^3	6	---	---	---	---	2.06	---	---	---	---	1.67
Benzene	$\mu g/m^3$	5	---	---	---	---	1.95	---	---	---	---	1.78

Ambient Air Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration 6roduction Liited

(Compliance Period: Oct' 19 - Feb'20)

ANNEXURE I

Name of Location			KANTABERIA		JAMGORA					JATGORIA	
Date			Jan' 20	Feb' 20	Oct' 19	Nov' 19	Dec' 19	Jan' 20	Feb' 20	Oct' 19	Nov' 19
Parameter	UoM	NAAQS LIMIT									
PM 2.5	$\mu g/m^3$	60	47.68	48.19	31.11	43.56	41.83	46.46	40.48	32.54	42.63
PM 10	$\mu g/m^3$	100	84.17	74.05	68.82	82.83	75.84	82.86	77.95	69.27	77.45
Nitrogen Dioxide	$\mu g/m^3$	80	39.41	39.88	40.44	39.05	39.22	41.13	40.22	37.47	39.37
Sulphur Dioxide	$\mu g/m^3$	80	6.57	6.47	5.09	6.00	6.18	6.69	6.34	4.77	6.41
Carbon Monoxide	mg/m^3	2	0.432	0.460	0.392	0.438	0.458	0.408	0.452	0.408	0.428
Hydrocarbon	mg/m^3	NIL	1.74	1.76	1.59	1.72	1.85	1.74	1.82	1.72	1.82
Mercury	mg/m^3		---	---	---	---	< 0.002	---	---	---	---
Hydrocarbon as Non Methane	mg/m^3	NIL	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
VOC's	$\mu g/m^3$		---	---	---	---	2.97	---	---	---	---
Benzo(a)Pyrene	ng/m^3	1	---	---	---	---	0.51	---	---	---	---
Ammonia	$\mu g/m^3$	400	---	---	---	---	26.29	---	---	---	---
Ozone	$\mu g/m^3$	180	---	---	---	---	39.33	---	---	---	---
Lead	$\mu g/m^3$	1	---	---	---	---	0.17	---	---	---	---
Nickel	ng/m^3	20	---	---	---	---	15.05	---	---	---	---
Arsenic	ng/m^3	6	---	---	---	---	1.69	---	---	---	---
Benzene	$\mu g/m^3$	5	---	---	---	---	1.75	---	---	---	---

Ambient Air Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration 7roduction Liited

(Compliance Period: Oct' 19 - Feb'20)

ANNEXURE I

Name of Location			JATGORIA			KULDIHA				
Date			Dec' 19	Jan' 20	Feb' 20	Oct' 19	Nov' 19	Dec' 19	Jan' 20	Feb' 20
Parameter	UoM	NAAQS LIMIT								
PM 2.5	µg/m^3	60	43.29	52.49	47.48	36.99	49.89	38.48	35.82	47.08
PM 10	µg/m^3	100	85.33	89.31	84.56	77.78	80.37	74.77	76.67	83.17
Nitrogen Dioxide	µg/m^3	80	39.12	40.19	39.27	38.38	39.72	36.78	40.26	38.77
Sulphur Dioxide	µg/m^3	80	6.61	6.74	7.16	4.82	5.63	6.06	6.35	7.29
Carbon Monoxide	mg/m^3	2	0.438	0.452	0.448	0.384	0.426	0.475	0.418	0.425
Hydrocarbon	mg/m^3	NIL	1.94	1.82	1.84	1.64	1.74	1.86	1.68	1.72
Mercury	mg/m^3		< 0.002	---	---	---	---	< 0.002	---	---
Hydrocarbon as Non Methane	mg/m^3	NIL	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
VOC's	µg/m^3		3.12	---	---	---	---	2.95	---	---
Benzo(a)Pyrene	ng/m^3	1	0.56	---	---	---	---	0.40	---	---
Ammonia	µg/m^3	400	29.73	---	---	---	---	24.47	---	---
Ozone	µg/m^3	180	40.24	---	---	---	---	38.15	---	---
Lead	µg/m^3	1	0.19	---	---	---	---	0.14	---	---
Nickel	ng/m^3	20	16.17	---	---	---	---	14.06	---	---
Arsenic	ng/m^3	6	1.73	---	---	---	---	1.53	---	---
Benzene	µg/m^3	5	1.87	---	---	---	---	1.66	---	---

ANNEXURE II: Ambient Noise Analysis Report

(Compliance Period: Oct' 19 – Feb' 20)

Noise in Surrounding Villages (Leq dB (A))					
Date of sampling	LOCATION	DAY TIME		NIGHT TIME	
		Permissible Limit as per CPCB dB(A)	Noise Level dB(A)	Permissible Limit as per CPCB dB(A)	Noise Level dB(A)
09.01.2020 to 10.01.2020	Jatgoria (EDD 005)	75	55.74	70	50.45
09.01.2020 to 10.01.2020	Saraswatigunj (EDI 039)	75	52.7	70	43.84
10.01.2020 to 11.01.2020	Kantaberia EDD 012	75	62.85	55	60.43
10.01.2020 to 11.01.2020	Khatgoria (GGS 001)	75	70.81	70	61.3
10.01.2020 to 11.01.2020	Jamgora (EDD 429)	75	60.48	70	55.37
11.01.2020 to 12.01.2020	Kuldiha (EDN 099)	75	61.05	70	51.8
13.01.2020 to 14.01.2020	Pratappur (EDD 049)	75	58.11	70	53.82
13.01.2020 to 14.01.2020	Bansia (EDD 411)	75	58.67	70	54.52
15.01.2020 to 16.01.2020	Parulia (EDC 413)	75	54.65	70	46.69
15.01.2020 to 16.01.2020	Nachan (EDD 053)	75	59.8	70	52.47
18.01.2020 to 19.01.2020	Akandara	75	64.76	70	63.58
20.01.2020 to 21.01.2020	Gopalpur Warehouse	75	58.82	70	56.86
20.01.2020 to 21.01.2020	Malandighi	75	59.51	70	56.7
22.01.2020 to 23.01.2020	Gopalpur (GGS 004)	75	65.44	70	51.64

ANNEXURE III: Produced Water Analysis Report

(Compliance Period: Oct'19- Feb' 20)

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'19 -Feb'20)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDI-041 V-1	EDI-038 V-1	EDD-013 D-2	EDD-012 D-5	EDD-003 D-2
MONTH					October' 19				
1	pH		5.5 to 9.0	5.5-9.0	7.33	7.51	7.80	7.61	7.75
2	Temperature			40 deg	34.2°C	32.8°C	37.1°C	38.1°C	42.8°C
3	Total Suspended Solids	mg/l	100	100	12	17	4	3	2
4	Total Dissolved Solids	mg/l	---	2100	4810	3842	2836	2740	2810
5	Chloride	mg/l	---	600	1870	1540	920	881	1010
6	Total Hardness	mg/l	---	1000	233.60	110.90	43.50	35.60	27.70
7	Sulphate	mg/l	---	1000	6.9	5.8	5.0	7.0	6.5
8	Calcium	mg/l		100	57.1	27	11.1	7.9	6.3
9	Magnesium	mg/l	---	10	22.1	10.6	3.8	3.8	2.9
10	Dissolved Oxygen	mg/l		1.2					
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	<2	<2	<2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8	<8	<8
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphide	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	3.29	3.05	2.8	2.5	2.69
17	Total Chromium	mg/l	2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	0.1	0.031	0.025	0.019	0.019	0.024
19	Copper	mg/l	---	0.2	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l		3	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
23	SAR		---	0.1	50.9	67.1	57.3	66.5	82
24	Aluminium	mg/l	---		---	---	---	---	---

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDI-041 V-1	EDI-038 V-1	EDD-013 D-2	EDD-012 D-5	EDD-003 D-2
MONTH					October' 19				
25	Lithium	mg/l			---	---	---	---	---
26	Molybdenum	mg/l	---		---	---	---	---	---
27	Palladium	mg/l	---		---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---
29	Vanadium	mg/l	---		---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---
32	Bicarbonate	mg/l			---	---	---	---	---
33	Sodium	mg/l	---		1790.0	1630.0	870.0	910.0	990.0
34	Cyanide	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01
36	% Sodium			60	---	---	---	---	---

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'19 -Feb'20)

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD-007 V-1	EDC-072 D-6	EDG-075 V-1	EDD-053 D-1	EDD-053 D-4
MONTH					October' 19				
1	pH		5.5 to 9.0	5.5-9.0	7.79	8.16	7.48	7.92	7.52
2	Temperature			40 deg	38.9°C	40.1°C	43.4°C	39.6°C	44.5°C
3	Total Suspended Solids	mg/l	100	100	4	<2	<2	<2	7
4	Total Dissolved Solids	mg/l	---	2100	2288	2980	2144	3486	2612
5	Chloride	mg/l	---	600	740	1120	610	1090	925
6	Total Hardness	mg/l	---	1000	43.50	35.60	43.50	43.50	31.70
7	Sulphate	mg/l	---	1000	5.9	3.9	3.0	4.6	5.3
8	Calcium	mg/l		100	12.7	7.9	11.1	12.7	7.9
9	Magnesium	mg/l	---	10	2.9	3.8	3.8	2.9	2.9
10	Dissolved Oxygen	mg/l		1.2					
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	<2	<2	<2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8	<8	<8
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphide	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	1.85	2.15	1.3	2.8	1.56
17	Total Chromium	mg/l	2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	0.1	0.018	0.021	0.017	0.020	0.027
19	Copper	mg/l	---	0.2	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l		3	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
23	SAR		---	0.1	53.4	86.1	38.5	73.5	79.5
24	Aluminium	mg/l	---		---	---	---	---	---

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD-007 V-1	EDC-072 D-6	EDG-075 V-1	EDD-053 D-1	EDD-053 D-4
MONTH					October' 19				
25	Lithium	mg/l			---	---	---	---	---
26	Molybdenum	mg/l	---		---	---	---	---	---
27	Palladium	mg/l	---		---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---
29	Vanadium	mg/l	---		---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---
32	Bicarbonate	mg/l			---	---	---	---	---
33	Sodium	mg/l	---		810.0	1180.0	585.0	1115.0	1025.0
34	Cyanide	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01
36	% Sodium			60	---	---	---	---	---

ANNEXURE III

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH-064 D-2	EDH-044 D-1	EDI-032 V-1	EDI-034 V-1	EDI-032 D-1
MONTH					October' 19				November' 19
1	pH		5.5 to 9.0	5.5-9.0	7.35	8.20	7.73	7.18	7.45
2	Temperature			40 deg	33.4°C	34.1°C	36.7°C	37.2°C	38.5°C
3	Total Suspended Solids	mg/l	100	100	13	16	3	11	3
4	Total Dissolved Solids	mg/l	---	2100	4864	1084	5116	7988	3890
5	Chloride	mg/l	---	600	1820	415	2025	2480	1620
6	Total Hardness	mg/l	---	1000	67.30	39.60	47.50	162.30	114.80
7	Sulphate	mg/l	---	1000	7.2	<2.5	6.8	8.0	5.9
8	Calcium	mg/l		100	17.4	9.5	11.1	41.2	28.5
9	Magnesium	mg/l	---	10	5.8	3.8	4.8	14.4	10.6
10	Dissolved Oxygen	mg/l		1.2					
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	<2	<2	<2	3	<2
12	Chemical Oxygen Demand	mg/l	250	100	8.0	<8	<8	10.0	<8
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphide	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	3.1	0.92	3.1	3.65	1.65
17	Total Chromium	mg/l	2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	0.1	0.030	<0.01	0.018	0.039	0.014
19	Copper	mg/l	---	0.2	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l		3	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
23	SAR		---	0.1	102.1	27.4	136.2	89.7	51.5
24	Aluminium	mg/l	---		---	---	---	---	---

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH-064 D-2	EDH-044 D-1	EDI-032 V-1	EDI-034 V-1	EDI-032 D-1
MONTH					October' 19				November' 19
25	Lithium	mg/l			---	---	---	---	---
26	Molybdenum	mg/l	---		---	---	---	---	---
27	Palladium	mg/l	---		---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---
29	Vanadium	mg/l	---		---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---
32	Bicarbonate	mg/l			---	---	---	---	---
33	Sodium	mg/l	---		1930.0	395.0	2160.0	2630.0	1270.0
34	Cyanide	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01
36	% Sodium			60	---	---	---	---	---

ANNEXURE III

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD-053 D-4	EDG-075 D-1	EDD-049 D-1	EDD-003 D-3	EDD-008 D-3
MONTH					November' 19				
1	pH		5.5 to 9.0	5.5-9.0	7.51	7.67	7.68	7.58	7.91
2	Temperature			40 deg	43.7°C	42.5°C	38.2°C	38.9°C	37.1°C
3	Total Suspended Solids	mg/l	100	100	11	<2	6	2	<2
4	Total Dissolved Solids	mg/l	---	2100	2698	1482	3045	2422	2586
5	Chloride	mg/l	---	600	1130	612	1085	735	810
6	Total Hardness	mg/l	---	1000	43.50	35.60	43.50	47.50	31.70
7	Sulphate	mg/l	---	1000	4.6	3.6	6.1	5.3	5.9
8	Calcium	mg/l		100	11.1	9.5	9.5	11.1	7.9
9	Magnesium	mg/l	---	10	3.8	2.9	4.8	4.8	2.9
10	Dissolved Oxygen	mg/l		1.2					
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	<2	<2	<2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8	<8	<8
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphide	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	1.05	0.9	2.25	1.8	1.93
17	Total Chromium	mg/l	2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	0.1	0.011	<0.01	0.019	0.013	0.016
19	Copper	mg/l	---	0.2	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l		3	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
23	SAR		---	0.1	62	31.4	60	38.7	56.1
24	Aluminium	mg/l	---		---	---	---	---	---

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD-053 D-4	EDG-075 D-1	EDD-049 D-1	EDD-003 D-3	EDD-008 D-3
MONTH					November' 19				
25	Lithium	mg/l			---	---	---	---	---
26	Molybdenum	mg/l	---		---	---	---	---	---
27	Palladium	mg/l	---		---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---
29	Vanadium	mg/l	---		---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---
32	Bicarbonate	mg/l			---	---	---	---	---
33	Sodium	mg/l	---		940.0	430.0	910.0	615.0	725.0
34	Cyanide	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01
36	% Sodium			60	---	---	---	---	---

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDI-123-D5	EDE-041 D2	EDE-001-V1	EDD-007-D1	EDD-011-D2
MONTH					December' 19				
1	pH		5.5 to 9.0	5.5-9.0	7.24	6.91	7.81	7.53	7.50
2	Temperature			40 deg	36.8°C	37.1°C	27.4°C	37.4°C	33.3°C
3	Total Suspended Solids	mg/l	100	100	107	23	20	2	3
4	Total Dissolved Solids	mg/l	---	2100	4028	3480	2976	1620	2284
5	Chloride	mg/l	---	600	1180	1075	882	470	635
6	Total Hardness	mg/l	---	1000	807.00	392.00	83.20	31.70	31.70
7	Sulphate	mg/l	---	1000	7.8	7.0	6.3	6.1	6.8
8	Calcium	mg/l		100	220.6	100.0	20.6	7.9	6.3
9	Magnesium	mg/l	---	10	81.8	34.6	7.7	2.9	3.8
10	Dissolved Oxygen	mg/l		1.2	4.9	5.3	5.1	5.3	5.1
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	2	<2	<2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	10.0	8.0	<8	<8	<8
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphide	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	3.2	2.95	2.25	1.7	1.85
17	Total Chromium	mg/l	2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	0.1	0.023	0.017	0.016	0.014	0.019
19	Copper	mg/l	---	0.2	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l		3	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
23	SAR		---	0.1	18.1	26.1	44.1	30.3	53.8
24	Aluminium	mg/l	---		<0.01	<0.01	<0.01	<0.01	<0.01

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDI-123-D5	EDE-041 D2	EDE-001-V1	EDD-007-D1	EDD-011-D2
MONTH					December' 19				
25	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5
26	Molybdenum	mg/l	---		<0.5	<0.5	<0.5	<0.5	<0.5
27	Palladium	mg/l	---		<0.5	<0.5	<0.5	<0.5	<0.5
28	Selenium	mg/l			<0.005	<0.005	<0.005	<0.005	<0.005
29	Vanadium	mg/l	---		<0.2	<0.2	<0.2	<0.2	<0.2
30	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02
31	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
32	Bicarbonate	mg/l			615.00	540.00	475.00	325.00	438.00
33	Sodium	mg/l	---		1240.0	1190.0	925.0	390.0	695.0
34	Cyanide	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01
36	% Sodium			60	75.3	86.9	96.1	96.5	98

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD-003-D6	EDG-075-D7	EDG-077-D5	EDG-077-D1	EDD-049-D3	EDH-064-D1
MONTH					December' 19					December' 19
1	pH		5.5 to 9.0	5.5-9.0	7.38	7.48	7.61	7.45	7.80	7.15
2	Temperature			40 deg	33.9°C	41.9°C	44.6°C	41.2°C	35.5°C	30.9°C
3	Total Suspended Solids	mg/l	100	100	<2	<2	<2	<2	<2	11
4	Total Dissolved Solids	mg/l	---	2100	2310	2210	2764	1580	2730	4516
5	Chloride	mg/l	---	600	575	712	1035	502	1170	1620
6	Total Hardness	mg/l	---	1000	35.60	43.50	55.40	63.30	27.70	75.20
7	Sulphate	mg/l	---	1000	6.0	4.8	4.0	<2.5	4.7	6.5
8	Calcium	mg/l		100	7.9	11.1	12.7	15.8	6.3	19
9	Magnesium	mg/l	---	10	3.8	3.8	5.8	5.8	2.9	6.7
10	Dissolved Oxygen	mg/l		1.2	5.8	5.5	5.1	5.4	5.2	4.9
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	<2	<2	<2	<2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8	<8	<8	<8
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphide	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	1.6	1.55	1.65	1.1	1.86	2.6
17	Total Chromium	mg/l	2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	0.1	0.015	0.016	0.022	<0.01	0.019	0.024
19	Copper	mg/l	---	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l		3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	SAR		---	0.1	46	44.9	54	26.5	100.3	79.8
24	Aluminium	mg/l	---		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD-003-D6	EDG-075-D7	EDG-077-D5	EDG-077-D1	EDD-049-D3	EDH-064-D1
MONTH					December' 19					December' 19
25	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Molybdenum	mg/l	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
27	Palladium	mg/l	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
28	Selenium	mg/l			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
29	Vanadium	mg/l	---		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
30	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
31	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
32	Bicarbonate	mg/l			465.00	290.00	315.00	266.00	449.00	685.00
33	Sodium	mg/l	---		630.0	680.0	925.0	485.0	1210.0	1590.0
34	Cyanide	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
36	% Sodium			60	97.5	97.2	97.3	94.3	99	98

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH-044-D2	EDC-413-D1	EDG-075	EDD-052-D2	EDD-003-D5	EDH-044-D1
MONTH					December' 19	January' 20				
1	pH		5.5 to 9.0	5.5-9.0	7.08	7.91	7.82	7.25	8.09	7.67
2	Temperature			40 deg	36.8°C	30.5°C	40.7°C	34.7°C	32.3°C	33.7°C
3	Total Suspended Solids	mg/l	100	100	7	30	<2	<2	4	15
4	Total Dissolved Solids	mg/l	---	2100	6790	2320	1490	3564	2258	1262
5	Chloride	mg/l	---	600	2140	710	460	1290	840	475
6	Total Hardness	mg/l	---	1000	83.20	95.00	35.00	67.00	35.00	47.00
7	Sulphate	mg/l	---	1000	7.9	3.8	<2.5	4.7	4.8	4.0
8	Calcium	mg/l		100	22.2	23.8	8.0	17.0	9.5	11.1
9	Magnesium	mg/l	---	10	6.7	8.7	3.8	5.8	2.9	4.8
10	Dissolved Oxygen	mg/l		1.2	5.0	3.7	7.1	2.2	2.4	3.8
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	<2	<2	<2	2	3	2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8	8.0	9.0	8.0
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphide	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	3.25	1.96	1.1	2.45	2.3	0.75
17	Total Chromium	mg/l	2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	0.1	0.033	0.022	0.015	0.027	0.019	0.012
19	Copper	mg/l	---	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l		3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	SAR		---	0.1	107.1	30.4	37.2	71.2	58	32.4
24	Aluminium	mg/l	---		<0.01	---	---	---	---	---

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH-044-D2	EDC-413-D1	EDG-075	EDD-052-D2	EDD-003-D5	EDH-044-D1
MONTH					December' 19	January' 20				
25	Lithium	mg/l			<0.5	---	---	---	---	---
26	Molybdenum	mg/l	---		<0.5	---	---	---	---	---
27	Palladium	mg/l	---		<0.5	---	---	---	---	---
28	Selenium	mg/l			<0.005	---	---	---	---	---
29	Vanadium	mg/l	---		<0.2	---	---	---	---	---
30	Cadmium	mg/l			<0.02	---	---	---	---	---
31	Cobalt	mg/l			<0.1	---	---	---	---	---
32	Bicarbonate	mg/l			705.00	1294.00	586.00	1840.00	1050.00	430.00
33	Sodium	mg/l	---		2245.0	680.0	505.0	1340.0	790.0	510.0
34	Cyanide	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
36	% Sodium			60	98.3	94.0	96.9	97.8	98.0	96.0

ANNEXURE III

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH-064-D4	EDI-032-D3	EDD-023-D1	EDD-008-D3	EDE-005-D2	EDI-038
MONTH					January' 20					January' 20
1	pH		5.5 to 9.0	5.5-9.0	7.11	7.15	7.19	7.70	7.41	7.20
2	Temperature			40 deg	35.8°C	37.8°C	40.6°C	37.7°C	33.7°C	37.7°C
3	Total Suspended Solids	mg/l	100	100	2	7	2	<2	7	5
4	Total Dissolved Solids	mg/l	---	2100	4560	4876	2630	2890	2960	4716
5	Chloride	mg/l	---	600	1420	1670	915	1370	1090	1820
6	Total Hardness	mg/l	---	1000	35.00	79.00	35.00	39.00	43.00	103.00
7	Sulphate	mg/l	---	1000	6.0	7.1	5.5	6.2	4.9	6.0
8	Calcium	mg/l		100	7.9	20.6	9.5	9.5	11.1	26.9
9	Magnesium	mg/l	---	10	3.8	6.7	2.9	3.8	3.8	10.6
10	Dissolved Oxygen	mg/l		1.2	5.0	6.1	6.4	4.5	2.7	2.5
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	<2	<2	<2	<2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8	<8	8.0	8.0
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphide	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	2.8	3.05	1.6	1.95	2.1	3.1
17	Total Chromium	mg/l	2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	0.1	0.027	0.019	0.015	0.022	0.024	0.029
19	Copper	mg/l	---	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l		3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	SAR		---	0.1	112.1	87.3	74.9	100.9	80.8	86.1
24	Aluminium	mg/l	---		---	---	---	---	---	---

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH-064-D4	EDI-032-D3	EDD-023-D1	EDD-008-D3	EDE-005-D2	EDI-038
MONTH					January' 20					January' 20
25	Lithium	mg/l			---	---	---	---	---	---
26	Molybdenum	mg/l	---		---	---	---	---	---	---
27	Palladium	mg/l	---		---	---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---	---
29	Vanadium	mg/l	---		---	---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---	---
32	Bicarbonate	mg/l			1910.00	1720.00	890.00	1150.00	1140.00	1670.00
33	Sodium	mg/l	---		1525.0	1785.0	1020.0	1450.0	1220.0	2010.0
34	Cyanide	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
36	% Sodium			60	99.0	98.0	98.5	98.8	98.4	97.7

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN-184-V1	EDN-184-D4	EDI-070-D3	EDI-120-D5	EDD-054-D4	EDD-053-D3
MONTH					January' 20	February' 20				
1	pH		5.5 to 9.0	5.5-9.0	6.80	8.39	7.20	7.15	7.52	7.40
2	Temperature			40 deg	39.9°C	42.4°C	32.9°C	32.3°C	35.5°C	37.6°C
3	Total Suspended Solids	mg/l	100	100	54	<2	58	61	2	6
4	Total Dissolved Solids	mg/l	---	2100	3802	992	5432	6118	2740	3486
5	Chloride	mg/l	---	600	1410	265	2216	2082	1060	1245
6	Total Hardness	mg/l	---	1000	249.00	43.00	495.00	863.00	47.00	39.00
7	Sulphate	mg/l	---	1000	5.7	<2.5	9.1	8.0	5.9	6.6
8	Calcium	mg/l		100	65.1	11.1	123.8	214.2	11.1	9.5
9	Magnesium	mg/l	---	10	21.2	4.8	45.2	79.8	4.8	3.8
10	Dissolved Oxygen	mg/l		1.2	2.0	3.4	<1	1.6	1.7	<1
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	3	<2	3	2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	12.0	<8	14.0	10.0	<8	8.0
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphide	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	2.55	0.69	2.7	2.25	1.7	2.55
17	Total Chromium	mg/l	2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	0.1	0.030	0.040	0.026	0.021	0.017	0.031
19	Copper	mg/l	---	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l		3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	SAR		---	0.1	42.5	21.5	38.2	28.5	71.6	112.1
24	Aluminium	mg/l	---		---	---	---	---	---	---

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN-184-V1	EDN-184-D4	EDI-070-D3	EDI-120-D5	EDD-054-D4	EDD-053-D3
MONTH					January' 20	February' 20				
25	Lithium	mg/l			---	---	---	---	---	---
26	Molybdenum	mg/l	---		---	---	---	---	---	---
27	Palladium	mg/l	---		---	---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---	---
29	Vanadium	mg/l	---		---	---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---	---
32	Bicarbonate	mg/l			1550.00	379.00	1251.00	1769.00	976.00	1098.00
33	Sodium	mg/l	---		1540.0	325.0	1955.0	1924.0	1130.0	1610.0
34	Cyanide	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
36	% Sodium			60	93.1	94.3	89.6	82.3	98.1	98.9

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDC-072-D3	EDC-409-D5	EDD-009-D3	EDD-007-D4	EDD-003-V1	EDD-012-D4
MONTH					February' 20					
1	pH		5.5 to 9.0	5.5-9.0	7.61	7.53	7.84	7.90	8.19	7.50
2	Temperature			40 deg	39.8°C	39.9°C	44.9°C	38.2°C	31.9°C	32.7°C
3	Total Suspended Solids	mg/l	100	100	2	25	<2	<2	<2	3
4	Total Dissolved Solids	mg/l	---	2100	2788	2436	1984	1798	2680	2628
5	Chloride	mg/l	---	600	970	1180	836	754	1110	1070
6	Total Hardness	mg/l	---	1000	31.00	35.00	28.00	28.00	31.00	31.00
7	Sulphate	mg/l	---	1000	4.9	3.6	<2.5	<2.5	5.5	6.3
8	Calcium	mg/l		100	6.3	7.9	6.3	6.3	7.9	6.3
9	Magnesium	mg/l	---	10	3.8	3.8	2.9	2.9	2.9	3.8
10	Dissolved Oxygen	mg/l		1.2	2.0	1.8	1.7	<1	2.0	3.6
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	<2	4	<2	3	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	<8	16.0	8.0	12.0	<8	<8
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphide	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	1.85	1.9	1.53	1.15	2.2	1.9
17	Total Chromium	mg/l	2	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	0.1	0.190	0.019	0.020	0.014	0.024	0.019
19	Copper	mg/l	---	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l		3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l		0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	SAR		---	0.1	81.2	69.5	73.5	66.5	85.1	89.4
24	Aluminium	mg/l	---		---	---	---	---	---	---

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDC-072-D3	EDC-409-D5	EDD-009-D3	EDD-007-D4	EDD-003-V1	EDD-012-D4
MONTH					February' 20					
25	Lithium	mg/l			---	---	---	---	---	---
26	Molybdenum	mg/l	---		---	---	---	---	---	---
27	Palladium	mg/l	---		---	---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---	---
29	Vanadium	mg/l	---		---	---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---	---
32	Bicarbonate	mg/l			488.00	549.00	464.00	390.00	610.00	488.00
33	Sodium	mg/l	---		1040.0	945.0	895.0	810.0	1090.0	1145.0
34	Cyanide	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
36	% Sodium			60	98.7	98.3	98.6	98.4	98.7	98.8

ANNEXURE III

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH-044-D3
MONTH					February' 20
1	pH		5.5 to 9.0	5.5-9.0	6.91
2	Temperature			40 deg	30.9°C
3	Total Suspended Solids	mg/l	100	100	47
4	Total Dissolved Solids	mg/l	---	2100	3845
5	Chloride	mg/l	---	600	1720
6	Total Hardness	mg/l	---	1000	122.00
7	Sulphate	mg/l	---	1000	7.5
8	Calcium	mg/l		100	31.7
9	Magnesium	mg/l	---	10	10.6
10	Dissolved Oxygen	mg/l		1.2	<1.0
11	Biological Oxygen Demand, 3 Days at 27ºC	mg/l	30	30	2
12	Chemical Oxygen Demand	mg/l	250	100	11.0
13	Oil & Grease (Hexane Extract)	mg/l	10	10	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002
15	Sulphide	mg/l	2	2	<0.5
16	Fluoride	mg/l	2	1.5	3.01
17	Total Chromium	mg/l	2	0.1	<0.05
18	Zinc	mg/l	---	0.1	0.026
19	Copper	mg/l	---	0.2	<0.05
20	Nickel	mg/l		3	<0.05
21	Lead	mg/l		0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001
23	SAR		---	0.1	65.7
24	Aluminium	mg/l	---		---

S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH-044-D3
MONTH					February' 20
25	Lithium	mg/l			---
26	Molybdenum	mg/l	---		---
27	Palladium	mg/l	---		---
28	Selenium	mg/l			---
29	Vanadium	mg/l	---		---
30	Cadmium	mg/l			---
31	Cobalt	mg/l			---
32	Bicarbonate	mg/l			732.00
33	Sodium	mg/l	---		1670.0
34	Cyanide	mg/l	0.2	0.2	<0.02
35	Hexavalent Chromium	mg/l	0.1		<0.01
36	% Sodium			60	96.8

ANNEXURE IV: RO Water Analysis Report

(Compliance Period: Oct’ 19- Feb’ 20)

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					October' 19						
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGS 01			EDD 050			EDH 044
					Inlet	Outlet	Reject	Inlet	Outlet	Reject	Inlet
1	pH		5.5 to 9.0	5.5-9.0	7.70	8.11	7.88	8.15	7.35	8.10	7.55
2	Temperature	deg C			34.2°C	34.9°C	25.3°C	32.3°C	35.7°C	33.6°C	32.4°C
3	Total Suspended Solids	mg/l	100	100	2	<2	2	4	<2	5	<2
4	Total Dissolved Solids	mg/l	---	2100	2712	976	3468	2892	880	3416	5750
5	Chlorides	mg/l	---	600	1025	335	1380	975	295	1024	2510
6	Total Hardness	mg/l	---	---	39.60	27.70	43.50	39.60	19.80	47.50	166.30
7	Sulphates	mg/l	---	1000	3.9	<2.5	4.5	3.0	<2.5	4.5	5.0
8	Calcium	mg/l			9.5	6.3	11.1	9.5	4.7	11.1	42.8
9	Magnesium	mg/l	---	---	3.8	2.90	3.8	3.8	1.9	4.8	14.4
10	Dissolved Oxygen	mg/l									
11	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
12	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluorides	mg/l	2	1.5	1.65	0.85	1.9	2.15	0.98	2.65	3.8
17	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	---	0.015	<0.01	0.016	0.022	0.013	0.027	0.029
19	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	Sodium Absorption Ratio		---	---	84.3	35.3	96.6	76.9	31.1	77.6	92.3
24	Aluminum	mg/l	---	---	---	---	---	---	---	---	---
25	Lithium	mg/l			---	---	---	---	---	---	---
26	Molybednum	mg/l	---	---	---	---	---	---	---	---	---
27	Palladium	mg/l	---	---	---	---	---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---	---	---

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					October' 19						
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGS 01			EDD 050			EDH 044
					Inlet	Outlet	Reject	Inlet	Outlet	Reject	Inlet
29	Vanadium	mg/l	---	---	---	---	---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---	---	---
32	Bicarbonate	mg/l			---	---	---	---	---	---	---
33	Sodium	mg/l	---	---	1220.0	425.0	1465.0	1110.0	320.0	1230.0	2740.0
34	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	% Sodium				---	---	---	---	---	---	---

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					October' 19		October' 19			November' 19	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH 044		EDN 099			GGS 01	
					Outlet	Reject	Inlet	Outlet	Reject	Inlet	Outlet
1	pH		5.5 to 9.0	5.5-9.0	7.62	7.49	6.95	7.25	7.10	7.80	8.08
2	Temperature	deg C			32.5°C	32.2°C	33.9°C	30.5°C	35.4°C	32.8°C	32.2°C
3	Total Suspended Solids	mg/l	100	100	<2	<2	3	<2	3	<2	<2
4	Total Dissolved Solids	mg/l	---	2100	1330	6290	3622	702	4814	2888	894
5	Chlorides	mg/l	---	600	425	2720	915	265	1130	1204	307
6	Total Hardness	mg/l	---	---	39.60	150.50	447.50	67.30	609.80	39.60	27.70
7	Sulphates	mg/l	---	1000	3.8	5.9	4.5	<2.5	5.0	5.2	4.5
8	Calcium	mg/l			9.5	36.5	117.4	18.9	161.9	9.5	6.3
9	Magnesium	mg/l	---	---	3.8	14.5	37.5	6.7	50.00	3.8	2.90
10	Dissolved Oxygen	mg/l									
11	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
12	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluorides	mg/l	2	1.5	1.05	4.1	2.4	0.85	3.15	1.1	0.47
17	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	---	0.014	0.028	0.019	<0.01	0.022	0.020	0.018
19	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	Sodium Absorption Ratio		---	---	30.4	107	23	14.8	22	69.8	17.5
24	Aluminum	mg/l	---	---	---	---	---	---	---	---	---
25	Lithium	mg/l			---	---	---	---	---	---	---
26	Molybednum	mg/l	---	---	---	---	---	---	---	---	---
27	Palladium	mg/l	---	---	---	---	---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---	---	---

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					October' 19		October' 19			November' 19	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH 044		EDN 099			GGS 01	
					Outlet	Reject	Inlet	Outlet	Reject	Inlet	Outlet
29	Vanadium	mg/l	---	---	---	---	---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---	---	---
32	Bicarbonate	mg/l			---	---	---	---	---	---	---
33	Sodium	mg/l	---	---	440.0	3020.0	1120.0	280.0	1250.0	1010.0	212.0
34	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	% Sodium				---	---	---	---	---	---	---

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					November' 19						
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGS 01	EDD 050			EDH 044		
					Reject	Inlet	Outlet	Reject	Inlet	Outlet	Reject
1	pH		5.5 to 9.0	5.5-9.0	7.80	8.29	7.83	8.15	7.50	7.18	7.71
2	Temperature	deg C			32.0°C	29.6°C	33.7°C	30.0°C	28.0°C	28.1°C	28.1°C
3	Total Suspended Solids	mg/l	100	100	<2	<2	<2	2	<2	<2	<2
4	Total Dissolved Solids	mg/l	---	2100	3416	2886	818	2910	2782	426	3280
5	Chlorides	mg/l	---	600	1520	1470	245	1510	1135	184	1230
6	Total Hardness	mg/l	---	---	43.50	51.50	23.70	51.50	87.10	27.70	83.20
7	Sulphates	mg/l	---	1000	6.8	4.9	3.0	5.6	6.9	3.5	7.5
8	Calcium	mg/l			9.5	12.7	4.7	12.7	22.2	6.3	19
9	Magnesium	mg/l	---	---	4.8	4.8	2.9	4.8	7.7	2.9	8.6
10	Dissolved Oxygen	mg/l									
11	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
12	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluorides	mg/l	2	1.5	1.35	1.65	0.8	1.92	1.75	0.56	2.05
17	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	---	0.240	0.021	0.015	0.027	0.024	0.012	0.029
19	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	Sodium Absorption Ratio		---	---	77.2	72	16.1	73.9	39.1	10.3	42.5
24	Aluminum	mg/l	---	---	---	---	---	---	---	---	---
25	Lithium	mg/l			---	---	---	---	---	---	---
26	Molybednum	mg/l	---	---	---	---	---	---	---	---	---
27	Palladium	mg/l	---	---	---	---	---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---	---	---

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					November' 19						
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGS 01	EDD 050			EDH 044		
					Reject	Inlet	Outlet	Reject	Inlet	Outlet	Reject
29	Vanadium	mg/l	---	---	---	---	---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---	---	---
32	Bicarbonate	mg/l			---	---	---	---	---	---	---
33	Sodium	mg/l	---	---	1170.0	1190.0	180.0	1220.0	840.0	125.0	890.0
34	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	% Sodium				---	---	---	---	---	---	---

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					November' 19			December' 19			
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN 099			GGS 01			EDD 050
					Inlet	Outlet	Reject	Inlet	Outlet	Reject	Inlet
1	pH		5.5 to 9.0	5.5-9.0	6.87	6.40	5.80	7.70	7.82	7.91	8.06
2	Temperature	deg C			31.4°C	27.8°C	29.4°C	29.9°C	29.3°C	29.7°C	28.7°C
3	Total Suspended Solids	mg/l	100	100	22	<2	<2	4	<2	2	4
4	Total Dissolved Solids	mg/l	---	2100	5112	1080	6192	2180	882	2896	2270
5	Chlorides	mg/l	---	600	2018	390	1925	745	236	885	825
6	Total Hardness	mg/l	---	---	491.00	182.20	518.80	43.5	15.8	47.5	47.5
7	Sulphates	mg/l	---	1000	7.5	4.7	8.5	5.7	<2.5	6.1	4.8
8	Calcium	mg/l			125.4	46	134.9	11.1	3.2	11.1	11.1
9	Magnesium	mg/l	---	---	43.3	16.30	44.00	3.8	1.90	4.8	4.8
10	Dissolved Oxygen	mg/l						4.8	5.90	5.0	5.0
11	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
12	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluorides	mg/l	2	1.5	2.6	0.7	2.5	1.95	0.45	2.1	2.25
17	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	---	0.033	0.019	0.030	0.015	<0.01	0.017	0.024
19	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	Sodium Absorption Ratio		---	---	35.7	10.2	32.7	60.3	34.3	71.2	51
24	Aluminum	mg/l	---	---	---	---	---	<0.01	<0.01	<0.01	<0.01
25	Lithium	mg/l			---	---	---	<0.5	<0.5	<0.5	<0.5
26	Molybednum	mg/l	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
27	Palladium	mg/l	---	---	---	---	---	<0.5	<0.5	<0.5	<0.5
28	Selenium	mg/l			---	---	---	<0.005	<0.005	<0.005	<0.005

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					November' 19			December' 19			
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN 099			GGS 01			EDD 050
					Inlet	Outlet	Reject	Inlet	Outlet	Reject	Inlet
29	Vanadium	mg/l	---	---	---	---	---	<0.2	<0.2	<0.2	<0.2
30	Cadmium	mg/l			---	---	---	<0.02	<0.02	<0.02	<0.02
31	Cobalt	mg/l			---	---	---	<0.1	<0.1	<0.1	<0.1
32	Bicarbonate	mg/l			---	---	---	425.0	220.0	550.0	385.0
33	Sodium	mg/l	---	---	1820.0	315.0	1715.0	915.0	315.0	1130.0	795.0
34	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	% Sodium				---	---	---	97.9	97.7	98.1	97.3

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					December' 19					December' 19	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD 050		EDH 044			EDN 099	
					Outlet	Reject	Inlet	Outlet	Reject	Inlet	Outlet
1	pH		5.5 to 9.0	5.5-9.0	7.61	8.20	7.51	7.69	7.40	7.53	6.63
2	Temperature	deg C			29.9°C	23.1°C	22.9°C	23.1°C	23.2°C	25.8°C	26.9°C
3	Total Suspended Solids	mg/l	100	100	<2	3	10	<2	5	9	<2
4	Total Dissolved Solids	mg/l	---	2100	856	2766	3522	704	3856	2310	466
5	Chlorides	mg/l	---	600	310	940	1170	198	1370	845	135
6	Total Hardness	mg/l	---	---	23.7	59.4	106.9	31.7	95.0	142.5	39.6
7	Sulphates	mg/l	---	1000	<2.5	5.9	6.0	3.5	7.2	5.0	<2.5
8	Calcium	mg/l			4.8	14.3	26.9	7.9	23.8	36.5	9.5
9	Magnesium	mg/l	---	---	2.9	5.8	9.6	2.9	8.7	12.5	3.8
10	Dissolved Oxygen	mg/l			5.7	5.2	4.7	5.8	4.9	5.0	6.1
11	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
12	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluorides	mg/l	2	1.5	0.70	2.35	1.9	0.83	2.15	0.9	0.26
17	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	---	<0.01	0.022	0.024	0.011	0.027	<0.01	<0.01
19	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	Sodium Absorption Ratio		---	---	26.4	57.8	45.8	23.7	63.5	33.7	11.1
24	Aluminum	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Molybednum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
27	Palladium	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
28	Selenium	mg/l			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					December' 19					December' 19	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD 050		EDH 044			EDN 099	
					Outlet	Reject	Inlet	Outlet	Reject	Inlet	Outlet
29	Vanadium	mg/l	---	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
30	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
31	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
32	Bicarbonate	mg/l			157.0	435.0	695.0	169.0	720.0	518.0	122.0
33	Sodium	mg/l	---	---	295.0	1025.0	1090.0	305.0	1430.0	920.0	160.0
34	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	% Sodium				96.5	97.4	95.7	95.5	97	93.4	89.9

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(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					December ' 19	January' 20					
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN 099	GGS 01			EDD 050		
					Reject	Inlet	Outlet	Reject	Inlet	Outlet	Reject
1	pH		5.5 to 9.0	5.5-9.0	7.16	8.15	8.11	7.90	7.78	7.51	7.90
2	Temperature	deg C			27.2°C	28.5°C	28.4°C	28.8°C	29.9°C	29.9°C	24.3°C
3	Total Suspended Solids	mg/l	100	100	<2	4	<2	6	3	<2	4
4	Total Dissolved Solids	mg/l	---	2100	2884	2248	1254	3128	2790	950	3452
5	Chlorides	mg/l	---	600	1085	705	530	1095	1185	385	1510
6	Total Hardness	mg/l	---	---	186.1	24.0	12.0	39.0	39.0	31.0	43.0
7	Sulphates	mg/l	---	1000	6.1	5.1	<2.5	6.2	3.9	<2.5	4.4
8	Calcium	mg/l			46.0	6.3	3.2	7.9	9.5	6.3	11.1
9	Magnesium	mg/l	---	---	17.3	2.0	<2	4.8	3.80	3.8	3.8
10	Dissolved Oxygen	mg/l			5.5	4.5	6.0	3.7	6.00	6.4	6.4
11	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
12	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluorides	mg/l	2	1.5	1.30	1.45	0.75	1.8	1.5	0.96	1.89
17	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	---	<0.01	0.023	0.011	0.026	0.014	<0.01	0.017
19	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	Sodium Absorption Ratio		---	---	37.3	72.9	62.1	87.8	70.9	31.1	94.9
24	Aluminum	mg/l	---	---	<0.01	---	---	---	---	---	---
25	Lithium	mg/l			<0.5	---	---	---	---	---	---
26	Molybednum	mg/l	---	---	<0.5	---	---	---	---	---	---
27	Palladium	mg/l	---	---	<0.5	---	---	---	---	---	---
28	Selenium	mg/l			<0.005	---	---	---	---	---	---

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					December ' 19	January' 20					
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN 099	GGS 01			EDD 050		
					Reject	Inlet	Outlet	Reject	Inlet	Outlet	Reject
29	Vanadium	mg/l	---	---	<0.2	---	---	---	---	---	---
30	Cadmium	mg/l			<0.02	---	---	---	---	---	---
31	Cobalt	mg/l			<0.1	---	---	---	---	---	---
32	Bicarbonate	mg/l			671.0	1165.0	425.0	1470.0	20.0	305.0	940.0
33	Sodium	mg/l	---	---	1170.0	820.0	495.0	1260.0	1020.0	405.0	1430.0
34	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	% Sodium				93.2	98.7	98.9	98.6	98.3	96.5	98.6

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					January' 20						February' 20
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH 044			EDN 099			GGS 01
					Inlet	Outlet	Reject	Inlet	Outlet	Reject	Inlet
1	pH		5.5 to 9.0	5.5-9.0	7.39	7.52	7.72	7.15	6.95	6.81	7.82
2	Temperature	deg C			26.3°C	26.3°C	26.1°C	27.2°C	28.5°C	27.8°C	27.5°C
3	Total Suspended Solids	mg/l	100	100	8	<2	7	<2	<2	<2	3
4	Total Dissolved Solids	mg/l	---	2100	3382	692	4188	4236	656	5280	2216
5	Chlorides	mg/l	---	600	1320	245	1710	2110	286	2340	830
6	Total Hardness	mg/l	---	---	115.0	16.0	79.0	436.0	36.0	594.0	47.0
7	Sulphates	mg/l	---	1000	8.0	<2.5	10.0	5.3	<2.5	6.2	<2.5
8	Calcium	mg/l			25.4	3.2	19	112.7	7.9	161.9	11.1
9	Magnesium	mg/l	---	---	12.5	2.0	7.7	37.5	3.8	46.2	4.8
10	Dissolved Oxygen	mg/l			4.7	6.1	4.3	5.0	5.9	3.5	2.0
11	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
12	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluorides	mg/l	2	1.5	2.9	0.61	1.75	1.85	0.81	2.30	1.4
17	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	---	0.019	<0.01	0.021	0.015	<0.01	0.022	0.017
19	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	Sodium Absorption Ratio		---	---	57.2	31.5	89.6	36.3	22.5	34.3	55.4
24	Aluminum	mg/l	---	---	---	---	---	---	---	---	---
25	Lithium	mg/l			---	---	---	---	---	---	---
26	Molybednum	mg/l	---	---	---	---	---	---	---	---	---
27	Palladium	mg/l	---	---	---	---	---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---	---	---

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					January' 20						February' 20
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH 044			EDN 099			GGS 01
					Inlet	Outlet	Reject	Inlet	Outlet	Reject	Inlet
29	Vanadium	mg/l	---	---	---	---	---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---	---	---
32	Bicarbonate	mg/l			815.0	280.0	1240.0	460.0	60.0	595.0	512.0
33	Sodium	mg/l	---	---	1410.0	290.0	1830.0	1740.0	310.0	1920.0	875.0
34	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	% Sodium				96.4	97.5	98.1	89.7	95	87.6	97.6

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					February' 20						
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGS 01		EDD 050			EDH 044	
					Outlet	Reject	Inlet	Outlet	Reject	Inlet	Outlet
1	pH		5.5 to 9.0	5.5-9.0	7.88	7.95	7.70	7.65	7.85	7.90	7.43
2	Temperature	deg C			27.4°C	30.2°C	30.9°C	31.2°C	24.7°C	35.7°C	26.2°C
3	Total Suspended Solids	mg/l	100	100	<2	4	4	<2	3	<2	<2
4	Total Dissolved Solids	mg/l	---	2100	702	3512	3102	912	3230	3214	656
5	Chlorides	mg/l	---	600	225	1140	1470	310	1510	1225	245
6	Total Hardness	mg/l	---	---	51.0	47.0	47.0	20.0	51.0	51.0	63.0
7	Sulphates	mg/l	---	1000	<2.5	<2.5	3.9	<2.5	4.2	<2.5	<2.5
8	Calcium	mg/l			11.1	9.5	11.1	4.8	12.7	12.7	14.3
9	Magnesium	mg/l	---	---	5.80	5.8	4.8	1.9	4.8	4.8	6.7
10	Dissolved Oxygen	mg/l			3.20	1.8	1.7	4.1	<1	2.8	5.0
11	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
12	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
16	Fluorides	mg/l	2	1.5	0.65	1.85	2.1	0.69	2.25	1.65	0.71
17	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	---	<0.01	0.022	0.014	<0.01	0.018	0.022	0.011
19	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	Sodium Absorption Ratio		---	---	18.6	81.2	84	25.7	85.7	89.5	15.9
24	Aluminum	mg/l	---	---	---	---	---	---	---	---	---
25	Lithium	mg/l			---	---	---	---	---	---	---
26	Molybednum	mg/l	---	---	---	---	---	---	---	---	---
27	Palladium	mg/l	---	---	---	---	---	---	---	---	---
28	Selenium	mg/l			---	---	---	---	---	---	---

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					February' 20						
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGS 01		EDD 050			EDH 044	
					Outlet	Reject	Inlet	Outlet	Reject	Inlet	Outlet
29	Vanadium	mg/l	---	---	---	---	---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---	---	---	---
31	Cobalt	mg/l			---	---	---	---	---	---	---
32	Bicarbonate	mg/l			293.0	1002.0	525.0	220.0	586.0	866.0	185.0
33	Sodium	mg/l	---	---	306.0	1280.0	1325.0	265.0	1408.0	1470.0	290.0
34	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
35	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	% Sodium				92.9	98.3	98.4	96.7	98.4	98.4	91

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					February' 20			
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH 044	EDN 099		
					Reject	Inlet	Outlet	Reject
1	pH		5.5 to 9.0	5.5-9.0	7.50	7.53	7.28	7.40
2	Temperature	deg C			25.8°C	26.6°C	27.9°C	27.6°C
3	Total Suspended Solids	mg/l	100	100	<2	8	<2	10
4	Total Dissolved Solids	mg/l	---	2100	3564	3458	768	4344
5	Chlorides	mg/l	---	600	1415	1445	260	1590
6	Total Hardness	mg/l	---	---	126.0	380.0	59.0	459.0
7	Sulphates	mg/l	---	1000	<2.5	5.6	3.0	6.4
8	Calcium	mg/l			31.7	95.2	12.7	111.1
9	Magnesium	mg/l	---	---	11.6	34.6	6.7	44.2
10	Dissolved Oxygen	mg/l			2.1	2.2	4.8	2.0
11	BOD	mg/l	30	30	<2	<2	<2	<2
12	COD	mg/l	250	100	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0
14	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002
15	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5
16	Fluorides	mg/l	2	1.5	1.9	3.15	0.48	2.80
17	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05
18	Zinc	mg/l	---	---	0.027	0.020	<0.01	0.021
19	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05
20	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05
21	Lead	mg/l			<0.1	<0.1	<0.1	<0.1
22	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001
23	Sodium Absorption Ratio		---	---	62.7	29.1	17.3	35
24	Aluminum	mg/l	---	---	---	---	---	---
25	Lithium	mg/l			---	---	---	---
26	Molybednum	mg/l	---	---	---	---	---	---
27	Palladium	mg/l	---	---	---	---	---	---
28	Selenium	mg/l			---	---	---	---

R.O. water analysis report of CBM Raniganj Project of EOGEPL
(Compliance period: Oct'19 to Feb'20)

ANNEXURE IV

Date					February' 20			
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH 044	EDN 099		
					Reject	Inlet	Outlet	Reject
29	Vanadium	mg/l	---	---	---	---	---	---
30	Cadmium	mg/l			---	---	---	---
31	Cobalt	mg/l			---	---	---	---
32	Bicarbonate	mg/l			952.0	1078.0	207.0	1214.0
33	Sodium	mg/l	---	---	1620.0	1305.0	305.0	1725.0
34	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01
35	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02
36	% Sodium				96.6	88.2	91.9	89.1

ANNEXURE IV A: Surface Water Analysis Report

(Compliance Period: Oct'19- Feb' 20)

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					October' 19			
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGS 01 Discharge	Kunur Nala Upstream Near GGS 01	EDD 050 Discharge	Kunur Nala Downstream Near Kuldiha Bridge
1	pH at 27 C		5.5 to 9.0	5.5-9.0	8.34	7.42	7.88	7.52
2	Temperature	Deg C	---		32.6°C	29.8°C	32.8°C	30.9°C
3	Total Suspended Solids	mg/l	100	100	<2	4	<2	14
4	Total Dissolved Solids	mg/l	---	2100	1160	288	1240	456
5	Acidity as CaCO3	mg/l	---		Nil	16.2	9.6	15
6	Total Alkalinity as CaCO3	mg/l	---		280	85	315	65
7	Chloride as Chlorine	mg/l	---	600	305	107	425	107
8	Total Hardness	mg/l	---		35.6	91.1	15.8	122.7
9	Calcium	mg/l	---		7.9	22.2	3.2	30.1
10	Magnesium	mg/l	---		3.8	8.7	1.9	11.5
11	Biochemical Oxygen Demand	mg/l	30	30	<2	<2	<2	2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8	9
13	Oil & Grease	mg/l	10	10	<5	<5	<5	<5
14	Phenolic Compounds (as C6H5OH)	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002
15	Sulphides (as S2) in mg/l	mg/l	2	2	<0.5	<0.5	0.81	<0.5
16	Fluoride	mg/l	2	1.5	0.62	0.33	0.72	0.75
17	Sodium	mg/l	---		390	120	355	128
18	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05
19	Zinc	mg/l	5		0.017	0.01	0.019	0.013
20	Copper	mg/l	3		<0.05	<0.05	<0.05	<0.05
21	Nickel	mg/l	3		<0.05	<0.05	<0.05	<0.05
22	Lead	mg/l	0.1		<0.1	<0.1	<0.1	<0.1
23	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001
24	SAR		---		28.5	5.5	38.5	5.1

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					October' 19			
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGS 01 Discharge	Kunur Nala Upstream Near GGS 01	EDD 050 Discharge	Kunur Nala Downstream Near Kuldiha Bridge
25	Electrical Conductivity at 25° C	µmhos/cm	---		1910	430	1940	640
26	Cyanide	mg/l	---		<0.02	<0.02	<0.02	<0.02
27	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01
28	%Sodium		---		---	---	---	---
29	Vanadium	mg/l	0.2		---	---	---	---
30	Manganese	mg/l	2		---	---	---	---
31	Dissolved Phosphate	mg/l	5		---	---	---	---
32	Selenium		0.05		---	---	---	---
33	Cadmium	mg/l	2		---	---	---	---
34	Arsenic	mg/l	0.2		---	---	---	---
35	Free Amonia	mg/l	5		---	---	---	---
36	Ammonical Nitrogen	mg/l	50		---	---	---	---
37	Total residual chlorine	mg/l	1		---	---	---	---
38	colour	Hazen Units	Colourless		---	---	---	---
39	Odor		Odourless		---	---	---	---
40	Particulate size of suspended solic	microns	---		---	---	---	---
41	Particulate size of suspended solic	microns	---		---	---	---	---
42	Particulate size of suspended solic	microns	---		---	---	---	---

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					October' 19	November' 19		
S. No.	**Parameter**	**Unit**	**CPCB Limit for Discharge**	**Onshore Discharge Standards**	**EDN 099 Discharge**	**GGS 01 Discharge**	**Kunur Nala Upstream Near GGS 01**	**EDD 050 Discharge**
1	**pH at 27 C**		**5.5 to 9.0**	**5.5-9.0**	7.14	8.1	7.79	8.01
2	**Temperature**	**Deg C**	**---**		30.5°C	30.4°C	26.0°C	30.3°C
3	**Total Suspended Solids**	**mg/l**	**100**	**100**	3	<2	4	<2
4	**Total Dissolved Solids**	**mg/l**	**---**	**2100**	872	992	284	1142
5	**Acidity as CaCO3**	**mg/l**	**---**		39.7	4.8	21	5.6
6	**Total Alkalinity as CaCO3**	**mg/l**	**---**		160	312	170	430
7	**Chloride as Chlorine**	**mg/l**	**---**	**600**	225	230	47	350
8	**Total Hardness**	**mg/l**	**---**		55.4	43.5	110.9	31.7
9	**Calcium**	**mg/l**	**---**		14.3	11.1	27	6.3
10	**Magnesium**	**mg/l**	**---**		4.8	3.8	10.6	3.8
11	**Biochemical Oxygen Demand**	**mg/l**	**30**	**30**	<2	<2	<2	<2
12	**Chemical Oxygen Demand**	**mg/l**	**250**	**100**	<8	<8	<8	<8
13	**Oil & Grease**	**mg/l**	**10**	**10**	<5	<5	<5	<5
14	**Phenolic Compounds (as C6H5OH)**	**mg/l**	**1**	**1.2**	<0.002	<0.002	<0.002	<0.002
15	**Sulphides (as S2) in mg/l**	**mg/l**	**2**	**2**	<0.5	<0.5	<0.5	<0.5
16	**Fluoride**	**mg/l**	**2**	**1.5**	0.91	0.65	0.21	0.72
17	**Sodium**	**mg/l**	**---**		245	295	37	325
18	**Total Chromium**	**mg/l**	**2**	**1**	<0.05	<0.05	<0.05	<0.05
19	**Zinc**	**mg/l**	**5**		0.02	<0.01	<0.01	<0.01
20	**Copper**	**mg/l**	**3**		<0.05	<0.05	<0.05	<0.05
21	**Nickel**	**mg/l**	**3**		<0.05	<0.05	<0.05	<0.05
22	**Lead**	**mg/l**	**0.1**		<0.1	<0.1	<0.1	<0.1
23	**Mercury**	**mg/l**	**0.01**	**0.01**	<0.001	<0.001	<0.001	<0.001
24	**SAR**		**---**		14.4	19.4	1.5	25.1

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					October' 19	November' 19		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN 099 Discharge	GGS 01 Discharge	Kunur Nala Upstream Near GGS 01	EDD 050 Discharge
25	Electrical Conductivity at 25° C	µmhos/cm	---		1250	1480	410	1590
26	Cyanide	mg/l	---		<0.02	<0.02	<0.02	<0.02
27	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01
28	%Sodium		---		---	---	---	---
29	Vanadium	mg/l	0.2		---	---	---	---
30	Manganese	mg/l	2		---	---	---	---
31	Dissolved Phosphate	mg/l	5		---	---	---	---
32	Selenium		0.05		---	---	---	---
33	Cadmium	mg/l	2		---	---	---	---
34	Arsenic	mg/l	0.2		---	---	---	---
35	Free Amonia	mg/l	5		---	---	---	---
36	Ammonical Nitrogen	mg/l	50		---	---	---	---
37	Total residual chlorine	mg/l	1		---	---	---	---
38	colour	Hazen Units	Colourless		---	---	---	---
39	Odor		Odourless		---	---	---	---
40	Particulate size of suspended solic	microns	---		---	---	---	---
41	Particulate size of suspended solic	microns	---		---	---	---	---
42	Particulate size of suspended solic	microns	---		---	---	---	---

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					November' 19	December' 19		
S. No.	**Parameter**	**Unit**	**CPCB Limit for Discharge**	**Onshore Discharge Standards**	**EDN 099 Discharge**	**Kunur Nala Downstream Near Kuldiha Bridge**	**EDN 099 Discharge**	**GGS 01 Discharge**
1	**pH at 27 C**		**5.5 to 9.0**	**5.5-9.0**	6.35	7.56	6.95	8.15
2	**Temperature**	**Deg C**	**---**		28.1°C	21.9°C	28.9°C	24.4°C
3	**Total Suspended Solids**	**mg/l**	**100**	**100**	4	7	<2	<2
4	**Total Dissolved Solids**	**mg/l**	**---**	**2100**	1160	1042	1552	1080
5	**Acidity as CaCO3**	**mg/l**	**---**		71	45	56	5
6	**Total Alkalinity as CaCO3**	**mg/l**	**---**		225	290	412	245
7	**Chloride as Chlorine**	**mg/l**	**---**	**600**	480	375	530	420
8	**Total Hardness**	**mg/l**	**---**		320.8	154.4	99	23.7
9	**Calcium**	**mg/l**	**---**		82.5	39.6	25.4	4.8
10	**Magnesium**	**mg/l**	**---**		27.9	13.5	8.7	2.9
11	**Biochemical Oxygen Demand**	**mg/l**	**30**	**30**	<2	<2	<2	<2
12	**Chemical Oxygen Demand**	**mg/l**	**250**	**100**	<8	<8	<8	<8
13	**Oil & Grease**	**mg/l**	**10**	**10**	<5	<5	<5	<5
14	**Phenolic Compounds (as C6H5OH)**	**mg/l**	**1**	**1.2**	<0.002	<0.002	<0.002	<0.002
15	**Sulphides (as S2) in mg/l**	**mg/l**	**2**	**2**	<0.5	<0.5	<0.5	<0.5
16	**Fluoride**	**mg/l**	**2**	**1.5**	1.05	0.75	0.91	1.1
17	**Sodium**	**mg/l**	**---**		345	392	555	496
18	**Total Chromium**	**mg/l**	**2**	**1**	<0.05	<0.05	<0.05	<0.05
19	**Zinc**	**mg/l**	**5**		0.017	<0.01	0.021	0.014
20	**Copper**	**mg/l**	**3**		<0.05	<0.05	<0.05	<0.05
21	**Nickel**	**mg/l**	**3**		<0.05	<0.05	<0.05	<0.05
22	**Lead**	**mg/l**	**0.1**		<0.1	<0.1	<0.1	<0.1
23	**Mercury**	**mg/l**	**0.01**	**0.01**	<0.001	<0.001	<0.001	<0.001
24	**SAR**		**---**		8.4	13.7	24.2	44.6

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(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					November' 19	December' 19		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN 099 Discharge	Kunur Nala Downstream Near Kuldiha Bridge	EDN 099 Discharge	GGS 01 Discharge
25	Electrical Conductivity at 25° C	µmhos/cm	---		2120	1820	2360	1790
26	Cyanide	mg/l	---		<0.02	<0.02	<0.02	<0.02
27	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01
28	%Sodium		---		---	84.7	92.4	97.9
29	Vanadium	mg/l	0.2		---	<0.2	<0.2	<0.2
30	Manganese	mg/l	2		---	0.075	<0.05	<0.05
31	Dissolved Phosphate	mg/l	5		---	0.12	0.15	0.19
32	Selenium		0.05		---	<0.005	<0.005	<0.005
33	Cadmium	mg/l	2		---	<0.02	<0.02	<0.02
34	Arsenic	mg/l	0.2		---	<0.01	<0.01	<0.01
35	Free Amonia	mg/l	5		---	0.06	Nil	0.2
36	Ammonical Nitrogen	mg/l	50		---	2.8	3.1	2.9
37	Total residual chlorine	mg/l	1		---	<0.1	<0.1	<0.1
38	colour	Hazen Units	Colourless		---	<5	<5	<5
39	Odor		Odourless		---	Agreeable	Agreeable	Agreeable
40	Particulate size of suspended solic	microns	---		---	5	<2	<2
41	Particulate size of suspended solic	microns	---		---	2	Not Traceable	Not Traceable
42	Particulate size of suspended solic	microns	---		---	Not Traceable	Not Traceable	Not Traceable

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					December' 19		
S. No.	**Parameter**	**Unit**	**CPCB Limit for Discharge**	**Onshore Discharge Standards**	**Kunur Nala Upstream Near GGS 01**	**EDD 050 Discharge**	**Kunur Nala Downstream between EDH 58 & 64**
1	pH at 27 C		5.5 to 9.0	5.5-9.0	7.46	8.37	7.07
2	Temperature	Deg C	---		19.2°C	22.7°C	20.3°C
3	Total Suspended Solids	mg/l	100	100	3	<2	11
4	Total Dissolved Solids	mg/l	---	2100	346	1154	1480
5	Acidity as CaCO3	mg/l	---		50	NIL	55
6	Total Alkalinity as CaCO3	mg/l	---		65	315	366
7	Chloride as Chlorine	mg/l	---	600	107	425	490
8	Total Hardness	mg/l	---		106.9	27.7	83.2
9	Calcium	mg/l	---		27	6.3	22.2
10	Magnesium	mg/l	---		9.6	2.9	6.7
11	Biochemical Oxygen Demand	mg/l	30	30	<2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5	<5	<5
14	Phenolic Compounds (as C6H5OH)	mg/l	1	1.2	<0.002	<0.002	<0.002
15	Sulphides (as S2) in mg/l	mg/l	2	2	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	0.42	0.71	0.85
17	Sodium	mg/l	---		105	440	495
18	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05
19	Zinc	mg/l	5		<0.01	0.011	0.015
20	Copper	mg/l	3		<0.05	<0.05	<0.05
21	Nickel	mg/l	3		<0.05	<0.05	<0.05
22	Lead	mg/l	0.1		<0.1	<0.1	<0.1
23	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001
24	SAR		---		4.4	36.4	23.6

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					December' 19		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Upstream Near GGS 01	EDD 050 Discharge	Kunur Nala Downstream between EDH 58 & 64
25	Electrical Conductivity at 25° C	µmhos/cm	---		510	1760	2100
26	Cyanide	mg/l	---		<0.02	<0.02	<0.02
27	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01
28	%Sodium		---		68.5	97.2	92.9
29	Vanadium	mg/l	0.2		<0.2	<0.2	<0.2
30	Manganese	mg/l	2		0.052	<0.05	0.082
31	Dissolved Phosphate	mg/l	5		0.07	0.11	0.16
32	Selenium		0.05		<0.005	<0.005	<0.005
33	Cadmium	mg/l	2		<0.02	<0.02	<0.02
34	Arsenic	mg/l	0.2		<0.01	<0.01	<0.01
35	Free Amonia	mg/l	5		Nil	0.53	Nil
36	Ammonical Nitrogen	mg/l	50		0.68	4.8	3.5
37	Total residual chlorine	mg/l	1		<0.1	<0.1	<0.1
38	colour	Hazen Units	Colourless		<5	<5	<5
39	Odor		Odourless		Agreeable	Agreeable	Agreeable
40	Particulate size of suspended solic	microns	---		3	<2	7
41	Particulate size of suspended solic	microns	---		Not Traceable	Not Traceable	4
42	Particulate size of suspended solic	microns	---		Not Traceable	Not Traceable	Not Traceable

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					January' 20			
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD 050 Discharge	Kunur Nala Upstream Near GGS 01	GGS 01 Discharge	Kunur Nala Downstream between EDH 58 & 64
1	pH at 27 C		5.5 to 9.0	5.5-9.0	8.16	7.53	8.2	8.16
2	Temperature	Deg C	---		23.7°C	19.8°C	25.3°C	23.2°C
3	Total Suspended Solids	mg/l	100	100	<2	<2	<2	30
4	Total Dissolved Solids	mg/l	---	2100	1264	550	1342	1442
5	Acidity as CaCO3	mg/l	---		4.8	30	4	4.8
6	Total Alkalinity as CaCO3	mg/l	---		437	246	491	310
7	Chloride as Chlorine	mg/l	---	600	396	207	412	510
8	Total Hardness	mg/l	---		44	99	32	67
9	Calcium	mg/l	---		11.1	25.4	6.3	15.8
10	Magnesium	mg/l	---		3.8	8.7	3.8	6.7
11	Biochemical Oxygen Demand	mg/l	30	30	<2	<2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5	<5	<5	<5
14	Phenolic Compounds (as C6H5OH)	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002
15	Sulphides (as S2) in mg/l	mg/l	2	2	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	1.8	0.63	1.95	0.95
17	Sodium	mg/l	---		415	190	392	496
18	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05
19	Zinc	mg/l	5		<0.01	<0.01	<0.01	0.016
20	Copper	mg/l	3		<0.05	<0.05	<0.05	<0.05
21	Nickel	mg/l	3		<0.05	<0.05	<0.05	<0.05
22	Lead	mg/l	0.1		<0.1	<0.1	<0.1	<0.1
23	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001
24	SAR		---		27.1	8.3	30.1	26.4

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					January' 20			
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD 050 Discharge	Kunur Nala Upstream Near GGS 01	GGS 01 Discharge	Kunur Nala Downstream between EDH 58 & 64
25	Electrical Conductivity at 25° C	µmhos/cm	---		1890	702	1980	2320
26	Cyanide	mg/l	---		<0.02	<0.02	<0.02	<0.02
27	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01
28	%Sodium		---		95.4	80.8	96.4	94.2
29	Vanadium	mg/l	0.2		<0.1	<0.1	<0.1	<0.1
30	Manganese	mg/l	2		<0.05	<0.05	<0.05	0.065
31	Dissolved Phosphate	mg/l	5		0.18	0.06	0.17	0.18
32	Selenium		0.05		<0.005	<0.005	<0.005	<0.005
33	Cadmium	mg/l	2		<0.02	<0.02	<0.02	<0.02
34	Arsenic	mg/l	0.2		<0.01	<0.01	<0.01	<0.01
35	Free Amonia	mg/l	5		0.2	0.04	0.25	0.15
36	Ammonical Nitrogen	mg/l	50		2.9	2.2	3.5	2.1
37	Total residual chlorine	mg/l	1		<0.1	<0.1	<0.1	<0.1
38	colour	Hazen Units	Colourless		<5	<5	<5	<5
39	Odor		Odourless		Agreeable	Agreeable	Agreeable	Agreeable
40	Particulate size of suspended solic	microns	---		<2	<2	<2	18
41	Particulate size of suspended solic	microns	---		Not Traceable	Not Traceable	Not Traceable	8
42	Particulate size of suspended solic	microns	---		Not Traceable	Not Traceable	Not Traceable	4

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					January' 20	February' 20		February' 20
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala downstream near Kuldiha Bridge	GGS 01 Discharge	EDD 050 Discharge	EDN 099 Discharge
1	pH at 27 C		5.5 to 9.0	5.5-9.0	7.25	8.13	8.11	7.11
2	Temperature	Deg C	---		23.3°C	27.9°C	26.5°C	27.1°C
3	Total Suspended Solids	mg/l	100	100	5	<2	<2	<2
4	Total Dissolved Solids	mg/l	---	2100	502	1466	1018	1386
5	Acidity as CaCO3	mg/l	---		38.5	Nil	Nil	24
6	Total Alkalinity as CaCO3	mg/l	---		215	425	303	385
7	Chloride as Chlorine	mg/l	---	600	162	560	315	495
8	Total Hardness	mg/l	---		158	43	24	99
9	Calcium	mg/l	---		39.6	9.5	4.8	22.2
10	Magnesium	mg/l	---		14.4	4.8	2.9	10.6
11	Biochemical Oxygen Demand	mg/l	30	30	<2	<2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5	<5	<5	<5
14	Phenolic Compounds (as C6H5OH)	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002
15	Sulphides (as S2) in mg/l	mg/l	2	2	<0.5	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	0.41	0.81	0.53	0.95
17	Sodium	mg/l	---		184	615	355	330
18	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05
19	Zinc	mg/l	5		0.01	0.011	<0.01	<0.01
20	Copper	mg/l	3		<0.05	<0.05	<0.05	<0.05
21	Nickel	mg/l	3		<0.05	<0.05	<0.05	<0.05
22	Lead	mg/l	0.1		<0.1	<0.1	<0.1	<0.1
23	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001
24	SAR		---		6.4	40.7	31.4	14.4

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					January' 20	February' 20		February' 20
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala downstream near Kuldiha Bridge	GGS 01 Discharge	EDD 050 Discharge	EDN 099 Discharge
25	Electrical Conductivity at 25° C	µmhos/cm	---		810	2110	1760	2130
26	Cyanide	mg/l	---		<0.02	<0.02	<0.02	<0.02
27	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01
28	%Sodium		---		71.8	99.2	97	87.9
29	Vanadium	mg/l	0.2		<0.1	<0.1	<0.1	<0.1
30	Manganese	mg/l	2		<0.05	<0.05	<0.05	<0.05
31	Dissolved Phosphate	mg/l	5		0.11	0.16	0.09	0.21
32	Selenium		0.05		<0.005	<0.005	<0.005	<0.005
33	Cadmium	mg/l	2		<0.02	<0.02	<0.02	<0.02
34	Arsenic	mg/l	0.2		<0.01	<0.01	<0.01	<0.01
35	Free Amonia	mg/l	5		0.02	0.12	0.11	Nil
36	Ammonical Nitrogen	mg/l	50		1.9	1.7	1.5	2.4
37	Total residual chlorine	mg/l	1		<0.1	<0.1	<0.1	<0.1
38	colour	Hazen Units	Colourless		<5	<5	<5	<5
39	Odor		Odourless		Agreeable	Agreeable	Agreeable	Agreeable
40	Particulate size of suspended solic	microns	---		3	<2	<2	<2
41	Particulate size of suspended solic	microns	---		2	Not Traceable	Not Traceable	Not Traceable
42	Particulate size of suspended solic	microns	---		Not Traceable	Not Traceable	Not Traceable	Not Traceable

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					February' 20		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala downstream near Kuldiha Bridge	Kunur Nala Upstream Near GGS 01	Kunur Nala Downstream between EDH 58 & 64
1	pH at 27 C		5.5 to 9.0	5.5-9.0	7.2	7.7	8.19
2	Temperature	Deg C	---		25.1°C	21.5°C	23.9°C
3	Total Suspended Solids	mg/l	100	100	3	<2	11
4	Total Dissolved Solids	mg/l	---	2100	798	498	2138
5	Acidity as CaCO3	mg/l	---		24	10	Nil
6	Total Alkalinity as CaCO3	mg/l	---		240	127	570
7	Chloride as Chlorine	mg/l	---	600	312	206	830
8	Total Hardness	mg/l	---		162	134	51
9	Calcium	mg/l	---		41.2	30.2	11.1
10	Magnesium	mg/l	---		14.4	14.4	5.8
11	Biochemical Oxygen Demand	mg/l	30	30	<2	<2	<2
12	Chemical Oxygen Demand	mg/l	250	100	<8	<8	<8
13	Oil & Grease	mg/l	10	10	<5	<5	<5
14	Phenolic Compounds (as C6H5OH)	mg/l	1	1.2	<0.002	<0.002	<0.002
15	Sulphides (as S2) in mg/l	mg/l	2	2	<0.5	<0.5	<0.5
16	Fluoride	mg/l	2	1.5	0.7	0.41	1.15
17	Sodium	mg/l	---		295	185	915
18	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05
19	Zinc	mg/l	5		<0.01	<0.01	0.017
20	Copper	mg/l	3		<0.05	<0.05	<0.05
21	Nickel	mg/l	3		<0.05	<0.05	<0.05
22	Lead	mg/l	0.1		<0.1	<0.1	<0.1
23	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001
24	SAR		---		10.1	6.9	55.7

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited

(Compliance Period: Oct'19 to Feb'20)

ANNEXURE IV A

Date					February' 20		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala downstream near Kuldiha Bridge	Kunur Nala Upstream Near GGS 01	Kunur Nala Downstream between EDH 58 & 64
25	Electrical Conductivity at 25° C	µmhos/cm	---		1150	760	2910
26	Cyanide	mg/l	---		<0.02	<0.02	<0.02
27	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01
28	%Sodium		---		79.9	75.5	97.5
29	Vanadium	mg/l	0.2		<0.1	<0.1	<0.1
30	Manganese	mg/l	2		<0.05	<0.05	<0.05
31	Dissolved Phosphate	mg/l	5		0.12	0.08	0.18
32	Selenium		0.05		<0.005	<0.005	<0.005
33	Cadmium	mg/l	2		<0.02	<0.02	<0.02
34	Arsenic	mg/l	0.2		<0.01	<0.01	<0.01
35	Free Amonia	mg/l	5		Nil	0.05	0.27
36	Ammonical Nitrogen	mg/l	50		2.1	1.8	3.4
37	Total residual chlorine	mg/l	1		<0.1	<0.1	<0.1
38	colour	Hazen Units	Colourless		<5	<5	<5
39	Odor		Odourless		Agreeable	Agreeable	Agreeable
40	Particulate size of suspended solic	microns	---		3	<2	7
41	Particulate size of suspended solic	microns	---		Not Traceable	Not Traceable	4
42	Particulate size of suspended solic	microns	---		Not Traceable	Not Traceable	<2

ANNEXURE V: Ground Water Analysis Report

(Compliance Period: Oct'19- Mar' 20)

Ground water analysis of surrounding areas of CBM Raniganj Project by Essar Oil Gas Exploration Production Ltd

Compliance Period: Oct'19 to Mar'20

ANNEXURE V

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Akandara	Dhabani	Bansia	Nachan	Kalikapur
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)					
1	pH at 27°C		6.5 to 8.5	No Relaxation	6.35	6.2	6.91	6.81	7.12
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	15	<2	12	<2
5	Total Dissolved Solids	mg/l	500	2000	54	12	322	352	298
6	Nitrate	mg/l	45	No Relaxation	<0.5	<0.5	<0.5	<0.5	<0.5
7	Total Alkalinity (as $CaCO_3$)	mg/l	200	600	32.8	92	194	220	161
8	Chloride	mg/l	250	1000	14	25	35	86	64
9	Total Hardness (as $CaCO_3$)	mg/l	200	600	31.7	83.2	182.2	217.8	158.4
10	Sulphate	mg/l	200	400	<2.5	4	6.7	6.5	5
11	Calcium	mg/l	75	200	7.9	20.6	47.6	60.3	38.1
12	Magnesium	mg/l	30	100	2.9	7.7	15.4	16.4	15.4
13	Anionic Detergents (as MBAS)	mg/l	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1
14	Mineral Oil	mg/l	0.5	No Relaxation	<1	<1	<1	<1	<1
15	Phenolic Compounds (as C_6H_5OH)	mg/l	0.001	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Fluoride	mg/l	1	1.5	0.37	0.45	0.61	0.41	0.33
17	Residual Free Chlorine	mg/l	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1
18	Iron	mg/l	0.3	No Relaxation	<0.1	1.75	<0.1	1.8	<0.1
19	Sodium	mg/l	---	---	7	12	25	42	32
20	Total Chromium	mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	5	15	<0.01	<0.01	<0.01	<0.01	<0.01
22	Copper	mg/l	0.05	1.5	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l	0.02	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05
24	Arsenic	mg/l	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	No Relaxation	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001

Ground water analysis of surrounding areas of CBM Raniganj Project by Essar Oil Gas Exploration Production Ltd

Compliance Period: Oct'19 to Mar'20

ANNEXURE V

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Akandara	Dhabani	Bansia	Nachan	Kalikapur
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)					
27	Boron	mg/l	0.5	1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
29	Potassium	mg/l	---	---	<1	2	3	2	2
30	Aluminium	mg/l	0.03	0.2	<0.01	<0.01	<0.01	<0.01	<0.01
31	Manganese	mg/l	0.1	0.3	<0.05	<0.05	<0.05	<0.05	<0.05
32	Selenium	mg/l	0.01	No Relaxation	<0.005	<0.005	<0.005	<0.005	<0.005
33	Cadmium	mg/l	0.003	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02
34	Cyanide	mg/l	0.05	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02
35	Electrical Conductivity at 25° C	us/cm	---	---	82	196	525	540	430
36	Hexavalent Chromium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
37	Total Coliform	MPN/100ml	---	---	2	4	<1	4	<1

Ground water analysis of surrounding areas of CBM Raniganj Project by Essar Oil Gas Exploration Production Ltd
Compliance Period: Oct'19 to Mar'20

ANNEXURE V

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Bargoria	Kantaberia	Jatgoria	Saraswatiganj	Gopalpur
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)					
1	pH at 27°C		6.5 to 8.5	No Relaxation	6.3	6.71	7.12	6.45	6.28
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	---	---	4	212	2	35	<2
5	Total Dissolved Solids	mg/l	500	2000	48	120	104	98	228
6	Nitrate	mg/l	45	No Relaxation	<0.5	<0.5	<0.5	<0.5	<0.5
7	Total Alkalinity (as $CaCO_3$)	mg/l	200	600	31	43	54	50	14.8
8	Chloride	mg/l	250	1000	10	24	22	28	82.6
9	Total Hardness (as $CaCO_3$)	mg/l	200	600	43.5	23.8	51.5	47.5	83.1
10	Sulphate	mg/l	200	400	<2.5	5	6.2	4.7	8
11	Calcium	mg/l	75	200	9.5	6.3	12.7	11.1	33.3
12	Magnesium	mg/l	30	100	4.8	1.9	4.8	4.8	7.7
13	Anionic Detergents (as MBAS)	mg/l	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1
14	Mineral Oil	mg/l	0.5	No Relaxation	<1	<1	<1	<1	<1
15	Phenolic Compounds (as C_6H_5OH)	mg/l	0.001	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
16	Fluoride	mg/l	1	1.5	0.2	0.19	0.1	0.12	0.26
17	Residual Free Chlorine	mg/l	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1
18	Iron	mg/l	0.3	No Relaxation	0.52	55.5	0.8	9	0.33
19	Sodium	mg/l	---	---	4	11	14	12	64
20	Total Chromium	mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	5	15	<0.01	<0.01	<0.01	<0.01	<0.01
22	Copper	mg/l	0.05	1.5	<0.05	<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l	0.02	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05
24	Arsenic	mg/l	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	0.01	No Relaxation	<0.1	<0.1	<0.1	<0.1	<0.1
26	Mercury	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001

Ground water analysis of surrounding areas of CBM Raniganj Project by Essar Oil Gas Exploration Production Ltd

Compliance Period: Oct'19 to Mar'20

ANNEXURE V

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Bargoria	Kantaberia	Jatgoria	Saraswatiganj	Gopalpur
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)					
27	Boron	mg/l	0.5	1	<1	<1	<1	<1	<1
28	Phosphorus	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
29	Potassium	mg/l	---	---	<1	<1	<1	<1	3
30	Aluminium	mg/l	0.03	0.2	<0.01	<0.01	<0.01	<0.01	<0.01
31	Manganese	mg/l	0.1	0.3	<0.05	0.186	<0.05	0.075	<0.05
32	Selenium	mg/l	0.01	No Relaxation	<0.005	<0.005	<0.005	<0.005	<0.005
33	Cadmium	mg/l	0.003	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02
34	Cyanide	mg/l	0.05	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02
35	Electrical Conductivity at 25° C	us/cm	---	---	60	175	148	135	350
36	Hexavalent Chromium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
37	Total Coliform	MPN/100ml	---	---	2	4	<1	2	<1

Ground water analysis of surrounding areas of CBM Raniganj Project by Essar Oil Gas Exploration Production Ltd

Compliance Period: Oct'19 to Mar'20

ANNEXURE V

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Sarenga	Ghatakdanga
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)		
1	pH at 27°C		6.5 to 8.5	No Relaxation	6.35	6.1
2	Colour in Hazen unit		5	15	<5	<5
3	Odour		Agreeable	Agreeable	Agreeable	Agreeable
4	Total Suspended Solids	mg/l	---	---	2	4
5	Total Dissolved Solids	mg/l	500	2000	316	48
6	Nitrate	mg/l	45	No Relaxation	<0.5	<0.5
7	Total Alkalinity (as $CaCO_3$)	mg/l	200	600	96.1	11.1
8	Chloride	mg/l	250	1000	38.3	12.1
9	Total Hardness (as $CaCO_3$)	mg/l	200	600	71.3	39.6
10	Sulphate	mg/l	200	400	7.1	<2.5
11	Calcium	mg/l	75	200	17.5	15.8
12	Magnesium	mg/l	30	100	6.7	3.8
13	Anionic Detergents (as MBAS)	mg/l	0.2	1	<0.1	<0.1
14	Mineral Oil	mg/l	0.5	No Relaxation	<1	<1
15	Phenolic Compounds (as C_6H_5OH)	mg/l	0.001	0.002	<0.002	<0.002
16	Fluoride	mg/l	1	1.5	0.2	<0.05
17	Residual Free Chlorine	mg/l	0.2	1	<0.1	<0.1
18	Iron	mg/l	0.3	No Relaxation	0.41	0.68
19	Sodium	mg/l	---	---	25	7
20	Total Chromium	mg/l	0.05	No Relaxation	<0.05	<0.05
21	Zinc	mg/l	5	15	<0.01	<0.01
22	Copper	mg/l	0.05	1.5	<0.05	<0.05
23	Nickel	mg/l	0.02	No Relaxation	<0.05	<0.05
24	Arsenic	mg/l	0.01	0.05	<0.01	<0.01
25	Lead	mg/l	0.01	No Relaxation	<0.1	<0.1
26	Mercury	mg/l	0.001	No Relaxation	<0.001	<0.001

Ground water analysis of surrounding areas of CBM Raniganj Project by Essar Oil Gas Exploration Production Ltd

Compliance Period: Oct'19 to Mar'20

ANNEXURE V

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Sarenga	Ghatakdanga
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)		
27	Boron	mg/l	0.5	1	<1	<1
28	Phosphorus	mg/l	---	---	<0.01	<0.01
29	Potassium	mg/l	---	---	3	<1
30	Aluminium	mg/l	0.03	0.2	<0.01	<0.01
31	Manganese	mg/l	0.1	0.3	<0.05	<0.05
32	Selenium	mg/l	0.01	No Relaxation	<0.005	<0.005
33	Cadmium	mg/l	0.003	No Relaxation	<0.02	<0.02
34	Cyanide	mg/l	0.05	No Relaxation	<0.02	<0.02
35	Electrical Conductivity at 25° C	us/cm	---	---	320	85
36	Hexavalent Chromium	mg/l	---	---	<0.01	<0.01
37	Total Coliform	MPN/100ml	---	---	<1	2

ANNEXURE VI: Land Subsidence Study Report

(Compliance Period: July' 19)

FOURTH (FINAL) PHASE

REPORT

ON

Land Subsidence Study at ESSAR Raniganj CBM Block at Durgapur

[RG (E) –CBM-2001/1 Block]

FOR

ESSAR OIL LTD. (E&P DIVISION)

PREPARED BY

DEPARTMENT OF EARTH AND ENVIRONMENTAL STUDIES

NATIONAL INSTITUTE OF TECHNOLOGY

DURGAPUR- 713209

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OCTOBER 2019

FOURTH (FINAL) PHASE

REPORT

ON

Land Subsidence Study at ESSAR Raniganj CBM Block at Durgapur

[RG (E) –CBM-2001/1 Block]

FOR

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OCTOBER 2019

Table of Contents

IMPORTANT TERMS

- **Base Station:** A base station is a receiver placed at a known point on a job site that tracks the same satellites as an RTK rover, and provides a real-time differential correction message stream through radio to their Rover, to obtain centimeter level positions on a continuous real-time basis. A base station can also be a part of a virtual reference station network, or a location at which GPS observations are collected over a period of time, for subsequent post processing to obtain the most accurate position for the location.
- **RINEX (Receiver Independent Exchange Format):** RINEX is the standard format that allows the management and disposal of the measures generated by a receiver, as well as their off-line processing by a multitude of applications, whatever the manufacturer of both the receiver and the computer application.

- **Rover:** A rover is any mobile GPS receiver that is used to collect or update data in the field, typically at an unknown location.
- **WGS84 (World Geodetic System):** A geodetic datum is the tool used to define the shape and size of the earth, as well as the reference point for the various coordinate systems used in mapping the earth. All GPS coordinates are based on theWGS-84 datum surface.

- **Coordinate systems: -** Aligning geographic data to a known coordinate system so it can be viewed, queried, and analyzed with other geographic data. Geo-referencing may involve shifting, rotating, scaling, skewing, and in some cases warping, rubber sheeting, or ortho-rectifying the data.

ABBREVIATIONS

PCP : Primary control points.

DGPS : Differential Global Positioning System.

RTK : Real Time Kinematic mode.

ETS : Electronic Total station.

RINEX : Receiver Independent Exchange Format

UTM : Universal Transverse Mercator

GIS : Geographical Information System

GCP : Ground Control Point.

1. Introduction:

Essar Oil Limited (EOL) was awarded block RG (East)-CBM-2001/1 covering an area of approx. 500 sq km under the CBM-I Round, contract signed on 26th July 2002. EOL holds 100% participating interest in the block. The Petroleum Exploration License (PEL) was issued by the Government of West Bengal on 29th March 2005.

The Ministry of Environment & Forests (MoEF) granted Environment Clearance for drilling 650 development cum production wells, laying 8 Gas Gathering Stations, 1 Main Compressor Station and pipeline vide F.No.J-11011/491/2011-IA II(I) dated 26th February, 2013.

It was further suggested by MoEF to get the land subsidence study carried out by an institute of repute. In view of above, it was requested by ESSAR to Department of Earth and Environmental Studies, National Institute of Technology (NIT) Durgapur for carrying out land subsidence study on prefixed control stations (vertical concrete pillars) at RG (E) –CBM-2001/1 block. Project work order was awarded to the Department of Earth and Environmental Studies, NIT Durgapur for a period of two years with half yearly frequency subsidence monitoring to all established monitoring stations. Accordingly, a visit was made by the Investigators for reconnaissance study of the site in the month of June 2016. During the study, it was observed that few controlling stations are in damaged conditions. However, first, second and third phase monitoring work was executed in the mid of June, 2016, mid of January 2017 and first week of February, 2019. Fourth phase monitoring work was executed in the last week of July, 2019.

A brief report was prepared based on the data obtained from the site.

This report mainly consists of the following

- A brief description of the Essar CBM Block, RG (East)-CBM-2001/1
- Details of locations of monitoring stations over the surface of the CBM block, RG (East)-CBM-2001/1
- Methodology adopted for subsidence study through DGPS observation.
- Plot of ground elevation of the control stations.

2. Location and Accessibility:

Block: RG (East)-CBM-2001/1 covers an area of 500 sq.km. (Approximately) and is located in the eastern-most part of the Raniganj Coalfield. It falls largely in Bardhaman district (90%), West Bengal. The block is bounded by Latitude 23021'45" and 23041'12" N and Longitude: 87014'40" and 87028'46" E. It lies in the Survey of India Topographical Sheet Nos. 73 M/2, M/3, M/6 & M/7 (1:50,000).

3. Development of subsidence

Coal seam gas production often involves the extraction of groundwater to facilitate depressurization of the target coal seam. The disposal or reuse of this collected water is an area of great public interest, as depressurization results in compaction of the ground and leads to settlement of the ground surface (surface subsidence). The reduction in pore pressure eventually promotes compaction of the geological units due to superincumbent load. In addition, the liberation of gas from coal seams results in compaction of the coal. Subsidence at the ground surface is some component of the total compaction occurring within (potentially) multiple geological units. It is dependent on the magnitude and direction of compression (which is dictated by pressure changes from groundwater withdrawal and desorption of gas from coal seams), the depth and depth-interval over which compression occurs, and the geotechnical properties of the geological units throughout the depth profile.

1. Impacts of subsidence

Land subsidence may affect a variety of assets, including infrastructure (such as buildings, roads, railways, pipelines, dams, water channels, levees and electrical infrastructure) and environmental assets (such as aquifers, groundwater dependent ecosystems, streams, lakes, springs, and other surface water resources). Impacts of subsidence on infrastructure could include structural damage to buildings, buried pipes and sewers, and reduction in stability of buildings and electrical transmission lines and towers/poles. The serviceability of roads and railways may be affected by distortion of the road surface and rail foundation. Depressions in the ground surface due to subsidence may increase exposure to flooding, overflowing levees

or storm surges in areas near the coast. Impacts of subsidence on environmental assets could include the formation of ground fissures and partial or complete loss of surface water drainage to deeper strata, stream bed and bank erosion, development of subsidence troughs and ponding of water, disruption to hillside groundwater springs and sensitive wetlands or swamps, and potential shearing of groundwater supply wells.

2. Instruments:

Detail of DGPS used is given below

1. **DGPS (Leica Make) GNSS, GPS/GLONASS/GALILEO with Triple frequency RTK receiver.**

GPS1200+ is loaded with a multitude of features and functions to meet the many different needs of users all over the world, yet it is remarkably easy to use.

GPS1200+ receivers: GX1230+ GNSS/ ATX1230+ GNSS

- Triple frequency
- GPS/ GLONASS/ Galileo/ Compass[1]
- 120 Channels
- L1/L2/L5 GPS
- L1/L2 GLONASS
- E1/ E5a/ E5b /Alt-BOC Galileo
- 4 SBAS
- Full Real Time RTK
- Use as rover or reference

Base:
-GX1230 GPS L1/L2 Receiver
-RX1210 Terminal
-AX1202 GPS L1/L2 Antenna w/ Cable
-Leica Pro Tribrach w/ Optical Plummet
-GRT144 Carrier w/ Stub and Quick Change Adapter

-Pacific Crest PDL Radio 35w, 450-470MHz w/ 1/4 Wave Antenna, Power/Data Cable, and Pelican Case.
-32MB Industrial CF Memory Card
-Leica Power Cable w/ Car Battery Adapter
-GZS4-1 Height Hook

Rover:

-RX1250X GPS Data Collector, Smartworx v8.50. Ext. OWI key. GLONASS ready.
-ATX1230 GG GNSS Antenna w/ Bluetooth
-GHT56 GFU Cradle w/ Rod Clamp
-GFU15-2 PDL Radio, 450-470MHz w/ Antenna
-GKL211 Charger
-GEB221 Battery (New Aftermarket)
-3 x GEB211 Battery (New Aftermarket)
-32MB Industrial CF Memory Card
-USB CF Multi Card Reader (New)

2. Prismatic Compass with all standard accessories.

A prismatic compass is a navigation and surveying instrument which is extensively used for determining course, waypoints (an endpoint of the leg of a course) and direction, and for calculating bearings of survey lines and included angles between them. Compass surveying is a type of surveying in which the directions of surveying lines are determined with a magnetic compass, and the length of the surveying lines are measured with a tape or chain or laser range finder. The compass is generally used to run a traverse line. The compass calculates bearings of lines with respect to magnetic north. The included angles can then be calculated using suitable formulas in case of clockwise and anti-clockwise traverse respectively. For each survey line in the traverse, surveyors take two bearings that is fore bearing and back bearing which should exactly differ by 180° if local attraction is negligible. The name Prismatic compass is given to it because it essentially consists of a prism which is used for taking observations more accurately.

3. Procedure:

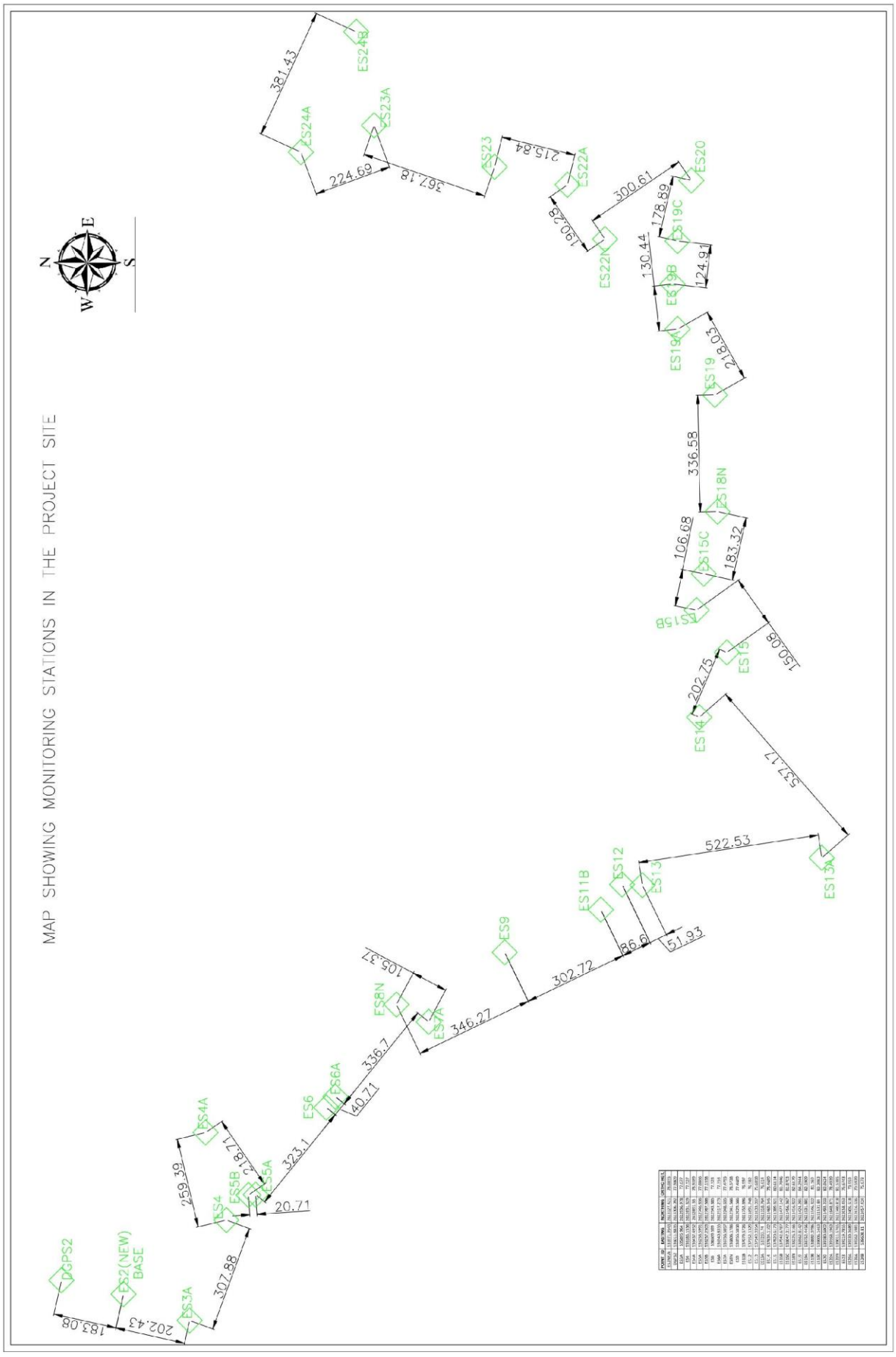
Survey work conducted from one DGPS Control Pillar to another control pillar by using DGPS.

The phase-wise subsidence monitoring studies were conducted by measuring the ground elevation of all pre-established permanent control stations near the well locations at the project site. The coordinates (X, Y, Z) of the stations were also checked. These control stations were found established by embedding and casting concrete pillars in the ground to a depth of at least 0.5 meters. At the time of survey we found few control points are partly or completely damaged. At some well locations, existing concrete foundation blocks were selected and control points were marked on the block using the appropriate markers. Table 1 exhibits the identification marks, corresponding Station ID and present status of the control points.

Control station details:

Station no.	Location details	Present Status
DGPS1	BENCH MARK. BARREN LAND NEAR GGS-1	Completely Damage
DGPS2	CULVERT OPPOSITE TO SCHOOL	Under Tree Cover
ES2 (NEW)	CONCRETE PILLAR NEAR GGS-1 ENTRANCE OLD SECURITY ROOM	Treated as New Base
ES3A	CONCRETE SMALL PILLAR NEAR SECURITY ROOM AT EDD009	Repaired after third phase
ES4	CONCRETE SMALL PILLAR NEAR SECURITY ROOM AT EDD011	Ok
ES4A	CONCRETE SMALL PILLAR NEAR SECURITY ROOM AT EDD006	Ok
ES5B	CONCRETE PILLAR NEAR WATER TANK AT EDD011	Under High Voltage Electrical Line
ES5A	PAINT MARK ON EXISTING FOUNDATION NEAR DG SET AT EDD011	Ok
ES6	ANCHOR PILLAR NEAR WATER POND AT EDD010	On a hanging clump
ES6A	CONCRETE PILLAR NEAR BOUNDARY AT EDD010	Ok
ES7A	CONCRETE PILLAR NEAR BOUNDARY & GATE AT EDD003	Under Dense Tree Cover
ES8N	PAINT MARK ON EXISTING FOUNDATION OF EARTH PROTECTOR PIPE NEAR ROAD SIDE TOWARDS EDD003	Ok
ES9	CONCRETE SMALL PILLAR NEAR BOUNDARY AT ROAD SIDE NEAR NEAM TREE	Under Tree Cover
ES10N	NAIL ON ROAD SIDE NEAR TEMPLE & BEDI	Missing
ES11 (NEW)	SURVEY PEG WITH NAIL AT ROAD SIDE NEAR TRANSFORMER	Missing
ES11B	KM MILESTONE PILLAR ROADSIDE LEADING TO KANTABERIA	Ok
ES12	BROKEN CONCRETE PILLAR AT ROAD SIDE NEAR ENTRY EDD004 (R/S)	Complete tilted pillar
ES13	EDD004	Ok
ES13A	EDD026	New constructed Pillar shifted to nearest location
ES14	EDD012	Ok

Station no.	Location details	Present Status
ES15	ROAD SIDE CULVERT	Almost Damaged
ES15A(NEW)	KM MILESTONE PILLAR ROADSIDE KANTABERIA CHOWK	Cancelled
ES15B	ROAD SIDE RIGHT HAND CULVERT AFTER KANTABERIA CHOWK	Almost Damaged
ES15C	ROAD SIDE KM MILE STONE AFTER KANTABERIA CHOWK	Under Tree Cover
ES18N	NEAR BOUNDARY WALL OF PLAYGROUND AFTER KANTABERIA CHOWK	Ok
ES19	EDD008	Ok
ES19A	PAINT MARK ON FOUNDATION OF PIPE LINE SIGN BOARD RIGHT SIDE ROAD AFTER EDD008	Almost Not Visible
ES19B	PAINT MARK ON FOUNDATION OF EARTH PROTECTOR RIGHT SIDE ROAD AFTER EDD008	Almost Not Visible
ES19C	PAINT MARK ON KM MILE STONE RIGHT SIDE ROAD AFTER EDD008	Ok
ES20	EDD005	Ok
ES22N	IN FRONT OF EDD013 ON HIGH MOUND GROUND NEAR TEMPORARY SHED	Ok
ES22A	LEFT SIDE CULVERT NEAR WATER SETLING POND AFTER EDD013	Ok
ES23	EDD002	Ok
ES23A	CONCRETE PILLAR LEFT SIDE OF ROAD AFTER EDD002, BARREN LAND	Ok
ES24A	EDD018	Ok
ES24B	EDD025	New constructed pillar


MAP SHOWING MONITORING STATIONS IN THE PROJECT SITE
N
E
S
W
DGPS2
ES2(NEW) BASE
ES3A
ES4
ES4A
ES5A
ES5B
ES6
ES6A
ES7
ES8N
ES9
ES11B
ES12
ES13
ES13A
ES14
ES15
ES15B
ES15C
ES18N
ES19
ES19A
ES19B
ES19C
ES20
ES22A
ES22N
ES23
ES23A
ES24A
ES24B
183.08
202.43
307.88
259.39
20.71
323.1
40.71
336.7
105.37
346.27
302.72
86.6
51.93
522.53
527.17
202.75
150.08
183.32
106.68
336.58
218.03
124.91
178.89
130.44
300.61
190.29
215.84
367.18
224.69
381.43

4. Results:

The R.L. (Elevation Z) as observed during the Third Phase (III) & Forth phase (IV) at the established control stations surrounding the well locations [ES2 (new) to ES24B] are given in Table 3, Table 4 respectively and Fig. 2. The photographs of subsidence monitoring study conducted at RG (East) CBM block are given in Annexure-1.

Table 3: Total Latitude, longitude and ground elevation at the control stations during February 2019

SL NO.	POINT_ID	TYPE	EASTING	NORTHING	ORTHO HEIGHT
1	ES2NEW	Reference	535971.9543	2613127.421	78.0855
2	DGPS2	Measured	536011.8835	2613306.092	77.9812
3	ES3A	Measured	535895.964	2612936.978	77.1294
4	ES4	Measured	536185.1536	2612831.329	77.5271
5	ES6	Measured	536509.599	2612543.385	77.3298
6	ES5A	Measured	536258.5991	2612746.836	77.0865
7	ES5B	Measured	536257.2503	2612767.506	77.1344
8	ES6A	Measured	536540.8355	2612517.273	77.3532
9	ES4A	Measured	536437.4952	2612891.38	78.9292
10	ES11B	Measured	537079.5726	2611752.896	76.9967
11	ES7A	Measured	536756.5057	2612248.635	77.4838
12	ES13	Measured	537149.9354	2611633.037	75.686
13	ES12	Measured	537152.1329	2611691.748	76.6908
14	ES14	Measured	537634.1102	2611469.345	78.4697
15	ES15A	Measured	537860.2241	2611474.448	80.9516
16	ES15	Measured	537820.6173	2611389.821	80.6117
17	ES15B	Measured	537942.6787	2611477.142	81.7059
18	ES15C	Measured	538047.3177	2611456.367	81.8705
19	ES18N	Measured	538226.3166	2611416.822	82.6185
20	ES19	Measured	538562.8142	2611424.201	84.2948
21	ES19A	Measured	538752.4456	2611531.801	82.1911
22	ES20	Measured	539180.6002	2611492.233	82.0627
23	ES19C	Measured	539006.1463	2611531.84	82.2092
24	ES22N	Measured	539011.5765	2611740.818	81.5396
25	ES22A	Measured	539168.1963	2611848.871	78.4946
26	ES24B	Measured	539608.81	2612457.424	75.6738
27	ES23	Measured	539219.7855	2612058.453	76.6745
28	ES24A	Measured	539262.1981	2612616.636	70.5945
29	ES23A	Measured	539339.3689	2612405.618	73.96
30	ES19B	Measured	538882.0786	2611546.322	81.2674
31	ES13A	Measured	537233.7395	2611118.764	76.7189
32	ES9	Measured	536956.5858	2612029.666	77.4691
33	ES8N	Measured	536806.1786	2612341.566	78.5734

Table 4: Total Latitude, longitude and ground elevation at the control stations during July 2019

POINT_ID	EASTING	NORTHING	ORTHO HEIGHT
ES2NEW	535971.9543	2613127.421	78.0855
DGPS2	536011.8835	2613306.092	77.9809
ES3A	535895.964	2612936.978	77.0770
ES4	536185.1536	2612831.329	77.5270
ES4A	536437.4952	2612891.38	78.9289
ES5A	536258.5991	2612746.836	77.0866
ES5B	536257.2503	2612767.506	77.1338
ES6	536509.599	2612543.385	77.3280
ES6A	536540.8355	2612517.273	77.3530
ES7A	536756.5057	2612248.635	77.4795
ES8N	536806.1786	2612341.566	78.5728
ES9	536956.5858	2612029.666	77.4689
ES11B	537079.5726	2611752.896	76.9970
ES12	537152.1329	2611691.748	76.5820
ES13	537149.9354	2611633.037	75.6858
ES13A	537233.74	2611118.764	76.6140
ES14	537634.1102	2611469.345	78.4689
ES15	537820.6173	2611389.821	80.6114
ES15B	537942.6787	2611477.142	81.7046
ES15C	538047.3177	2611456.367	81.8703
ES18N	538226.3166	2611416.822	82.6179
ES19	538562.8142	2611424.201	84.2944
ES19A	538752.4456	2611531.801	82.1909
ES19B	538882.0786	2611546.322	81.1690
ES19C	539006.1463	2611531.84	82.2082
ES20	539180.6002	2611492.233	82.0624
ES22A	539168.1963	2611848.871	78.4939
ES22N	539011.5765	2611740.818	81.5385
ES23	539219.7855	2612058.453	76.6743
ES23A	539339.3689	2612405.618	73.9590
ES24A	539262.1981	2612616.636	70.5929
ES24B	539608.81	2612457.424	75.6730

Table 4.1: Comparisons of measured ground elevation at the control stations during February 2019 vs. July 2019

SL. NO	POINT_ID	TYPE	EASTING	NORTHING	ORTHO HEIGHT		DIFFERENCE	REMARKS
					FEBRUARY,19	JULY,19		
1	ES2NEW	Reference	535971.9543	2613127.421	78.0855	78.0855	0.000	
2	DGPS2	Measured	536011.8835	2613306.092	77.9812	77.9809	0.000	
3	ES3A	Measured	535895.964	2612936.978	77.1294	77.077	0.052	THE PILLAR REPAIRED AFTER THIRD PHASE SURVEY
4	ES4	Measured	536185.1536	2612831.329	77.5271	77.527	0.000	
5	ES6	Measured	536509.599	2612543.385	77.3298	77.328	0.002	
6	ES5A	Measured	536258.5991	2612746.836	77.0865	77.0866	0.000	
7	ES5B	Measured	536257.2503	2612767.506	77.1344	77.1338	0.001	
8	ES6A	Measured	536540.8355	2612517.273	77.3532	77.353	0.000	
9	ES4A	Measured	536437.4952	2612891.38	78.9292	78.9289	0.000	
10	ES11B	Measured	537079.5726	2611752.896	76.9967	76.997	0.000	
11	ES7A	Measured	536756.5057	2612248.635	77.4838	77.4795	0.004	
12	ES13	Measured	537149.9354	2611633.037	75.686	75.6858	0.000	
13	ES12	Measured	537152.1329	2611691.748	76.6908	76.582	0.109	COMPLETE TILLTED PILLAR
14	ES14	Measured	537634.1102	2611469.345	78.4697	78.4689	0.001	
15	ES15	Measured	537820.6173	2611389.821	80.6117	80.6114	0.000	
16	ES15B	Measured	537942.6787	2611477.142	81.7059	81.7046	0.001	
17	ES15C	Measured	538047.3177	2611456.367	81.8705	81.8703	0.000	
18	ES18N	Measured	538226.3166	2611416.822	82.6185	82.6179	0.001	
19	ES19	Measured	538562.8142	2611424.201	84.2948	84.2944	0.000	
20	ES19A	Measured	538752.4456	2611531.801	82.1911	82.1909	0.000	
21	ES20	Measured	539180.6002	2611492.233	82.0627	82.0624	0.000	
22	ES19C	Measured	539006.1463	2611531.84	82.2092	82.2082	0.001	
23	ES22N	Measured	539011.5765	2611740.818	81.5396	81.5385	0.001	
24	ES22A	Measured	539168.1963	2611848.871	78.4946	78.4939	0.001	
25	ES24B	Measured	539608.81	2612457.424	75.6738	75.673	0.001	
26	ES23	Measured	539219.7855	2612058.453	76.6745	76.6743	0.000	
27	ES24A	Measured	539262.1981	2612616.636	70.5945	70.5929	0.002	
28	ES23A	Measured	539339.3689	2612405.618	73.96	73.959	0.001	
29	ES19B	Measured	538882.0786	2611546.322	81.2674	81.169	0.098	

SL. NO	POINT_ID	TYPE	EASTING	NORTHING	ORTHO HEIGHT		DIFFERENCE	REMARKS
					FEBRUARY,19	JULY,19		
30	ES13A	Measured	537233.740	2611118.764	76.719	76.614	0.105	THE PILLAR CONSTRUCTED AFTER THIRD PHASE SURVEY
31	ES9	Measured	536956.5858	2612029.666	77.4691	77.4689	0.000	
32	ES8N	Measured	536806.1786	2612341.566	78.5734	78.5728	0.001	

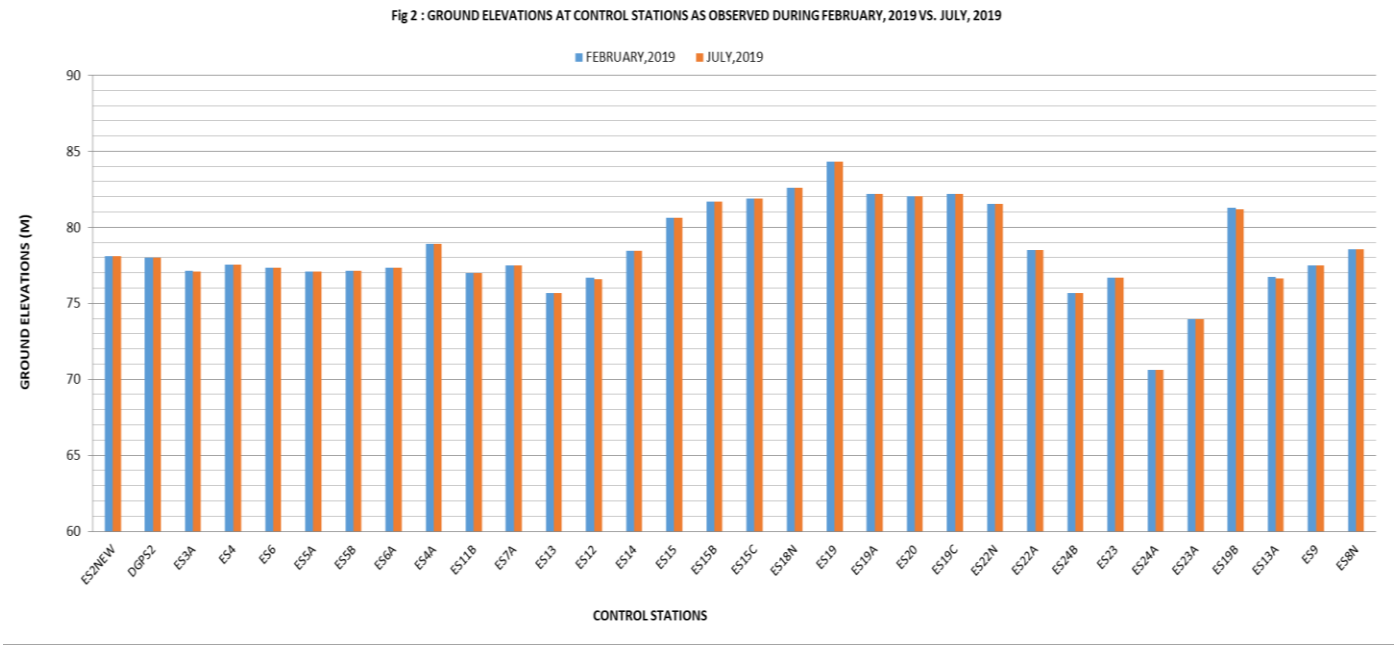


Fig.2: Ground elevations at control stations as observed during April, 2019 and October, 2019

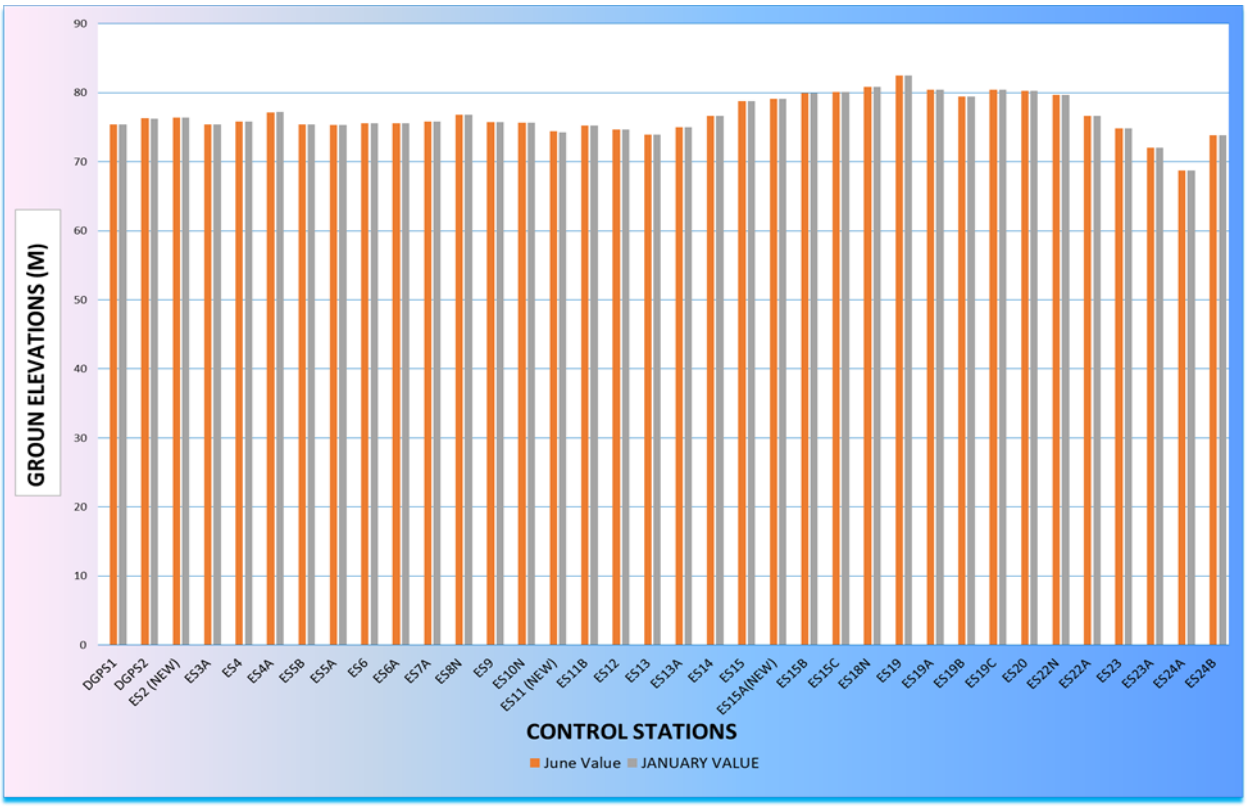


Fig.3: Ground elevations at control stations as observed during June 2016 vs. January 2017

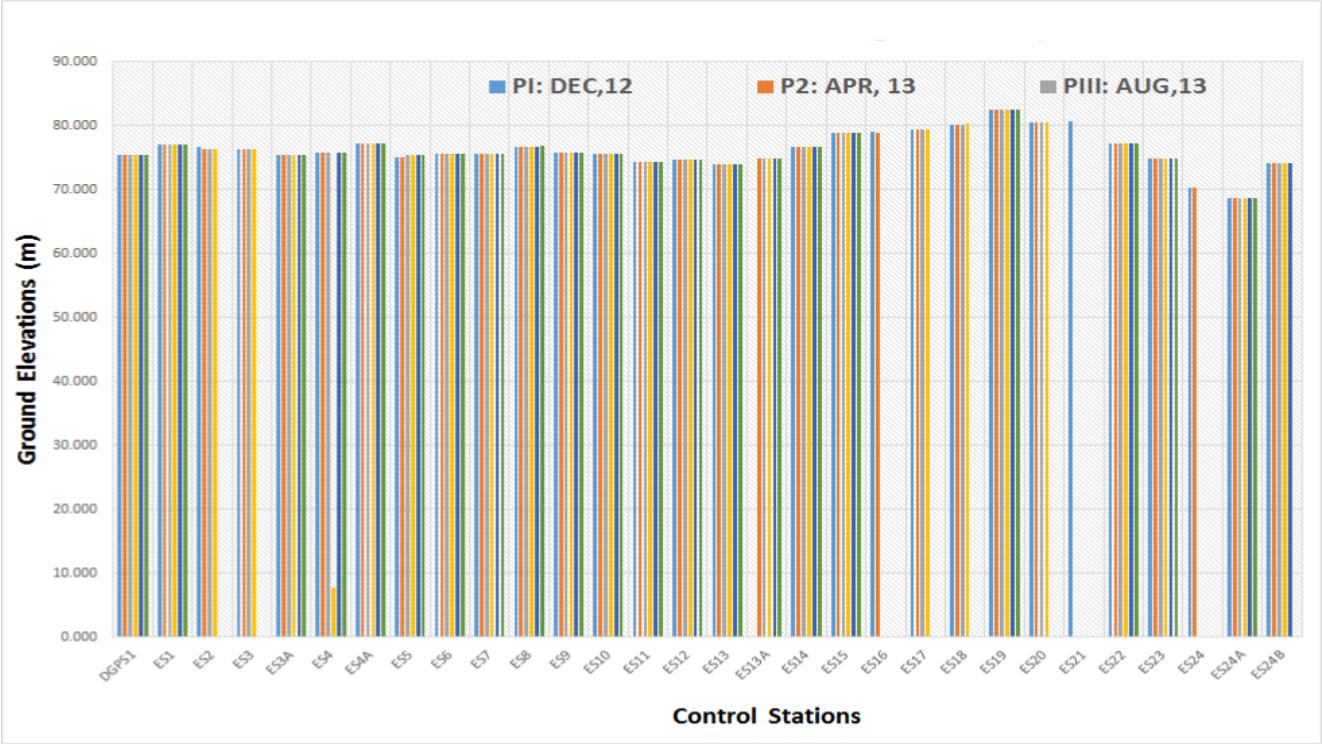


Fig.4.: Ground elevation at ESSAR Raniganj CBM Block during Dec,12 to May,15. Source : as per report of Department of Mining Engineering, Indian School of Mines, Dhanbad supplied by Essar Oil Limited (EOL).

Conclusion & Recommendation:

The R.Ls. (Elevation) of all the survey control points were measured during the present phases of subsidence survey with DGPS instrument in order to periodically monitor the ground subsidence in the area due to compaction and collapse of overlying litho units as a result of continuous withdrawal of CBM gases. During the subsidence monitoring for nearing two and half years (December 2012 – May 2015) at CBM block conducted by Department of Mining Engineering, Indian School of Mines, Dhanbad and the studies (June 2016- October 2019) performed by National Institute of Technology Durgapur, no active subsidence were observed at the stations close to the sites of CBM Gas well, plants as well as at places of habitats.

The established control stations should be preserved carefully without causing any ground disturbance at the surroundings. However, during the study at the site, it was observed that few control stations were either disturbed or removed/broken. Therefore, suitable precautionary measures should be taken to preserve the survey stations from any external disturbances. A very careful preservation of control stations are required because subsidence study is a long term study and comparison of time series elevation data of each control station will depict the occurrence of subsidence, if any. Proper fencing arrangements surrounding the control stations along with sign boards displaying names/numbers of subsidence monitoring stations with their elevations are recommended to be provided at control stations. The already disturbed control stations are to be repaired prior to next phase of the monitoring study. It is further recommended that the control stations which are under tree cover should be free from cover so that transmission of signals to and from DGPS does not get hampered.

9. Deliverables:

- ✓ Text report - Text report explaining the procedure adopted for DGPS survey.
- ✓ Tabulated reading of the DGPS (in UTM and Ortho Heights).

10. Site Photographs:

Plate 1: Subsidence monitoring station at ES5A

Plate 2: Subsidence monitoring station at ES5B

Plate 3: Subsidence monitoring station at ES15C

Plate 4: Subsidence monitoring station at ES19

Plate 5: Subsidence monitoring station at ES19B

Plate 6: Subsidence monitoring station at ES23

Plate 7: Subsidence monitoring station at ES15B

Plate 8: Subsidence monitoring station at ES19C

ANNEXURE VII: Corporate Environmental Policy

ANNEXURE VII

ESSAR
OIL & GAS

Essar Oil and Gas Exploration and Production Limited

Environmental Policy

Our Vision

To foster sustainable development by managing our business in a way that demonstrates our commitment for environmental protection.

Our Mission

To integrate environmental protection and sustainable development measures in all spheres of our business in order to strive for their continual improvement.

Our Values

- To take steps for minimizing environmental footprint of our operations and services on the environment by adopting best practices.
- To comply with all applicable national environmental acts, rules, regulations, notifications and guidelines.
- To conserve resource by embedding necessary controls and practices into the management systems.
- To put in place and implement necessary management systems and processes for environment protection.
- To impart adequate training to our employees and contractors for ensuring compliance to environmental norms.
- To develop partnerships with local communities and relevant organizations in implementing environment improvement measures in the neighborhood of our operations.
- To communicate this policy to all our employees, associates and make available to other stakeholders.

We believe, environment protection is the responsibility of every employee in our organization and our neighboring community is our stakeholder. It will be our endeavor to have sustainable development central to our business planning process.

Place Mahesana

Vilas Tawde

(Managing Director & CEO)

ANNEXURE VIII: Hazardous Waste Authorization and Amendment

ANNEXURE VIII

WEST BENGAL POLLUTION CONTROL BOARD

(Department of Environment, Govt. of West Bengal)
Paribesh Bhawan
Bldg. No. 10 A, Block-LA, Sector-III, Bidhan Nagar,
Kolkata – 700 098
Tel : 0091 (033) 2335-9088 / 8861 / 8211 / 8073 / 6731
2335-0261 / 8212 / 8213 / 7428 / 5975
Fax : 0091 (033) 2335 6730 / 2813
Website : www.wbpcb.gov.in, e-mail : wbpcbnet@wbpcb.gov.in

Authorisation letter no.:

Memo No. 205/2S(HW) –2449/2008 Date: 19 /11/2018

FORM 2

Grant of Authorization under the provisions of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

Ref.: Application for authorization dated 12.08.2018 for management & handling of hazardous waste.

M/s Essar Oil and Gas Exploration and Production Ltd.

P.O.: Gopalpur, P.S.: Kanksa, District : Burdwan, PIN – 713 212, West Bengal is hereby granted an authorisation based on the enclosed signed inspection report for generation, collection, reception, storage, transport, reuse, recycling, recovery, pre-processing, co-processing, utilisation, treatment, disposal, or any other use of hazardous or other wastes or both on the premises situated at **P.O.: Gopalpur, P.S.: Kanksa, District : Burdwan, PIN – 713 212, West Bengal.**

Details of Authorisation

Sl. no.	Category of Hazardous Waste as per the Schedule I, II and III of these rules	Authorised mode of disposal or recycling or utilization or co-processing etc.	Quantity (ton/annum)
1.	5.1	Recycling through authorized recyclers.*	50.0
2.	5.2	Disposal to CHWTSDF	5.0
3.	36.2	Disposal to CHWTSDF	5.0

**** For detail refer to Specific Conditions.***

(1) Authorisation shall be valid for a period upto **31.10.2023** with effect from the date of issue.

(2) The authorisation is subject to the following general and specific conditions.

[Chief Engineer]
Waste Management Cell
West Bengal Pollution Control Board

A. General conditions of authorisation

1. The authorised person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.

2. The authorisation or its renewal shall be produced for inspection at the request of an officer authorised by the State Pollution Control Board.

3. The person authorised shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorisation.

4. Any unauthorised change in personnel, equipment or working conditions as mentioned in the application by the person authorised shall constitute a breach of his authorisation.

5. The person authorised shall implement Emergency Response Procedure (ERP) for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;

6. The person authorised shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty"

7. It is the duty of the authorised person to take prior permission of the State Pollution Control Board to close down the facility.

8. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.

9. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.

10. The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilisation of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorisation.

11. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.

12. An application for the renewal of an authorisation shall be made three months before the expiry of such authorisation.

13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.

14. Annual return in Form 4 shall be filed by June 30th every year for the period ending 31st March of that year.

B. Specific conditions:

1. The unit shall store the hazardous wastes (category wise separately) under shade in an environment friendly safe manner within the premises at designated places.
2. The unit shall not store hazardous wastes onsite for more than 90 days.
3. Oil soaked cotton waste (5.2) and Discarded oil filters (36.2) to be disposed to the Common Hazardous Waste Treatment, Storage & Disposal Facility through manifest system (Form 10).

4. Used oil (5.1) shall be sold through manifest system to the authorized recyclers having valid Pass Book from the State Pollution Control Board (SPCB). During each sale, the original Pass-book issued by SPCB to the recyclers shall be endorsed mentioning the quantity and copy of the same should be kept as record. The manifest system shall be followed.
5. Transport of hazardous and other waste shall be in accordance with the Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016, guidelines issued by the Central Pollution Control Board (CPCB) and rules made under the Motor Vechiles Act, 1988. The responsibility of safe transport shall be either of the sender or the receiver whosoever arranges the transport and this responsibility shall be clearly indicated in the Manifest.
6. The unit shall submit copies of Form 10 to the State Board on a regular basis.
7. Records of hazardous waste generation, storage and disposal shall be maintained properly and shall be available to the inspecting officials of the State Board during inspection.
8. The unit shall update regularly the environmental information in Display Boards as per the order of the Hon'ble Supreme Court dated. 14.10.2003 in W.P.(C) NO.657 of 1995.
9. Authorisation will be revoked in case of non-compliances with any of the above conditions.

M/s Essar Oil and Gas Exploration and Production Ltd.
P.O.: Gopalpur, P.S.: Kanksa, District : Burdwan, PIN – 713 212, West Bengal.

[Chief Engineer]
Waste Management Cell
West Bengal Pollution Control Board

Enclosed: As stated

WEST BENGAL POLLUTION CONTROL BOARD
(Department of Environment, Govt. of West Bengal)
Paribesh Bhawan
Bldg. No. 10 A, Block-LA, Sector-III, Bidhannagar
Kolkata – 700 098
Tel: 0091 (033) 2335-9088 / 7428 / 8211 / 8073 / 6731
2335-0261 / 8212 / 8213 / 8861 / 5975
Fax: 0091 (033) 2335 6730 / 2813
Website: www.wbpcb.gov.in, e-mail: wbpcbnet@wbpcb.gov.in

Memo no ..70/..2S(HW)-2449/2008 Date : 01 /04/2019

M/s. Essar Oil and Gas Exploration and Production Ltd.,
P.O.: Gopalpur, P.S.: Kanksa, District : Burdwan,
PIN – 713 212, West Bengal.

Sub : Approval for extension of time period for onsite storage of hazardous waste
Ref : Your letter no. EOL/CBM-RG (E) /WBPCB/2018/716 dt. 25.02.2019.

Sir,

This is to inform you that State Board has considered your above referred prayer for extension of time period for onsite storage of hazardous waste. As per the provision of Rule 7(1)/(i) of Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, you are hereby allowed to store waste/residues containing oil / cotton wastes contaminated with oil (5.2) and damaged & discarded DG set/ compressor oil filters (36.2) onsite for 180 **days (six months)** instead of 90 days. However, the matter shall be reviewed once the generation of the above mentioned hazardous wastes quantity are altered substantially.

Sd/-
[Dr. T. K. Gupta]
Chief Engineer
Waste Management Cell

Memo no 70(1-2)/..2S(HW)-2449/2008 Date : 01 /04/2019

Copy to : i) Senior Environmental Engineer, Kankinara Circle Office, WBPCB.
ii) Environmental Engineer, Durgapur Regional Office, WBPCB

1/4/19

[Dr. T. K. Gupta]
Chief Engineer
Waste Management Cell

ANNEXURE IX: Expenditure towards Environmental Protection

ANNEXURE IX

Expenditure towards Environmental Protection Measures at EOGEPL CBM Project, Raniganj (October'19 to March' 20)		
S. No.	**Particular**	**Expenses (INR)**
1	Installation of Reverse Osmosis Treatment System for Produced Water Treatment (Capital & Recurring)	Rs. 95,29,987.00
2	Environmental Monitoring Activities (Recurring)	Rs. 7,65,016.00
3	HDPE liners for produced water storage at site when needed (Capital)	Rs. 51,430.00
4	Non Hazardous Waste Disposal (Recurring)	Rs. 81,153.00
5	Green Belt Development (Recurring)	Rs. 35,352.00
6	Land Subsidence Study (Recurring)	Rs. 4,46,000.00
TOTAL		**Rs. 1,09,08,938.00**

ANNEXURE XI: Ground Water Level Report

(Compliance Period: Oct’ 19 to Mar’ 20)

Groung Water Level report of surrounding areas of CBM Ranigan project by Essar Oil Gas Exploration Production Limited **ANNEXURE X**

Compliance Period: Oct'19 to Mar'20

S. No.	Location	Latitude	Longitude	Parapet Height (m)	Well Diameter (m)	DTW from Parapet top (m)	DTW bgl (m)
1	Nachan	23°36′42.4″N	87°19′58.9″E	0.68	1	2.54	1.24
2	Bansia	23°37.464″N	87°20.151″E	0.76	0.97	2.36	1.6
3	Kalikapur	23°37.464″N	87°20.151″E	0.8	1.85	2.72	1.04
4	Bargoria	23°37′580″N	87°21′397″E	0.7	2.5	2.34	1.19
5	Jatgoria	23°36′973″N	87°23′432″E	0.6	1.8	2.03	1.34
6	Dhabani 1st location	23°35′31.2″N	87°22′00.9″E	0.7	0.68	2.31	0.66
7	Dhabani 2nd location	23°35′519″N	87°22.085″E	0.95	1.8	1.93	0.93
8	Labnapara	23°35′05.36N	87°22′15.8″E	1.2	1.5	2.31	1.85
9	Akandara	23°34′461″N	87°23′013″E	0.65	1.85	3.61	3.02
10	Sarenga	23°31′665″N	87°24′400″E	0	0.6	1.55	1.29
11	Saraswatigunj	23°35′226″N	87°24′784″E	0.6	1.75	2.67	1.55
12	Ghatakdanga	23°34′147″N	87°24′308″E	1	2.4	3.48	1.67
13	Kantaberia	23°36′829″N	87°22′242″E	0.6	1.3	2.01	1.14
14	Gopalpur	23°30′639″N	87°23′408″E	0.5	1.53	1.9	1.44