

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

**RG (East)-CBM-2001/1 (Phase-II) Half Yearly
Environment Clearance Compliance Report
(October'18 to March'19)**

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

Ref No. EOGEP/CEM-RG (E)/MoEF/2019/877

Date: 25th May, 2019

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

Sub: Submission Half-yearly Compliance Report of the Environmental Clearance (Phase-II and 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 EOGEP dated 06.11.2017

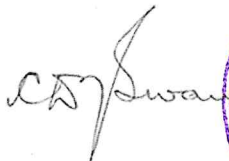

Dear Sir

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, 2018 to March, 2019.

Thanking you for your continued support,

With Best Regards,

For Essar Oil and Gas Exploration and Production Limited

C. D. Narayanswamy
Chief Operating Officer
Raniganj East, CBM Project Durgapur

Encl: Phase-II and Amendment Compliance Report

Copy to:

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

Essar Oil and Gas Exploration and Production Limited
RG (East)-CBM-2001/1 (Phase-II) Half Yearly Environment Clearance Compliance Report
(October'18 to March'19)

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 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 be obtained regarding impact of proposed	Four (4) nos. of Gas Gathering Station (GGS) and One Main Compressor Station (MCS) was constructed as

S. No.	EC Conditions	Compliance Status
	plant on Panagarh air base, if any.	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 OISD, DGMS and international standards viz. API.
vii	Ambient air quality shall be monitored near the closest human settlements as per the National Ambient Air Quality Emission Standards (NAAQES) issued by the Ministry vide G.S.R. No. 826(E) dated 16th November, 2009 for PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO, CH ₄ , 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 PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO, CH ₄ , VOCs, HC, Non-methane HC. Please find the ambient air quality monitoring results attached with this report as Annexure I .
viii	The company shall monitor data on methane and non-methane hydrocarbon at the drilling site, GGS, CGS and at the SV station from where the gas is supplied to the customers.	Methane hydrocarbons are monitored as part of Ambient Air Quality Monitoring Plan at major facilities (GGS) and villages. Please find the ambient air quality monitoring results attached with this report as Annexure I .
ix	Mercury shall also be analyzed in air, water and drill cuttings twice during drilling period.	The drilling operation has been temporarily suspended 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: <ul style="list-style-type: none"> • 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

S. No.	EC Conditions	Compliance Status
		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 ground water shall be used without permission of CGWA.	The drilling operation has been temporarily suspended from April, 2017 till date. However, The RO treated water is reused in work over operations and other utilities. Ground water is not used & withdrawn for water consumption.
xiv	The produced water during drilling operations shall be collected in HDPE lined waste pit to prevent ground water contamination. Effluent shall be properly treated and treated effluent shall conform to CPCB standards. As proposed, produced water may also be used in operational coal mines of Eastern Coal Fields for dust suppression, slurry activities and post-mining restoration efforts etc. Domestic effluent shall be disposed through septic tank followed by soak pit. No effluent shall be discharged outside the premises and 'zero' discharge shall be adopted	Produced water is collected & stored in 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 our own operations (Work over & site preparation activities). Excess treated water is discharged to nearby streams 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.

S. No.	EC Conditions	Compliance Status
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 m ³ /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 analysis results of RO water monitoring attached with this report as Annexure IV . The treated water is reused in HF, Work over and other construction activities. Excess water is discharged to nearby streams only after meeting the discharges standards. Please find the analysis results of surface water monitoring attached with this report as Annexure IV A .
xvii	Ground water quality monitoring shall be done to assess if produced water storage or disposal has any effect.	The ground water monitoring has been carried out by collecting samples from tube- wells (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	The drilling operation has been temporarily suspended from April 2017 till date.

S. No.	EC Conditions	Compliance Status
	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.	
xix	Only water based drilling mud shall be used. The drilling mud shall be recycled. Hazardous waste shall be disposed of as per Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules, 2008. The recyclable waste (oily sludge) and spent oil shall be disposed of to the authorized recyclers/re-processors.	<p>The drilling operation has been temporarily suspended from April 2017 till date.</p> <p>Oil contaminated waste & waste filters are sent to TSDF facility, Haldia.</p> <p>Please find the copies of FORM 10 for hazardous waste attached with this report as Annexure VI.</p>
xx	The Company shall carry out long term subsidence study by collecting base line data before initiating drilling operation till the project lasts. The data so collected shall be submitted six monthly to the Ministry and its Regional Office at Bhubaneswar.	Subsidence study & monitoring has been performed by the National Institute of Technology (NIT), Durgapur and no significant subsidence has been observed from 2012 till date. For the current year, NIT Durgapur has conducted the study and the report is attached as Annexure VII .
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.	<p>The necessary measures have been taken to prevent fire hazards and soil remediation as follows.</p> <ul style="list-style-type: none"> • 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.

S. No.	EC Conditions	Compliance Status
		<ul style="list-style-type: none"> Impervious surface, secondary containment and spill kits are provided whenever there is a possibility of soil contamination.
xxii	<p>The project authorities shall install SCADA system with dedicated optical fiber based telecommunication link for safe operation of pipeline and Leak Detection System. Additional sectionalizing valves in the residential area and sensitive installations shall be provided to prevent the amount of gas going to the atmosphere in the event of pipeline failure. Intelligent pigging facility shall be provided for the entire pipeline system for internal corrosion monitoring. Coating and impressed current cathodic protection system shall be provided to prevent external corrosion.</p>	<p>Installation of SCADA system with dedicated optical fiber based telecommunication link for safe operation of pipeline and Leak Detection System is under process. Cathodic Ray Protection system has been installed along the length of pipeline to prevent the corrosion. The design and laying of surface facilities have been confirmed to the standards of OISD 141.</p>
xxiii	<p>All the surface facilities including GGS, CGS and SV station shall be as per applicable codes and standards, international practices and applicable local regulations.</p>	<p>All the surface facilities including GGS, CGS and SV stations have been laid as per OISD & API standards.</p>
xxiv	<p>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.</p>	<p>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.</p>
xxv	<p>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</p>	<p>Safety audits are conducted by third party to maintain the safety standards.</p>

S. No.	EC Conditions	Compliance Status
	operations and maintenance.	
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. Pearson survey and continuous potential survey should be carried out at regular intervals to ensure the adequacy of cathodic protection system.	Regular patrolling and inspection of laid pipeline has been carried out for detection of faults as per OISD guidelines. Pipeline operations shall be continuously monitored by adopting non-destructive methods of testing as envisaged in the EIA/EMP. Pearson survey and continuous potential survey shall be carried out at regular intervals to ensure the adequacy of cathodic protection system.
xxvii	The company shall develop a contingency plan for H ₂ S release including all necessary recommendations from evacuation to resumption of normal operations. The workers shall be provided with personal H ₂ S detectors in locations of high risk of exposure along with self-containing breathing apparatus.	H ₂ S 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.	Emergency response plan has been prepared as per the OISD & DGMS guidelines. Recommendations

S. No.	EC Conditions	Compliance Status
	of India. Recommendations mentioned in the Risk Assessment & Consequence Analysis and Disaster Management Plan shall be strictly followed.	mentioned in risk assessment and consequence analysis are being duly implemented.
xxxii	Project proponent shall comply with the environment protection measures and safeguards recommended in the EIA/EMP/risk analysis report/disaster management plan.	Environmental protection measures and safeguards recommended in EMP/risk analysis report/disaster management plan have been implemented.
xxxiii	The company shall take measures after completion of drilling process by well plugging and secured enclosures, decommissioning of rig upon abandonment of the well and drilling site shall be restored in original condition. In the event that no economic quantity of hydrocarbon is found a full abandonment plan shall be implemented for the drilling site in accordance with the applicable Indian Petroleum Regulations.	Wells will be abandoned and restored to natural position if found unsuitable for hydrocarbon extraction. Wells will be fully abandoned in compliance with Indian Petroleum Regulations in the event of no economic quantity 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	Corporate Environmental Policy is in place and being implemented. Please find the corporate Environment Policy attached with this report as Annexure VIII .

S. No.	EC Conditions	Compliance Status
	implemented.	
xxxviii	<p>Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, Safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project</p>	<p>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.</p>
General Condition		
i	<p>The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board (SPCB), State Government and any other statutory authority.</p>	<p>We comply with the stipulations made by the State Pollution Control Board (SPCB), State Government and statutory bodies.</p>
ii	<p>No further expansion or modification in the project shall be carried out without prior approval of the Ministry of Environment & Forests. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any</p>	<p>For any further expansion and modification in project configuration, we would approach MoEF for the prior Environmental Clearance.</p>
iii	<p>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.</p>	<p>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.</p>
iv	<p>The project authorities must strictly comply with</p>	<p>We comply with the rules and regulations with regard to</p>

S. No.	EC Conditions	Compliance Status
	<p>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</p>	<p>handling and disposal of Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008.</p> <p>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 attached with this report as Annexure IX & IX a.</p>
v	<p>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).</p>	<p>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.</p>
vi	<p>A separate Environmental Management Cell equipped with full-fledged laboratory facilities must be set up to carry out the environmental management and monitoring functions.</p>	<p>A dedicated environment management is currently in operation and functioning for implementation of environment management plan at large.</p> <p>The sampling and analysis of environmental parameters is been carried out by Scientific Research laboratory (MoEF recognized).</p>
vii	<p>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.</p>	<p>The environment expenditure for the environment activities has been attached as Annexure X.</p>

S. No.	EC Conditions	Compliance Status
viii	The Regional Office of this Ministry/Central Pollution Control Board/State Pollution Control Board will monitor the stipulated conditions. A six monthly compliance report and the monitored data along with statistical interpretation shall be submitted to them regularly.	Support has been and will be extended to the Regional office of this Ministry/Central Pollution Control Board/State Pollution Control Board for monitoring the stipulated conditions. Six monthly compliance reports of environmental clearances are regularly submitted to Regional office of MoEF.
ix	A copy of clearance letter shall be sent by the proponent to concerned Panchayat, ZilaParishad / Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the web site of the company by the proponent	A copy of Environmental Clearance (EC) has been circulated to the local administration and was uploaded on the Company's website.
x	The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MOEF, the respective Zonal Office of CPCB and the WBPCB. The criteria pollutant levels namely; SPM, RSPM, SO ₂ , NO _x , 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 , NO _x , 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	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

S. No.	EC Conditions	Compliance Status
	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.	CPCB and the WBPCB.
xii	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental conditions and shall also be sent to the respective Regional Offices of the MOEF by e-mail.	The environmental statement for each financial year ending 31st March in Form-V as is being regularly submitted to West Bengal Pollution Control Board and the same will be uploaded on the company's website along with the status of compliance report.
xiii	The Project Proponent shall inform the public that. The project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the WBPCB and may also be seen at Website of the Ministry of Environment and Forests at http://envfor.nic.in . This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the Regional office.	The advertisement was published in The Telegraph, Calcutta and Anand Bazaar Pathrika on 30th September, 2011. A copy of the same has been submitted in the compliance report during the period Apr'11-Sep'11.
xiv	Project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work	Financial closure has been prepared in the year of 2010. The development work was commenced on 7th Dec, 2011 after obtaining consent to establish from WBPCB.

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**RG (East)-CBM-2001/1 (Phase-IIA) Half Yearly
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Ref: Environment Clearance no. F. No. J-11011/351/2009- IA II (I) dated 18.06.2012

Essar Oil and Gas Exploration and Production Limited
RG (East)-CBM-2001/1 (Phase-IIA) Half Yearly Environment Clearance Compliance Report
(October'18 to March'19)

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 in pre-monsoon season. Please find the ground water level report attached with this report as Annexure XI .
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 .
4(vii)	Approach road shall be constructed prior to the drilling	Approach roads are being constructed wherever the access is not available.
4(viii)	Land subsidence shall be monitored regularly and monitoring report shall be submitted to CPCB, SPCB and respective Ministry's regional office	Subsidence study & monitoring has been performed by the National Institute of Technology (NIT), Durgapur and no significant subsidence has been observed from 2012 till date. For the current year, NIT Durgapur has conducted the study and the report is attached as Annexure VII .
5	All the specific conditions and general conditions specified in the environmental clearance accorded vide Ministry's letter no.J-11011/351/2009-IA II (I) dated 23rd September, 2011 shall be implemented	All the specific and general conditions of the Phase-II Environmental Clearance are being implemented.
6	Consent to Establish & Operate for the revised proposal shall be obtained from the W.B. Pollution Control Board	Regular CTE & CTO will be obtained from Pollution Control Board and will be submitted to MoEF.
7	No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment and Forests. In case of	No further expansion or modification will be done in the project configuration without prior approval from the MoEF.

S. No.	EC Conditions	Compliance Status
	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.	

**Ambient Air Analysis Report of CBM Raniganj Project of
Essar Oil & Gas Exploration & Production Limited:
ANNEXURE I**

(Compliance Period: Oct' 18 - Mar'19)

Ambient Air Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration 1roduction Lited
(Compliance Period: Oct' 18 - Mar'19)

ANNEXURE I

Name of Location			MCS						GGs- 01					
Date			Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19	Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19
Parameter	UoM	NAAQS LIMIT												
PM 2.5	µg/m ³	60	39.28	41.28	50.22	32.60	40.63	42.54	34.28	36.44	49.50	34.86	29.40	36.58
PM 10	µg/m ³	100	72.44	78.64	108.33	74.40	83.55	90.27	68.28	75.60	94.74	79.29	64.08	78.63
Nitrogen Dioxide	µg/m ³	80	42.56	44.52	45.30	39.48	46.21	31.49	44.32	47.26	38.03	43.61	47.78	27.52
Sulphur Dioxide	µg/m ³	80	6.23	6.28	7.76	6.06	6.69	7.12	5.94	6.28	6.81	6.31	6.73	6.32
Carbon Monoxide	mg/m ³	2	0.43	0.43	0.408	0.438	0.45	0.541	0.42	0.44	0.422	0.452	0.402	0.473
Hydrocarbon	mg/m ³	NIL	1.67	2.27	1.95	2.08	1.78	2.37	1.69	1.89	1.75	1.96	2.02	1.98
Mercury	mg/m ³		< 0.002		< 0.002			< 0.002	< 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		2.73		2.83			2.97	2.67		2.55			2.84
Benzo(a)Pyrene	ng/m ³	1	0.39		0.59			0.64	0.34		0.45			0.58
Ammonia	µg/m ³	400	22.53		23.84			25.33	20.06		25.07			21.54
Ozone	µg/m ³	180	42.56		42.34			41.14	38.64		41.89			37.22
Lead	µg/m ³	1	0.15		0.15			0.15	0.10		0.19			0.12
Nickel	ng/m ³	20	16.57		15.78			14.28	12.88		13.78			13.78
Arsenic	ng/m ³	6	1.59		1.82			1.92	1.29		1.61			1.38
Benzene	µg/m ³	5	1.56		1.63			1.78	1.44		1.42			1.72

Name of Location			GGs- 02						Gopalpur Warehouse					
Date			Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19	Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19
Parameter	UoM	NAAQS LIMIT												
PM 2.5	µg/m ³	60	36.22	39.16	66.82	39.24	31.46	39.62	36.24	37.64	54.79	39.47	38.48	67.24
PM 10	µg/m ³	100	65.38	74.36	121.17	77.91	67.64	80.54	66.38	79.22	119.06	82.23	72.34	78.64
Nitrogen Dioxide	µg/m ³	80	40.28	46.34	37.92	38.07	46.32	28.05	40.32	44.36	46.09	39.13	47.68	30.34
Sulphur Dioxide	µg/m ³	80	6.32	6.12	6.23	6.01	6.87	6.40	6.08	6.14	7.26	6.08	6.66	6.34
Carbon Monoxide	mg/m ³	2	0.42	0.456	0.412	0.436	0.412	0.436	0.43	0.47	0.432	0.432	0.44	0.504
Hydrocarbon	mg/m ³	NIL	1.70	2.01	2.41	2.18	1.88	1.91	1.73	1.91	2.05	1.84	1.82	2.14
Mercury	mg/m ³		< 0.002		< 0.002			< 0.002	< 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		2.69		3.13			2.88	2.98		3.02			3.05
Benzo(a)Pyrene	ng/m ³	1	0.36		0.65			0.59	0.33		0.47			0.62
Ammonia	µg/m ³	400	18.74		27.12			24.58	21.08		24.41			25.12
Ozone	µg/m ³	180	40.24		44.18			40.12	39.78		42.37			41.04
Lead	µg/m ³	1	0.11		0.2			0.14	0.16		0.15			0.16
Nickel	ng/m ³	20	11.61		17.12			14.04	15.72		14.16			15.02
Arsenic	ng/m ³	6	1.21		1.91			1.34	1.33		1.85			1.88
Benzene	µg/m ³	5	1.37		1.98			1.64	1.57		1.88			1.85

Name of Location			KULDIHA						SARENGA					
Date			Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19	Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19
Parameter	UoM	NAAQS LIMIT												
PM 2.5	µg/m ³	60	41.22	35.28	47.28	40.09	46.65	37.52	44.58	33.18	50.64	37.02	43.65	40.64
PM 10	µg/m ³	100	72.68	72.61	109.34	81.30	86.17	72.58	78.26	70.08	103.14	80.76	83.70	89.24
Nitrogen Dioxide	µg/m ³	80	38.64	49.24	45.82	40.53	48.20	27.76	44.38	45.74	42.34	40.24	47.75	28.17
Sulphur Dioxide	µg/m ³	80	6.64	6.84	7.33	6.20	6.41	5.75	6.28	6.32	6.42	6.68	6.75	6.84
Carbon Monoxide	mg/m ³	2	0.412	0.458	0.43	0.432	0.452	0.46	0.432	0.436	0.41	0.46	0.485	0.45
Hydrocarbon	mg/m ³	NIL	1.76	1.82	1.87	1.92	1.84	1.84	1.95	1.79	1.79	2.12	1.96	2.08
Mercury	mg/m ³		< 0.002		< 0.002			< 0.002	< 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		2.91		2.97			2.52	3.14		2.85			2.78
Benzo(a)Pyrene	ng/m ³	1	0.57		0.39			0.51	0.52		0.58			0.58
Ammonia	µg/m ³	400	25.12		23.72			20.76	21.89		25.44			20.54
Ozone	µg/m ³	180	40.56		43.09			35.17	39.78		41.19			38.64
Lead	µg/m ³	1	0.14		0.14			0.13	0.11		0.13			0.14
Nickel	ng/m ³	20	15.27		14.76			12.27	13.09		13.87			10.36
Arsenic	ng/m ³	6	1.64		1.92			1.52	1.52		1.77			1.42
Benzene	µg/m ³	5	1.59		1.82			1.39	1.68		1.61			1.54

Ambient Air Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration & Production Limited
(Compliance Period: Oct' 18 - Mar'19)

ANNEXURE I

Name of Location			SARASWATIGUNJ						NACHAN					
Date			Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19	Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19
Parameter	UoM	NAAQS LIMIT												
PM 2.5	µg/m ³	60	39.28	37.02	60.07	41.97	38.80	36.52	34.56	36.22	41.15	40.63	38.37	41.08
PM 10	µg/m ³	100	70.42	71.58	125.57	88.63	78.13	76.14	68.92	70.22	88.31	87.66	73.36	82.36
Nitrogen Dioxide	µg/m ³	80	39.64	44.36	41.47	44.08	46.58	28.40	42.38	41.68	41.58	40.56	44.48	31.48
Sulphur Dioxide	µg/m ³	80	5.84	6.22	6.52	6.88	6.83	5.53	6.08	6.44	6.46	6.59	7.02	5.98
Carbon Monoxide	mg/m ³	2	0.408	0.448	0.42	0.418	0.43	0.45	0.412	0.462	0.43	0.442	0.432	0.46
Hydrocarbon	mg/m ³	NIL	1.79	1.84	2.37	1.84	1.86	1.78	1.65	1.95	1.67	2.32	2.12	1.93
Mercury	mg/m ³		< 0.002		< 0.002			< 0.002	< 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		2.82		3.27			2.68	2.92		2.65			2.96
Benzo(a)Pyrene	ng/m ³	1	0.45		0.66			0.39	0.5		0.42			0.57
Ammonia	µg/m ³	400	20.73		28.29			23.44	23.16		26.71			25.53
Ozone	µg/m ³	180	41.17		45.16			38.54	42.33		41.78			41.28
Lead	µg/m ³	1	0.12		0.19			0.11	0.15		0.12			0.14
Nickel	ng/m ³	20	13.88		18.05			11.24	15.51		12.05			14.52
Arsenic	ng/m ³	6	1.49		2.05			1.36	1.61		1.42			1.68
Benzene	µg/m ³	5	1.51		2.08			1.69	1.63		1.54			1.95

Name of Location			PRATPPUR						BANSIA					
			Date											
Parameter	UoM	NAAQS LIMIT	Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19	Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19
PM 2.5	µg/m ³	60	37.64	42.34	48.88	42.51	47.19	45.24	37.54	36.47	47.05	38.68	42.25	39.28
PM 10	µg/m ³	100	76.28	81.36	103.20	82.59	90.28	84.26	71.56	76.45	111.52	79.59	83.93	76.28
Nitrogen Dioxide	µg/m ³	80	43.28	46.28	47.06	42.11	42.07	27.94	40.28	45.36	43.50	38.40	45.97	28.39
Sulphur Dioxide	µg/m ³	80	6.34	6.32	6.60	6.99	7.39	5.38	6.12	6.74	7.20	6.04	7.70	5.78
Carbon Monoxide	mg/m ³	2	0.418	0.484	0.40	0.46	0.442	0.50	0.426	0.438	0.44	0.432	0.436	0.48
Hydrocarbon	mg/m ³	NIL	2.09	2.38	1.83	1.96	2.12	2.02	1.85	1.99	1.97	2.16	1.86	1.96
Mercury	mg/m ³		< 0.002		< 0.002			< 0.002	< 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		3.13		2.98			2.87	2.85		2.95			2.64
Benzo(a)Pyrene	ng/m ³	1	0.38		0.54			0.61	0.41		0.57			0.52
Ammonia	µg/m ³	400	24.39		24.52			26.37	22.07		22.18			22.54
Ozone	µg/m ³	180	43.18		41.18			43.09	41.58		43.25			38.64
Lead	µg/m ³	1	0.18		0.13			0.15	0.14		0.18			0.11
Nickel	ng/m ³	20	16.18		14.02			13.97	14.83		16.14			13.40
Arsenic	ng/m ³	6	1.48		1.69			1.72	1.47		1.54			1.58
Benzene	µg/m ³	5	1.72		1.58			1.81	1.67		1.69			1.54

Name of Location			GGS-04			
Date			Dec'18	Jan'19	Feb'19	Mar'19
Parameter	UoM	NAAQS LIMIT				
PM 2.5	µg/m ³	60	63.53	47.06	37.68	43.05
PM 10	µg/m ³	100	132.96	92.17	74.00	86.28
Nitrogen Dioxide	µg/m ³	80	43.07	38.66	45.51	29.57
Sulphur Dioxide	µg/m ³	80	6.60	6.05	6.50	5.93
Carbon Monoxide	mg/m ³	2	0.442	0.434	0.44	0.438
Hydrocarbon	mg/m ³	NIL	2.54	2.27	1.82	1.98
Mercury	mg/m ³		<0.002			<0.002
Hydrocarbon as Non Methane	mg/m ³	NIL	<0.003	<0.003	<0.003	<0.003
VOC's	µg/m ³		3.24			2.92
Benzo(a)Pyrene	ng/m ³	1	0.69			0.56
Ammonia	µg/m ³	400	23.79			26.22
Ozone	µg/m ³	180	40.94			39.55
Lead	µg/m ³	1	0.21			0.15
Nickel	ng/m ³	20	17.82			14.76
Arsenic	ng/m ³	6	1.95			1.73
Benzene	µg/m ³	5	2.09			1.86

**Noise monitoring report of CBM Raniganj project by Essar
Oil & Gas Exploration & Production Ltd: ANNEXURE II**

(Compliance Period: Oct' 18 - Mar'19)

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)
09.01.19 to 10.01.19	Saraswatigunj (EDI-039)	75	48.23	70	48.04
09.01.19 to 10.01.19	Kuldiha (EDN- 162)	75	48.32	70	48.33
10.01.19 to 11.01.19	Jatgoria (EDE- 05)	65	50.66	55	51.79
11.01.19 to 12.01.19	MCS	75	51.84	70	48.31
11.01.19 to 12.01.19	GG5- 01	75	59.84	70	57.51
14.01.19 to 15.01.19	Bargoria (EDD- 04)	75	55.53	70	49.76
14.01.19 to 15.01.19	Akandara	75	60.92	70	59.72
15.01.19 to 16.01.19	Bansia (EDC-411)	75	56.78	70	56.47
15.01.19 to 16.01.19	Pratappur (EDD-049)	75	55.01	70	47.7
16.01.19 to 17.01.19	Kamalpur (EDG-077)	75	50.05	70	48.62
16.01.19 to 17.01.19	Nachan (EDD-053)	75	54.7	70	53.79

**Produced Water Analysis Report of CBM Raniganj
Project of Essar Oil and Gas Exploration and
Production Limited: ANNEXURE III**

(Compliance Period: Oct' 18 - Mar'19)

S. No.	Parameter	Unit	CPCB Standard	EDN-184 D-4	EDI-120 D-1	EDI-115 V-1	EDI-039 D-2	EDI-039 V-1	EDI-032 D-2	EDI-032 D-3
Date				OCTOBER' 2018						
1	pH		5.5 to 9.0	8.11	7.26	7.45	7.71	7.62	7.87	7.71
2	Temperature									
3	Total Suspended Solids	mg/l	100	2	89	6	48	<2	<2	3
4	Total Dissolved Solids	mg/l	---	912	4402	1958	5250	3648	5278	4842
5	Chloride	mg/l	---	348	2080	812	2469	1670	2510	2145
6	Total Hardness	mg/l	---	38.80	578.1	34.9	190.1	139.7	58.2	54.3
7	Sulphate	mg/l	---	4.5	7.1	6	9.5	8.2	10	8.5
8	Calcium	mg/l		10.9	199	7.8	59.1	51.3	18.7	18.7
9	Magnesium	mg/l	---	2.8	19.8	3.8	10.4	2.8	2.8	1.9
10	BOD	mg/l	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	8.0	<8	<8	8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	1.8	2.55	1.95	2.85	2.1	3.05	2.65
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	0.010	0.019	0.015	0.021	<0.01	<0.01	0.024
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	21.1	30	53.2	64.3	55.6	112.5	103.6
23	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

S. No.	Parameter	Unit	CPCB Standard	EDN-184 D-4	EDI-120 D-1	EDI-115 V-1	EDI-039 D-2	EDI-039 V-1	EDI-032 D-2	EDI-032 D-3
Date				OCTOBER' 2018						
28	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	304.0	1661	724	2040	1310	1970	1760
32	Cyanide	mg/l	0.2							
33	Hexavalent Chromium	mg/l	0.1							

S. No.	Parameter	Unit	CPCB Standard	EDH-044 D-1	EDE-061 D-1	EDE-013 D-1	EDD-008 D-4	EDD-04 D-4	EDD-003 D-1	EDD-003 V-1
Date				OCTOBER' 2018						
1	pH		5.5 to 9.0	8.73	8.55	8.58	8.48	8.35	8.61	8.49
2	Temperature									
3	Total Suspended Solids	mg/l	100	6	<2	2	<2	2	8	<2
4	Total Dissolved Solids	mg/l	---	1204	2210	2684	2844	2392	2184	1894
5	Chloride	mg/l	---	428	922	1025	1220	1085	740	712
6	Total Hardness	mg/l	---	42.7	27.2	19.4	31	34.9	27.2	15.5
7	Sulphate	mg/l	---	6	7	7	9	6	9	5
8	Calcium	mg/l		14	7.8	4.7	7.8	9.3	7.8	4.7
9	Magnesium	mg/l	---	1.9	1.9	1.9	2.8	2.8	1.9	1
10	BOD	mg/l	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	1.3	1.75	1.8	2.05	1.75	1.65	1.25
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	30.1	68.7	107.8	76.5	54.8	69.5	79.5
23	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

S. No.	Parameter	Unit	CPCB Standard	EDH-044 D-1	EDE-061 D-1	EDE-013 D-1	EDD-008 D-4	EDD-04 D-4	EDD-003 D-1	EDD-003 V-1
Date				OCTOBER' 2018						
28	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	450	820	1095	980	745	830	720
32	Cyanide	mg/l	0.2							
33	Hexavalent Chromium	mg/l	0.1							

S. No.	Parameter	Unit	CPCB Standard	EDD-015 D-2	EDD-017 D-7	EDI-032 D-2	EDH-044 D-4	EDG-077 D-1	EDD-003 D-6	EDD-09 D-3
Date				OCTOBER' 2018			NOVEMBER' 2018			
1	pH		5.5 to 9.0	8.33	8.39	8.15	7.53	8.1	8.2	8.3
2	Temperature									
3	Total Suspended Solids	mg/l	100	<2	14	<2	81	<2	<2	<2
4	Total Dissolved Solids	mg/l	---	2426	2784	4332	3312	2642	2262	1856
5	Chloride	mg/l	---	860	975	2220	1685	1225	914	740
6	Total Hardness	mg/l	---	23.3	23.3	62.10	81.5	34.9	34.9	27.2
7	Sulphate	mg/l	---	8	8	8.9	7.6	6.8	7.3	5.8
8	Calcium	mg/l		6.2	6.2	20.2	30	7.8	7.8	6.2
9	Magnesium	mg/l	---	1.9	1.9	2.8	2.8	3.8	3.8	2.8
10	BOD	mg/l	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	<8	<8	<8	8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	2.1	2.3	1.86	1.6	1.45	0.9	0.75
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	0.017	0.024	0.029	0.017	0.015	0.011	<0.01
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	81.7	97.4	85.1	53.2	69.1	65.1	60
23	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

S. No.	Parameter	Unit	CPCB Standard	EDD-015 D-2	EDD-017 D-7	EDI-032 D-2	EDH-044 D-4	EDG-077 D-1	EDD-003 D-6	EDD-09 D-3
Date				OCTOBER' 2018			NOVEMBER' 2018			
28	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	910	1085	1540.0	1104	940	885	718
32	Cyanide	mg/l	0.2							
33	Hexavalent Chromium	mg/l	0.1							

S. No.	Parameter	Unit	CPCB Standard	EDD-015 D-4	EDD-04 D-4	EDI-042 D-4	EDI-039 D-3	EDI-038 V-1	EDE-01 V-1	EDE-061-D-1
Date				NOVEMBER' 2018						
1	pH		5.5 to 9.0	7.89	8.33	7.75	8.05	7.91	8.32	8.62
2	Temperature									
3	Total Suspended Solids	mg/l	100	<2	<2	2	2	<2	<2	<2
4	Total Dissolved Solids	mg/l	---	2386	2476	4976	4014	4532	2436	2012
5	Chloride	mg/l	---	925	1080	2470	1930	2010	1040	885
6	Total Hardness	mg/l	---	27.2	38.8	279.4	69.8	77.6	23.3	31
7	Sulphate	mg/l	---	6.2	6.3	8.8	8	9.2	5.8	5
8	Calcium	mg/l		7.8	10.9	101.1	18.7	26.4	4.7	7.8
9	Magnesium	mg/l	---	1.9	2.8	6.6	5.7	2.8	2.8	2.8
10	BOD	mg/l	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	1.55	1.95	2.55	2.15	2.5	1.9	1.4
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	<0.01	<0.01	0.017	0.02	<0.01	<0.01	<0.01
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	74.4	63.7	44.4	74.1	94.3	81.7	57.8
23	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

S. No.	Parameter	Unit	CPCB Standard	EDD-015 D-4	EDD-04 D-4	EDI-042 D-4	EDI-039 D-3	EDI-038 V-1	EDE-01 V-1	EDE-061-D-1
Date				NOVEMBER' 2018						
28	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	890	915	1710	1425	1910	910	740
32	Cyanide	mg/l	0.2							
33	Hexavalent Chromium	mg/l	0.1							

S. No.	Parameter	Unit	CPCB Standard	EDN-099 D-3	EDD-003 V-1	EDD-009 V-1	EDD-015 D-2	EDE-061 D-1	EDI-039 V-1	EDI-041 V-1
Date				NOVEMBER' 2018	DECEMBER' 2018					
1	pH		5.5 to 9.0	7.71	8.48	8.39	8.34	8.59	8.16	7.72
2	Temperature									
3	Total Suspended Solids	mg/l	100	122	<2	<2	<2	<2	68	29
4	Total Dissolved Solids	mg/l	---	5916	2186	1820	982	1920	2968	3516
5	Chloride	mg/l	---	2710	435	235.7	122.6	301.3	770	825
6	Total Hardness	mg/l	---	259.9	23.50	31.40	19.60	31.40	149.00	211.70
7	Sulphate	mg/l	---	11	3.3	<2.5	<2.5	<2.5	5.3	6.1
8	Calcium	mg/l		91.7	6.3	7.9	4.7	7.9	45.6	75.4
9	Magnesium	mg/l	---	7.5	1.9	2.9	1.9	2.9	8.6	5.7
10	BOD	mg/l	30	3	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	11	<8	<8	<8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	2.9	6.8	6.5	6	5.2	5.3	5.75
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	0.071	0.021	0.017	<0.01	0.019	<0.01	<0.01
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	66	79.8	59.5	34	60.8	44.9	42.9
23	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Palladium	mg/l	---	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l		<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

S. No.	Parameter	Unit	CPCB Standard	EDN-099 D-3	EDD-003 V-1	EDD-009 V-1	EDD-015 D-2	EDE-061 D-1	EDI-039 V-1	EDI-041 V-1
Date				NOVEMBER' 2018	DECEMBER' 2018					
28	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	2450	890.6	769.3	345.4	785.0	1260.0	1430.0
32	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
33	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

S. No.	Parameter	Unit	CPCB Standard	EDI-115 V-1	EDI-120 D-1	EDN-184 D-4	EDD-004 V-1	EDD-007 D-4	EDG-077 D-1	EDG-077 D-5
Date				DECEMBER' 2018						
1	pH		5.5 to 9.0	7.60	7.32	8.48	8.19	8.52	8.15	8.20
2	Temperature									
3	Total Suspended Solids	mg/l	100	<2	27	<2	<2	<2	2	3
4	Total Dissolved Solids	mg/l	---	1560	2692	2112	2082	1344	1184	2348
5	Chloride	mg/l	---	206.5	370	425.7	310.6	225	207.5	470.5
6	Total Hardness	mg/l	---	35.30	505.70	9.60	39.20	23.50	23.50	31.40
7	Sulphate	mg/l	---	<2.5	3.8	<2.5	<2.5	<2.5	<2.5	<2.5
8	Calcium	mg/l		7.9	168.1	4.7	12.6	6.3	6.3	7.9
9	Magnesium	mg/l	---	3.8	20.9	1.9	1.9	1.9	1.9	2.9
10	BOD	mg/l	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	3.9	4.6	4.1	3.8	2.65	1.9	4.9
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	<0.01	0.015	<0.01	<0.01	<0.01	<0.01	0.017
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	46	18.2	146.6	61.3	60.2	33.6	91.4
23	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

S. No.	Parameter	Unit	CPCB Standard	EDI-115 V-1	EDI-120 D-1	EDN-184 D-4	EDD-004 V-1	EDD-007 D-4	EDG-077 D-1	EDG-077 D-5
Date				DECEMBER' 2018						
28	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	630.5	940.0	1040.0	882.0	670.5	375.1	1180.0
32	Cyanide	mg/l	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
33	Hexavalent Chromium	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

S. No.	Parameter	Unit	CPCB Standard	EDI-032 D-1	EDI-038 V-1	EDD-013 D-1	EDE-025 V-2	EDE-060 V-1	EDD-004 V-1	EDD-003 D-6
Date				DECEMBER' 2018	JANUARY' 2019					
1	pH		5.5 to 9.0	7.81	8.28	8.59	8.68	8.58	8.22	8.15
2	Temperature				39.2°C	34.3°C	32.6°C	32.2°C	37.2°C	38.7°C
3	Total Suspended Solids	mg/l	100	8	3	2	<2	2	<2	<2
4	Total Dissolved Solids	mg/l	---	3412	4246	2782	2640	1986	2684	3120
5	Chloride	mg/l	---	505	2107	240	196	192.8	1080	1140
6	Total Hardness	mg/l	---	149.00	82.30	23.50	31.40	39.20	39.20	35.30
7	Sulphate	mg/l	---	4.5	5.0	3.7	<2.5	<2.5	<2.5	<2.5
8	Calcium	mg/l		48.7	29.8	6.3	7.9	11	12.6	11
9	Magnesium	mg/l	---	6.7	1.9	1.9	2.9	2.9	1.9	1.9
10	BOD	mg/l	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	5.15	5.2	4.5	3.2	5	4.1	4.7
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	0.022	0.019	0.015	0.017	<0.01	0.012	0.014
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	47	103.6	218.9	146.5	46.9	100.2	132.1
23	Aluminium	mg/l	---	<0.01						
24	Lithium	mg/l		<0.5						
25	Molybdenum	mg/l	---	<0.5						
26	Palladium	mg/l	---	<0.5						
27	Selenium	mg/l		<0.01						

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'18 - Mar'19)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDI-032 D-1	EDI-038 V-1	EDD-013 D-1	EDE-025 V-2	EDE-060 V-1	EDD-004 V-1	EDD-003 D-6
Date				DECEMBER' 2018	JANUARY' 2019					
28	Vanadium	mg/l	---	<0.2						
29	Cadmium	mg/l		<0.02						
30	Cobalt	mg/l		<0.1						
31	Sodium	mg/l	---	1320.0	2165.0	2440.0	1890.0	675.0	1440.0	1810.0
32	Cyanide	mg/l	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
33	Hexavalent Chromium	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'18 - Mar'19)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDD-007 D-1	EDD-009 D-3	EDD-015 D-4	EDE-024 D-3	EDI-032 D-1	EDH-033 D-6	EDG-077 D-5
Date				JANUARY' 2019						
1	pH		5.5 to 9.0	8.36	8.29	8.10	8.39	7.55	8.32	8.25
2	Temperature			35.8°C	41.9°C	45.2°C	29.2°C	37.4°C	30.5°C	41.5°C
3	Total Suspended Solids	mg/l	100	<2	27	<2	<2	14	8	2
4	Total Dissolved Solids	mg/l	---	1878	2522	3348	3610	4622	4480	3470
5	Chloride	mg/l	---	782	810	1070	940	1220	1180	1026
6	Total Hardness	mg/l	---	39.20	27.40	35.30	31.40	117.60	39.20	35.30
7	Sulphate	mg/l	---	3.0	3.5	4.5	4.8	5.5	6.0	5.1
8	Calcium	mg/l		11	7.9	7.9	9.4	42.4	11	12.6
9	Magnesium	mg/l	---	2.9	2.9	3.8	1.9	2.9	2.9	1.0
10	BOD	mg/l	30	<2	<2	<2	<2	2	<2	<2
11	COD	mg/l	250	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	2.9	3.5	5.1	5.7	6	5.5	4.5
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	0.013	0.018	0.021	0.024	0.028	0.026	0.019
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	65.5	126	146.7	173.5	119.1	190.7	169.3
23	Aluminium	mg/l	---							
24	Lithium	mg/l								
25	Molybdenum	mg/l	---							
26	Palladium	mg/l	---							
27	Selenium	mg/l								

S. No.	Parameter	Unit	CPCB Standard	EDD-007 D-1	EDD-009 D-3	EDD-015 D-4	EDE-024 D-3	EDI-032 D-1	EDH-033 D-6	EDG-077 D-5
Date				JANUARY' 2019						
28	Vanadium	mg/l	---							
29	Cadmium	mg/l								
30	Cobalt	mg/l								
31	Sodium	mg/l	---	940.0	1520.0	2010.0	2240.0	2970.0	2740.0	2320.0
32	Cyanide	mg/l	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
33	Hexavalent Chromium	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'18 - Mar'19)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDE-018 D-1	EDD-049 D-1	EDC-072 V-1	EDG-074 D-1	EDC-411 D-1	EDD-406 D-2	EDD-004 V-1
Date				JANUARY' 2019	FEBRUARY' 2019					
1	pH		5.5 to 9.0	8.53	8.33	8.12	8.15	8.16	7.99	8.15
2	Temperature			34.9°C	29°C	42°C	37°C	35.4°C	39°C	40.12°C
3	Total Suspended Solids	mg/l	100	<2	2	2	5	3	2	2
4	Total Dissolved Solids	mg/l	---	3230	2952	2928	2348	1566	818	2658
5	Chloride	mg/l	---	740	588.2	620.4	432.5	264.4	163.9	392
6	Total Hardness	mg/l	---	23.50	35.30	39.20	27.40	31.40	27.40	35.30
7	Sulphate	mg/l	---	4.0	3.0	2.8	3.5	<2.5	<2.5	<2.5
8	Calcium	mg/l		7.9	7.9	11	7.9	7.9	7.9	9.4
9	Magnesium	mg/l	---	1.0	3.8	2.9	1.9	2.9	1.9	2.9
10	BOD	mg/l	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	4	2.4	1.9	2.1	0.95	0.7	1.75
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	0.022	0.013	0.011	0.020	0.010	<0.01	0.019
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	176.8	118.2	106.5	107	63.6	47.3	105.7
23	Aluminium	mg/l	---							
24	Lithium	mg/l								
25	Molybdenum	mg/l	---							
26	Palladium	mg/l	---							
27	Selenium	mg/l								

S. No.	Parameter	Unit	CPCB Standard	EDE-018 D-1	EDD-049 D-1	EDC-072 V-1	EDG-074 D-1	EDC-411 D-1	EDD-406 D-2	EDD-004 V-1
Date				JANUARY' 2019	FEBRUARY' 2019					
28	Vanadium	mg/l	---							
29	Cadmium	mg/l								
30	Cobalt	mg/l								
31	Sodium	mg/l	---	1970.0	1620.0	1530.0	1290.0	820.0	570.0	1450.0
32	Cyanide	mg/l	0.2	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
33	Hexavalent Chromium	mg/l	0.1	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Produced Water Analysis Report of CBM Raniganj Project of Essar Oil and Gas Exploration and Production Limited
(Compliance Period: Oct'18 - Mar'19)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDD-007 D-4	EDD-013 D-1	EDD-015 D-4	EDE-022 D-1	EDI-032 D-2	EDH-038 V-1	EDI-039 D-3
Date				FEBRUARY' 2019						
1	pH		5.5 to 9.0	8.67	8.79	8.26	8.39	8.01	8.21	8.09
2	Temperature			38.1°C	35.5°C	29°C	36.7°C	38.23°C	39.1°C	33.4°C
3	Total Suspended Solids	mg/l	100	2	8	2	3	2	2	4
4	Total Dissolved Solids	mg/l	---	1682	2632	2584	2042	6812	6348	5968
5	Chloride	mg/l	---	403	260.3	575	640	2796.3	2428.1	2845
6	Total Hardness	mg/l	---	27.40	23.50	27.40	27.40	70.60	78.40	70.60
7	Sulphate	mg/l	---	<2.5	4.0	4.8	3.6	6.5	5.8	6.0
8	Calcium	mg/l		7.9	6.3	6.3	7.9	20.4	28.3	22
9	Magnesium	mg/l	---	1.9	1.9	2.9	1.9	4.8	1.9	3.8
10	BOD	mg/l	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	2.06	2.5	2.65	1.05	3.3	2.8	3
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	0.013	0.021	0.017	0.016	0.033	0.028	0.024
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	74.2	167.7	134.2	94.6	104.4	97.7	127.9
23	Aluminium	mg/l	---							
24	Lithium	mg/l								
25	Molybdenum	mg/l	---							
26	Palladium	mg/l	---							
27	Selenium	mg/l								

S. No.	Parameter	Unit	CPCB Standard	EDD-007 D-4	EDD-013 D-1	EDD-015 D-4	EDE-022 D-1	EDI-032 D-2	EDH-038 V-1	EDI-039 D-3
Date				FEBRUARY' 2019						
28	Vanadium	mg/l	---							
29	Cadmium	mg/l								
30	Cobalt	mg/l								
31	Sodium	mg/l	---	895.0	1870.0	1620.0	1140.0	2016.0	1992.0	2470.0
32	Cyanide	mg/l	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
33	Hexavalent Chromium	mg/l	0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

S. No.	Parameter	Unit	CPCB Standard	EDE-041 D-2	EDN-162 D-4	EDI-041 D-2	EDI-039 D-3	EDD-022 D-2	EDD-007 D-1	EDD-403 D-2
Date				FEBRUARY' 2019	MARCH' 2019					
1	pH		5.5 to 9.0	7.49	7.28	7.61	8.09	8.36	8.39	8.25
2	Temperature			35.1°C	42.8°C	35.8°C	37.1°C	37.6°C	37.5°C	38.4°C
3	Total Suspended Solids	mg/l	100	7	31	12	4	<2	4	3
4	Total Dissolved Solids	mg/l	---	6254	3692	3396	5598	2318	1462	1344
5	Chloride	mg/l	---	2962	1440	940	1680	770	452	398
6	Total Hardness	mg/l	---	309.70	784.00	286.20	70.60	27.40	19.60	19.60
7	Sulphate	mg/l	---	7.2	6.4	5.2	6.9	5.2	<2.5	<2.5
8	Calcium	mg/l		106.8	220	69.1	17.3	7.9	4.7	4.7
9	Magnesium	mg/l	---	10.5	57.2	27.6	6.7	1.9	1.9	1.9
10	BOD	mg/l	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	3.8	2.65	2.2	3.05	1.15	0.8	0.65
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	0.029	0.023	0.019	0.026	0.015	0.011	<0.01
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	64.5	20.3	22.4	75	53	38.5	27.6
23	Aluminium	mg/l	---		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybdenum	mg/l	---		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Palladium	mg/l	---		<0.1	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

S. No.	Parameter	Unit	CPCB Standard	EDE-041 D-2	EDN-162 D-4	EDI-041 D-2	EDI-039 D-3	EDD-022 D-2	EDD-007 D-1	EDD-403 D-2
Date				FEBRUARY' 2019	MARCH' 2019					
28	Vanadium	mg/l	---		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	2610.0	1310.0	870.0	1450.0	640.0	392.0	280.0
32	Cyanide	mg/l	0.2	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
33	Hexavalent Chromium	mg/l	0.1	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

S. No.	Parameter	Unit	CPCB Standard	EDD-009 D-3	EDD-053 D-4	EDG-074 D-2	EDG-075 V-1	EDG-077 D-1	EDC-072 D-7	EDD-052 D-5
Date				MARCH' 2019						
1	pH		5.5 to 9.0	8.32	8.14	8.11	8.19	8.22	8.07	8.30
2	Temperature			42.1°C	40.4°C	38.09°C	38.8°C	39.6°C	32.6°C	39.1°C
3	Total Suspended Solids	mg/l	100	<2	<2	<2	2	2	2	<2
4	Total Dissolved Solids	mg/l	---	1742	2298	3180	1862	1426	2648	3164
5	Chloride	mg/l	---	375	842	1030	705	390	1040	855
6	Total Hardness	mg/l	---	34.20	27.40	23.50	31.40	31.40	23.50	31.40
7	Sulphate	mg/l	---	<2.5	4.1	4.9	<2.5	<2.5	<2.5	6.1
8	Calcium	mg/l		11	6.3	6.3	9.4	9.4	6.3	7.9
9	Magnesium	mg/l	---	2.9	2.9	1.9	1.9	1.9	1.9	2.9
10	BOD	mg/l	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	1.6	1.95	2.55	0.65	0.71	0.98	1.75
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	0.013	0.019	0.024	<0.01	<0.01	<0.01	0.028
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	20.9	55.1	84.4	49.5	31.4	82.1	56.1
23	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

S. No.	Parameter	Unit	CPCB Standard	EDD-009 D-3	EDD-053 D-4	EDG-074 D-2	EDG-075 V-1	EDG-077 D-1	EDC-072 D-7	EDD-052 D-5
Date				MARCH' 2019						
28	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	280.0	665.0	945.0	640.0	405.0	915.0	725.0
32	Cyanide	mg/l	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
33	Hexavalent Chromium	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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(Compliance Period: Oct'18 - Mar'19)

ANNEXURE III

S. No.	Parameter	Unit	CPCB Standard	EDI-032 D-1	EDI-032 D-2	EDI-041 D-3	EDI-041 V	EDI-040 D-3	EDI-040 D-4
Date				MARCH' 2019					
1	pH		5.5 to 9.0	8.58	7.71	7.50	7.34	7.22	7.45
2	Temperature			37.2°C	42.8°C	36.7°C	34.9°C	31.7°C	33.4°C
3	Total Suspended Solids	mg/l	100	9	<2	19	22	98	87
4	Total Dissolved Solids	mg/l	---	4736	5162	5284	7386	4822	5874
5	Chloride	mg/l	---	1105	2150	2210	3012	1940	2085
6	Total Hardness	mg/l	---	90.20	58.80	145.00	215.60	188.20	223.40
7	Sulphate	mg/l	---	7.0	7.8	6.9	8.5	6.2	6.6
8	Calcium	mg/l		26.7	14.1	39.3	55	56.6	53.4
9	Magnesium	mg/l	---	5.7	5.7	11.9	19.1	11.4	21.9
10	BOD	mg/l	30	<2	<2	<2	2	3	4
11	COD	mg/l	250	<8	<8	<8	10.0	12.0	15.0
12	Oil & Grease(Hexane Extract)	mg/l	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphide	mg/l	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluoride	mg/l	2	2.2	3.9	2.95	3.95	2.55	2.9
16	Total Chromium	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	0.019	0.014	0.022	0.033	0.043	0.052
18	Copper	mg/l	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	44.5	83.7	55.5	66.7	45.4	56.9
23	Aluminium	mg/l	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybdenum	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
26	Palladium	mg/l	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

S. No.	Parameter	Unit	CPCB Standard	EDI-032 D-1	EDI-032 D-2	EDI-041 D-3	EDI-041 V	EDI-040 D-3	EDI-040 D-4
Date				MARCH' 2019					
28	Vanadium	mg/l	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	970.0	1480.0	1520.0	2250.0	1430.0	1955.0
32	Cyanide	mg/l	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
33	Hexavalent Chromium	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

**R.O. water analysis report of CBM Raniganj Project of
EOGEPL: ANNEXURE IV**

(Compliance Period: Oct' 18 - Mar'19)

Date					OCTOBER' 2018				
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN-099			EDH- 044	
					R.O Inlet	R.O Outlet	R.O Reject	R.O Inlet	R.O Outlet
1	pH		5.5 to 9.0	5.5-9.0	8.34	9.25	8.18	8.5	8.85
2	Temperature								
3	Total Suspended Solids	mg/l	100	100	<2	<2	<2	<2	2
4	Total Dissolved Solids	mg/l	---	2100	3208	206	4962	2758	232
5	Chlorides	mg/l	---	600	1410	54	2470	1140	63
6	Total Hardness	mg/l	---	---	108.6	3.9	128	38.8	7.8
7	Sulphates	mg/l	---	1000	9.5	<2.5	10.5	8	<2.5
8	Calcium	mg/l			38.9	1.6	45.1	14	1.6
9	Magnesium	mg/l	---	---	2.8	<1	3.8	1	1
10	BOD	mg/l	30	30	<2	<2	<2	<2	<2
11	COD	mg/l	250	100	<8	<8	8	<8	<8
12	Oil & Grease	mg/l	10	10	<5	<5	<5	<5	<5
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	2.25	0.7	2.8	1.7	0.8
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	0.016	<0.01	0.029	<0.01	<0.01
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	46.4	17.2	66.1	66.8	11.7
23	Aluminum	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybednum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5

Date					OCTOBER' 2018				
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN-099			EDH- 044	
					R.O Inlet	R.O Outlet	R.O Reject	R.O Inlet	R.O Outlet
26	Palladium	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l			<0.005	<0.005	<0.005	<0.005	<0.005
28	Vanadium	mg/l	---	---	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	---	1120	78	1720	960	75
32	Hexavalent Chromium	mg/l	0.1						
33	Cyanide	mg/l	0.2						

Date					October' 2018				
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH- 044	EDD- 050			GGs- 01
					R.O Reject	R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet
1	pH		5.5 to 9.0	5.5-9.0	8.37	8.47	8.31	8.65	8.49
2	Temperature								
3	Total Suspended Solids	mg/l	100	100	3	3	<2	3	3
4	Total Dissolved Solids	mg/l	---	2100	4038	2508	692	3442	1648
5	Chlorides	mg/l	---	600	1874	1040	220	1630	602
6	Total Hardness	mg/l	---	---	54.3	31	11.6	38.8	23.3
7	Sulphates	mg/l	---	1000	9	9	5	11	7.5
8	Calcium	mg/l			18.7	9.3	1.6	12.4	6.2
9	Magnesium	mg/l	---	---	1.9	1.9	1.9	1.9	1.9
10	BOD	mg/l	30	30	2	<2	<2	<2	<2
11	COD	mg/l	250	100	8	<8	<8	<8	<8
12	Oil & Grease	mg/l	10	10	<5	<5	<5	<5	<5
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	2.35	1.9	0.95	2.2	1.45
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	<0.01	<0.01	<0.01	0.019	0.017
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	84.8	71.8	33.6	72.7	49.3
23	Aluminum	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybednum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5

Date					October' 2018				
					EDH- 044	EDD- 050			GGs- 01
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	R.O Reject	R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet
26	Palladium	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l			<0.005	<0.005	<0.005	<0.005	<0.005
28	Vanadium	mg/l	---	---	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	---	1440	920	262	1045	550
32	Hexavalent Chromium	mg/l	0.1						
33	Cyanide	mg/l	0.2						

Date					October' 2018		November' 2018		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGs- 01		EDN- 099		
					R.O-Outlet	R.O-Reject	R.O Inlet	R.O Outlet	R.O Reject
1	pH		5.5 to 9.0	5.5-9.0	7.88	8.32	8.36	8.63	8.2
2	Temperature								
3	Total Suspended Solids	mg/l	100	100	<2	2	<2	2	<2
4	Total Dissolved Solids	mg/l	---	2100	302	2978	3436	318	4516
5	Chlorides	mg/l	---	600	92	1210	1470	142	2050
6	Total Hardness	mg/l	---	---	7.8	31	112.5	7.8	170.7
7	Sulphates	mg/l	---	1000	3	9.1	7.2	3	8.5
8	Calcium	mg/l			1.6	9.3	34.2	1.6	57.5
9	Magnesium	mg/l	---	---	1	1.9	6.6	1	6.6
10	BOD	mg/l	30	30	<2	2	<2	<2	<2
11	COD	mg/l	250	100	<8	<8	<8	<8	<8
12	Oil & Grease	mg/l	10	10	<5	<5	<5	<5	<5
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	0.5	2.1	1.95	0.6	2.55
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	0.011	0.024	0.022	<0.01	0.029
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	13.1	88	52.5	18	61
23	Aluminum	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybednum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5

Date					October' 2018		November' 2018		
					GGs- 01		EDN- 099		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	R.O-Outlet	R.O-Reject	R.O Inlet	R.O Outlet	R.O Reject
26	Palladium	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l			<0.005	<0.005	<0.005	<0.005	<0.005
28	Vanadium	mg/l	---	---	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	---	86	1135	1280	117	1830
32	Hexavalent Chromium	mg/l	0.1						
33	Cyanide	mg/l	0.2						

Date					November' 2018					
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD- 050			GGS-01		
					R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet	R.O-outlet	R.O-Reject
26	Palladium	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
28	Vanadium	mg/l	---	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	---	775	290	820	540	198	1040
32	Hexavalent Chromium	mg/l	0.1							
33	Cyanide	mg/l	0.2							

R.O. water analysis report of CBM Raniganj Project of EOGEP
(Compliance period: Oct'18 to Mar'19)

ANNEXURE IV

Date					November' 2018			December' 2018	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH- 044			EDN- 099	
					R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet	R.O-outlet
1	pH		5.5 to 9.0	5.5-9.0	8.62	8.81	8.4	8.37	8.68
2	Temperature								
3	Total Suspended Solids	mg/l	100	100	<2	<2	<2	2	<2
4	Total Dissolved Solids	mg/l	---	2100	2264	466	3502	2896	156
5	Chlorides	mg/l	---	600	950	187	1625	526.5	52.8
6	Total Hardness	mg/l	---	---	54.3	7.8	73.7	121.50	7.80
7	Sulphates	mg/l	---	1000	5.2	<2.5	8.5	4.5	<2.5
8	Calcium	mg/l			15.5	1.6	23.3	45.6	1.6
9	Magnesium	mg/l	---	---	3.8	1	3.8	1.9	1.00
10	BOD	mg/l	30	30	<2	<2	<2	<2	<2
11	COD	mg/l	250	100	<8	<8	<8	<8	<8
12	Oil & Grease	mg/l	10	10	<5	<5	<5	<5.0	<5.0
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	1.75	0.41	1.9	2.65	0.17
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	0.01	<0.01	<0.01	0.022	<0.01
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	34.3	17.9	41.6	41.6	4.9
23	Aluminum	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybednum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5

R.O. water analysis report of CBM Raniganj Project of EOGEP
 (Compliance period: Oct'18 to Mar'19)

ANNEXURE IV

Date					November' 2018			December' 2018	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH- 044			EDN- 099	
					R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet	R.O-outlet
26	Palladium	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l			<0.005	<0.005	<0.005	<0.01	<0.01
28	Vanadium	mg/l	---	---	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	---	865	170	1210	1055.0	32.4
32	Hexavalent Chromium	mg/l	0.1					<0.01	<0.01
33	Cyanide	mg/l	0.2					<0.02	<0.02

Date					December' 2018				
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN-099	EDH- 044			EDD- 050
					R.O-Reject	R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet
1	pH		5.5 to 9.0	5.5-9.0	8.35	8.47	8.42	8.37	8.32
2	Temperature								
3	Total Suspended Solids	mg/l	100	100	<2	<2	<2	<2	4
4	Total Dissolved Solids	mg/l	---	2100	3712	442	408	3264	2066
5	Chlorides	mg/l	---	600	640.5	480.5	107	1068	975
6	Total Hardness	mg/l	---	---	156.80	15.70	7.80	82.30	27.40
7	Sulphates	mg/l	---	1000	5.5	5.1	<2.5	5.9	<2.5
8	Calcium	mg/l			58.1	3.1	1.6	29.8	7.9
9	Magnesium	mg/l	---	---	2.9	1.9	1.0	1.9	1.9
10	BOD	mg/l	30	30	<2	<2	<2	<2	<2
11	COD	mg/l	250	100	<8	<8	<8	<8	<8
12	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	3.3	2.15	1.8	2.85	2.5
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	0.024	0.016	<0.01	0.017	<0.01
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	40.9	100.8	237	54.7	66
23	Aluminum	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybednum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5

Date					December' 2018				
					EDN-099	EDH- 044			EDD- 050
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	R.O-Reject	R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet
26	Palladium	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01
28	Vanadium	mg/l	---	---	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	---	1170.0	912.0	155.0	1125.0	795.0
32	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01
33	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02

Date					December' 2018				
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD- 050		GGs- 01		
					R.O-outlet	R.O-Reject	R.O-Inlet	R.O-outlet	R.O-Reject
1	pH		5.5 to 9.0	5.5-9.0	8.23	8.39	8.51	8.49	8.45
2	Temperature								
3	Total Suspended Solids	mg/l	100	100	<2	4	4	3	2
4	Total Dissolved Solids	mg/l	---	2100	588	2356	512	1682	2748
5	Chlorides	mg/l	---	600	370	445	265	370	645
6	Total Hardness	mg/l	---	---	11.80	43.10	7.80	19.60	39.20
7	Sulphates	mg/l	---	1000	<2.5	5.9	<2.5	<2.5	6.5
8	Calcium	mg/l			3.1	14.1	1.6	4.7	12.6
9	Magnesium	mg/l	---	---	1.0	1.9	1.0	1.9	1.90
10	BOD	mg/l	30	30	<2	<2	<2	<2	<2
11	COD	mg/l	250	100	<8	<8	<8	<8	<8
12	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	2.25	3.35	0.9	1.85	3.6
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	<0.01	0.024	<0.01	0.011	0.027
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	28.3	79.5	16.6	72.5	86.6
23	Aluminum	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybednum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5

Date					December' 2018				
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDD- 050		GGs- 01		
					R.O-outlet	R.O-Reject	R.O-Inlet	R.O-outlet	R.O-Reject
26	Palladium	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01
28	Vanadium	mg/l	---	---	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	---	226.0	1198.0	109.0	735.0	1245.0
32	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01
33	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02

Date					January' 2019						
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGs- 01			EDD- 050			EDH- 044
					R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet
1	pH		5.5 to 9.0	5.5-9.0	8.48	8.52	8.55	8.56	8.35	8.81	8.53
2	Temperature				31.5°C	31.1°C	30.6°C	29.6°C	30.2°C	24.4°C	25.3°C
3	Total Suspended Solids	mg/l	100	100	2	<2	2	2	<2	2	4
4	Total Dissolved Solids	mg/l	---	2100	2674	848	3250	3210	508	3380	4280
5	Chlorides	mg/l	---	600	183.2	54	260	206	102	218	1120
6	Total Hardness	mg/l	---	---	23.50	15.70	39.20	39.20	7.80	35.30	54.90
7	Sulphates	mg/l	---	1000	<2.5	<2.5	<2.5	3.9	<2.5	4.5	5.1
8	Calcium	mg/l			6.3	3.1	12.6	11	1.6	11	17.3
9	Magnesium	mg/l	---	---	1.9	1.90	1.9	2.9	1.0	1.9	2.9
10	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	3.6	3.2	5	3.9	2.9	4.2	4
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	0.011	<0.01	0.017	0.015	<0.01	0.019	0.021
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	196.4	56.4	156	141.3	92.6	156.9	130.8
23	Aluminum	mg/l	---	---							
24	Lithium	mg/l									
25	Molybednum	mg/l	---	---							

R.O. water analysis report of CBM Raniganj Project of EOGEP
(Compliance period: Oct'18 to Mar'19)

ANNEXURE IV

Date					January' 2019					February' 2019	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDH- 044		EDN- 099			GGs- 01	
					R.O-outlet	R.O-Reject	R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet	R.O-outlet
1	pH		5.5 to 9.0	5.5-9.0	8.80	8.50	8.15	7.73	8.20	8.41	8.38
2	Temperature				24.4°C	24.8°C	24.1°C	24.1°C	24.4°C	33.7°C	30.4°C
3	Total Suspended Solids	mg/l	100	100	<2	5	7	<2	<2	2	<2
4	Total Dissolved Solids	mg/l	---	2100	578	4884	6696	128	7026	2182	808
5	Chlorides	mg/l	---	600	51.5	1463	2867	38.5	3010	720	228
6	Total Hardness	mg/l	---	---	11.80	82.30	266.60	7.80	192.10	23.50	27.40
7	Sulphates	mg/l	---	1000	<2.5	5.7	6.0	<2.5	6.5	6.2	3.5
8	Calcium	mg/l			3.1	26.7	92.7	1.6	66	6.3	7.9
9	Magnesium	mg/l	---	---	1.0	3.8	8.6	1.0	6.70	1.9	1.90
10	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	0.75	4.3	3.6	0.16	5.7	1.8	0.59
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	<0.01	0.024	0.019	<0.01	0.022	0.024	<0.01
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	40.1	104.4	65	3.6	85	55.9	23.3
23	Aluminum	mg/l	---	---							
24	Lithium	mg/l									
25	Molybednum	mg/l	---	---							

Date					February' 2019						
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGs- 01	EDD- 050			EDH- 044		
					R.O- Reject	R.O-Inlet	R.O- outlet	R.O- Reject	R.O-Inlet	R.O- outlet	R.O- Reject
1	pH		5.5 to 9.0	5.5-9.0	8.31	8.43	8.20	8.60	8.47	8.35	8.42
2	Temperature				30.7°C	32.5°C	31.9°C	28.2°C	26.0°C	25.9°C	26.3°C
3	Total Suspended Solids	mg/l	100	100	2	5	<2	4	3	2	3
4	Total Dissolved Solids	mg/l	---	2100	3646	4288	912	5396	4386	388	5466
5	Chlorides	mg/l	---	600	1670	1128	307	1980	2014	123.4	2645
6	Total Hardness	mg/l	---	---	27.40	31.40	19.60	31.40	19.80	11.80	11.80
7	Sulphates	mg/l	---	1000	7.1	5.8	2.9	6.4	4.7	<2.5	6.8
8	Calcium	mg/l			9.4	7.9	4.7	7.9	4.7	3.1	3.1
9	Magnesium	mg/l	---	---	1.0	2.9	1.9	2.9	1.9	1.0	1.0
10	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	2.6	2.3	0.91	3.15	2.85	0.86	3.15
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	0.027	0.015	<0.01	0.019	0.025	0.011	0.030
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	103.2	75.5	27.2	133.6	118.1	13.6	190.8
23	Aluminum	mg/l	---	---							
24	Lithium	mg/l									
25	Molybednum	mg/l	---	---							

R.O. water analysis report of CBM Raniganj Project of EOGEP
(Compliance period: Oct'18 to Mar'19)

ANNEXURE IV

Date					February' 2019			March' 2019			
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN- 099			EDD- 050			
					R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet	R.O-outlet	R.O-Reject	R.O-Inlet
1	pH		5.5 to 9.0	5.5-9.0	8.29	7.56	8.40	8.43	8.20	8.33	8.29
2	Temperature				26.8°C	26.7°C	22.1°C	31.7°C	31.2°C	26.1°C	34.8°C
3	Total Suspended Solids	mg/l	100	100	4	2	3	2	<2	7	<2
4	Total Dissolved Solids	mg/l	---	2100	6428	418	7884	2332	992	3016	2246
5	Chlorides	mg/l	---	600	2085	115.7	3905	1140	305	1420	980
6	Total Hardness	mg/l	---	---	152.90	78.40	121.50	27.40	15.70	31.40	23.50
7	Sulphates	mg/l	---	1000	5.5	<2.5	7.6	3.7	<2.5	4.5	4.9
8	Calcium	mg/l			48.7	28.3	44	6.3	3.1	7.9	6.3
9	Magnesium	mg/l	---	---	7.6	1.9	2.9	2.9	1.9	2.9	1.9
10	BOD	mg/l	30	30	<2	<2	<2	<2	<2	<2	<2
11	COD	mg/l	250	100	<8	<8	<8	<8	<8	<8	<8
12	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	2.95	0.29	3.35	2.75	1.05	3.1	1.85
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	0.029	<0.01	0.034	0.022	<0.01	0.042	0.015
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	65.4	3.8	114.8	72.1	31.5	73.6	54.3
23	Aluminum	mg/l	---	---				<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l						<0.5	<0.5	<0.5	<0.5
25	Molybednum	mg/l	---	---				<0.5	<0.5	<0.5	<0.5

R.O. water analysis report of CBM Raniganj Project of EOGEP
(Compliance period: Oct'18 to Mar'19)

ANNEXURE IV

Date					March' 2019				
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGs- 01		EDH- 044		
					R.O-outlet	R.O- Reject	R.O-Inlet	R.O-outlet	R.O- Reject
1	pH		5.5 to 9.0	5.5-9.0	8.15	8.72	8.27	8.19	8.40
2	Temperature				34.3°C	30.7°C	27.6°C	28.0°C	28.1°C
3	Total Suspended Solids	mg/l	100	100	<2	4	<2	<2	<2
4	Total Dissolved Solids	mg/l	---	2100	608	3310	3848	514	5596
5	Chlorides	mg/l	---	600	265	1520	1702	206	2045
6	Total Hardness	mg/l	---	---	11.80	31.40	90.20	11.80	102.00
7	Sulphates	mg/l	---	1000	<2.5	5.5	5.1	<2.5	6.6
8	Calcium	mg/l			3.1	9.4	26.7	3.1	29.9
9	Magnesium	mg/l	---	---	1.0	1.9	5.7	1.0	6.7
10	BOD	mg/l	30	30	<2	<2	<2	<2	<2
11	COD	mg/l	250	100	<8	<8	<8	<8	<8
12	Oil & Grease	mg/l	10	10	<5.0	<5.0	<5.0	<5.0	<5.0
13	Phenolic Compounds	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002	<0.002
14	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5	<0.5
15	Fluorides	mg/l	2	1.5	0.9	3.2	2.55	0.72	3.5
16	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05	<0.05
17	Zinc	mg/l	---	---	<0.01	0.019	0.024	<0.01	0.033
18	Copper	mg/l	---	---	<0.05	<0.05	<0.05	<0.05	<0.05
19	Nickel	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05
20	Lead	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
21	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
22	SAR		---	---	24	57.7	37.3	23.7	65.1
23	Aluminum	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
24	Lithium	mg/l			<0.5	<0.5	<0.5	<0.5	<0.5
25	Molybednum	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5

R.O. water analysis report of CBM Raniganj Project of EOGEP
 (Compliance period: Oct'18 to Mar'19)

ANNEXURE IV

Date					March' 2019				
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGs- 01		EDH- 044		
					R.O-outlet	R.O-Reject	R.O-Inlet	R.O-outlet	R.O-Reject
26	Palladium	mg/l	---	---	<0.5	<0.5	<0.5	<0.5	<0.5
27	Selenium	mg/l			<0.01	<0.01	<0.01	<0.01	<0.01
28	Vanadium	mg/l	---	---	<0.2	<0.2	<0.2	<0.2	<0.2
29	Cadmium	mg/l			<0.02	<0.02	<0.02	<0.02	<0.02
30	Cobalt	mg/l			<0.1	<0.1	<0.1	<0.1	<0.1
31	Sodium	mg/l	---	---	190.0	745.0	815.0	188.0	1510.0
32	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01	<0.01
33	Cyanide	mg/l	0.2		<0.02	<0.02	<0.02	<0.02	<0.02

**Surface water analysis report of CBM Raniganj Project
of EOG EPL: ANNEXURE IV a**

(Compliance Period: Oct' 18 - Mar'19)

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

ANNEXURE IV a

(Compliance Period: Oct'18 to Mar'19)

Date				October' 2018			
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN-99 Discharge	Kunur Nala Downstream Between EDH-58 & 64	EDD-50 Discharge
1	pH at 27 C		5.5 to 9.0	5.5-9.0	8.33	8.3	8.48
2	Temperature						
3	Total Suspended Solids	mg/l	100	100	<2	26	<2
4	Total Dissolved Solids	mg/l		2100	1482	708	1296
5	Acidity as CaCO3	mg/l			Nil	Nil	Nil
6	Total Alkalinity as CaCO3	mg/l			496	201	524
7	Chloride as Chlorine	mg/l		600	552	266	482
8	Total Hardness	mg/l			93.1	85.4	19.4
9	Sulphate	mg/l		1000	7.8	4.5	7.3
10	Calcium	mg/l			31.1	29.5	4.7
11	Magnesium	mg/l			3.8	2.8	1.9
12	DO	mg/l			4.9	5.3	5
13	BOD	mg/l	30	30	<2	<2	<2
14	COD	mg/l	250	100	<8	<8	<8
15	Oil & Grease	mg/l	10	10	<5	<5	<5
16	Phenolic Compounds (as C6H5OH)	mg/l	1	1.2	<0.002	<0.002	<0.002
17	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	1.5	1.7	0.9	1.35
19	Sodium	mg/l			472	270	468
20	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05
21	Zinc	mg/l	5		0.018	0.012	<0.01
22	Copper	mg/l	3		<0.05	<0.05	<0.05
23	Nickel	mg/l	3		<0.05	<0.05	<0.05
24	Lead	mg/l	0.1		<0.1	<0.1	<0.1
25	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited
 (Compliance Period: Oct'18 to Mar'19)

ANNEXURE IV a

Date					October' 2018		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	EDN-99 Discharge	Kunur Nala Downstream Between EDH-58 & 64	EDD-50 Discharge
26	SAR				31.3	12.7	45.9
27	Electrical Conductivity at 25° C	µmhos/cm			2240	980	1860
28	Cyanide	mg/l			<0.02	<0.02	<0.02
29	Bicarbonate (as HCO ₃)	mg/l			605.1	245.2	585.6
30	Hexavalent Chromium	mg/l	0.1				

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

ANNEXURE IV a

(Compliance Period: Oct'18 to Mar'19)

Date					October' 2018		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGs-1 R.O Discharge	Kunur Nala Upstream Near GGS-1	Kunur Nala Downstream Near Kuldiha Bridge
1	pH at 27 C		5.5 to 9.0	5.5-9.0	8.85	8.81	8.1
2	Temperature						
3	Total Suspended Solids	mg/l	100	100	<2	4	7
4	Total Dissolved Solids	mg/l		2100	538	188	308
5	Acidity as CaCO ₃	mg/l			Nil	Nil	2.8
6	Total Alkalinity as CaCO ₃	mg/l			285	89	126
7	Chloride as Chlorine	mg/l		600	124	38	88
8	Total Hardness	mg/l			7.8	69.8	104.8
9	Sulphate	mg/l		1000	5.9	<2.5	5
10	Calcium	mg/l			1.6	26.4	34.2
11	Magnesium	mg/l			1	1	4.7
12	DO	mg/l			5.2	5.4	5.1
13	BOD	mg/l	30	30	<2	<2	<2
14	COD	mg/l	250	100	<8	<8	<8
15	Oil & Grease	mg/l	10	10	<5	<5	<5
16	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	1.2	<0.002	<0.002	<0.002
17	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	1.5	0.69	0.48	0.59
19	Sodium	mg/l			225	64	107
20	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05
21	Zinc	mg/l	5		<0.01	<0.01	0.022
22	Copper	mg/l	3		<0.05	<0.05	<0.05
23	Nickel	mg/l	3		<0.05	<0.05	<0.05
24	Lead	mg/l	0.1		<0.1	<0.1	<0.1
25	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited
 (Compliance Period: Oct'18 to Mar'19)

ANNEXURE IV a

Date					October' 2018		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	GGs-1 R.O Discharge	Kunur Nala Upstream Near GGS-1	Kunur Nala Downstream Near Kuldiha Bridge
26	SAR				34.6	3.3	4.6
27	Electrical Conductivity at 25° C	µmhos/cm			802	275	440
28	Cyanide	mg/l			<0.02	<0.02	<0.02
29	Bicarbonate (as HCO ₃)	mg/l			170.8	48.8	107.4
30	Hexavalent Chromium	mg/l	0.1				

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ANNEXURE IV a

(Compliance Period: Oct'18 to Mar'19)

Date					November' 2018		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Downstream Between EDH-58 & 64	EDD-50 Discharge	Kunur Nala Upstream Near GGS-1
1	pH at 27 C		5.5 to 9.0	5.5-9.0	8.34	8.39	8.38
2	Temperature						
3	Total Suspended Solids	mg/l	100	100	14	<2	3
4	Total Dissolved Solids	mg/l		2100	812	804	376
5	Acidity as CaCO ₃	mg/l			Nil	Nil	Nil
6	Total Alkalinity as CaCO ₃	mg/l			240	265	88
7	Chloride as Chlorine	mg/l		600	310	298	172
8	Total Hardness	mg/l			58.2	15.5	85.4
9	Sulphate	mg/l		1000	3.6	3.4	3
10	Calcium	mg/l			15.5	3.1	29.5
11	Magnesium	mg/l			4.7	1.9	2.8
12	DO	mg/l			5.2	5.9	5.5
13	BOD	mg/l	30	30	<2	<2	<2
14	COD	mg/l	250	100	<8	<8	<8
15	Oil & Grease	mg/l	10	10	<5	<5	<5
16	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	1.2	<0.002	<0.002	<0.002
17	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	1.5	0.84	0.75	0.41
19	Sodium	mg/l			295	305	102
20	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05
21	Zinc	mg/l	5		<0.01	<0.01	<0.01
22	Copper	mg/l	3		<0.05	<0.05	<0.05
23	Nickel	mg/l	3		<0.05	<0.05	<0.05
24	Lead	mg/l	0.1		<0.1	<0.1	<0.1
25	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001

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 (Compliance Period: Oct'18 to Mar'19)

ANNEXURE IV a

Date					November' 2018		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Downstream Between EDH-58 & 64	EDD-50 Discharge	Kunur Nala Upstream Near GGS-1
26	SAR				16.8	33.8	4.8
27	Electrical Conductivity at 25° C	µmhos/cm			1280	1100	490
28	Cyanide	mg/l			<0.02	<0.02	<0.02
29	Bicarbonate (as HCO ₃)	mg/l			292.8	323.3	107.4
30	Hexavalent Chromium	mg/l	0.1				

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

ANNEXURE IV a

(Compliance Period: Oct'18 to Mar'19)

Date					November' 2018	December' 2018	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Downstream Near Kuldiha Bridge	EDD-50 Discharge	Kunur Nala Downstream Near Kuldiha Bridge
1	pH at 27 C		5.5 to 9.0	5.5-9.0	8.35	8.33	8.32
2	Temperature						
3	Total Suspended Solids	mg/l	100	100	4	<2	6
4	Total Dissolved Solids	mg/l		2100	422	776	332
5	Acidity as CaCO ₃	mg/l			Nil	Nil	Nil
6	Total Alkalinity as CaCO ₃	mg/l			97	303	86
7	Chloride as Chlorine	mg/l		600	185	201	103
8	Total Hardness	mg/l			112.5	7.8	133.3
9	Sulphate	mg/l		1000	2.6	<2.5	<2.5
10	Calcium	mg/l			35.8	1.6	48.7
11	Magnesium	mg/l			5.7	1	2.9
12	DO	mg/l			5.3	5.9	5.1
13	BOD	mg/l	30	30	<2	<2	<2
14	COD	mg/l	250	100	<8	<8	<8
15	Oil & Grease	mg/l	10	10	<5	<5	<5
16	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	1.2	<0.002	<0.002	<0.002
17	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	1.5	0.52	1.6	0.95
19	Sodium	mg/l			123	375	107
20	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05
21	Zinc	mg/l	5		<0.01	<0.01	<0.01
22	Copper	mg/l	3		<0.05	<0.05	<0.05
23	Nickel	mg/l	3		<0.05	<0.05	<0.05
24	Lead	mg/l	0.1		<0.1	<0.1	<0.1
25	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited
 (Compliance Period: Oct'18 to Mar'19)

ANNEXURE IV a

Date					November' 2018	December' 2018	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Downstream Near Kuldiha Bridge	EDD-50 Discharge	Kunur Nala Downstream Near Kuldiha Bridge
26	SAR				5	57.6	4.1
27	Electrical Conductivity at 25° C	µmhos/cm			530	1120	475
28	Cyanide	mg/l			<0.02	<0.02	<0.02
29	Bicarbonate (as HCO ₃)	mg/l			118.3	268.4	104.9
30	Hexavalent Chromium	mg/l	0.1			<0.01	<0.01

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

ANNEXURE IV a

(Compliance Period: Oct'18 to Mar'19)

Date					December' 2018		January' 2019	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Upstream Near GGS-1	GGs-1 Discharge	Kunur Nala Upstream Near GGS-1	EDD-50 Discharge
1	pH at 27 C		5.5 to 9.0	5.5-9.0	8.65	8.78	8.55	8.35
2	Temperature						17.8°C	29.2°C
3	Total Suspended Solids	mg/l	100	100	4	<2	2	<2
4	Total Dissolved Solids	mg/l		2100	438	510	628	892
5	Acidity as CaCO3	mg/l			Nil	Nil	Nil	Nil
6	Total Alkalinity as CaCO3	mg/l			225	407	382.8	513.3
7	Chloride as Chlorine	mg/l		600	112	145	184	492
8	Total Hardness	mg/l			94.1	11.8	94.1	15.7
9	Sulphate	mg/l		1000	<2.5	<2.5	<2.5	<2.5
10	Calcium	mg/l			34.6	3.1	33	3.1
11	Magnesium	mg/l			1.9	1	2.9	1.9
12	DO	mg/l			5.7	5.9	6	5.7
13	BOD	mg/l	30	30	<2	<2	<2	<2
14	COD	mg/l	250	100	<8	<8	8	<8
15	Oil & Grease	mg/l	10	10	<5	<5	<5	<5
16	Phenolic Compounds (as C6H5OH)	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002
17	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	1.5	1.85	2.3	0.6	1.5
19	Sodium	mg/l			148	212	37	68
20	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	5		<0.01	<0.01	<0.01	<0.01
22	Copper	mg/l	3		<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l	3		<0.05	<0.05	<0.05	<0.05
24	Lead	mg/l	0.1		<0.1	<0.1	<0.1	<0.1
25	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001

Surface Water Analysis Report of CBM Raniganj Project of Essar Oil Gas Exploration Production Limited
(Compliance Period: Oct'18 to Mar'19)

ANNEXURE IV a

Date					December' 2018		January' 2019	
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Upstream Near GGS-1	GGs-1 Discharge	Kunur Nala Upstream Near GGS-1	EDD-50 Discharge
26	SAR				6.6	26.6	1.7	7.6
27	Electrical Conductivity at 25° C	µmhos/cm			610	780	880	1670
28	Cyanide	mg/l			<0.02	<0.02	<0.02	<0.02
29	Bicarbonate (as HCO ₃)	mg/l			175.7	292.8	366	585.6
30	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01

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

ANNEXURE IV a

(Compliance Period: Oct'18 to Mar'19)

Date					January' 2019	February' 2019		February' 2019
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Downstream Near Kuldiha Bridge	EDD-50 Discharge	GGs-1 Discharge	Kunur Nala Upstream Near GGS-1
1	pH at 27 C		5.5 to 9.0	5.5-9.0	8.32	8.65	9.08	8.87
2	Temperature				21.9°C	28.2°C	24.4°C	21.2°C
3	Total Suspended Solids	mg/l	100	100	2	<2	<2	2
4	Total Dissolved Solids	mg/l		2100	516	1586	804	482
5	Acidity as CaCO ₃	mg/l			Nil	Nil	Nil	Nil
6	Total Alkalinity as CaCO ₃	mg/l			217.5	611.8	377.2	207
7	Chloride as Chlorine	mg/l		600	63.6	584	53.9	48
8	Total Hardness	mg/l			121.5	19.6	7.8	82.3
9	Sulphate	mg/l		1000	<2.5	3.1	<2.5	<2.5
10	Calcium	mg/l			45.6	4.7	1.6	29.8
11	Magnesium	mg/l			1.9	1.9	1	1.9
12	DO	mg/l			5.3	5.6	5.7	5.9
13	BOD	mg/l	30	30	<2	<2	<2	<2
14	COD	mg/l	250	100	<8	<8	<8	<8
15	Oil & Grease	mg/l	10	10	<5	<5	<5	<5
16	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002
17	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	1.5	1.1	1.8	0.76	0.58
19	Sodium	mg/l			186.4	614	485	234
20	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	5		0.011	0.022	<0.01	<0.01
22	Copper	mg/l	3		<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l	3		<0.05	<0.05	<0.05	<0.05
24	Lead	mg/l	0.1		<0.1	<0.1	<0.1	<0.1
25	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001

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(Compliance Period: Oct'18 to Mar'19)

ANNEXURE IV a

Date					January' 2019	February' 2019		February' 2019
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Downstream Near Kuldiha Bridge	EDD-50 Discharge	GGs-1 Discharge	Kunur Nala Upstream Near GGS-1
26	SAR				7.3	60.5	74.6	11.2
27	Electrical Conductivity at 25° C	µmhos/cm			860	2260	1210	807
28	Cyanide	mg/l			<0.02	<0.02	<0.02	<0.02
29	Bicarbonate (as HCO ₃)	mg/l			265.4	512.4	244	146.4
30	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01

(Compliance Period: Oct'18 to Mar'19)

Date					February' 2019	March' 2019		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Downstream Near Kuldiha Bridge	EDD-50 Discharge	GGs-1 Discharge	Kunur Nala Upstream Near GGS-1
1	pH at 27 C		5.5 to 9.0	5.5-9.0	8.32	8.41	8.28	9.05
2	Temperature				25.5°C	29.4°C	27.9°C	26.3°C
3	Total Suspended Solids	mg/l	100	100	4	<2	<2	16
4	Total Dissolved Solids	mg/l		2100	674	1320	756	426
5	Acidity as CaCO ₃	mg/l			Nil	Nil	Nil	Nil
6	Total Alkalinity as CaCO ₃	mg/l			299	290	185	250
7	Chloride as Chlorine	mg/l		600	104	180	105	206
8	Total Hardness	mg/l			117.6	11.8	11.8	70.6
9	Sulphate	mg/l		1000	<2.5	<2.5	<2.5	<2.5
10	Calcium	mg/l			42.4	3.1	3.1	18.9
11	Magnesium	mg/l			2.9	1	1	5.7
12	DO	mg/l			4.7	5.2	4.9	4.1
13	BOD	mg/l	30	30	<2	<2	<2	<2
14	COD	mg/l	250	100	<8	<8	<8	<8
15	Oil & Grease	mg/l	10	10	<5	<5	<5	<5
16	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	1	1.2	<0.002	<0.002	<0.002	<0.002
17	Sulphides	mg/l	2	2	<0.5	<0.5	<0.5	<0.5
18	Fluoride	mg/l	2	1.5	0.65	0.81	0.55	0.4
19	Sodium	mg/l			312	301	215	79
20	Total Chromium	mg/l	2	1	<0.05	<0.05	<0.05	<0.05
21	Zinc	mg/l	5		0.014	0.012	0.014	0.039
22	Copper	mg/l	3		<0.05	<0.05	<0.05	<0.05
23	Nickel	mg/l	3		<0.05	<0.05	<0.05	<0.05
24	Lead	mg/l	0.1		<0.1	<0.1	<0.1	<0.1
25	Mercury	mg/l	0.01	0.01	<0.001	<0.001	<0.001	<0.001

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

Date					February' 2019	March' 2019		
S. No.	Parameter	Unit	CPCB Limit for Discharge	Onshore Discharge Standards	Kunur Nala Downstream Near Kuldiha Bridge	EDD-50 Discharge	GGs-1 Discharge	Kunur Nala Upstream Near GGS-1
26	SAR				12.5	37.8	27.1	4
27	Electrical Conductivity at 25° C	µmhos/cm			1024	1690	980	575
28	Cyanide	mg/l			<0.02	<0.02	<0.02	<0.02
29	Bicarbonate (as HCO ₃)	mg/l			364.8	321	225.7	390.4
30	Hexavalent Chromium	mg/l	0.1		<0.01	<0.01	<0.01	<0.01

**Ground water analysis report of CBM Raniganj Project
of EOGEP: ANNEXURE V**

(Compliance Period: Oct' 18 - Mar'19)

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Nachan	Bansia	Kalikapur	Bargoria	Kantaberia	Jatgoria
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)	22.03.2019	22.03.2019	22.03.2019	22.03.2019	22.03.2019	22.03.2019
24	Nickel	mg/l	0.02	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
25	Arsenic	mg/l	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l	0.01	No Relaxation	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l	0.5	1	<1	<1	<1	<1	<1	<1
29	Phosphorus	mg/l	---	---	<0.03	<0.03	0.06	<0.03	<0.03	0.04
30	Potassium	mg/l	---	---	2	2	4	3	<1	<1
31	Aluminium	mg/l	0.03	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
32	Manganese	mg/l	0.1	0.3	0.107	<0.05	<0.05	<0.05	<0.05	<0.05
33	Selenium	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
34	Cadmium	mg/l	0.003	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
35	Cyanide	mg/l	0.05	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
36	Electrical Conductivity at 25° C	us/cm	---	---	556	548	760	510	126	145
37	Hexavalent Chromium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
38	Total Coliform	MPN/10 0ml	---	---	6	<1	<1	2	4	<1

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Dhabani	Labnapara	Akandara	Sarenga 1st Location	Sarenga 2nd Location
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)	22.03.2019	22.03.2019	23.03.2019	23.03.2019	23.03.2019
1	pH at 27°C		6.5 to 8.5	No Relaxation	7.25	6.33	7.37	7.2	6.25
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	---	---	215	<2	<2	<2	<2
5	Total Dissolved Solids	mg/l	500	2000	112	232	132	208	92
6	Turbidity	NTU	1	5	468.5	2.5	1	<1	3.5
7	Nitrate	mg/l	45	No Relaxation	<0.5	<0.5	<0.5	<0.5	<0.5
8	Total Alkalinity (as CaCO ₃)	mg/l	200	600	40	52	59	61	20
9	Chloride	mg/l	250	1000	37	77	30	51	28
10	Total Hardness (as CaCO ₃)	mg/l	200	600	31.4	82.3	47	176.4	90.2
11	Sulphate	mg/l	200	400	<2.5	3.5	<2.5	<2.5	<2.5
12	Calcium	mg/l	75	200	7.9	26.7	23.6	56.6	33
13	Magnesium	mg/l	30	100	2.9	3.8	2.9	8.9	1.9
14	Anionic Detergents (as MBAS)	mg/l	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1
15	Mineral Oil	mg/l	0.5	No Relaxation	<1	<1	<1	<1	<1
16	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	0.001	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
17	Fluoride	mg/l	1	1.5	0.37	0.4	0.22	0.35	0.19
18	Residual Free Chlorine	mg/l	0.2	1	<0.1	<0.1	<0.1	<0.1	<0.1
19	Iron	mg/l	0.3	No Relaxation	24.6	0.42	<0.1	<0.1	0.19
20	Sodium	mg/l	---	---	34	80	40	52	22
21	Total Chromium	mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05
22	Zinc	mg/l	5	15	0.011	0.014	<0.01	<0.01	<0.01
23	Copper	mg/l	0.05	1.5	<0.05	<0.05	<0.05	<0.05	<0.05

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Dhabani	Labnapara	Akandara	Sarenga 1st Location	Sarenga 2nd Location
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)	22.03.2019	22.03.2019	23.03.2019	23.03.2019	23.03.2019
24	Nickel	mg/l	0.02	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05
25	Arsenic	mg/l	0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
26	Lead	mg/l	0.01	No Relaxation	<0.1	<0.1	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001
28	Boron	mg/l	0.5	1	<1	<1	<1	<1	<1
29	Phosphorus	mg/l	---	---	<0.03	<0.03	<0.03	<0.03	<0.03
30	Potassium	mg/l	---	---	<1	2	<1	<1	<1
31	Aluminium	mg/l	0.03	0.2	<0.01	<0.01	<0.01	<0.01	<0.01
32	Manganese	mg/l	0.1	0.3	0.188	<0.05	<0.05	<0.05	<0.05
33	Selenium	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
34	Cadmium	mg/l	0.003	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02
35	Cyanide	mg/l	0.05	No Relaxation	<0.02	<0.02	<0.02	<0.02	<0.02
36	Electrical Conductivity at 25° C	us/cm	---	---	155	360	180	295	130
37	Hexavalent Chromium	mg/l	---	---	<0.01	<0.01	<0.01	<0.01	<0.01
38	Total Coliform	MPN/10 0ml	---	---	9	<1	2	<1	4

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Saraswatiganj	Ghatakdanga	Gopalpur
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)	23.03.2019	23.03.2019	23.03.2019
1	pH at 27°C		6.5 to 8.5	No Relaxation	6.39	6.25	7.19
2	Colour in Hazen unit		5	15	<5	<5	<5
3	Odour		Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Total Suspended Solids	mg/l	---	---	9	<2	<2
5	Total Dissolved Solids	mg/l	500	2000	170	58	188
6	Turbidity	NTU	1	5	21.1	1.3	<1
7	Nitrate	mg/l	45	No Relaxation	<0.5	<0.5	<0.5
8	Total Alkalinity (as CaCO ₃)	mg/l	200	600	48	22	54
9	Chloride	mg/l	250	1000	55	18	66
10	Total Hardness (as CaCO ₃)	mg/l	200	600	102	19.6	66.6
11	Sulphate	mg/l	200	400	<2.5	<2.5	3
12	Calcium	mg/l	75	200	29.8	4.7	11
13	Magnesium	mg/l	30	100	6.7	1.9	6.7
14	Anionic Detergents (as MBAS)	mg/l	0.2	1	<0.1	<0.1	<0.1
15	Mineral Oil	mg/l	0.5	No Relaxation	<1	<1	<1
16	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	0.001	0.002	<0.002	<0.002	<0.002
17	Fluoride	mg/l	1	1.5	0.29	0.15	0.3
18	Residual Free Chlorine	mg/l	0.2	1	<0.1	<0.1	<0.1
19	Iron	mg/l	0.3	No Relaxation	1.85	0.12	<0.1
20	Sodium	mg/l	---	---	47	19	69
21	Total Chromium	mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05
22	Zinc	mg/l	5	15	<0.01	<0.01	<0.01
23	Copper	mg/l	0.05	1.5	<0.05	<0.05	<0.05

S. No.	Parameter	Unit	Limits of IS:10500 -1991 Reaffirmed 2009		Saraswatiganj	Ghatakdanga	Gopalpur
			Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)	23.03.2019	23.03.2019	23.03.2019
24	Nickel	mg/l	0.02	No Relaxation	<0.05	<0.05	<0.05
25	Arsenic	mg/l	0.01	0.05	<0.01	<0.01	<0.01
26	Lead	mg/l	0.01	No Relaxation	<0.1	<0.1	<0.1
27	Mercury	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001
28	Boron	mg/l	0.5	1	<1	<1	<1
29	Phosphorus	mg/l	---	---	<0.03	<0.03	<0.03
30	Potassium	mg/l	---	---	<1	<1	2
31	Aluminium	mg/l	0.03	0.2	<0.01	<0.01	<0.01
32	Manganese	mg/l	0.1	0.3	<0.05	<0.05	<0.05
33	Selenium	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01
34	Cadmium	mg/l	0.003	No Relaxation	<0.02	<0.02	<0.02
35	Cyanide	mg/l	0.05	No Relaxation	<0.02	<0.02	<0.02
36	Electrical Conductivity at 25° C	us/cm	---	---	245	75	252
37	Hexavalent Chromium	mg/l	---	---	<0.01	<0.01	<0.01
38	Total Coliform	MPN/10 0ml	---	---	5	2	<1

**FORM 10 of CBM Raniganj Project of EOGEP L:
ANNEXURE VI**

(Compliance Period: Oct' 18 - Mar'19)

ANNEXURE VI




FORM 10

1th Copy

WEST BENGAL WASTE MANAGEMENT LIMITED

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

MANIFEST FOR HAZARDOUS AND OTHER WASTE

1	Sender's name and mailing address (including Phone No. and e-mail) :	Essar oil and gas Exploration and Production Ltd, AN 81B, Sector-2, Martin Luther King Sarani, Bidhanagar, Durgapur - 713212 15/25(HW) - 2449/2008			
2	Sender's authorization No. :				
3	Manifest Document No. :	1 6661			
4	Transporter's name and address (including Phone No. and e-mail) :	West Bengal Waste Management Limited J.L. No. 103, Mouza Purba Srikrishnapur, P.O. & P.S. Sutahata, Haldia 721635 Dist. Purba Medinipur, West Bengal, Ph. No.-03224-278238 / 39 E-mail : wbwml_haldia@ramky.com			
5	Type of vehicle :	(Truck/Tanker/Special Vehicle)			
6	Transporter's registration No. :	1-MD(E)/X/06			
7	Vehicle registration No.:	WB29 - 9763			
8	Receiver's name and mailing address (including Phone No. and e-mail) :	West Bengal Waste Management Limited J.L. No. 103, Mouza Purba Srikrishnapur, P.O. & P.S. Sutahata, Haldia 721635 Dist. Purba Medinipur, West Bengal, Ph. No.-03224-278238 / 39 E-mail : wbwml_haldia@ramky.com			
9	Receiver's authorization No. :				
10	Waste description :	oil contaminated waste & filter			
11	Total quantity No. of Containers :	1.590 m3 or MT Nos.			
12	Physical form :	(Solid/Semi-Solid/Sludge/Oily/Tarry/Slurry/Liquid)			
13	Special handling instructions and additional information	USE SAFETY SHOE, HANDGLOVES, EYE PROTECTOR.			
14	Sender's Certificate	I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping categorized, packed, marked and name and are labeled and are in all respects in proper conditions for transport by road according to applicable National Government Regulations.			
	Name and stamp	Signature	Day	Month	Year
	P. K. RAY		2	7	03 2019
15	Transporter acknowledgement of receipt of Wastes :				
	Name and stamp	Signature	Day	Month	Year
	SK FAR DALI		2	7	03 2019
16	Receiver's certification for receipt of hazardous and other waste :				
	Name and stamp	Signature	Day	Month	Year
	SK FAR DALI				

1. White Colour forwarded to WBPCB by HzW Sender
3. Pink Colour retained by HzW Receiver
5. Green Colour forwarded to WBPCP after disposal by HzW Receiver

2. Yellow Colour retained by HzW sender
4. Orange Colour retained by transporter
6. Blue Colour returned to sender after disposal by HzW Receiver

**Subsidence Study of CBM Raniganj Project of
EOGEPL: ANNEXURE VII**

(Compliance Period: Oct' 18 - Mar'19)

THIRD PHASE**REPORT****ON****Subsidence Monitoring 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****Dr. Kalyan Adhikari****Dept. of EES****Principal Investigator****Dr. Supriya Pal****Dept. of CE****Investigator****APRIL 2019**

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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 the WGS-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 and second phase monitoring work was executed in the mid of June, 2016 and mid of January 2017 and third phase monitoring work was executed in the first week of February, 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 pressure results in compaction of the geological units in which depressurization occurs. 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.

4. 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.

5. Instruments:

For DGPS Survey the following instruments have been used:

i. **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/ Compass¹
- 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 Tribach 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)

ii. 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.



6. 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 some control points are partly or completely damaged.** At some well locations, existing concrete cemented 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 Damaged and abandoned
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	Broken
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	Under Cow Dung etc.
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	Not Found, only a hole found
ES14	EDD012	Ok
ES15	ROAD SIDE CULVERT	Almost Damaged
ES15A(NEW)	KM MILESTONE PILLAR ROADSIDE KANTABERIA CHOWK	not properly located
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

Station no.	Location details	Present Status
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	Broken

Table 1

The above detail clearly indicates proper care was not taken in preserving the control stations which is mandatory to acquire proper precise monitoring data. If data are not perfect interpretation of data may become erroneous. **DGPS1, used to be the base observation station, has been completely damaged and declared defunct. A new base observation station ES2 (NEW) has been established to carry out the present and future studies.** Change of base observation station may have implication on relative variations of data on each observation stations.

7. Results:

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

SL NO.	POINT_ID	TYPE	EASTING	NORTHING	ELLIPSOID HEIGHT	ORTHO HEIGHT
1	ES2NEW	Reference	535971.9543	2613127.421	22.5325	78.0855
2	DGPS2	Measured	536011.8835	2613306.092	22.4292	77.9812
3	ES3A	Measured	535895.964	2612936.978	21.5744	77.1294
4	ES4	Measured	536185.1536	2612831.329	21.9681	77.5271
5	ES6	Measured	536509.599	2612543.385	21.7578	77.3298
6	ES5A	Measured	536258.5991	2612746.836	21.5195	77.0865
7	ES5B	Measured	536257.2503	2612767.506	21.5734	77.1344
8	ES6A	Measured	536540.8355	2612517.273	21.7802	77.3532
9	ES4A	Measured	536437.4952	2612891.38	23.3672	78.9292
10	ES11B	Measured	537079.5726	2611752.896	21.4077	76.9967
11	ES7A	Measured	536756.5057	2612248.635	21.9048	77.4838
12	ES13	Measured	537149.9354	2611633.037	20.095	75.686
13	ES12	Measured	537152.1329	2611691.748	21.0998	76.6908
14	ES14	Measured	537634.1102	2611469.345	22.8697	78.4697
15	ES15A	Measured	537860.2241	2611474.448	25.3486	80.9516
16	ES15	Measured	537820.6173	2611389.821	25.0077	80.6117
17	ES15B	Measured	537942.6787	2611477.142	26.1019	81.7059
18	ES15C	Measured	538047.3177	2611456.367	26.2645	81.8705
19	ES18N	Measured	538226.3166	2611416.822	27.0095	82.6185
20	ES19	Measured	538562.8142	2611424.201	28.6588	84.2948
21	ES19A	Measured	538752.4456	2611531.801	26.5531	82.1911
22	ES20	Measured	539180.6002	2611492.233	26.4177	82.0627
23	ES19C	Measured	539006.1463	2611531.84	26.5672	82.2092
24	ES22N	Measured	539011.5765	2611740.818	25.9006	81.5396
25	ES22A	Measured	539168.1963	2611848.871	22.8546	78.4946
26	ES24B	Measured	539608.81	2612457.424	20.0338	75.6738
27	ES23	Measured	539219.7855	2612058.453	21.0355	76.6745
28	ES24A	Measured	539262.1981	2612616.636	14.9615	70.5945
29	ES23A	Measured	539339.3689	2612405.618	18.323	73.96
30	ES19B	Measured	538882.0786	2611546.322	25.6274	81.2674
31	ES13A	Measured	537233.7395	2611118.764	21.1209	76.7189
32	ES9	Measured	536956.5858	2612029.666	21.8851	77.4691
33	ES8N	Measured	536806.1786	2612341.566	22.9944	78.5734

Table 2: Total Latitude, longitude and ground elevation at the control stations during February 2019

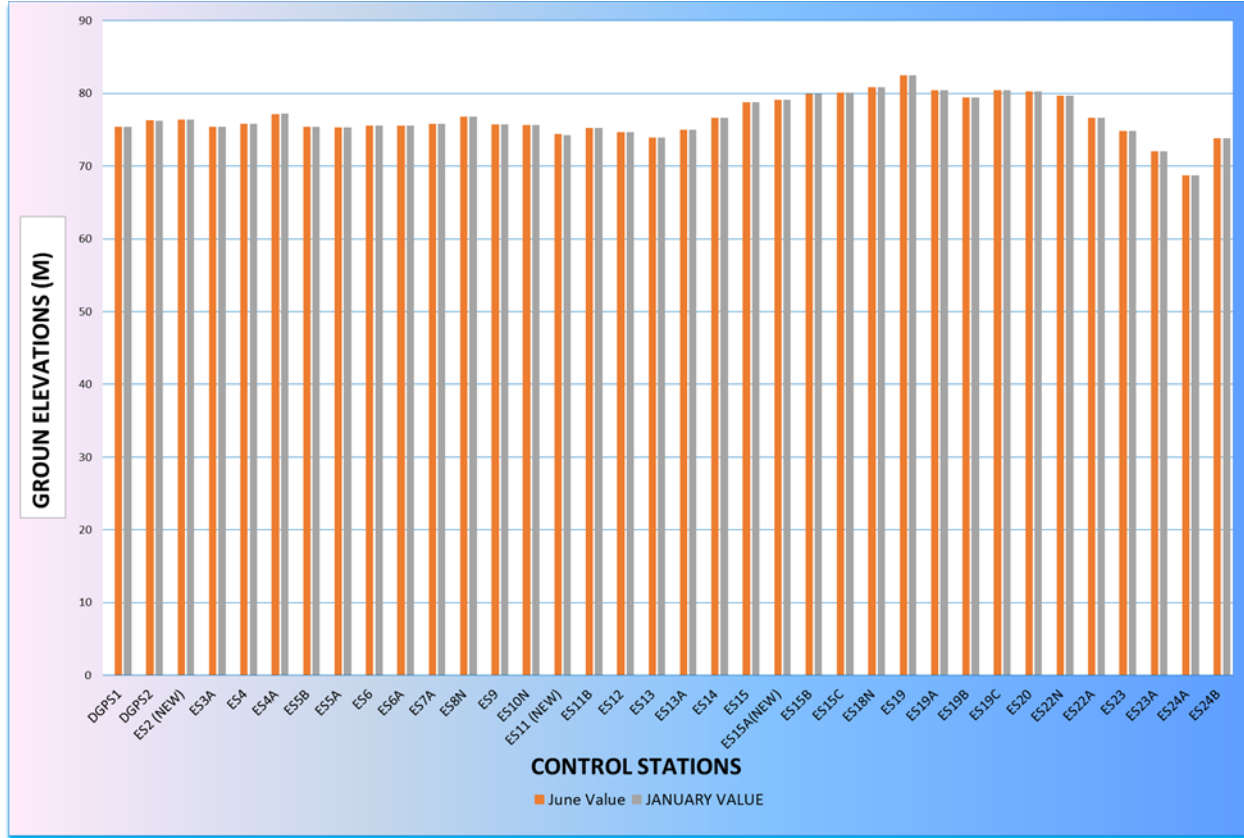


Fig.2: Ground elevations at control stations as observed during June 2016 vs. January 2017

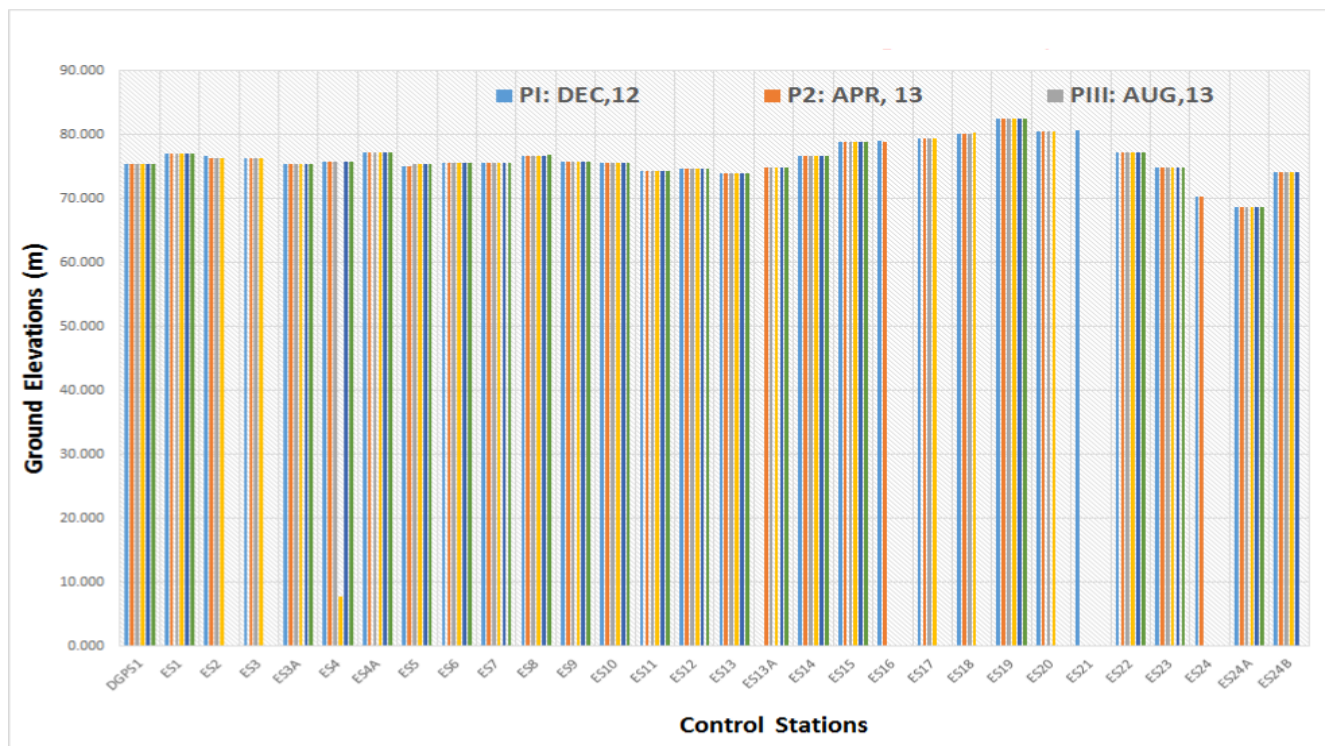


Fig.3.: Ground elevation at ESSAR Raniganj CBM Block during Dec, 12 to May, 15. Source-as per report of Department of Mining Engineering, Indian School of Mines, Dhanbad supplied by Essar Oil Limited (EOL).

8. Conclusion & Recommendation:

Due to damaged condition of previously established reference point (DGPS1 & DGPS2) the new base reference station ES2 (NEW) has been taken to measure R.Ls. (Elevation) of all the survey control points during the present phases of subsidence survey. **As the base reference has been changed comparison of previous elevation data with the present elevation data may not reflect the original scenario and therefore, comparison has not been made.** 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- January 2017) performed by National Institute of Technology Durgapur, no active subsidence were observed at the stations close to the CBM Gas well, plants side 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 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. Some control stations (Table 1) are under tree cover. Branches of trees of those stations need to be trimmed just before next monitoring study to facilitate receiving clear signals by the DGPS.

10. Site Photographs:



Plate 1: Subsidence monitoring Base station ES2 (NEW)



Plate 2: Subsidence monitoring station at ES8N At



Plate 3: Subsidence monitoring station at ES13A

Plate 4: Subsidence monitoring station at

ES9



Plate 5: Subsidence monitoring station at ES22N

Plate 6: Subsidence monitoring station at DGPS1



Plate 7: Subsidence monitoring station at ES15B

Plate 8: Subsidence monitoring station at ES19C

**Corporate Environment Policy of CBM Raniganj
Project of EOGEP: ANNEXURE VIII**

(Compliance Period: Oct' 18 - Mar'19)



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

A handwritten signature in blue ink, appearing to read "Vilas Tawde", written over a blue ink stamp or watermark.

(Managing Director & CEO)

**Hazardous Waste Authorization of CBM Raniganj
Project of EOG EPL: ANNEXURE IX**

(Compliance Period: Oct' 18 - Mar'19)



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 : wbpcbnnet@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 Vehicles 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

**Hazardous Waste Authorization Amendment of CBM
Raniganj Project of EOGEP: ANNEXURE IX a**

(Compliance Period: Oct' 18 - Mar'19)



ANNEXURE IX a
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(r-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

[Dr. T. K. Gupta]

Chief Engineer

Waste Management Cell

**Environmental Protection Expenditure of CBM
Raniganj Project of EOGEP: ANNEXURE X**

(Compliance Period: Oct' 18 - Mar'19)

Expenditure towards Environmental Protection Measures at EOGEP L CBM Project, Raniganj (October' 18 to March'19)		
S. No.	Particular	Expenses (INR)
1	Installation of Reverse Osmosis Treatment System for Produced Water Treatment (Capital & Recurring)	₹ 10,698,014.08
2	Environmental Monitoring Activities (Recurring)	₹ 772,686.00
3	HDPE liners for produced water storage at site when needed (Capital)	₹ 399,230.00
4	Non Hazardous Waste Disposal (Recurring)	₹ 167,880.00
5	Hazardous Waste Disposal (Recurring)	₹ 190,841.93
6	Green Belt Development (Recurring)	₹ 32,412.00
7	Instrument (Capital & Recurring)	₹ 84,961.60
8	Training (Recurring)	₹ 14,000.00
TOTAL		₹ 12,360,025.61

**Ground water level of surrounding areas of CBM
Raniganj Project of EOGEP: ANNEXURE XI**

(Compliance Period: Oct' 18 - Mar'19)

S. No.	Location	Latitude	Longitude	Parapet Height (m)	Well Diameter (m)	DTW from Parapet top (m)	DTW bgl (m)
MARCH' 2019							
1	Nachan	23°36'42.4"N	87°19'58.9"E	0.68	1	2.54	1.86
2	Bansia	23°37.464"N	87°20.151"E	0.76	0.97	2.36	1.56
3	Kalikapur	23°37.464"N	87°20.151"E	0.8	1.85	2.72	1.92
4	Bargoria	23°37'580"N	87°21'397"E	0.7	2.5	2.34	1.64
5	Jatgoria	23°36'973"N	87°23'432"E	0.6	1.8	2.03	1.43
6	Dhabani 1st location	23°35'31.2"N	87°22'00.9"E	0.7	0.68	2.31	1.61
7	Dhabani 2nd location	23°35'519"N	87°22.085"E	0.95	1.8	1.93	0.98
8	Labnapara	23°35'05.36N	87°22'15.8"E	1.2	1.5	2.31	1.11