

इंडियन ऑयल कॉर्पोरेशन लिमिटेड

बरौनी रिफाइनरी, डाकघर : बरौनी ऑयल रिफाइनरी

जिला : बेगूसराय, बिहार - 851114

Indian Oil Corporation Limited

Barauni Refinery, P. O. : Barauni Oil Refinery

Begusarai, Bihar - 851114

Phone : 06243 - 240183-86 (4 Lines)

Grams : 'OILREFIN', FAX : 06243-240150/240167



रिफाइनरी प्रभाग  
Refineries Division

ISO : 9001- 2000, 14001 & OHSAS : 18001 Certified Refinery

**BY REGD POST WITH A/D**

Ref. No. TS/HSE/E/02

Date: 17-09-2016

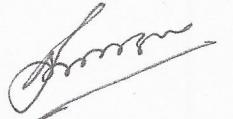
TO,  
THE MEMBER SECRETARY,  
BIHAR STATE POLLUTION CONTROL BOARD,  
BELTRON BHAWAN, 2<sup>ND</sup> FLOOR,  
SHASTRI NAGAR,  
PATNA – 800 023

Sub: Environmental Statement for the financial year ending 31<sup>st</sup> March' 2016.

Dear Sir,

Enclosed please find the Environmental Statement for 2015-16 duly filled in the prescribed Form-5 as per Environment Protection Amendment Rules 2008.

Thanking you,

  
(A M Shaikh)  
Chief Manager (HSE)

Encl. As above.

CC: Shri A.K. Gupta  
Regional Officer,  
BSPCB, Tilrath, Begusarai  
PIN: 851101

Barauni Refinery - *In Harmony with Nature*

पंजीकृत कार्यालय : जी-9, अली यावर जंग मार्ग, बान्द्रा (पूर्व), मुम्बई-400051

**FORM - V**

**ENVIRONMENTAL STATEMENT FOR THE FINANCIAL YEAR ENDING 31<sup>ST</sup>  
MARCH' 2016.**

**PART - A**

I. Name and Address of the owner/occupier of the industry, operation or process. **SHRI V. K. SHUKLA**  
Executive Director,  
Barauni Refinery, IOCL  
Distt - Begusarai  
Bihar - 851114

II. Industry Category Major Industry

III. Production Capacity

UNIT	CAPACITY (THOUSAND MT/ANNUM)
Atmospheric & Vacuum Distillation Unit - I & II	1750 Each
Atmospheric Distillation Unit - III	2500
Delayed Coking Unit - A	600
Delayed Coking Unit - B	500
LPG Recovery Unit	200
Catalytic Reformer Unit	300
RFCCU	1400
NSU	464
DHDT	2200
HGU-1	34 TMTPA OF H2 GEN.
SRU	2*40 MT PER DAY
NHDT	183
ISOM	126
PRIME G+	403
HGU-2	20 TMTPA of H2 GEN.

IV. Year of establishment 1964

V. Date of last environmental statement submitted 30.09.2015

## PART – B

<b>1.</b>	<b>Water Consumption M3 / day</b>	
	Process (Processing whereby water gets polluted and the pollutants are easily biodegradable )	9652.011
	Cooling (Industrial cooling/ spraying in mine pits or boiler feed )	5343.058
	Domestic	11727.44

Name of products	Water consumption per unit of products	
	During the previous financial year	During the current financial year
	(1)	(2)
1. Liquefied Petroleum Gas		
2. Naphtha		
3. Motor Spirit	1.006 M3/MT**	0.888 M3/MT**
4. Superior Kerosene	CRUDE	CRUDE
5. High Speed Diesel		
6. Light Diesel Oil		
7. Low Sulphur Heavy Stock		
8. CBFS		
9. Raw Petroleum Coke		

\*\* The products are not separately processed and all products are obtained from the same raw material i.e. Crude oil. Hence, water consumption has been indicated as M<sup>3</sup> / MT crude processed.

### 2. Raw Material Consumption

Name of raw materials	Name of products	Production in MT	
		During the previous financial year (2014-15)	During the current financial year (2014-15)
	Liquefied Petroleum Gas	291839	335957
	Naphtha	102695	220839
	Motor Spirit	1113302	1218699
CRUDE OIL	Superior Kerosene	713278	763549
	High Speed Diesel	2971092	3294921
	Light Diesel Oil	0	0

Raw Petroleum coke	131561	147499
Carbon Black feedstock	37775	37750
Sulphur	8630	5562
FO	40320	61254

**PART – C**

**POLLUTANTS DISCHARGED TO ENVIRONMENT / UNIT OF CRUDE TPWT.  
(PARAMETER AS SPECIFIED IN THE CONSENT ISSUED)**

Pollution	Quantity of pollutants discharged	Conc. of pollutants in discharges	Percentage of variation from prescribed standards with reasons.
(a) Water			Refer Annexure-1
(b) Air			Refer Annexure-2

**PART – D  
HAZARDOUS WASTES**

(As specified under the Hazardous Waste (Management and Handling) Rules, 1989)

Hazardous Wastes	Total Quantity	
	During the previous financial year (2014-15)	During the current financial year (2015-16)
<b>Oily Sludge</b>		
(a) From process (Tank cleaning)	<ul style="list-style-type: none"> <li>Opening stock: 882.95* m<sup>3</sup></li> <li>Generation: 3543 m<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>Opening stock: 1288.11* m<sup>3</sup></li> <li>Generation: 3570 m<sup>3</sup></li> </ul>
(b) From Pollution Control facilities (ETP)	<ul style="list-style-type: none"> <li>Processing: 3137.84 m<sup>3</sup></li> <li>Closing stock: 1288.11 m<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>Processing: 3799.139 m<sup>3</sup></li> <li>Closing stock: 1058.97 m<sup>3</sup></li> </ul>

\* About 2300 m<sup>3</sup> of old oily sludge stock not included in oily sludge inventory given here. It is being processed for oil recovery through Mechanized Skid Process (Centrifuge) by M/s Balmer Lawrie for recovery of maximum oil.

Hazardous Wastes	Total Quantity	
	During the previous financial year (2014-15)	During the current financial year (2015-16)
<b>Residual Oily Sludge</b>		
(a) From process (Tank cleaning)	<ul style="list-style-type: none"> <li>• Opening stock: 539.8 MT.</li> <li>• Generation: 46.5 MT</li> </ul>	<ul style="list-style-type: none"> <li>• Opening stock: 86.3 MT.</li> <li>• Generation: 34.0 MT</li> </ul>
(b) From Pollution Control facilities (ETP)	<ul style="list-style-type: none"> <li>• Closing stock: 86.3 MT</li> </ul>	<ul style="list-style-type: none"> <li>• Closing stock: 120.3 MT</li> </ul>

- 500 MT sludge has been used in Sept'2014 for bioremediation.

Hazardous Wastes	Total Quantity	
	During the previous financial year (2014-15)	During the current financial year (2015-16)
<b>RFCCU Spent Catalyst</b>		
(a) From process ( ex RFCCU)	<ul style="list-style-type: none"> <li>• Opening Stock : 7503 MT</li> <li>• Generation : 1454 MT</li> <li>• Disposal: 0 MT</li> <li>• Closing Stock: 8957 MT</li> </ul>	<ul style="list-style-type: none"> <li>• Opening Stock : 8957 MT</li> <li>• Generation : 1537 MT</li> <li>• Disposal: 465 MT</li> <li>• Closing Stock: 10029 MT</li> </ul>
(b) From Pollution Control facility	NIL	NIL

**PART – E  
SOLID WASTES**

Hazardous Wastes	Total Quantity	
	During the previous financial year (2014-15)	During the current financial year (2015-16)
<b>Bio Sludge</b>		
(a) From process		
(b) From Pollution Control facility (Ex Sludge Lagoons in BTP)	415 MT ( Dry basis)	430 MT ( Dry basis)
(c) Quantity recycled or reutilized	NIL	NIL
2. Sold	NIL	NIL
3. Disposed	415 MT (in Horticulture as manure and as Landfill)	430 MT (in Horticulture as manure and as Landfill)

## PART – F

Please specify the characterizations (in terms of concentration and quantum) of hazardous as well as solid wastes and indicate disposal practice and opted for both these categories of wastes.

### I. HAZARDOUS WASTES

- a) **Oily Sludge**: Processed by “Mechanized Skid or Extraction Process” for recovery of 90-95% oil from oily sludge and generation of minimum quantity of residual oily sludge. Mechanical extraction method uses solvent and steam heating and then oily sludge is processed in a plant equipped with hydro-cyclones, centrifuges and decanting facility in order to recover the maximum possible oil and water. The sludge is broken down into water, oil and base sediments. Water is drained into ETP for further treatment while the recovered oil is pumped into slop oil tanks for reprocessing in refinery. The base sediments generated in this process is called residual oily sludge which is in solid state having an oil content of around 3-8 % wt. Further, oily sludge generated from crude tank is cleaned onsite by mechanized cleaning of tanks. This methodology followed in this process is also same as mentioned above.

**Pl. Refer Annexure 3 for chemical composition of Oily Sludge**

- b) **Residual Oily Sludge**: The residual oily sludge generated by processing sludge through mechanized skid process is bio-remediated using oilivorous bacteria developed by TERI.

**Pl. Refer Annexure 4 for chemical composition of Residual Oily Sludge**

- c) **Spent Catalyst**: With the kind permission and support of BSPCB and JSPCB, a trial run was successfully conducted in March 2011 in collaboration with ACC cements in its Chaibasa, Jharkhand Plant for co-processing of RFCCU spent catalyst in cement industry. Based on the trial run report, CPCB has granted permission to ACC for regular co-processing of RFCCU spent catalyst. So we have lined up ACC for co-processing of RFCCU spent catalyst in cement industry. Thus, disposal & co-processing as environment friendly manner is going on since Jan'16..

**Pl. Refer Annexure 5 for chemical composition of Spent Catalyst**

### II. SOLID WASTES

- a) **Biological sludge from Biological Treatment Plant (BTP)**: Biological sludge gets generated in the BTP from excess sludge in bio-treater. Same is processed through Thickener & Centrifuge and dry bio sludge is used as manure for the horticulture purpose & green belt development.

## PART - G

**Impact of Pollution Abatement measures on conservation of natural resources and on the cost of production:**

### **1. Implementation of 2 Nos. of Rain Water Harvesting Schemes**

2 (two) numbers of roof top rain water harvesting schemes is implemented in the refinery in year 2015-16 to recharge ground water at the following locations:

- MSQ Control Room
- MSQ Check & Change room

## **PART-H**

**Additional measures / investment proposal for environmental protection including abatement of pollution, prevention of pollution,**

### **1. ETP Modernization**

To meet revised standards consistently, Barauni Refinery has implemented a full large scale modernization and revamp of its entire effluent treatment plant system (ETP & BTP) which includes TPI (Tilted Plate Interceptor) & DAF (Dissolved Air Flootation) system, Spent Caustic Treatment System, Bio-Tower, Bubble Diffuser Type Aeration Tanks, New Clarifiers, Sand Filters, Sludge Handling Facilities, VOC (Volatile Organic Compounds) Control System and Ultra-filtration (UF) module.

With the commissioning of the new modernized plant, Barauni Refinery (BR) is now consistently meeting the revised MoEF standards for treated effluent as per Environment (P) Amendment Rules 2008 w.r.t Oil & Grease, TSS & BOD.

Online effluent monitoring analyzers for pH, BOD, COD and TSS has been installed and connected to CPCB server since 15<sup>th</sup> January '16.

## PART – I

### Any other particulars in respect of environment protection and abatement of pollution.

#### 1. Green Belt

Barauni Refinery has imbibed the habit of regular and large scale tree plantation since long in order to preserve the environment. The critical facts pertaining to the activity of tree plantation at Barauni Refinery are as follows:

About 33% of the total refinery area is consistently being maintained as green area.

Total Area of Green Belt: about 207 Acres in all (including township and Eco park all put together)

Green Belt area in Refinery = about 121 Acres

Green Belt area in Township = about 86 Acres

No. of trees planted till date in Green Belt: about 1,82,627

Total no of trees surviving as on date: about 1,29,617

Trees surviving in the refinery: 81,364

Trees surviving in the Township: 48,253

In FY 2015-16, total 1627 nos. of tree was planted in refinery / township.

#### 2. Ecological Park:

Living testimony of our environment commitment the ecological park of Barauni Refinery exhibits our true commitment towards environment protection. The silent features of the ecological park are presented below:

It is spread over an area of 75 acres. The Garden has more than 279 plant species under 81 families including some medicinal plants both indigenous and exotic. Some important tree species planted in the park are Sissoo, Babool, subabool, Siris, Gular, Teak, Gulmohar, Jamun, Semul, Amaltas, Bamboo, Palas, Bargad, Maulshree, Muckkund, African Tulip tree and Arjun. The Ecological Park has a Rose garden with 31 varieties of roses. It also has about 37 species of medicinal plants of well known value. A medicinal plant "Rouvolfia serpentine", which is becoming rare now- a-days, can be found abundantly in the Eco Park. Two artificial ponds (Eco Ponds) are also present in the



Ecological Park. More than 1000 trees of different species are planted every year. The Ecological Park attracts about 100 species of local resident and migratory birds (water birds as well as the terrestrial birds). The park is a breeding and roosting ground for at least 20 species of birds. Thousands of migratory birds of species such as Common Teal, Mallard, Shoveller, Garganey, Pintail, White Eyed, Pied Crested Cuckoo, Coot, Green Sandpiper, Swallow, Yellow headed Wagtail etc from Siberia and other parts of globe come to ecological park every winter. The park is developed into different zones i.e Jal Vihar, Jantu Vihar, Kala Vihar, Pushpa Vihar and Prabat Vihar

During their visit to Ecological park it is highly appreciated by various dignitaries, distinguished visitors and media including the world famous birds catcher Mr. Ali Husain of Bombay Nature Society and the members of Mandar Nature Club, Bhagalpur.

Eco Park as a bird site has been mentioned in report of Bio-diversity strategy of Bihar and Jharkhand for National Bio-diversity Strategy & Action Plan (NBSAP).

Eco Park as a bird site has also been mentioned by internationally acclaimed bird watchers M. Zafar-ul Islam and Asad R. Rahmani in the following books:

- POTENTIAL AND EXISTING RAMSAR SITES IN INDIA
- DUCKS, GEESE AND SWANS OF INDIA
- IMPORTANT BIRD AREAS IN INDIA

It is matter a great proud for Barauni Refinery that many dignitaries of international stature have referred the BR ecological park "as one of best maintained by an industry in the World" in the visitor's book.

## Annexure 1

SN	Parameter	Quantity of pollutants discharged (Kg/1000 MT crude) 2015-16	Conc. of pollutants in discharges (mg/l except pH) 2015-16
1	pH	--	7.35
2	Oil & Grease	0.00	2.77
3	BOD	0.00	9.67
4	COD	0.00	37.57
5	TSS	0.00	8.21
6	Phenols	0.00	0.09
7	Sulphides	0.00	0.28
8	CN	0.00	0.00
9	Ammonia as N	0.00	12.08
10	TKN	0.00	23.35
11	P	0.00	<0.5
12	Cr (Hexavalent)	0.00	<0.01
13	Cr (Total)	0.00	<0.01
14	Pb	0.00	<0.01
15	Hg	0.00	<0.001
16	Zn	0.00	<0.01
17	Ni	0.00	<0.01
18	Cu	0.00	<0.01
19	V	0.00	<0.01
20	Benzene	0.00	<0.01
21	Benzo (a) - Pyrene	0.00	<0.01

## Annexure 2

S. SN O	Emission	Quantity of pollutants discharged (kg/hr)
1	SO <sub>2</sub>	705.5
2	NO <sub>X</sub>	186.59
3	CO	21.1
4	PM	80.1

## Annexure-3

## COMPOSITION OF OILY SLUDGE

Parameter	Unit	Oily Sludge
pH		-
Oil Content	% wt	50-60
Water	% wt	19-24
Sediment	% wt	9-11
Ash Content	% wt	8-10
Zinc	ppm	240-260
Manganese	ppm	12-15
Copper	ppm	55-58
Nickel	ppm	27-30
Lead	ppm	12-16
Chromium	ppm	40-48
Mercury	ppm	1-2.5
Arsenic	ppm	BDL
Vanadium	ppm	7-9
Cadmium	ppm	10-12
Cobalt	ppm	5-7
Selenium	ppm	2-4
Thallium	ppm	-
Tellurium	ppm	-
Antimony	ppm	-
Tin	ppm	-
Chloride	% wt	-
Sulphur	% wt	-
Calorific Value (as received basis)	kcal/kg	-
Loss on Ignition at 850°C	% wt	

## Annexure-4

### COMPOSITION OF RESIDUAL OILY SLUDGE

Parameter	Unit	Residual Oily SLUDGE
pH		7-8
Oil Content	% wt	5-10
Water	% wt	10-15
Sediment	% wt	19-22
Ash Content	% wt	55-60
Zinc	ppm	170-200
Manganese	ppm	15-25
Copper	ppm	50-70
Nickel	ppm	35-45
Lead	ppm	10-15
Chromium	ppm	35-40
Mercury	ppm	1-2
Arsenic	ppm	BDL
Vanadium	ppm	5-10
Cadmium	ppm	5-10
Cobalt	ppm	3-6
Selenium	ppm	3-6
Thallium	ppm	10-15
Tellurium	ppm	12-16
Antimony	ppm	8-10
Tin	ppm	60-70
Chloride	% wt	0.5-0.7
Sulphur	% wt	0.7-1.0
Calorific Value (as received basis)	kcal/kg	2000-2300
Loss on Ignition at 850°C	% wt	-

## Annexure-5

### TYPICAL CHEMICAL COMPOSITION OF RFCCU SPENT CATALYST

SN	Constituent	% Weight (Range)	% Weight (Avg.)
1.	Al <sub>2</sub> O <sub>3</sub>	40.0 - 48.0	45
2.	SiO <sub>2</sub>	45.0 - 52.0	47
3.	Rare Earth Oxides	2.0 - 2.9	2.6
4.	Fe <sub>2</sub> O <sub>3</sub>	0.4 - 1.0	1.0
5.	CaO	0.4 - 0.5	0.45
6.	Sodium	0.25 - 0.41	0.29
7.	Carbon	0.01 - 0.11	0.04
8.	MgO	0.5 - 1.5	1.0
9.	P <sub>2</sub> O <sub>5</sub>	0.10 - 0.60	0.35
10.	Antimony, Sb	0 - 75 ppm	0 ppm
11.	Cu	0 - 1 ppm	0 ppm
12.	Nickel, Ni	2200 - 4500 ppm	3100 ppm
13.	Vanadium, V	5400 - 10000 ppm	7600 ppm
14.	Loss on Ignition	0.4 - 1.0	0.5