आईआरईएल (इंडिया) लिमिटेड
IREL (India) Limited
(Formerly INDIAN RARE EARTHS LIMITED)
(भारत सरकार का उपक्रम – परमाणु ऊर्जा विभाग)
(A Government of India Undertaking – Dept. of Atomic Energy)

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उड़ीसा सैण्ड्स कॉम्प्लेक्स, माटिखलो (डाक)
छत्रपुर (गंजाम), ओडिशा- 761045, भारत

Orissa Sands Complex, Matikhalo (P.O)
Chatrapur (Ganjam), Odisha -761 045, INDIA

ISO 9001: 2015, ISO 14001: 2015 & OHSAS 18001: 2007 Company

By Registered Post

TS/ENVR/01/ 2770 A

September 25, 2020

To
The Member Secretary,
State Pollution Control Board, Odisha,
Dept. of Forest & Environment,
Government of Odisha,
Paribesh Bhawan, A- 118,
Nilakantha Nagar, Bhubaneswar - 751 012.

Sub : Environmental Statement of OSCOM & Rare Earth Extraction Plant (formerly named MoPP) for the financial year 2019-20.

Dear Sir,

We are enclosing herewith two copies of Environmental Statement report for the financial year **2019-20** for your information please.

Thanking you.

Yours truly,
For IREL (India) Limited.

CGM & HEAD,OSCOM

Copy : The Regional Officer, : A copy of the same report is enclosed
State Pollution Control Board, Odisha for information please.
Dept. of Forest & Environment,
Government of Odisha,
Regional Office, IDCO Division, 2nd Floor,
Industrial Estate,Berhampur-760 008,Odisha.

: UNIT HEAD(OSCOM)'s file/TS.

Q9116318E9116323
H9116337

ISO:9001:2015
ISO:14001:2015
OHSAS:18001:2007

ENVIRONMENTAL STATEMENT

For the year 2019-20

September2020

IREL (India) Limited
Orissa Sands Complex
Matikhalo, Chatrapur, Odisha-761 045

FORM - V"
(See Rule 14)

Environmental Statement for the financial year ending the 31st March 2020.

PART - A

(i)Name and address of the owner/Agent: A.J.Janarthanan
Occupier of the industry CGM & Head, OSCOM
Operation or process. IREL (India) Limited.
Orissa Sands Complex
Matikhalo,Chatrapur,
Dist. -Ganjam (Odisha)
PIN - 761 045

(ii) Industry category : Major scale Industry

(iii)Production capacity : Product Quantity (t/month)

OSCOM

As per consent order no 636/18-19 dated 01.03.2019,
Beach sand mineral products (Ilmenite, Rutile, Zircon, Sillimanite, Garnet ,Monazite) : 30850(t/Month)

Zirconia/Stabilised Zirconia/zirconium chemicals : 0.29

As per consent order no 2794 dated 03.03.2018,
Rare Earth Extraction Plant (REEP)(t/ Mon)

Tri-Sodium Phosphate	:	1125
Ammonium Di-uranate (Nuclear grade)	:	2.16
Thorium oxalate	:	166.66
Thorium nitrate/oxide	:	12.5
Rare Earth Chloride	:	864.58

(iv) Year of establishment:

Dredge & Wet upgradation plant (D&WUP) - October 1986
Mineral Separation Plant (MSP) - October 1986
*Thorium Plant (TP) - February 1992
(*: Merged with REEP)
Zirconia semi Pilot Plant (ZPP) - December 2000
Rare Earths Extraction Plant
(Earlier named MoPP) - August 2013

(v) Date of last environmental Statement submitted : November30, 2019 Vide our letter No.TS/ENVR/01/

PART - B

Water and Raw Material Consumption:

(1) **Water consumption(average),m^3/day** :

	Mining*	MSP	REEP	BOILER	ZPP**
Process	105	1241	157.21	245	Nil
Cooling			45		
Domestic	116.0 (for OSCOM & REEP) and 392.0 (for IREL Housing Colony)				

About 90% of the water, after slurry transportation, is taken back to the Pond (in mining area). Thus, the actual water consumed is worked out to be 10% of the total quantity during slurry transportation from mining area to MSP.

'**' : ZPP was not under operation during the year 2019-20.

	Water consumption per unit of products		
	1 Nature of Products	2 During the year 2018-19	3 During the year 2019-20
(1)	Per ton of heavy minerals(MSP) (Ilmenite, Rutile, Zircon, Monazite, sillimanite, Garnet)	1.49m^3	1.21m^3
(2)	Per ton of total products of REEP i.e. Thorium nitrate, Rare earths chloride, Tri-Sodium phosphate	3.80 m^3	3.28 m^3
(3)	Per Kg of Zirconia/Zirconium basic Sulphate (intermediate product)	Nil	NIL

Note:

i. Water consumption per unit of products has been assessed on the basis of total production of heavy mineral combined product and fresh water consumed.

ii. The water consumption for production of the total heavy mineral production in MSP is nearly same to the previous year.

iii. A part of water was recycled (1266@m^3/day) from Pond No.1 for MSP process.

iv. Water consumption per unit of products has been assessed based on the total production of REEP and fresh water consumed.

(2) **Raw Material Consumption**:

i. For OSCOM operation :

Sl. No.	***Raw material consumption per ton of product output***			
	Nature of raw Material		***during the year 2018-19***	***during the year 2019-20***
1	**DWUP**			
1.1	Raw sand, t	(for production of upgraded heavy minerals consisting of ilmenite, rutile, zircon, monazites sillimanite & garnet.	7.00	6.57
2	**MSP**			
2.1	Furnace oil,L	-do-	19.29	16.00
2.2	Sodium chloride, Kg	(for production of sillimanite)	1.85	1.43
2.3	Soda ash,Kg	-do-	1.24	0.96
2.4	Sodium silicate,Kg	-do-	0.38	0.33
2.5	Oleic acid,Kg	-do-	1.02	0.89
2	**ZPP (*Raw material consumption per Kg of product output)***			
3.1	Zircon frit, Kg (avg. ZrO_2:60%)	(for production of zirconia/equivalent products interim products)	*Nil	*Nil
3.2	Hydrochloric Acid, Kg (~30% conc),	-do-	*Nil	*Nil
3.3	Sulphuric acid, L (~98% conc.),	-do-	*Nil	*Nil
3.4	Ammonia, Kg	-do-	*Nil	*Nil
3.5	Magnesium nitrate, Kg	-do-	*Nil	*Nil
3.6	Sodium hydroxide Flakes, Kg,	-do-	*Nil	*Nil
3.7	High speed diesel (HSD), L	-do-	*Nil	*Nil
3.8	Yttrium oxide, Kg	-do-	*Nil	*Nil
3.9	Hydrated lime, Kg	(for effluent neutralization.)	*Nil	*Nil

Note:

a. In the case of consumption of raw materials in DWUP & MSP (such as raw sand & furnace oil respectively) given is for the production of one ton heavy minerals.

b. The consumption of input chemicals like furnace oil, sodium chloride, sodium silicate, oleic acid etc.in MSP are less than previous year.

c. Number of day's plant operated during the year **2019-20:**

Mining: 356 **days**, MSP: 356 **days,**
ZPP : NIL

ii. For Rare Earth Extraction Plant operation:

Sl. No.	***Raw material consumption per ton of product output***			
	Nature of raw Material		***during the year 2018-19***	***during the year 2019-20***
3	**Rare Earth Extraction Plant**			
1.1	Monazite	For processing & production total products in REEP	0.45	0.459
1.2	Hydrochloric acid (~30% w/w), L	For processing & production total products in REEP	0.56	0.742
1.3	Caustic lye, t	For processing & production total products in REEP	0.55	0.82
1.4	Barium chloride, Kg	For production of Rare earths chloride.	15.2	17.1
1.5	Sodium sulphide, Kg		14.5	9.4
1.6	Magnesium sulphate, Kg		17.0	16.82
1.7	Thorium oxalate, t	For production of Thorium nitrate	3.15	3.2
1.8	Soda ash, t		1.52	1.4
1.9	Hydrogen peroxide, t		0.028	0.029
1.10	Petrofin, Kg	For production of Thorium nitrate, Thorium oxalate& Ammonium di-uranate(ADU)	9.9	4.73
1.11	Nitric acid, t	For production of Thorium oxalate&ADU	3.96	4.91
1.12	Alamine, kg		4.83	0.09
1.13	Tri-n-butyl phosphate (TBP), Kg	For production of Thorium nitrate, &ADU	20.9	0.13
1.14	Ammonia, t	For production of ADU	0.41	0.23

Sl. No.	*Raw material consumption per ton of product output*			
	Nature of raw Material		***during the year 2018-19***	***during the year 2019-20***
4.	**Boiler** ***(Raw material consumption per ton of steam output)***			
4.1	Coal,t	For steam generation	0.26	0.23
4.2	Furnace oil, Kg		Nil	Nil
4.3	Sodium hydroxide, Kg	For regeneration in DM Plant	3.11	3.2
4.4	Hydrochloric acid (~30% w/w), L	For regeneration in DM Plant	2.54	2.58

Note:

a. During the year 2019-20, 5150 ton of Monazite was processed and products e.g. 5845 ton of Tri-sodium phosphate, 5048 ton of Rare Earths Chloride, 1045 ton Thorium oxalate & 6.01 ton of Nuclear Grade (NGADU) and 4.2 ton Thorium nitrate products were produced.

b. Consumption norm of the raw materials/chemicals,such as Monazite, Hydrochloric acid, Barium sulphate, caustic lye, used were slightly higher than that of the previous year. However, for chemicals such as Magnesium sulphate, Sodium sulphide, Thorium oxalate, Soda ash, Petrofin, Nitric acid, Alamine, TBP, Ammonia were marginally lower.

c. The coal fired Boiler was operated for meeting the steam requirement of REEP.

d. Number of days plant operated during the year **2019-20:**

REEP (earlier named MoPP): 356 **days**, Boiler: 355days.

PART - C

Pollution discharged to environment/unit of out put

Parameters as specified in the Consent issued

Pollutants	Quantity of pollutants, Pollutants discharged	Percentage of variation from prescribed standards with reasons
(a) Water		
MSP	1241 m^3/day	Nil*(all parameter are with in limit)
ZPP	Nil	
Boiler & DM Plant	9.6 m^3/day	
REEP(earlier named MoPP)	15.44 m^3/day	Nil#

Note:

i. The volume of waste water / treated effluents discharged are below 6400 **m^3/day** for OSCOM Plants.(as specified in consent)

ii: The volume of treated effluents discharged are below 30 **m^3/day** for Rare Earth Extraction Plant.(as specified in consent)

iii. Waste water containing slime, generated in MSP, was discharged to our Pond No.1.

iv. The effluent generated in Boiler & DMwere neutralized and discharged to Pond No.2.

v. The non-nitrate effluent (5500**m^3**), generated in REEP, were neutralized, chemically treated, filtered and reused at MSP. The cake after filtration was stored in underground RCC trenches, as approved by AERB.

vi. Nitrate bearing effluent (38**m^3**) was stored in impervious storage ponds under shed. After drying, the sodium nitrate crystals were stored in RCC trenches along with low level radioactive wastes.

vii. The qualities of effluents discharged in Pond No.1 & 2 are given Under “Effluent quality”.

EFFLUENT QUALITY(2019-2020) :

The waste water/ treated effluent quality analysis for two discharge outlets i.e. Pond No.1 & 2 was taken up by M/s Centre for Envotech & Management Consultancy Pvt. Ltd., Bhubaneswar, a NABL Accredited & MoEF &CC Authorized Laboratory.
Total 24 numbers of samples were analyzed (12 for each outlet). The range of values obtained for different parameters on half-yearly basis for are given below:
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MoEF&CC, Govt. of India, Recognised Environment Laboratory under Environment (Protection) Act, 1986.
Certificate No.: T-4144

Report no. - CEMC/IREL/WW1 **Date-16.05.2020**

EFFLUENT WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client : **M/s. Indian Rare Earths Limited, Matikhala, Chatrapur, Ganjam, Odisha**
Sampling Period : April' 2019 to March' 2020
Sampling by : Mr.S Pradhan & Mr. R Das
Sample Description : **Treated Effluent Quality (Pond-1)**
Sample Quantity : 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Permissible Norms by CPCB	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value	--	5.5 to 9.0	8.03	7.92	7.84	7.51	8.01	7.93	8.03	7.51	7.87	0.19
2	Temp#	°C	--	32.4	32.1	32.8	32.6	32.1	29.9	32.8	29.9	31.98	1.06
3	Turbidity#	NTU	--	9	11	7	12	11	10	12	7	10.00	1.79
4	Colour#	Hazen	--	7	6	5	7	6	8	8	5	6.50	1.05
5	Alkalinity#	mg/l	--	82	94	80	90	86	96	96	80	88.00	6.45
6	TDS	mg/l	--	270.6	289.3	260.7	278.5	247.8	360.3	360.3	247.8	284.5	39.78
7	TSS	mg/l	100	11.6	10.9	11.3	12.6	13.8	16.1	16.1	10.9	12.72	1.96
8	O&G	mg/l	20	<5	<5	<5	<5	<5	<5	0	0	0	0
9	BOD	mg/l	100	3.4	3.2	3.0	3.4	3.2	3.6	3.6	3	3.30	0.21
10	COD	mg/l	250	20	22	24	24	22	26	26	20	23.00	2.10
11	DO	mg/l	--	3.4	3.6	5.2	3.4	3.4	5.0	5.2	3.4	4.00	0.86
12	Chloride#	mg/l	--	26.8	28.9	27.3	27.6	25.9	35.6	35.6	25.9	28.68	3.53
13	Sulphate#	mg/l	--	9.5	10.8	9.6	10.3	9.6	13.5	13.5	9.5	10.55	1.53
14	Fluoride#	mg/l	15.0	0.11	0.12	0.12	0.11	0.11	0.14	0.14	0.11	0.12	0.01
15	TH#	mg/l	--	82	94	90	90	84	106	106	82	91.00	8.56
16	Calcium#	mg/l	--	25.25	28.05	25.65	26.45	24.85	30.46	30.46	24.85	26.79	2.13
17	Magnesium#	mg/l	--	4.62	5.83	6.32	5.83	5.34	7.29	7.29	4.62	5.87	0.90
18	Sodium #	mg/l	--	25.9	29.7	25.3	27.9	25.5	32.9	32.9	25.3	27.87	2.99
19	Potassium#	mg/l	--	9.1	10.9	7.5	9.8	9.2	10.1	10.9	7.5	9.43	1.15
20	TN#	mg/l	--	2.6	3.1	2.1	3.0	2.8	4.1	4.1	2.1	2.95	0.67
21	Diss PO_4	mg/l	--	0.31	0.38	0.26	0.34	0.31	0.36	0.38	0.26	0.33	0.04
22	Iron#	mg/l	3.0	0.31	0.36	0.34	0.33	0.30	0.41	0.41	0.3	0.34	0.04
23	Copper#	mg/l	3.0	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	NA	NA	NA	NA
24	Cadmium#	mg/l	2.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA
25	Lead#	mg/l	2.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA
26	Zinc#	mg/l	15.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA
27	TCr#	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA
28	Cr^{+6}#	mg/l	1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA
29	C_6H_5OH#	mg/l	5.0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NA	NA	NA	NA
30	RFC#	mg/l	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
31	TKN#	mg/l	100	0.98	0.99	1.06	0.98	0.94	1.92	1.92	0.94	1.15	0.38
32	Free NH_3#	mg/l	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Certificate No.: T-4144

33	Arsenic#	mg/l	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NA	NA	NA	NA
34	Mercury#	mg/l	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NA	NA	NA	NA
35	Selenium#	mg/l	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NA	NA	NA	NA
36	Nickel#	mg/l	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA
37	Cyanide#	mg/l	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA
38	Sulphides#	mg/l	5.0	0.05	0.37	0.2	0.36	0.32	0.31	0.37	0.05	0.27	0.12
39	Manganese#	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA
40	Vanadium#	mg/l	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA
41	NO_3#	mg/l	20	0.45	0.49	1.10	0.46	0.49	1.74	1.74	0.45	0.79	0.53
42	Bio-assay Test#	--	90% Survival of Fish after 96 hrs in 100% Effluent	91%	92%	91%	91%	92%	91%	92%	91%	91%	0.01
43	α- emitters*	Bq/l	3.7	BDL	0.26	0.12	0.18	0.16	0.18	0.26	0.12	0.18	0.05
44	β- emitters*	Bq/l	37	BDL	0.49	0.11	0.44	0.39	0.31	0.49	0.11	0.35	0.15

Sl. No	Parameter	Unit	Permissible Norms by CPCB	Oct	Nov	Dec	Jan	Feb	Mar	Max	Min	Avg	SD
1	pH Value	--	5.5 to 9.0	7.58	7.81	7.36	7.59	7.42	7.34	7.81	7.34	7.52	0.18
2	Temp	°C	--	29.2	28.4	26.7	26.2	27.5	28.7	29.2	26.2	27.78	1.18
3	Turbidity	NTU	--	12	14	11	9	11	7	14	7	10.67	2.42
4	Colour	Hazen	--	11	12	10	9	10	5	12	5	9.50	2.43
5	Alkalinity	mg/l	--	82	88	76	78	132	90	132	76	91.00	20.81
6	TDS	mg/l	--	261.2	284.6	228.9	233.4	571.4	258.7	571.4	228.9	306.37	131.42
7	TSS	mg/l	100	16.1	12.3	10.3	11.6	13.9	10.2	16.1	10.2	12.40	2.27
8	O&G	mg/l	20	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
9	BOD	mg/l	100	3.0	2.6	2.2	2.4	2.6	3.2	3.2	2.2	2.67	0.37
10	COD	mg/l	250	18	20	16	18	22	22	22	16	19.33	2.42
11	DO	mg/l	--	5.8	5.4	5.6	5.6	5.4	5.4	5.8	5.4	5.53	0.16
12	Chloride	mg/l	--	23.9	27.6	21.9	29.3	48.9	31.3	48.9	21.9	30.48	9.66
13	Sulphate	mg/l	--	11.4	12.8	9.4	9.9	25.6	10.9	25.6	9.4	13.33	6.13
14	Fluoride	mg/l	15.0	0.11	0.12	0.11	0.12	0.17	0.11	0.17	0.11	0.12	0.02
15	TH	mg/l	--	80	86	74	92	138	102	138	74	95.33	23.04
16	Calcium	mg/l	--	22.04	24.04	21.64	26.05	38.48	28.06	38.48	21.64	26.72	6.25
17	Magnesium	mg/l	--	6.08	6.32	4.86	6.56	10.21	7.78	10.21	4.86	6.97	1.84
18	Sodium	mg/l	--	26.4	28.7	23.4	26.1	45.8	29.3	45.8	23.4	29.95	8.04
19	Potassium	mg/l	--	8.6	9.2	7.5	7.9	23.7	10.2	23.7	7.5	11.18	6.21
20	TN#	mg/l	--	2.9	3.1	3.0	3.8	4.9	2.5	4.9	2.5	3.37	0.86
21	Diss PO_4	mg/l	--	0.22	0.25	0.21	0.23	0.48	0.29	0.48	0.21	0.28	0.10
22	Iron	mg/l	3.0	0.32	0.34	0.28	0.31	0.41	0.38	0.41	0.28	0.34	0.05
23	Copper	mg/l	3.0	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium	mg/l	2.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	2.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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MoEF&CC, Govt. of India, Recognised Environment Laboratory under Environment (Protection) Act, 1986.
Certificate No.: T-4144

26	Zinc	mg/l	15.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	TCr	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Cr^{+6}	mg/l	1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	C_6H_5OH	mg/l	5.0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
30	RFC#	mg/l	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
31	TKN#	mg/l	100	1.31	1.36	1.19	1.25	2.31	1.19	2.31	1.19	1.44	0.43
32	Free NH_3#	mg/l	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33	Arsenic	mg/l	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
34	Mercury#	mg/l	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Selenium#	mg/l	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
36	Nickel	mg/l	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Cyanide	mg/l	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
38	Sulphides#	mg/l	5.0	0.26	0.28	0.22	0.24	0.35	0.17	0.35	0.17	0.25	0.06
39	Manganese	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
40	Vanadium#	mg/l	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
41	NO_3	mg/l	20	1.51	1.53	1.37	1.44	2.13	1.38	2.13	1.37	1.56	0.29
42	Bio-assay Test#	--	90% Survival of Fish after 96 hrs in 100% Effluent	93%	93%	94%	92%	91%	92%	0.94	0.91	0.93	0.01
43	α- emitters*	Bq/l	3.7	0.18	0.13	0.15	0.08	0.07	0.09	0.18	0.07	0.12	0.04
44	β- emitters*	Bq/l	37	0.49	0.42	0.27	0.66	0.42	0.27	0.66	0.27	0.42	0.15

N.B: ND-Not Detectable, MPN-Most Probable Number,NA- Not Applicable
*Sample Tested By Health Physics Unit of BARC, OSCOM
#- Analyzed by Eko Pro Engineers, Gaziabad, Certificate No.-T-1418

Authorized Signatory **Seal of Laboratory**

Notes:

- The result given above related to the tested sample, as received. The customer asked for the above test only.
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Certificate No.: T-4144

Report no. - CEMC/IREL/WW2 **Date. 16.11.2019**

EFFLUENT WATER QUALITY MONITORING TEST REPORT

Name & Address of the Client : **M/s. Indian Rare Earths Limited, Matikhala, Chatrapur, Ganjam, Odisha**
Sampling Period : April' 2019 to March' 2020
Sampling by : Mr.S Pradhan & Mr. R Das
Sample Description : **Pond-2 (RPP Pit, Inlet)**
Sample Quantity : 2.0 Ltrs

ANALYSIS RESULT

Sl. No	Parameter	Unit	Permissible Norms by CPCB	Apr	May	June	July	Aug	Sept	Max	Min	Avg	SD
1	pH Value	--	5.5 to 9.0	8.08	7.76	7.75	7.62	7.63	7.98	8.08	7.62	7.80	0.19
2	Temp.#	°C	--	31.9	31.5	32.4	32.7	31.9	29.7	32.7	29.7	31.68	1.06
3	Turbidity#	NTU	--	8	9	9	11	16	9	16	8	10.33	2.94
4	Colour #	Hazen	--	6	5	5	6	8	6	8	5	6.00	1.10
5	Alkalinity#	mg/l	--	90	92	86	88	96	82	96	82	89.00	4.86
6	TDS	mg/l	--	278.4	280.5	273.6	270.3	281.2	230.2	281.2	230.2	269.03	19.48
7	TSS	mg/l	100	10.9	10.6	10.9	11.8	23.4	11.3	23.4	10.6	13.15	5.04
8	O&G	mg/l	20	<5	<5	<5	<5	<5	<5	NA	NA	NA	NA
9	BOD	mg/l	100	3.2	3.0	3.1	3.6	3.2	3.2	3.6	3	3.22	0.20
10	COD	mg/l	250	22	20	22	24	20	18	24	18	21.00	2.10
11	DO	mg/l	--	3.8	3.6	5.4	3.2	3.6	5.6	5.6	3.2	4.20	1.03
12	Chloride#	mg/l	--	28.1	28.6	28.6	27.3	29.9	22.9	29.9	22.9	27.57	2.44
13	Sulphate#	mg/l	--	9.9	10.1	10.2	10.0	12.6	8.4	12.6	8.4	10.20	1.35
14	Fluoride#	mg/l	15.0	0.09	0.09	0.1	0.09	0.09	0.1	0.1	0.09	0.09	0.01
15	TH#	mg/l	--	90	90	92	88	96	84	96	84	90.00	4.00
16	Calcium#	mg/l	--	26.85	26.85	25.65	25.65	28.86	24.85	28.86	24.85	26.45	1.41
17	Magnesium#	mg/l	--	5.59	5.59	6.8	5.83	5.83	5.35	6.8	5.35	5.83	0.51
18	Sodium #	mg/l	--	27.8	27.9	27.1	26.4	28.2	25.2	28.2	25.2	27.10	1.13
19	Potassium#	mg/l	--	10.2	10.3	7.9	9.1	9.4	7.3	10.3	7.3	9.03	1.22
20	TN#	mg/l	--	2.8	2.8	2.2	2.7	2.9	2.1	2.9	2.1	2.58	0.34
21	Diss PO_4	mg/l	--	0.36	0.35	0.29	0.32	0.34	0.21	0.36	0.21	0.31	0.06
22	Iron#	mg/l	3.0	0.35	0.34	0.38	0.31	0.35	0.32	0.38	0.31	0.34	0.02
23	Copper#	mg/l	3.0	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	NA	NA	NA	NA
24	Cadmium#	mg/l	2.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA
25	Lead#	mg/l	2.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA
26	Zinc#	mg/l	15.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA
27	TCr#	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA
28	Cr^{+6}#	mg/l	1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA
29	C_6H_5OH#	mg/l	5.0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NA	NA	NA	NA
30	RFC#	mg/l	1.0	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
31	TKN#	mg/l	100	0.99	0.95	1.12	0.94	0.91	1.01	1.12	0.91	0.99	0.07
32	Free NH_3#	mg/l	5.0	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
33	Arsenic#	mg/l	0.2	<0.00	<0.00	<0.00	<0.001	<0.00	<0.001	NA	NA	NA	NA

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34	Mercury#	mg/l	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NA	NA	NA	NA
35	Selenium#	mg/l	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NA	NA	NA	NA
36	Nickel#	mg/l	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA
37	Cyanide#	mg/l	0.02	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA
38	Sulphides#	mg/l	5.0	0.34	0.32	0.21	0.32	0.36	0.19	0.36	0.19	0.29	0.07
39	Manganese#	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	NA	NA
40	Vanadium#	mg/l	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NA	NA	NA	NA
41	NO_3#	mg/l	20	0.48	0.47	1.22	0.45	0.41	1.03	1.22	0.41	0.68	0.35
42	Bio-assay Test#	--	90% Survival of Fish after 96 hrs in 100% Effluent	93%	94%	91%	92%	93%	94%	94%	91%	93%	0.01
43	α- emitters*	Bq/l	3.7	0.12	0.13	0.80	0.10	0.20	0.14	0.8	0.1	0.25	0.27
44	β- emitters*	Bq/l	37	BDL	0.32	0.34	0.52	0.41	0.46	0.52	0.32	0.41	0.08

Sl. No	Parameter	Unit	Permissible Norms by CPCB	Oct	Nov	Dec	Jan	Feb	Mar	Max	Min	Avg	SD
1	pH Value	--	5.5 to 9.0	7.53	7.76	7.58	7.41	7.57	7.56	7.76	7.41	7.57	0.11
2	Temp	°C	--	29.1	28.3	26.9	26.3	27.2	28.6	29.1	26.3	27.73	1.09
3	Turbidity	NTU	--	11	12	10	8	12	6	12	6	9.83	2.40
4	Colour	Hazen	--	14	11	9	7	10	5	14	5	9.33	3.14
5	Alkalinity	mg/l	--	74	82	70	70	124	94	124	70	85.67	20.88
6	TDS	mg/l	--	215.8	242.4	215.5	229.6	498.3	262.4	498.3	215.5	277.33	109.69
7	TSS	mg/l	100	17.5	14.1	11.3	11.1	13.2	14.3	17.5	11.1	13.58	2.35
8	O&G	mg/l	20	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
9	BOD	mg/l	100	2.8	2.4	2.0	2.2	2.6	3.0	3	2	2.50	0.37
10	COD	mg/l	250	14	16	12	16	20	24	24	12	17.00	4.34
11	DO	mg/l	--	5.8	5.6	5.8	5.6	5.2	5.2	5.8	5.2	5.53	0.27
12	Chloride	mg/l	--	17.3	21.3	18.1	29.1	40.3	32.6	40.3	17.3	26.45	9.13
13	Sulphate	mg/l	--	6.9	8.5	7.2	9.1	21.2	11.2	21.2	6.9	10.68	5.38
14	Fluoride	mg/l	15.0	0.09	0.11	0.1	0.11	0.14	0.12	0.14	0.09	0.11	0.02
15	TH	mg/l	--	72	78	66	90	126	110	126	66	90.33	23.41
16	Calcium	mg/l	--	20.04	22.45	20.04	25.25	36.07	30.06	36.07	20.04	25.65	6.35
17	Magnesium	mg/l	--	5.35	5.35	3.9	6.56	8.75	8.51	8.75	3.9	6.40	1.92
18	Sodium	mg/l	--	23.1	26.2	21.3	25.7	38.2	30.2	38.2	21.3	27.45	6.07
19	Potassium	mg/l	--	6.8	7.7	6.2	7.3	17.5	10.6	17.5	6.2	9.35	4.27
20	TN#	mg/l	--	2.0	2.4	2.7	3.4	4.1	2.8	4.1	2	2.90	0.75
21	Diss PO_4	mg/l	--	0.19	0.21	0.18	0.21	0.31	0.32	0.32	0.18	0.24	0.06
22	Iron	mg/l	3.0	0.28	0.29	0.25	0.29	0.33	0.41	0.41	0.25	0.31	0.06

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23	Copper	mg/l	3.0	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Cadmium	mg/l	2.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Lead	mg/l	2.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
26	Zinc	mg/l	15.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	TCr	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Cr^{+6}	mg/l	1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
29	C_6H_5OH	mg/l	5.0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
30	RFC#	mg/l	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
31	TKN#	mg/l	100	1.02	1.12	1.08	1.19	2.04	1.21	2.04	1.02	1.28	0.38
32	Free NH_3#	mg/l	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
33	Arsenic	mg/l	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
34	Mercury#	mg/l	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
35	Selenium#	mg/l	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
36	Nickel	mg/l	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
37	Cyanide	mg/l	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
38	Sulphides#	mg/l	5.0	0.15	0.16	0.14	0.21	0.29	0.19	0.29	0.14	0.19	0.06
39	Manganese	mg/l	2.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
40	Vanadium#	mg/l	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
41	NO_3	mg/l	20	1.01	1.09	1.02	1.38	1.84	1.41	1.84	1.01	1.29	0.32
42	Bio-assay Test#	--	90% Survival of Fish after 96 hrs in 100% Effluent	93%	93%	94%	93%	91%	92%	0.94	0.91	0.93	0.01
43	α- emitters*	Bq/l	3.7	0.11	0.10	0.16	0.06	0.09	0.25	0.25	0.06	0.13	0.07
44	β- emitters*	Bq/l	37	0.69	0.40	BDL	0.21	0.54	0.28	0.69	0.21	0.42	0.19

N.B: ND-Not Detectable, MPN-Most Probable Number, NA- Not Applicable
*Sample Tested By Health Physics Unit of BARC, OSCOM
#- Analyzed by Eko Pro Engineers, Gaziabad, Certificate No.-T-1418

Authorized Signatory **Seal of Laboratory**

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(b) Air:

The emission monitoring for the stacks attached to the dryers, shaft dryers of MSP, REEP&Boiler was taken up by M/s Centre for Envotech& Management Consultancy Pvt. Ltd., Bhubaneswar, a NABL Accredited & MoEF &CC Authorized Laboratory.

The range of values obtained for different parameters on half-yearly basis for are given below.

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Report no. - CEMC/IREL/St1 **Issued Date-16.05.2020**

STACK EMISSION MONITORING TEST REPORT

Issued to	**M/s. Indian Rare Earths Limited, Matikhala, Chatrapur, Ganjam, Odisha**
Work Order No.	**R-07/O/01560/07-S.C.-1208, Dated-11.03.2017**
Locations	**ST-1 Boiler, ST-2- Main Dryer, ST-3- Shaft Dryer-Ilemenite, ST-4- Shaft Dryer- Rutile, ST-5- Sillimanite Dryer, ST-6-Monazite Upgradation Section, ST-7-Zircon Dryer, ST-8-MoPP Processing Plant-Stack-1, ST- MoPP Processing Plant-Stack-2**
Nature of Sampling	**Source Emission**
Sampling By	**Mr.S Pradhan and Mr. R. Das**
Instrument Used	**Stack monitoring kit, Flue Gas Analyzer**
Sampling Period	**April' 2019 to March' 2020**
Parameter	**Particulate Matter**

FREQUENCY		LOCATIONS								
Month	Week	ST-1	ST-2	ST-3	ST-4	ST-5	ST-6	ST-7	ST-8	ST-9
April	1st	123.6	49.4	50.5	50.2	51.3	50.9	49.8	6.1	5.9
	3rd	122.8	50.3	49.8	49.6	50.2	50.4	50.7	6.5	5.8
May	1st	121.5	49.4	50.2	49.2	50.5	50.2	49.3	6.1	6.2
	3rd	126.3	50.3	49.8	49.6	50.2	50.4	50.7	5.3	5.7
June	1st	119.6	49.4	50.1	49.2	50.7	49.8	49.3	6.1	5.6
	3rd	118.4	51.3	50.6	48.7	51.2	48.9	50.2	5.9	6.1
July	1st	103.7	48.5	50.1	49.4	51.2	49.8	48.9	5.9	5.7
	3rd	99.8	48.5	50.3	51.2	49.6	50.6	49.1	5.5	5.6
August	1st	118.5	50.2	49.6	48.9	50.7	51.1	47.9	6.1	5.8
	3rd	110.9	51.6	50.2	44.8	51.6	50.3	42.6	6.2	5.8
September	1st	103.7	51.4	50.8	49.5	49.9	50.4	50.3	6.1	5.7
	3rd	112.7	49.4	50.3	48.6	49.8	50.2	49.5	5.9	5.7
MAXIMUM		126.3	51.6	50.8	51.2	51.6	51.1	50.7	6.5	6.2
MINIMUM		99.8	48.5	49.6	44.8	49.6	48.9	42.6	5.3	5.6
AVERAGE		115.13	49.98	50.19	49.08	50.58	50.25	49.03	5.98	5.80
STD DEVIATION		8.83	1.06	0.35	1.52	0.65	0.57	2.18	0.32	0.19

FREQUENCY		LOCATIONS								
Month	Week	ST-1	ST-2	ST-3	ST-4	ST-5	ST-6	ST-7	ST-8	ST-9
October	1st	109.4	49.7	48.9	50.1	50.3	49.5	48.6	5.9	6.0
	3rd	116.5	51.3	49.6	49.2	48.7	50.1	49.4	6.2	5.9
November	1st	109.4	49.7	48.9	50.1	50.3	49.5	48.6	5.9	6.0
	3rd	116.5	51.3	49.6	49.2	48.7	50.1	49.4	6.2	5.9
December	1st	123.5	51.3	50.1	49.4	48.7	48.9	50.2	6.7	6.4
	3rd	116.5	51.3	49.6	49.2	48.7	50.1	49.4	6.2	5.9
January	1st	109.7	49.8	51.3	50.6	50.2	49.5	48.9	6.2	6.0

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	3rd	102.9	51.4	49.6	51.1	49.5	50.8	51.2	5.9	5.8
February	1st	118.4	50.6	49.2	48.3	51.7	50.1	49.8	5.9	6.2
	3rd	112.6	49.7	50.3	48.5	50.1	49.6	50.6	6.3	6.1
March	1st	115.2	48.7	49.3	48.9	50.2	49.6	49.8	6.5	6.6
	3rd	101.8	50.3	48.6	49.2	50.1	49.2	50.4	6.3	6.1
MAXIMUM		123.5	51.4	51.3	51.1	51.7	50.8	51.2	6.7	6.6
MINIMUM		101.8	48.7	48.6	48.3	48.7	48.9	48.6	5.9	5.8
AVERAGE		112.70	50.43	49.58	49.48	49.77	49.75	49.69	6.18	6.08
STD DEVIATION		6.36	0.90	0.73	0.83	0.93	0.51	0.81	0.26	0.23

OSPCB Permissible Limits- 150 mg/Nm^3

Authorized Signatory **Seal of Laboratory**

Notes:

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Note: During the period, number of measurements carried out was 144 for MSP, 48 for REEP& 24 for Boiler. The mean value of PM in all stacks & acid mist for REEP stack were lower than the stipulated limits i.e.150 mg/m^{3}for (for all stacks except REEP) & 50 mg/m^3 for REEP stack.

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Report no. - CEMC/IREL/St2 **Issued Date-16.05.2020**

STACK EMISSION MONITORING TEST REPORT

Issued to	**M/s. Indian Rare Earths Limited, Matikhala, Chatrapur, Ganjam, Odisha**
Work Order No.	**R-07/O/01560/07-S.C.-1208, Dated-11.03.2017**
Locations	**ST-8-MoPP Processing Plant-Stack-1, ST- MoPP Processing Plant-Stack-2**
Nature of Sampling	**Source Emission**
Sampling By	**Mr.S Pradhan and Mr. R. Das**
Instrument Used	**Stack monitoring kit, Flue Gas Analyzer**
Sampling Period	**April' 2019 to March' 2020**
Parameter	**Acid Mist**

FREQUENCY		LOCATIONS	
Month	**Week**	**ST-8**	**ST-9**
April	**1st**	5.7	5.5
	3rd	5.2	5.1
May	**1st**	5.7	5.2
	3rd	5.2	5.5
June	**1st**	5.3	5.2
	3rd	5.6	5.3
July	**1st**	5.8	5.5
	3rd	5.4	5.4
August	**1st**	5.3	5.5
	3rd	5.9	5.6
September	**1st**	5.4	5.2
	3rd	5.6	5.5
MAXIMUM		5.9	5.6
MINIMUM		5.2	5.1
AVERAGE		5.51	5.38
STD DEVIATION		0.24	0.17

FREQUENCY		LOCATIONS	
Month	**Week**	**ST-8**	**ST-9**
October	**1st**	5.6	5.7
	3rd	5.9	5.8
November	**1st**	5.6	5.7
	3rd	5.9	5.8
December	**1st**	5.9	6.1
	3rd	5.9	5.8
January	**1st**	5.7	5.8
	3rd	5.9	5.8

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Certificate No.: T-4144

February	**1st**	5.9	6.1
	3rd	6.1	6.2
March	**1st**	6.1	6.2
	3rd	6.0	5.9
MAXIMUM		6.1	6.2
MINIMUM		5.6	5.7
AVERAGE		5.88	5.91
STD DEVIATION		0.17	0.19

OSPCB Permissible Limits- 50 mg/Nm^3

Authorized Signatory **Seal of Laboratory**

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PART - D

HAZARDOUS WASTES

[As specified under Hazardous wastes/
Management and Handling Rules, 1989&
Amendment thereof]

Authorization No.Ind/IV/HW-13527 dated 17th Dec 2019.

Hazardous Wastes		Total Quantity	
		during the year 2018-19	during the year 2019-20
(a) From Process :			
i.	Used oil, KL	1.140	1.2 KL
ii.	Waste containing oil	Nil	1.0 Tonne
ii.	Oily Sludge	**Nil**	**Nil**
iii.	Spent resin	**Nil**	**Nil**

(b).Used batteries, No.	38	44 *
©**From effluent treatment**	Covered under radioactive wastes	
(d)Non-ferrous scrap(burnt Cu wire), Kg	Nil	NIL

*: 44 numbers were disposed under buy-back.

PART - E

SOLID WASTES

Solid wastes		Total Quantity	
		during the year 2018-19	during the year 2019-20
(a) From Process :			
i.	Reject Sand from mining, t	26,59,676	32,18,912
ii.	Reject sand from MSP (including HUS),t	1,10,594	1,04,736
iii.	Boiler ash, t	7300	10905
iv.	Rare Earth Extraction Plant,		
	Lead-Barium(Pb-Ba) cake(radioactive), t	641.12	724
	Iron-Carbonate cake(radioactive),t	223.34	371
	Insoluble muck (radioactive),t	666.80	667
	ETP Cake(radioactive),t	50.40	301
	Deactivated sludge(radioactive),t	NIL	NIL
(b) From pollution control facilities :			
i.	Neutralization sludge, m^3	Nil	NIL
(c) Quantity recycled or reutilized within the unit		Nil	NIL
(d) Sold		Nil	NIL
(e) Disposal		Details as given in page 23.	

Note: HUS: Heavies Upgradation Section

PART – F

Please specify the characterizations (in terms of composition and quantum) of Hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes.

I. Characteristics of Hazardous Wastes & disposal practices :

a. Used oil:
The oil generated from vehicles/transformers/lubrication is stored (in Stores go-down).

b. Used batteries:
The used batteries, generated from vehicles & UPS systems, are stored under shed on impervious floor (in Stores go-down). 44 numbers of used batteries were disposed under buy-back policy to the manufacturer/authorized dealers during 2019-20.

II. Characteristics of solid wastes:

(i) Reject Sands: Average composition of tailings (process rejects), %

The tailings generated from mining and MSP operations had the following average composition during the year:

Constituents	Mining	MSP (HUS tails)
Ilmenite %	0.28	2.06
Garnet %	1.53	24.44
Monazite %	0.00	0.04
Rutile %	0.03	0.37
Zircon %	0.02	0.27
Sillimanite %	1.13	15.49
Quartz %	96.87	56.40
Others %	0.13	0.94

(HUS: Heavies Up gradation Section)

(iii) Solid Waste from Rare Extraction Plant (REEP):

The composition of the waste generated during the year had the following average composition:-

Rare Earth Extraction Plant,	Moisture%	ThO_2%	REO %	U_3O_8%
Lead-Barium(Pb-Ba) cake	32.23	10.8	13.5	0.12
Iron-Carbonate cake	73.38	1.37	1.77	0.19
Insoluble muck	32.88	3.53	5.52	0.06
ETP Cake	34.70	1.9	13.5	0.2

`*' : BDL : Below detection level is less than 0.0001%.

(ii) Boiler Ash: Average composition, %

Constituent calculated as oxides	% by weight(as such basis)		
	Collected on 18.7.2019	Collected on 15.11.19	Collected on 11.02.2020
SiO_2	53.9	54.1	53.2
Al_2O_3	19.6	20.3	20.7
Fe_2O_3	7.9	6.7	7.2
Moisture	2.3	1.95	2.1
LOI	2.5	2.2	2.3
CaO	10.8	10.9	11.1
MgO	2.49	2.41	2.23
MnO	<0.001	<0.001	<0.001
V_2O_5	<0.001	<0.001	<0.001
Cr_2O_3	<0.001	<0.001	<0.001

Disposal practices :

i. Tailings from mining operation were used for back filling of mined out areas.
ii. MSP tailings are stockpiled in mined out area for future use.
iii. Boiler ash was shifted to ash storage pond in mined out area.
iv. All the radioactive wastes generated in REEP, are handled & stored in RCC trenches as per the Atomic Energy Regulatory Board (AERB) Authorization No. AERB/OPSD/IREL-O/61011/2020/398 dated 28.5.2020 and the return submitted to AERB as per Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987 and amendments thereon.

PART - G

Impact of the pollution control abatement measures taken on conservation of natural resources and on the cost of production.

- Pollution control equipments like cyclones, bag filters, scrubbers etc. have been provided in different plants for reducing atmospheric emissions.

- Stack heights are maintained as per OSPCB norms. Roof extractors and exhaust fans are provided to keep the work-zone air quality clean.

- No untreated effluent was released into the environment.

- Cost of pollution control has already been included in the project cost.

- The wastes generated at Rare Earth Extraction Plant, both solid & liquid wastes, are handled, disposed as per the requirement of Atomic Energy Regulatory Board(AERB) and the returns are submitted to AERB as per (Safe Disposal of Radioactive Wastes) Rules,1987 and amendments thereon.

- Radioactive solid wastes from REEP are presently stored in underground RCC trenches.

- The sodium nitrate solution, generated in Rare Extraction Plant (REEP), was stored in sodium nitrate storage pond (lined). Time to time, the solution was pumped to solar evaporation ponds(lined) to reduce the volume (due to evaporation) and to increase the sodium nitrate content in the solution. After drying, the Sodium Nitrate salts were stored in RCC Trenches along with radioactive solid wastes.

- The ambient air monitoring were carried out in five permanent locations around OSCOM at a frequency of 3 times in a month during 2019-20 and the monitoring results have indicated that the air quality even in close proximity of the plant areas are well within the stipulated levels for PM_{10}, SO_2, NO_x& CO.

- Monitoring of surface /ground waters around the plant has also shown that the various constituents are within the limits.

- During the year, 24.88 ha area was mined. Trees number 56000 (Casuarina Cashew, date palm, coconut saplings) were planted in mined out area (details are mentioned in page number 27).

- Efforts have been underway to conserve water. Artificial recharge structures have already been constructed as approved by Central Ground Water Board, Bhubaneswar for effective rainwater harvesting in Plant premises as well as in IREL Housing Colony area.

PART - H

Additional measures/investment proposed for environmental protection including abatement of pollution, prevention of pollution.

- The expenditures incurred for environmental & pollution control measures were Rs.279.84 lakhs both for OSCOM & Rare Earth Extraction Plant (REEP)respectively which includes effluent treatment, solid waste disposal, stack emission, ventilation systems, green belt development, floor tiling at MoPP for radiation control, health checkup (occupational & nearby village population), payment of Water Cess/Consent fees to Odisha State Pollution Control Board, Corporate Social Responsibility(CSR) activities and other miscellaneous expenditures for environmental protection.

- Budget allocation of Rs 30 Lakh has already been made for planting about 50,000 numbers of trees during the year 2019-20.

PART – I

Any other particulars for improving the quality of the environment.

- Environment Management Cell is existing and functioning. In addition, quarterly Environment Management Review meetings are being conducted to review and monitored the implementation of the recommendations made by various Regulatory Agencies and the progress of requirements as per ISO 14001:2015.

- Technical Services Department of OSCOM and Health Physics Unit of Bhaba Atomic Research Center (B.A.R.C) oversee the pollution control activities and carry out necessary monitoring of the waste arising as well as other environmental aspects. Proper evaluation of the monitoring data, early identifications of trends and appropriate remedial activities are being carried out to ensure environmental protection.

AFFORESTATION AND GREEN BELT DEVELOPMENT IN OSCOM

YEAR	Area mined (Ha)	Area planted in, (Ha)			No. of trees Planted		
		Mined out area	Others (Plant & colony)	Total	Mined out area	Others (Plant & colony)	Total
1987-88	4.0	7.0	--	7.0	14,000	--	14,000
1988-89	5.0	10.0	--	10.0	20,000	--	20,000
1989-90	8.0	7.5	--	7.5	15,000	--	15,000
1990-91	6.0	3.0	--	3.0	6,000	--	6,000
1991-92	12.0	8.5	--	8.5	16,500	--	16,500
1992-93	8.0	14.5	--	14.5	29,000	--	29,000
1993-94	6.67	9.88	--	9.88	25,000	--	25,000
1994-95	12.92	8.23	3.0	11.23	40,000	8,500	48,500
1995-96	16.94	8.5	--	8.5	42,000	--	42,000
1996-97	11.7	8.5	2.0	10.5	40,000	6,000	46,000
1997-98	15.5	8.5	3.0	11.5	40,000	5,000	45,000
1998-99	14.16	9.0	4.4	13.4	45,000	5,000	50,000
1999-2000	12.42	5.0	--	5.0	50,900	--	50,900
2000-2001	20.94	7.5	1.5	9.0	74,800	3,575	78,375
2001-2002	13.12	10.23	--	10.23	80,000	1,959	81,959
2002-2003	14.51	16.8	--	16.8	75,300	--	75,300
2003-2004	17.25	18.5	Avenue plantation	18.5	82,000	400	82,400
2004-2005	26.76	18.0	Avenue plantation	18.0	80,000	500	80,500
2005-2006	21.02	17.0	0.24	17.24	75,600	5,500	81,100
2006-2007	25.2	21.47	0.13	21.6	95,553	5,500	1,01,053
2007-2008	22.11	22.68	--	22.68	1,00,583	229	1,00,812
2008-2009	24.62	16.95	Avenue plantation	16.95	75,130	5,400	80,530
2009-2010	28.45	24.89	--	24.89	1,10,623	--	1,10,623
2010-2011	28.73	13.79	--	13.79	59,482	--	59,482
2011-2012	25.03	18.61	--	18.61	84,523	--	84,523
2012-2013	26.55	16.0	0.5	16.5	60,674	640	61,314
2013-2014	24.86	10	--	10	62,870	--	62,870
2014-2015	35.42	20	0.12	20.12	54,500	300	54,800
2015-2016	32.78	22	0.5	22.5	54,000	500	54,500
2016-2017	29.44	32	0.2	32.2	80,000	200	80,200
2017-2018	33.32	16	0.2	16.2	40600	200	40800
2018-2019	63.50	22.0	0.1	22.1	54900	200	55100
2019-2020	24.28	23	0.6	24.88	56000	600	56600

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